

School of Dentistry 2019 Research Report



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i. Forewords

From the Head of School and Director of Research

It is a pleasure to present the 2020 University of Queensland School of Dentistry research report. The school has a long standing history of producing high quality oral health research, with the aim of contributing to the advancement of evidence based knowledge both locally and internationally. We have a strong focus on translational research, emphasizing the importance of research impact on patient outcomes, as well as healthcare policy and practice. The School has demonstrated a strong track record of quality research, achieving the highest level of 5 ('well-above world standard') in the current Excellence in Research for Australia (ERA) rankings. This is a testament to the exceptional quality research being undertaken at the school.

In 2019, the school continued with its strong research performance, maintaining a high level of quantity and quality of research outputs. Research within the school focusses on several themes, spanning fields from biomaterial science and tissue engineering through to technologies applied in clinical practice, dental public health and dental education. In 2019, there were four principal research streams established at the school:

Advanced Materials and Technologies: *This group works across the interface between oral microbiology, cariology, dental materials science and advanced technologies to explore key topics of importance with an emphasis on the transition of research into clinical practice.*

Regenerative Dentistry: *This group conducts a wide range of translational research in tissue engineering, stem cells and molecular biology aiming to replace, engineer or regenerate damaged tissues or organs, restoring normal functionality*

Dental Public Health: *The Dental Public Health research stream broadly conducts research to understand the epidemiology of health and oral ill-health; and improve and enhance the oral health of communities at a population level.*

Tissue Engineering and Additive Manufacturing: *This group focusses on bioengineering solutions to regenerating and reconstructing oral and maxillofacial tissues, exploring novel advances in biomaterial science and innovations in biomanufacturing.*

Our staff and students are continually striving to achieve research excellence. This report reflects the depth and breadth of research being undertaken at the school. These achievements have helped to provide effective solutions to contemporary challenges in dentistry and position the School as a global leader in dental and oral health research.



Professor Pauline Ford
Head of School, Dentistry



Professor Saso Ivanovski
Director of Research

1. Core Research Groups

Advanced Materials and Technologies (Lead - Professor Laurie Walsh)

The Advanced Materials and Technologies group works across the interface between oral microbiology, cariology, dental materials science and advanced technologies to explore key topics of importance with an emphasis on the transition of research into clinical practice.

Key collaborators within UQ include Mark Blaskovich and Zyta Ziora (IMB) and Ross Barnard (SCMB). External collaborators in 2019 included Helen Boocock and Margaret Pukallus (Metro South), Roy George (Griffith University), Paul Abbott and Donna Geddes (UWA), Ola Al Batanyeh (JUST Jordan), Maryam Kuzekanani (Kerman University Iran), Hans Laroo and Basil Athanassiadis.

Members for this group in 2019 included the following:

UQ academics: George Bogen, Ambereen Khan, Bilal El Masoud, Alex Moule, Kim Seow, Sowmya Shetty, Laurie Walsh, Sobia Zafar, Alyssa Zhang

UQ academic title holders: Bill Kahler, Peter Osborne, Ove Peters, Carol Tran, Alex Forrest

Postdocs: Shaneen Leishman, Kathryn Elsworthy, Helen He, Fardad Shakibaie

Research assistant: Janet Palmer

PhD students: Baboucarr Lowe, Sepanta Hosseinpour, Yvonne Lai, Ashwin Nanda, Nebu Philip, Trish Wright

MPhil students: Leigh Harrison-Barry, Tom Hogerhyde, Mark Westaway, Philip Chien

DClinDent students: David Fu, Yu-Yao Teoh, Kiran Kuman, Kavita Rana, Andy Tsai, Shenna Ho, Janice Chuang.

MBiotech students: Xing Wan, Lingzhao Gong

BDS students: Monica Farrelly, Tracy Tang, Joyce Wong, Yu Chieh Chou, Eun Jae Lee, Yao Sheng Ng, Benjamin Sheng Li Seow, Eleanor Churchill, Barbara Lee, Tiffany Ji-Yun Chang, Nur Sakinah Kamarul Zaki.

Examples of Major Projects in 2019:

Novel antimicrobial agents (including phytochemicals, silver nanoparticles, and calcium hydroxide nanoparticles): Nebu Philip, Helen He, Zyta Ziora, Hans Laroo, Carol Tran, Laurie Walsh.

Endodontic technologies and materials (including medicament pastes, endodontic cements and irrigants): Trish Wright, Bill Kahler, Ove Peters, Alex Moule, Kiran Kumar, George Bogen, Maryam Kuzekanani, Paul Abbott, Basil Athanassiadis, Laurie Walsh

Restorative and prosthodontic dental materials: Kavita Rana, Ambereen Khan, Bilal El Masoud, Sowmya Shetty, Laurie Walsh

Caries prevention in children (including clinical trials of novel caries preventive strategies, and combinations of fluorides and CPP-ACP): Kathryn Elsworthy, Shaneen Leishman, Jan Palmer, Leigh Harrison-Barry, Kim Seow, Margaret Pukallus, Helen Boocock, Laurie Walsh

Fluorescence diagnostics (including assessment of microbial proteins in biofilms and in dental hard tissues): Fardad Shakibaie, Yu-Yao Teoh, Ola Al Batanyeh, Laurie Walsh

Advanced Imaging technologies and lasers (including radiographic imaging, 3D imaging, and optically controlled laser debridement): Andy Tsai, Alex Forrest, Roy George, Sobia Zafar, Alyssa Zhang, Laurie Walsh

Effect of clinician experience and image inversion on contrast thresholds for caries detection using digital bitewing radiographs: Monica Farrelly, Tracy Tang, Joyce Wong, Laurie Walsh

Factors Influencing Bacterial Levels in Dental Unit Waterlines at South-East Queensland Dental Clinics: Yu Chieh Chou, Eun Jae Lee, Yao Sheng Ng, Laurie Walsh

Investigating the latest enzymatic pre-sterilisation adjuncts and nanotechnology in removing dentine bioburden from rotary endodontic files: Benjamin Sheng Li Seow, Eleanor Churchill, Laurie Walsh

Nanoparticle-assisted smear layer removal: An explorative study: Barbara Lee, Tiffany Ji-Yun Chang, Nur Sakinah Kamarul Zaki, Laurie Walsh

Tissue Engineering and Additive Manufacturing (Lead - Professor Saso Ivanovski)

The Ivanovski Tissue Engineering and Additive Manufacturing (iTEAM) research stream works at the forefront of innovation in regenerative medicine, restoring native oro-dental tissue form and function through the application of novel materials and manufacturing technologies to tissue engineering.

Focus areas of this stream include the regeneration of periodontal tissues, the enhancement of horizontal and vertical bone augmentation in the oral region, the functionalisation of metallic dental implants, the application of immunomodulation to encourage healing, and the modulation of bacterial response through material modifications. Within these research areas, functional approaches typically involve the development of novel biomaterials and tissue engineering scaffold strategies, preclinical testing, the advancement of additive manufacturing technologies, and the targeting of clinical translation.

Research leaders within this stream are active collaborators in both a clinical and research setting, with ongoing projects with internal (UQ CCR, UQ FoM, TRI, QBI, AIBN), external (QUT IHBI, QUT CARF, Griffith MHIQ), and international universities (Paris University (Diderot), University of Minho, Mayo Clinic, Chinese Academy of Sciences, Technical University of Munich) along with prominent industry partners (Geistlich Pharma/Biomaterials, Straumann Group).

Members for this group in 2019 included the following:

UQ academics: Saso Ivanovski, Ryan Lee, Amro Farag

Postdoctoral researchers: Kanika Jain, Karan Gulati, Michal Bartnikowski, Abdalla Ali, Pingping Han, Cedryck Vaquette

PhD students: Tulio Fernandez, Srinivas Sulugodu Ramachandra, Nimal Thattaruparambil Raveendran, Amelia Carr, Miriam Lee, Reuben Staples, Tianqi Guo, Vignesh Selvaprithiviraj

Visiting PhD students: Fanny Blaudez (Griffith), Greeshma Ratheesh (QUT), Alexandra Mutch (UQ - School of Chemistry)

Research Trainee: Divya Chopra

MPhil student: Joshua Mitchell

Masters students: Anna Garbuzov, Nicholas Bao Han Hang, Yixiao Zhou, My Tran Hoai

DClinDent students: Akila Vithanage, Sarah Benton

Additive Biomanufacturing and Clinical Translation

In this research theme, the additive biomanufacturing technologies of 3-dimensional (3D) printing and melt electrospinning writing (MEW) are explored with an aim to engineer highly innovative structures for tissue regeneration. Prominently, this theme targets the utilisation of additive manufacturing technologies for the development of multiphasic constructs for various applications in regenerative dentistry (periodontal and vertical bone regeneration etc.), with aims to reach clinical translation of these products in the near future.

Involved researchers: Dr Cedryck Vaquette, Dr Michal Bartnikowski, Dr Abdalla Ali, Mr Nimal Thattaruparambil Raveendran, Mr Vignesh Selvaprithiviraj, Ms Amelia Carr, Mr Reuben Staples, Ms Fanny Blaudez

Several projects are listed below:

- **Decellularised tissue engineered construct for periodontal regeneration in a porcine model:** Cedryck Vaquette, Saso Ivanovski, Ryan Lee, Tulio Fernandez, Fanny Blaudez
- **A multiphasic hierarchical 3D bioprinted hydrogel scaffold for periodontal regeneration:** Nimal Thattaruparambil Raveendran, Cedryck Vaquette, Michal Bartnikowski, Saso Ivanovski
- **The controlled manufacturing of fibre guiding scaffold for promoting functional periodontal ligament attachment:** Reuben Staples, Cedryck Vaquette, Saso Ivanovski
- **Development of a 3D-printed bone-ligament-bone construct for scapholunate interosseous ligament reconstruction:** Hayman Lui, Cedryck Vaquette, Saso Ivanovski.
- **Development and Characterisation of a Novel Bioink Using Autogenous Bone Source:** Greeshma Ratheesh, Cedryck Vaquette, Yi Xiao (QUT)

Functional Biomaterials

The focus of this research theme is innovation in biomaterials science, producing bioactive biomaterials that are able to provide functional cues to the local environment. This involves work such as surface modification or functionalisation of materials, blending of polymer or ceramic composites, and novel polymerisations.

Involved researchers: Dr Abdalla Ali, Dr Cedryck Vaquette, Dr Michal Bartnikowski, Mr Nimal Thattaruparambil Raveendran, Mr Vignesh Selvaprithviraj, Dr Tulio Fernandez, Ms Fanny Blaudez

- **Application of a commercially available xenograft and platelet concentrate as loading agent for local delivery of Azithromycin in the treatment of Peri-implantitis:** Miriam Lee, Saso Ivanovski, Cedryck Vaquette
- **Harnessing the native extracellular matrix for periodontal regeneration:** Fanny Blaudez, Stephen Hamlet (Griffith), Himanshu Arora (Griffith), Saso Ivanovski, Cedryck Vaquette
- **Chitosan/graphene porous scaffold for bone regeneration:** My Tran, Reuben Staples, Cedryck Vaquette, Natalia Alves (Uni Minho, Portugal)
- **Injectable swelling hydrogels for soft tissue augmentation:** Vignesh Selvaprithviraj, Cedryck Vaquette, Saso Ivanovski, Michal Bartnikowski

Nano-Engineered Implants

Aimed at achieving early stability and long-term success of metal-based dental implants, electrochemically anodized surfaces with various nanotopographies are fabricated on implants to enable enhanced bioactivity and local drug elution. This research theme focusses on achieving maximum therapeutic potential from the surface of implants which can cater to immunomodulation, soft- and hard-tissue integration and prevent bacterial infection.

Involved researchers: Dr Karan Gulati, Dr Pingping Han, Dr Guo Tianqi, Anjana Jayasree

Research Projects:

- **Nano-engineered titanium dental abutments towards guidance of gingival fibroblasts:** Karan Gulati, Pingping Han, Benjamin Fournier (Paris Diderot University, France), Saso Ivanovski
- **Application of quality by design (QBD) towards optimized fabrication of titania nanotubes modified implants for industry translation:** Daniel Martinez-Marquez (Griffith University), Karan Gulati, Rodney A. Stewart (Griffith University), Saso Ivanovski
- **Transmucosal tissue integration from the surface of nano-engineered titanium dental abutments:** Guo Tianqi, Pingping Han, Benjamin Fournier (Paris Diderot University, France), Saso Ivanovski
- **Fabrication optimization of controlled nanotopographies on dental implants with preserved micro-roughness:** Karan Gulati, Saso Ivanovski

Diagnostics in Periodontal Management

The theme aims to implement the current diagnostic protocol, by investigating the molecular drivers (e.g. protein, epigenetics, proteome and lipidome) abundant in biofluids, as a novel molecular biomarker for periodontal management. This work involves clinical periodontology, molecular biology, extracellular vesicles biology, epigenetics and meta-omics analysis.

Involved researchers: Dr Pingping Han, Dr Akila Vithanage, Dr Ryan Lee, Professor Saso Ivanovski

Dental Public Health (Lead – Associate Professor Ratilal Laloo)

The Dental Public Health (DPH) research stream broadly conducts research to understand the epidemiology of health and oral ill-health; and improve and enhance the oral health of communities at a population level. The DPH stream has a specific focus on understanding and improving the oral health and quality of life of vulnerable populations including Aboriginal and Torres Strait Islander People, people suffering general health morbidities such as Multiple Sclerosis, mental health illnesses and people who are homeless. The stream is also keenly interested in investigating best clinical practice to ensure populations receive evidence-based care.

Members of the stream has significant networks and collaborations across UQ (for example various schools across the Faculty of Health and Behavioural Sciences, Faculty of Medicine and the Centre for the Business and Economics of Health) as well as with Australian and international universities. The stream is a collaborator on the Global Burden of Disease. The stream is well-established with a critical mass of both academic staff and Higher Degree Research students.

Members for this group in 2019 included the following:

Associate Professor Ratilal Laloo – Discipline Lead and Director (Research Training)
Professor Pauline Ford – Head of School
Dr Matthew Nangle – Senior Lecturer
Christopher Sexton – Associate Lecturer
Dr Jessica Zachar – Associate Lecturer
Dr Archana Pradhan – Adjunct/Honorary Senior Lecturer
Dr Kelly McGowan – Research Officer
Alison Dickinson – Doctor of Philosophy Candidate
Dr Nicolie Jenkins – Doctor of Philosophy Candidate
Dr Nithin Manchery – Doctor of Philosophy Candidate
Nicole Stormon – Doctor of Philosophy Candidate
Clare Mangoyana – Research Assistant

Examples of Major Projects in 2019:

Effectiveness, cost-effectiveness and cost-benefit of a single annual professional intervention for the prevention of childhood dental caries in a remote rural Indigenous community

Laloo, R., Kroon, J., Tut, O., Kularatna, S., Jamieson, L.M., Wallace, V., Boase, R., Fernando, S., Cadet-James, Y., Scuffham, P.A., Johnson, N.W. Effectiveness, cost-effectiveness and cost-benefit of a single annual professional intervention for the prevention of childhood dental caries in a remote rural Indigenous community.

Kularatna S, Laloo R, Kroon J, Tadakamadla SKK, Scuffham PA, Johnson NW. Demonstration of High Value Care to Improve Oral Health of a Remote Indigenous Community in Australia.

Kroon J, Laloo R, Tadakamadla SK, Johnson NW. Dental Caries Experience in Children of a Remote Australian Indigenous Community Following Passive and Active Preventive Interventions.

Predictors of oral health in Australian children

Stormon, N., Kazantzis, N., Ford, P.J. and Laloo, R. Children's oral health in Australia: The past decade's research agenda.

Stormon N, Ford PJ, Laloo R. Community-level Predictors of Australian Children's Dental Caries and Injury.

Stormon N, Ford PJ, Laloo R. Oral Health in the Longitudinal Study of Australian Children: An Age, Period, and Cohort Analysis

Facilitating access to dental care for disadvantaged adults

Stormon, N., Pradhan, A., McAuliffe, A. and Ford, P.J. Does a facilitated pathway improve access to dental services for homeless and disadvantaged adults?

Stormon, N., Pateman, K., Smith, P., Callander, A. and Ford, P.J. Evaluation of a community based dental clinic for youth experiencing homelessness in Brisbane.

Pradhan A, Stormon N, Laloo R. Oral and aural problems in Australian Special Olympics athletes.

Oral health of people living with Multiple Sclerosis

Sexton, C., Laloo, R., Stormon, N., Pateman, K., van der Mei, I., Campbell, J., Ford, P.J. Oral health and behaviours of people living with Multiple Sclerosis in Australia.

Oral Health and cognitive function of older adults

Nangle, M.R., Riches, J., Grainger, S.A., Manchery, N., Sachdev, P.S., Henry, J.D.

Emotional expressivity in schizophrenia

Varcin KJ, Nangle MR, Henry JD, Bailey PE, Richmond JL.

Emotion and social cognition in dental occupational burnout

Nangle MR, Henry JD, von Hippel C, Kjelsaas K.

Oral health in people with multiple sclerosis

Manchery N, Henry JD, Nangle MR.

Oral inflammation, masticatory dysfunction and cognitive impairment

Nangle MR, Manchery N.

Prospective memory and oral health in late adulthood

Manchery N, Nangle MR, Grainger SA, Haines S, Pradhan A, Rendell PG, Henry JD

Global Burden of Disease (GBD)

GBD 2017 Oral Disorders Collaborators (including Lalloo R.) Global, Regional, and National Levels and Trends in Burden of Oral Conditions From 1990 to 2017: A Systematic Analysis for the Global Burden of Disease 2017 Study.

Lalloo R, et al. Epidemiology of Facial Fractures: Incidence, Prevalence and Years Lived With Disability Estimates From the Global Burden of Disease 2017 Study.

2. News from the School of dentistry

2.1 IADR-Brisbane

The School played an active role in the APR-4 (Asia-Pacific region) meeting of the International Association for Dental Research, which was held in Brisbane at the Brisbane Convention and Exhibition Centre in late November 2019. Professors Saso Ivanovski and Laurie Walsh had senior roles in the Local Organizing Committee. The meeting was well attended, with over 700 registrations. The School had a booth which was supported by many staff and students, and which attracted strong interest from attendees.

2.2 Research Day 2019

The School of dentistry research day was held in our premises on 23 August 2019 and was an opportunity to show case the school's research both internally and externally and initiate research collaborations. This year, a little over 100 people attended and two distinguished keynote speakers delivered world-class presentations on diverse topics.

Professor Stephen Birch from the Centre for the Business and Economics of Health presented his work on the Economics of a referral management & triage programme for minor oral surgery referrals in primary care dentistry and demonstrated how governmental healthcare policies impact daily clinical decisions and activities in the hospital setting. Our second keynote speaker was Professor Benjamin Fournier who enlightened us on the biology of gingival scarfree healing, a unique feature in the human body.

The research day's scientific program was articulated around the three main pillars of the school's research activities, Dental Education, Regenerative Dentistry, and Clinical Sciences. Each of these topics were discussed in separate sessions where our PhD student and Post-doctoral researchers presented their works. The presentations addressed woman oral health, small extracellular vesicles for periodontitis diagnostic, additive manufacturing for periodontal regeneration, biomaterials surface modification for enhanced osseointegration and dentine changes associated with patient age and cavity site to only cite a few. This exemplified the very diverse and yet comprehensive research ecosystem present in our school.



Professor Pauline Ford with some of the many attendees of the conference.

3. Research Grants (current or awarded in 2019)

NHMRC Early Career Fellowships

Current in 2019:

- Dr Karan Gulati - *Titanium implants with dual micro and nano-scale topography for electrically stimulated osteogenic and antibacterial functions.* - \$80,738
- Dr Chun Xu - *Functional nano-cement scaffolds for the treatment of osteoporotic bone defects.* - \$80,738

NHMRC Ideas grants

Awarded in 2019:

- Professor Pauline Ford, L. Do, Spencer, J.; FOLEY, Michael A; Whelton, H.; Broadbent, J.; Roberts-Thomson, K. & Ratilal Lalloo, *Contemporary evidence for water fluoridation program - a before-and-after population-based study.* - \$1,655,282

ARC Discovery Projects

Awarded in 2019:

- Dr Luke Conelly, Professor Stephen Birch, Nguyen, H., Professor Pauline Ford, Le, H. & Paolucci, F - *Child Dental Benefit Policies and the Health of Australian Children.* - \$249,993

UQ Development Fellowship

Current in 2019:

- Dr Pingping Han - *Discovering novel targets for treating bone loss associated with ageing-related osteoporosis through long non-coding RNA landscapes.* - \$59,008

International Team for Implantology Research Grant

Current in 2019:

- Dr Karan Gulati, Dr Ryan Lee, Dr Pingping Han & Professor Saso Ivanovski - *Nano-Engineered Titanium Abutments for Enhanced Gingival Fibroblast Functions In Vitro.* - \$38,337

Awarded in 2019:

- Professor Saso Ivanovski, Dr Cedryck Vaquette, Professor Lisa Heitz-Mayfield, Professor Mark Bartold, *Regenerative treatment of peri-implantitis using bone constructs with osteogenic, immunomodulatory and antimicrobial properties.* - \$ 164,358

Osteology Foundation

Awarded in 2019:

- Professor Saso Ivanovski, Dr Cedryck Vaquette, - *3D-printed customised Bio-Oss/Polydioxanone scaffold for vertical bone regeneration.* - \$ 145,484

2019 HaBS Research Collaboration Seeding Grants

Current in 2019:

- Dr Peter Michael Moyle & Professor Adam Ye - *Improving Human Health: Novel Formulations of Antimicrobials to Combat Superbugs.* - \$36,750
- Dr Helen He, Tushar Kumeria, Amirali Popat & Professor Adam Ye - *Osteoimmunomodulation through Nano-structuring: Enhanced Osseointegration on Anodized 3D printed Titanium Dental Implants with Titania Nanotubes.* - \$32,000
- Karan Gulati, Tushar Kumeria, Amirali Popat, Saso Ivanovski - *Nanofibers on Nanopores: Engineered Titanium Dental Abutments towards Simultaneous Soft-Tissue Integration and Antibacterial Therapy.* - \$ 34,000
- Kelly McGowan, Geoff Mitchell, Allyson Mutch, Saso Ivanovski, Pauline Ford, Chris Sexton, Marcin Sowa - *Integrated model of diabetic and periodontal care.* - \$40,000

- Jason Roberts, Saso Ivanovski, Fekade Sime, Ryan Lee - *Maximising the outcomes of antibiotic therapy in the management of gum disease caused by a community of multi-species bacteria.* - \$34,000
- Peter Little, Pauline Ford, Danielle Kamato - *Defining a novel link between periodontal disease and atherosclerotic cardiovascular disease.* - \$32,000

Awarded in 2019:

- Danielle Kamato, Karan Gulati, Saso Ivanovski, Peter Little - *Galunisertib-Eluting Nano-Engineered Titanium Implants towards Enhanced Anti-Cancer Efficacy.* - \$24,052

HaBS Faculty Economic & Health Value of Student Placements Research Grants

- Sandra March, Ratilal Laloo, Laurence Walsh, Stephen Birch. - *Outcomes of clinical placement: an audit of the economic and social benefits of a dental student clinical outplacement program for an Indigenous population in a rural Queensland community.* - \$50,000.

UQ ECR Grants

Current in 2019:

- Dr Michal Bartnikowski - *Patient-specific degradable tissue-engineered scaffolds for jaw bone regeneration.* - \$37,000
- Dr Pingping Han - *Salivary exosomal DNA methylation: a potential epigenetic biomarker for periodontitis.* - \$34,000
- Dr Karan Gulati - *'Fit and Forget': Dual micro-nano titanium dental implants with electro-stimulated bioactivity.* - \$33,000

MTPConnect

Current in 2019:

- Lloyd, D., Bindra, R., Orthocell Limited, Zheng, M-H., Vaquette, C. - *Development of a 3D printed graft for surgical repair of the Scapholunate Interosseous wrist ligament.* (SLIL). 2018-2020 - \$891,500

ADRF Research Grants

Current in 2019:

- Mr Tulio Fernandez, Professor Dietmar Hutmacher, Professor Saso Ivanovski, Dr Cedryck Vaquette - *Autologous platelet - Derivated grown factors for the functionalization of PCL-3D printed constructs: An in-vitro and in-vivo study.* - \$14,600
- Dr Karan Gulati, Dr Stephen Hamlet, Professor Saso Ivanovski, Dr Ryan Lee, Moon, HJ. - *Immunomodulatory effects of Titania nanotubules during early stage of osseous healing.* - \$10,500
- Dr Sarah Grainger, Professor Julie Henry, Dr Matthew Nangle - *Oral care capacity and oral health in late adulthood.* - \$5,268
- Dr Karan Gulati, Professor Saso Ivanovski, Dr Cedryck Vaquette - *Nano-Engineered Titanium Dental Implants for Enhanced Osteogenesis.* - \$ 6,548
- Dr Amro Farag, Professor Saso Ivanovski - *MCP-1 induced by rough titanium surface topography recruits mesenchymal stem cells for early bone healing.* - \$4,484
- Dr Amro Farag - *Combining lyophilized decellularized cell sheets and customized 3D bioprinted CaP coated constructs for periodontal tissue regeneration.* - \$ 9,312
- Dr Chun Xu, Professor Adam Ye - *Developing novel growth factors delivery systems for guided tissue regeneration by combining state-of-art nanotechnology and electrospinning method.* - \$4,400

- Himanshu Arora, Dr Stephen Hamlet, Professor Saso Ivanovski, Dr Stephen Hamlet, Dr Cedryck Vaquette - *Effect of local delivery of a novel melatonin containing hydrogel on peri-implant bone regeneration in an osteoporotic large animal model.* - \$1,120
- Dr Chun Xu, Dr Tushar Kumeria, Dr Yan He, Dr Amirali Papat, Professor Adam Ye - *Enhanced Osseointegration on growth factor releasing anodized 3D printed titanium dental implants with titanium nanotubes.* - \$8,207
- Dr Michal Bartnikowski, Professor Saso Ivanovski, Dr Cedryck Vaquette - *Promoting periodontal regeneration through immunomodulation with timed lithium release from 3D printed polycaprolactone scaffolds.* - \$12,563
- Professor Saso Ivanovski, A/Professor Grondahl Lisbeth, Mr Nimal T. Raveendran, Dr Cedryck Vaquette - *A multiphasic hierarchical hydrogel bioprinted scaffold for periodontal regeneration.* - \$14,784
- Associate Professor Robert Ashman, Ms Andrea Kazoullis - *Properties of an isolate of Candida Albicans that are associated with oro-pharyngeal colonization.* - \$5,570
- Dr Sarah Benton, Professor Pauline Ford, A/Professor Coral Gartner, Professor Saso Ivanovski - *The effect of E-cigarette use on clinical parameters and inflammatory biomarkers in response to routine scaling and cleaning.* - \$1,996
- Professor Saso Ivanovski, Dr Miriam Lee, Dr Cedryck Vaquette - *Application of a commercially available xenograft impregnated with Azithromycin for peri-implantitis treatment.* - \$9,832

Awarded in 2019:

- Chang Lei, Chun Xu, Chengzhong Yu - *Novel bioactive nanoparticles induced fast growth of nano-hydroxyapatite for dentin hypersensitivity treatment.* - \$ 6,215
- Karan Gulati, Saso Ivanovski. *Dual-Action Titanium Abutments: Micro-Nano Scale Topography and Local Protein Release towards Augmented Soft-Tissue Integration.* - \$8,694
- P. Han, C. Salomon, S. Ivanovski - *A multiplex bead platform to identify small extracellular vesicle surfaces signatures in periodontitis.* - \$9,119
- Dr Kanika Jain, Dr Cedryck Vaquette, Prof Saso Ivanovski - *Chairside isolation and application of buccal fat pad derived mesenchymal stem cells for dental tissue regeneration: Thinking beyond drills.* - \$10,199
- Dr Maria Natividad Gomez Cerezo, Dr Cedryck Vaquette - *Sequential release of azithromycin from stimuli-responsive mesoporous bioactive glasses for application in periodontal regeneration.* - \$10,753.00
- Mrs Fanny Blaudez, Prof Saso Ivanovski, Dr Cedryck Vaquette, Dr Stephen Hamlet - *Development of an immunomodulatory scaffold for periodontal regeneration.* - \$11,792
- Dr Tulio Fernandez-Medina, Dr Cedryck Vaquette, Dr Saso Ivanovski - *Immunomodulatory properties of three different chairside autologous blood preparations for the functionalization of PCL-3D printed constructs.* - \$13,600
- Mr Reuben John Staples, Dr Cedryck Vaquette, Professor Saso Ivanovski - *A comparison of various melt electrospinning fibre arrangements for the promotion of functional periodontal ligament attachment.* - \$11,967
- Mr Vignesh Selvaprithiviraj, Dr Cedryck Vaquette, Dr Michal Bartnikowski, Prof Saso Ivanovski - *Injectable swelling hydrogels for soft tissue expansion.* - \$13,185
- Mr Nimal Thattaruparambil, Mr Vignesh Selvaprithiviraj, Dr Cedryck Vaquette, Prof Saso Ivanovski - *Evaluation of a novel nanocomposite bioprinted scaffolds for bone tissue engineering.* - \$9,654

- Miss Alexandra Mutch, Dr Cedryck Vaquette, and A/Prof Lisbeth Grondahl - *Growth factor eluting scaffolds for alveolar ridge preservation*. \$9,505

Colgate-Palmolive Student Grants

Benjamin Sheng Li Seow, Eleanor Churchill. *Investigating the latest enzymatic pre-sterilisation adjuncts and nanotechnology in removing dentine bioburden from rotary endodontic files* - \$ 700

Barbara Lee, Tiffany Ji-Yun Chang, Nur Sakinah Kamarul Zaki. *Nanoparticle-assisted smear layer removal: An explorative study* - \$ 700

S Hosseinpour. Awarded “**Colgate-Palmolive Student Research Grant**”, School of Dentistry, The University of Queensland, 2019, Brisbane, Australia

Other Grants

Current in 2019:

- Alexander Moule, Unnikrishnan Kunjukrishna Pillai - *A novel disinfectant delivery system involving controlled release of Octenidine from silica based nanoparticles*, Australian Society of Endodontology Inc Federal Branch. - \$6,187
- Elissa Freer, *Student Research grant*, Australian Society of Orthodontists' Foundation. - \$ 24,000

Awarded in 2019:

- Matthew Nangle, Stefan Blum, Julie Henry, Nithin Manchery Gopinathan - *Addressing the oral health needs of people with multiple sclerosis*, Multiple Sclerosis Research Australia. - \$ 16,261
- Stefan Blum, Matthew Nangle, H. Boocock, Julie Henry, Andrew Swayne - *Improving oral health outcomes for people with multiple sclerosis*, Metro South Hospital and Health Service. \$100,000–
- Tianqi Guo, Karan Gulati, Pingping Han and Saso Ivanovski - *Nano-engineered titanium dental abutments towards soft-tissue integration therapy* – \$ 1000
- S Hosseinpour - Awarded as **Second Place** in “**UQ Pitching Research Competition**”, School of Dentistry, The University of Queensland, 2019, Brisbane, Australia.
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4. Journal Publications

2019 publications overview

Top 10% World-wide

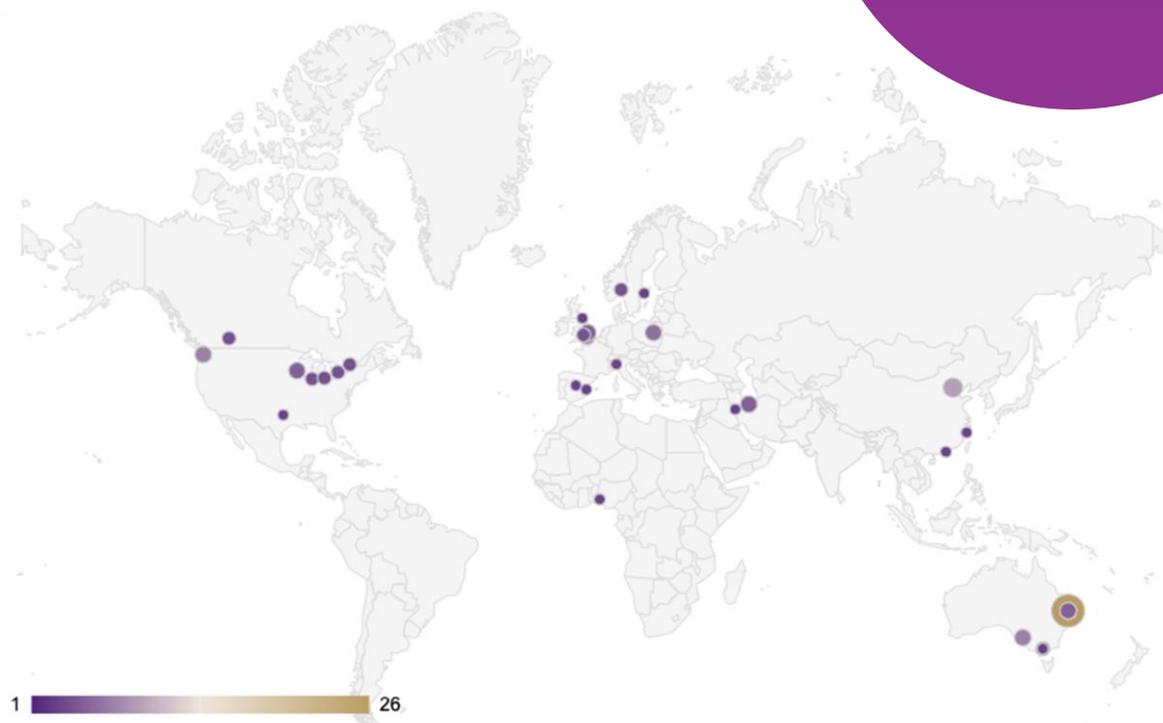
15 of the 2019 articles are in the top 10% for the most cited papers when compared to paper in the same (field weighed citation impact).

Source: SciVal, March 2020

80+

Countries have cited our 2019 publications

Source: Scopus, March 2020



- Abbasi, N., Abdal-Hay, A.* , Hamlet, S., Graham, E. & Ivanovski, S.* (2019) Effects of gradient and offset architectures on the mechanical and biological properties of 3-D melt electrowritten (MEW) scaffolds. *ACS Biomaterials Science and Engineering*, 5(7): 3448-3461. <https://doi.org/10.1021/acsbomaterials.8b01456>
- Abdal-hay, A.* , Agour, M., Kim, Y., Lee, M., Hassan, M., El-Ainin, H. et al. (2019) Magnesium-particle/polyurethane composite layer coating on titanium surfaces for orthopedic applications. *European Polymer Journal*, 112: 555-568. <https://doi.org/10.1016/j.eurpolymj.2018.https://doi.org/10.012>
- Abdal-hay, A., Gulati, K., Fernandez-Medina, T., Qian, M. & Ivanovski, S. (2019) In situ hydrothermal transformation of titanium surface into lithium-doped continuous nanowire network towards augmented bioactivity. *Applied Surface Science*, 505. <https://doi.org/10.1016/j.apsusc.2019.144604>
- Abdal-hay, A.* , Taha, M., Mousa, H., Bartnikowski, M.* , Hassan, M., Dewidar, M. et al. (2019) Engineering of electrically-conductive poly(ϵ -caprolactone)/ multi-walled carbon nanotubes composite nanofibers for tissue engineering applications. *Ceramics International*, 45(12): 15736-15740. <https://doi.org/10.1016/j.ceramint.2019.04.206>
- Abdalla, Y., Brown, L.* & Sonnesen, L. (2019) Effects of rapid maxillary expansion on upper airway volume: A three-dimensional cone-beam computed tomography study. *Angle Orthodontist*, 89(6): 917-923. <https://doi.org/10.2319/101218-738.1>
- Alayan, J. & Ivanovski, S.* (2019) Biological and technical outcomes of restored implants after maxillary sinus augmentation—results at 1-year loading. *Clinical Oral Implants Research*, 30(9): 849-860. <https://doi.org/10.1111/clr.13489>
- Alqurashi, N., Hashimi, S., Alowaidi, F., Ivanovski, S.* , Farag, A.* & Wei, M. (2019) miR-496, miR-1185, miR-654, miR-3183 and miR-495 are downregulated in colorectal cancer cells and have putative roles in the mTOR pathway. *Oncology Letters*, 18(2): 1657-1668. <https://doi.org/10.3892/ol.2019.10508>
- Alsudairi, D. & AlQahtani, S. (2019) Testing and comparing the accuracy of two dental age estimation methods on saudi children: measurements of open apices in teeth and the London Atlas of Tooth Development. *Forensic Science International*, 295: 226.e1-226.e9. <https://doi.org/10.1016/j.forsciint.2018.11.011>
- Anton, N., Birca, A., Grumezescu, A., Hamblin, M., Walsh, L. & Wen, C. (2019) Bioengineering International joins the Family of Platinum Open Access Journals. *Bioengineering International*, 1(1): 001-001. <https://doi.org/10.33263/bioengineering11.001001>
- Ashammakhi, N., Ahadian, S., Xu, C.* , Montazerian, H., Ko, H., Nasiri, R. et al. (2019) Bioinks and bioprinting technologies to make heterogeneous and biomimetic tissue constructs. *Materials Today Bio*, 1. <https://doi.org/10.1016/j.mtbio.2019.100008>
- Bartnikowski, M., Bartnikowski, N., Woloszyk, A., Matthys, R. & Glatt, V. (2019) Genetic variation in mice affects closed femoral fracture pattern outcomes. *Injury*, 50(3): 639-647. <https://doi.org/10.1016/j.injury.2019.02.012>
- Bartnikowski, M.* , Dargaville, T., Ivanovski, S.* & Hutmacher, D. (2019) Degradation mechanisms of polycaprolactone in the context of chemistry, geometry and environment. *Progress in Polymer Science*, 96: 1-20. <https://doi.org/10.1016/j.progpolymsci.2019.05.004>
- Bartold, M., Gronthos, S., Haynes, D. & Ivanovski, S.* (2019) Mesenchymal stem cells and biologic factors leading to bone formation. *Journal of Clinical Periodontology*, 46(S21): 12-32. <https://doi.org/10.1111/jcpe.13053>
- Blaudez, F., Ivanovski, S.* , Hamlet, S. & Vaquette, C.* (2019) An overview of decellularisation techniques of native tissues and tissue engineered products for bone, ligament and tendon regeneration. *Methods*, 171: 28-40. <https://doi.org/10.1016/j.ymeth.2019.08.002>
- Cao, Y.* , Naseri, M., He, Y., Xu, C.* , Walsh, L.* & Ziora, Z.* (2019) Non-antibiotic antimicrobial agents to combat biofilm-forming bacteria. *Journal of Global Antimicrobial Resistance*. <https://doi.org/10.1016/j.jgar.2019.11.012>

- Cao, Y.* , Xiao, L.* , Cao, Y., Ashwin, N.* , Xu, C.* & Ye, Q.* (2019) 3D printed b-TCP scaffold with sphingosine 1-phosphate coating promotes osteogenesis and inhibits inflammation. *Biochemical and Biophysical Research Communications*, 512(4): 889-895. <https://doi.org/10.1016/j.bbrc.2019.03.132>
- Carluccio, D., Xu, C., Venezuela, J., Cao, Y., Kent, D., Bermingham, M. et al. (2019) Additively Manufactured Iron-Manganese for Biodegradable Porous Load-Bearing Bone Scaffold Applications. *Acta Biomaterialia*, 103: 346-360. <https://doi.org/10.1016/j.actbio.2019.12.018>
- Caudillo-Flores, U., Barba-Nieto, I., Gómez-Cerezo, M., Martínez-Arias, A., Fernández-García, M. & Kubacka, A. (2019) Toward the green production of H₂: binary Pt-Ru promoted Nb-TiO₂ based photocatalysts. *ACS Sustainable Chemistry and Engineering*, 7(18): 15671-15683. <https://doi.org/10.1021/acssuschemeng.9b03796>
- Chai, B., Tay, B., Chow, C., Fuss, J.* & Krishnan, U.* (2019) Treatment preferences for deep caries lesions among Australian dentists. *Australian Dental Journal*, 65(1): 83-89. <https://doi.org/10.1111/adj.12740>
- Chen, X., Xu, C.* & He, H. (2019) Electrospinning of silica nanoparticles-entrapped nanofibers for sustained gentamicin release. *Biochemical and Biophysical Research Communications*, 516(4): 1085-1089. <https://doi.org/10.1016/j.bbrc.2019.06.163>
- Chen, Y.* , Han, P.* , Vandl, L.* , Dehghan-Manshadi, A.* , Humphry, J.* , Kent, D.* et al. (2019) A biocompatible thermoset polymer binder for Direct Ink Writing of porous titanium scaffolds for bone tissue engineering. *Materials Science and Engineering: C*, 95: 160-165. <https://doi.org/10.1016/j.msec.2018.10.033>
- Choi, S. & Thomson, P. (2019) Increasing incidence of oral cancer in Hong Kong—who, where...and why?. *Journal of Oral Pathology & Medicine*, 48(6): 483-490. <https://doi.org/10.1111/jop.12868>
- Chu, J., Chia, K., Qui, A., Moule, A.* & Ha, W. (2019) The effects of sodium hypochlorite and ethylenediaminetetraacetic acid on the microhardness of Mineral Trioxide Aggregate and TotalFill Bioceramic Putty. *Australian Endodontic Journal*. <https://doi.org/10.1111/aej.12352>
- Cindy Zhou, Jeannine Shen, Hsuan-Yau Wen & Nicole Stormon (2019) Reported oral side effects of antiepileptic medications. *Australia New Zealand Journal of Dental and Oral Health Therapy*, 7(3): 11-16.
- Coelho, J., Miranda, S., da Cruz, S., Trindade, S., Passos-Soares, J., Cerqueira, E. et al. (2019) Is there association between stress and periodontitis?. *Clinical Oral Investigations*. <https://doi.org/10.1007/s00784-019-03083-9>
- Dargusch, M.* , Dehghan-Manshadi, A.* , Shahbazi, M., Venezuela, J.* , Tran, X.* , Song, J.* et al. (2019) Exploring the role of manganese on the microstructure, mechanical properties, biodegradability and biocompatibility of porous iron-based scaffolds. *ACS Biomaterials Science and Engineering*, 5(4): 1686-1702. <https://doi.org/10.1021/acsbmaterials.8b01497>
- Davin, L., Thistlethwaite, J., Bartle, E.* & Russell, K. (2019) Touch in health professional practice: a review. *The Clinical Teacher*, 16(6): 559-564. <https://doi.org/10.1111/tct.13089>
- Dickie, R., Bartle, E.* , Jackman, K. & Bonney, D. (2019) Clinical supervisors' experiences of using an interprofessional clinical supervision model in an acute care setting. *Journal of Interprofessional Care*, 33(6): 1-4. <https://doi.org/10.1080/13561820.2019.1594728>
- Di Credico, G., Edefonti, V., Polesel, J., Pauli, F., Torelli, N., Serraino, D. et al. (2019) Joint effects of intensity and duration of cigarette smoking on the risk of head and neck cancer: a bivariate spline model approach. *Oral Oncology*, 94: 47-57. <https://doi.org/10.1016/j.oraloncology.2019.05.006>
- Ding, Z., Yuan, Q., Huang, K., Gu, Z., Xuan, M., Xu, Q. et al. (2019) Double-layer microsphere incorporated with strontium doped calcium polyphosphate scaffold for bone regeneration. *Journal of Biomedical Nanotechnology*, 15(6): 1223-1231. <https://doi.org/10.1166/jbn.2019.2728>
- Elmowafy, E., Abdal-Hay, A.* , Skouras, A., Tiboni, M., Casettari, L. & Guarino, V. (2019) Polyhydroxyalkanoate (PHA): applications in drug delivery and tissue engineering. *Expert Review of Medical Devices*, 16(6): 467-482. <https://doi.org/10.1080/17434440.2019.1615439>

Farah, C.* , Jessri, M.* , Bennett, N.* , Dalley, A.* , Shearston, K. & Fox, S. (2019) Exome sequencing of oral leukoplakia and oral squamous cell carcinoma implicates DNA damage repair gene defects in malignant transformation. *Oral Oncology*, 96: 42-50. <https://doi.org/10.1016/j.oraloncology.2019.07.005>

Fernández-Medina, T.* , Vaquette, C.* & Ivanovski, S.* (2019) Systematic comparison of the effect of four clinical-grade platelet rich hemoderivatives on osteoblast behaviour. *International Journal of Molecular Sciences*, 20(24). <https://doi.org/10.3390/ijms20246243>

Fowler, P., Keall, H., Kennedy, D., Healey, D.* & Thompson, J. (2019) Dental arch relationship outcomes for children with complete unilateral and complete bilateral cleft lip and palate in New Zealand. *Orthodontics and Craniofacial Research*, 22(3): 147-152. <https://doi.org/10.1111/ocr.12300>

Gao, Y., Ku, N., Sung, T., Higuchi, A., Hung, C., Lee, H. et al. (2019) The effect of human platelet lysate on the differentiation ability of human adipose-derived stem cells cultured on ECM-coated surfaces. *Journal of Materials Chemistry B*, 7(45): 7110-7119. <https://doi.org/10.1039/c9tb01764j>

GBD 2016 Traumatic Brain Injury and Spinal Cord Injury Collaborators. (incl Lalloo R.*) Global, regional, and national burden of traumatic brain injury and spinal cord injury, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet Neurol*. 2019 Jan;18(1):56-87. [https://doi.org/10.1016/S1474-4422\(18\)30415-0](https://doi.org/10.1016/S1474-4422(18)30415-0)

Gómez-Cerezo, N., Casarrubios, L., Saiz-Pardo, M., Ortega, L., de Pablo, D., Díaz-Güemes, I. et al. (2019) Mesoporous bioactive glass/ ϵ -polycaprolactone scaffolds promote bone regeneration in osteoporotic sheep. *Acta Biomaterialia*, 90: 393-402. <https://doi.org/10.1016/j.actbio.2019.04.019>

Goncalves, L., Ferreira, D., Heng, N., Vidal, F., Santos, H., Zanicotti, D. et al. (2019) Oral bacteriome of HIV-1-infected children from Rio de Janeiro, Brazil: next-generation DNA sequencing analysis. *Journal of Clinical Periodontology*, 46(12): 1192-1204. <https://doi.org/10.1111/jcpe.13176>

Goodson, M., Smith, D. & Thomson, P. (2019) The “Newcastle Nomogram” — statistical modelling predicts malignant transformation in potentially malignant disorders. *Journal of Oral Pathology and Medicine*, 48(8): 662-668. <https://doi.org/10.1111/jop.12881>

Gupta, V. & Ramachandra, S. (2019) Aggressive periodontitis with a history of orthodontic treatment. *Journal of Indian Society of Periodontology*, 23(4): 371-376. https://doi.org/10.4103/jisp.jisp_654_18

Haagsma, J., James, S., Castle, C., Dingels, Z., Fox, J., Hamilton, E. et al. (2019) Burden of injury along the development spectrum: Associations between the Socio-demographic Index and disability-adjusted life year estimates from the Global Burden of Disease Study 2017. *Injury Prevention: injuryprev-2019*. <https://doi.org/10.1136/injuryprev-2019-043296>

Hamlet, S., Lee, R.* , Moon, H., Alfarsi, M. & Ivanovski, S.* (2019) Hydrophilic titanium surface-induced macrophage modulation promotes pro-osteogenic signalling. *Clinical Oral Implants Research*, 30(11): 1085-1096. <https://doi.org/10.1111/clr.13522>

Han, P.* , Frith, J.* , Gomez, G.* , Yap, A.* , O'Neill, G. & Cooper-White, J.* (2019) Five piconewtons: the difference between osteogenic and adipogenic fate choice in human mesenchymal stem cells. *ACS Nano*, 13(10): 11129-11143. <https://doi.org/10.1021/acsnano.9b03914>

Han, P.* & Ivanovski, S.* (2019) Effect of saliva collection methods on the detection of periodontium-related genetic and epigenetic biomarkers— A pilot study. *International Journal of Molecular Sciences*, 20(19). <https://doi.org/10.3390/ijms20194729>

Hides, J., Murphy, M.* , Jang, E., Blackwell, L., Sexton, M., Sexton, C.* et al. (2019) Predicting a beneficial response to motor control training in patients with low back pain: a longitudinal cohort study. *European Spine Journal*, 28(11): 2462-2469. <https://doi.org/10.1007/s00586-019-06045-7>

Hosseinpour, S.* , Fekrazad, R., Arany, P. & Ye, Q.* (2019) Molecular impacts of photobiomodulation on bone regeneration: a systematic review. *Progress in Biophysics and Molecular Biology*, 149: 147-159. <https://doi.org/10.1016/j.pbiomolbio.2019.04.005>

Hosseinpour, S.* , He, Y.* , Nanda, A.* & Ye, Q.* (2019) MicroRNAs involved in the regulation of angiogenesis in bone regeneration. *Calcified Tissue International*, 105(3): 223-238.

<https://doi.org/10.1007/s00223-019-00571-8>

Hosseinpour S.*, Fekrazad R, Arany PR, Ye Q. Molecular impacts of photobiomodulation on bone regeneration: a systematic review. *Progress in biophysics and molecular biology*. 2019 Apr 17.

Hosseinpour S.*, Tunér J, Fekrazad R. Photobiomodulation in Oral Surgery: A review. *Photobiomodulation, Photomedicine, and Laser Surgery*. Dec 2019. <http://doi.org/10.1089/photob.2019.4712>.

Tunér J, Hosseinpour S.*, Fekrazad R. Photobiomodulation in Temporomandibular Disorders. *Photobiomodulation, Photomedicine, and Laser Surgery*. Dec 2019. <http://doi.org/10.1089/photob.2019.4705>.

Khojasteh A, Hosseinpour S.*, Rezai Rad M, Alikhasi M, Zadeh HH. Buccal fat pad-derived stem cells with anorganic bovine bone mineral scaffold for augmentation of atrophic posterior mandible: An exploratory prospective clinical study. *Clinical implant dentistry and related research*. 2019 Apr;21(2):292-300.

Salehi M, Ehtrami A, Bastami F, Farzamfar S, Hosseinpour S.*, Vahedi H, Vaez A, Rahvar M, Goodarzi A. Polyurethane/Gelatin Nanofiber Neural Guidance Conduit in Combination with Resveratrol and Schwann Cells for Sciatic Nerve Regeneration in the Rat Model. *Fibers and Polymers*. 2019 Mar 1;20(3):490-500.

Khojasteh A, Hosseinpour S.*, Rad MR, Alikhasi M. Buccal Fat Pad–Derived Stem Cells in Three-Dimensional Rehabilitation of Large Alveolar Defects: A Report of Two Cases. *Journal of Oral Implantology*. 2019 Feb;45(1):45-54.

Nazemisalman B, Vahabi S, Sabouri E, Hosseinpour S.*, Doaju S. Association of vitamin D binding protein and vitamin D receptor gene polymorphisms in Iranian patients with chronic periodontitis. *Odontology*. 2019 Jan 25;107(1):46-53.

Vahabi S, Nazemisalman B, Kalantari M, Hosseinpour S.* Association of Matrix Metalloproteinase-1-1607 1G/2G and C-Reactive Protein-717 C/T Gene Polymorphisms in Iranian Patients with Chronic Periodontitis: A Clinical Trial. *Iranian Red Crescent Medical Journal*. 2019;21(1).

Hou, M., Lee, R.*, Du, Z., Hamlet, S., Vaquette, C.* & Ivanovski, S.* (2019) The influence of high-dose systemic zoledronate administration on osseointegration of implants with different surface topography. *Journal of Periodontal Research*, 54(6): 633-643. <https://doi.org/10.1111/jre.12664>

Jensen, L., Murphy, S., Williamson, A., Teixeira, F., Johnson, W., Friedl, C. et al. (2019) Root canal preparation in mandibular premolars with TRUShape and Vortex Blue: a micro-computed tomography study. *Australian Endodontic Journal*, 45(1): 12-19. <https://doi.org/10.1111/aej.12322>

Kahler, B.*, Mistry, S., Case, P., Prabhu, N. & Lin, L. (2019) Regenerative endodontic treatment: a clinical focus and review. *Endo*, 13(4): 307-322.

Kan, S., Ho, V., Siddiqi, A. & Zafar, S.* (2019) The prevalence of percutaneous exposure incidents among staff and students treating pediatric patients. *Journal of Dentistry for Children*, 86(2): 81-87.

Khetan, P., Boffetta, P., Luce, D., Stucker, I., Curado, M., Menezes, A. et al. (2019) Occupations and the risk of head and neck cancer: a pooled analysis of the International Head and Neck Cancer Epidemiology (INHANCE) Consortium. *Journal of Occupational and Environmental Medicine*, 61(5): 397-404. <https://doi.org/10.1097/jom.0000000000001563>

Kiran, R., Chapman, J., Tennant, M., Forrest, A.* & Walsh, L.* (2019) Effect of heat on the fluorescence properties of tooth-colored restorative materials and their forensic implications. *Journal of Forensic Sciences*, 64(6): 1698-1706. <https://doi.org/10.1111/1556-4029.14122>

Kiran, R., Chapman, J., Tennant, M., Forrest, A.* & Walsh, L.* (2019) Fluorescence-aided selective removal of resin-based composite restorative materials: an in vitro comparative study. *Journal of Esthetic and Restorative Dentistry*. <https://doi.org/10.1111/jerd.12536>

Kraatz, J., Hoang, H., Ivanovski, S.*, Ware, R. & Crocombe, L. (2019) Non-clinical factors associated with referral to periodontal specialists. *Journal of Periodontology*, 90(8): 877-883. <https://doi.org/10.1002/JPER.18-0642>

- Kraatz, J., Hoang, H., Ivanovski, S.* , Ware, R. & Crocombe, L. (2019) Periodontal diagnosis, treatment, and referral patterns of general dental practitioners. *Journal of Investigative and Clinical Dentistry*, 10(3). <https://doi.org/10.1111/jicd.12411>
- Kroon, J., Lalloo, R.* , Tadakamadla, S. & Johnson, N. (2019) Dental caries experience in children of a remote Australian Indigenous community following passive and active preventive interventions. *Community Dentistry and Oral Epidemiology*, 47(6): 470-476. <https://doi.org/10.1111/cdoe.12486>
- Kulkarni, S., Thambar, S. & Arora, H. (2019) Evaluating the effectiveness of nonsteroidal anti-inflammatory drug(s) for relief of pain associated with temporomandibular joint disorders: a systematic review. *Clinical and Experimental Dental Research*, 6(1): 134-146. <https://doi.org/10.1002/cre2.24>
- Lalloo, R., Lucchesi, L., Bisignano, C., Castle, C., Dingels, Z., Fox, J. et al. (2019) Epidemiology of facial fractures: Incidence, prevalence and years lived with disability estimates from the Global Burden of Disease 2017 study. *Injury Prevention: injuryprev-2019*. <https://doi.org/10.1136/injuryprev-2019-043297>
- Lalloo, R.* , Tadakamadla, S., Kroon, J., Tut, O., Kularatna, S., Boase, R. et al. (2019) Salivary characteristics and dental caries experience in remote Indigenous children in Australia: a cross-sectional study. *BMC Oral Health*, 19(1). <https://doi.org/10.1186/s12903-018-0692-2>
- Lau, J., Ng, L., Siddiqi, A. & Zafar, S.* (2019) Paediatric dentists treating children on bisphosphonates: a cross-sectional questionnaire-based study. *Pediatric Dentistry*, 41(4): 285-292.
- Li, H., Guo, H., Lei, C.* , Liu, L., Xu, L., Feng, Y. et al. (2019) Nanotherapy in joints: increasing endogenous hyaluronan production by delivering hyaluronan synthase 2. *Advanced Materials*, 31(46). <https://doi.org/10.1002/adma.201904535>
- Lim, C.* , Baker, A., Saha, S.* , Foley, S., Gordon, A., Ward, D. et al. (2019) Protocol update and statistical analysis plan for CADENCE-BZ: a randomized clinical trial to assess the efficacy of sodium benzoate as an adjunctive treatment in early psychosis. *Trials*, 20(1). <https://doi.org/10.1186/s13063-019-3232-8>
- Lin, L., Ricucci, D., Saoud, T., Sigurdsson, A. & Kahler, B.* (2019) Vital pulp therapy of mature permanent teeth with irreversible pulpitis from the perspective of pulp biology. *Australian Endodontic Journal*. <https://doi.org/10.1111/aej.12392>
- Liu, J., Bai, R., Lei, Z., Xu, C., Ye, Q.* , Martens, W. et al. (2019) Experimental and numerical investigation of the toughening mechanisms in bioinspired composites prepared by freeze casting. *Composites Science and Technology*, 182. <https://doi.org/10.1016/j.compscitech.2019.107768>
- Li, Y., Zhang, K., Liu, P., Chen, M., Zhong, Y., Ye, Q.* et al. (2019) Encapsulation of plasmid DNA by nanoscale metal–organic frameworks for efficient gene transportation and expression. *Advanced Materials*, 31(29). <https://doi.org/10.1002/adma.201901570>
- Lowe, B.* , Hardy, J. & Walsh, L.* (2019) Optimizing nanohydroxyapatite nanocomposites for bone tissue engineering. *ACS Omega*, 5(1): 1-9. <https://doi.org/10.1021/acsomega.9b02917>
- Lowe, B.* , Ottensmeyer, M., Xu, C.* , He, Y.* , Ye, Q.* & Troulis, M. (2019) The regenerative applicability of bioactive glass and beta-tricalcium phosphate in bone tissue engineering: a transformation perspective. *Journal of Functional Biomaterials*, 10(1). <https://doi.org/10.3390/jfb10010016>
- Lui, H., Bindra, R., Baldwin, J., Ivanovski, S.* & Vaquette, C.* (2019) Additively manufactured multiphasic bone–ligament–bone scaffold for scapholunate interosseous ligament reconstruction. *Advanced Healthcare Materials*, 8(14). <https://doi.org/10.1002/adhm.201900133>
- Manchery, N.* , Henry, J.* & Nangle, M.* (2019) A systematic review of oral health in people with multiple sclerosis. *Community Dentistry and Oral Epidemiology*, 48(2): 89-100. <https://doi.org/10.1111/cdoe.12512>
- McGowan, K.* , Acton, C., Ivanovski, S.* , Johnson, N. & Ware, R. (2019) Systemic comorbidities are associated with medication-related osteonecrosis of the jaws: case-control study. *Oral Diseases*, 25(4): 1107-1115. <https://doi.org/10.1111/odi.13046>

McGowan, K.* , Ware, R., Acton, C., Ivanovski, S.* & Johnson, N. (2019) Both non-surgical dental treatment and extractions increase the risk of medication-related osteonecrosis of the jaw: case-control study. *Clinical Oral Investigations*, 23(11): 3967-3975. <https://doi.org/10.1007/s00784-019-02828-w>

McGowan, K.* , Ware, R., Acton, C., Ivanovski, S.* & Johnson, N. (2019) Full blood counts are not predictive of the risk of medication-related osteonecrosis of the jaws: a case-control study. *Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology*, 128(4): 373-380. <https://doi.org/10.1016/j.oooo.2019.04.004>

McGregor, G.* & Bartle, E.* (2019) The creation and trial of a serious game to support teaching and learning of professional psychology competencies in postgraduate programs. *Australasian Journal of Educational Technology*, 35(5): 15-28. <https://doi.org/10.14742/ajet.4237>

Mercado, F.* , Hamlet, S. & Ivanovski, S.* (2019) A 3-year prospective clinical and patient-centered trial on subepithelial connective tissue graft with or without enamel matrix derivative in Class I-II Miller recessions. *Journal of Periodontal Research*. <https://doi.org/10.1111/jre.12715>

Mercado, F.* , Hamlet, S. & Ivanovski, S.* (2019) Subepithelial connective tissue graft with or without enamel matrix derivative for the treatment of multiple Class III-IV recessions in lower anterior teeth: a 3-year randomized clinical trial. *Journal of Periodontology*. <https://doi.org/10.1002/JPER.19-0058>

Meyers, I.* (2019) Herodontics – is there a place for maintaining the apparently hopeless tooth?. *Australian Dental Journal*, 64(S1): S71-S79. <https://doi.org/10.1111/adj.12698>

Meyers, I. & Hallett, K. (2019) Restorative dentistry and teeth for life. *Australian Dental Journal*, 64(S1): S3-S3. <https://doi.org/10.1111/adj.12683>

Mohan, A., Krishnan, U.* , Akber, M., Nair, M. & Balan, A. (2019) Successful management of a case of true radicular dens invaginatus using platelet-rich fibrin and guided tissue regeneration. *Australian Endodontic Journal*. <https://doi.org/10.1111/aej.12377>

Muñoz-Batista, M., Andrini, L., Requejo, F., Gómez-Cerezo, M., Fernández-García, M. & Kubacka, A. (2019) Sunlight active g-C₃N₄-based Mn+ (M[dbnd]Cu, Ni, Zn, Mn) – promoted catalysts: Sharing of nitrogen atoms as a door for optimizing photo-activity. *Molecular Catalysis*, 484. <https://doi.org/10.1016/j.mcat.2019.110725>

Nagappan, N., Madhanmohan, R., Gopinathan, N.* , Stephen, S., Pillai, D. & Tirupati, N. (2019) Oral health-related quality of life and dental caries status in children with orofacial cleft: An Indian outlook. *Journal of Pharmacy and Bioallied Sciences*, 11(6): S169-S174. https://doi.org/10.4103/JPBS.JPBS_285_18

Nagappan, N., Tirupati, N., Gopinath, N.* , Selvam, D., Subramani, G. & Subbiah, G. (2019) Oral health status of sports university students in Chennai. *Journal of Pharmacy and Bioallied Sciences*, 11(6): S180-S183. https://doi.org/10.4103/JPBS.JPBS_287_18

Nagendrababu, V., Murray, P., Ordinola-Zapata, R., Peters, O.* , Rôças, I., Siqueira, J. et al. (2019) A protocol for developing reporting guidelines for laboratory studies in Endodontology. *International Endodontic Journal*, 52(8): 1090-1095. <https://doi.org/10.1111/iej.13123>

Nangle, M.* , Henry, J.* , von Hippel, C.* & Kjelsaas, K.* (2019) An empirical study of how emotion dysregulation and social cognition relate to occupational burnout in dentistry. *British Dental Journal*, 227(4): 285-290. <https://doi.org/10.1038/s41415-019-0620-0>

Nangle, M.* , Riches, J.* , Grainger, S., Manchery, N.* , Sachdev, P. & Henry, J.* (2019) Oral health and cognitive function in older adults: a systematic review. *Gerontology*, 65(6): 1-14. <https://doi.org/10.1159/000496730>

Oh D, Samuels J, Chaw S.* , et al. (2019) Cemento-osseous dysplasia. Revisited. *Int J Dent Res Oral Health*, 1:1-11

Ordinola-Zapata, R., Peters, O.* , Nagendrababu, V., Azevedo, B., Dummer, P. & Neelakantan, P. (2019) What is of interest in Endodontology? A bibliometric review of research published in the *International Endodontic Journal* and the *Journal of Endodontics* from 1980 to 2019. *International Endodontic Journal*, 53(1): 36-52. <https://doi.org/10.1111/iej.13210>

Pateman, K.* , Huang, J., Ford, P.* , Mutch, A.* , Freeman, C.* & Taing, M.* (2019) Consumer perspectives on pharmacy staff roles in providing oral health services in Australia. *Health & Social Care in the Community*, 28(2): 524-532. <https://doi.org/10.1111/hsc.12885>

Pateman, K.* , Weerakoon, A.* , Batstone, M.* & Ford, P.* (2019) A culture shock in dental hygiene: exploring the management of oral health after head and neck cancer. *International Journal of Dental Hygiene*, 17(2): 183-191. <https://doi.org/10.1111/idh.12376>

Perera, C.* , Patterson, S.* & Bruxner, G. (2019) 'Conceivably neglected' – are prescribers sufficiently aware of the risks of prescribing sodium valproate to women with mental illness?. *Australasian Psychiatry*, 27(2): 125-128. <https://doi.org/10.1177/1039856219828175>

Peters, O.* , Du, D., Ho, M., Chu, R. & Moule, A.* (2019) Assessing the cutting efficiency of different burs on zirconia substrate. *Australian Endodontic Journal*, 45(3): 289-297. <https://doi.org/10.1111/aej.12350>

Peters, O.* , Teo, M., Ooi, J., Foo, A., Teoh, Y.* & Moule, A.* (2019) The effect of different sealer removal protocols on the bond strength of AH plus-contaminated dentine to a bulk-fill composite. *Australian Endodontic Journal*. <https://doi.org/10.1111/aej.12383>

Philip, N.* , Bandara, H., Leishman, S.* & Walsh, L.* (2019) Effect of polyphenol-rich cranberry extracts on cariogenic biofilm properties and microbial composition of polymicrobial biofilms. *Archives of Oral Biology*, 102: 1-6. <https://doi.org/10.1016/j.archoralbio.2019.03.026>

Philip, N.* , Bandara, H., Leishman, S.* & Walsh, L.* (2019) Inhibitory effects of fruit berry extracts on *Streptococcus mutans* biofilms. *European Journal of Oral Sciences*, 127(2): 122-129. <https://doi.org/10.1111/eos.12602>

Philip, N.* , Leishman, S.* , Bandara, H., Healey, D.* & Walsh, L.* (2019) Randomized controlled study to evaluate microbial ecological effects of CPP-ACP and cranberry on dental plaque. *JDR Clinical and Translational Research*. <https://doi.org/10.1177/2380084419859871>

Philip, N.* , Leishman, S.* , Bandara, H. & Walsh, L.* (2019) Casein phosphopeptide-amorphous calcium phosphate attenuates virulence and modulates microbial ecology of saliva-derived polymicrobial biofilms. *Caries Research*, 53(6): 1-7. <https://doi.org/10.1159/000499869>

Philip, N.* , Leishman, S.* , Bandara, H. & Walsh, L.* (2019) Polyphenol-rich cranberry extracts modulate virulence of *Streptococcus mutans*-*Candida albicans* biofilms implicated in the pathogenesis of early childhood caries. *Pediatric dentistry*, 41(1): 56-62.

Philip, N., Leishman, S. & Walsh, L. (2019) Potential role for natural products in dental caries control. *Oral Health and Preventive Dentistry*, 17(5): 479-485. <https://doi.org/10.3290/j.ohpd.a42741>

Philip, N.* & Walsh, L.* (2019) Cranberry polyphenols: natural weapons against dental caries. *Dentistry Journal*, 7(1). <https://doi.org/10.3390/dj7010020>

Philip, N. & Walsh, L.* (2019) The potential ecological effects of casein phosphopeptide-amorphous calcium phosphate in dental caries prevention. *Australian Dental Journal*, 64(1): 66-71. <https://doi.org/10.1111/adj.12661>

Pradhan, A., Stormon, N.* , & Laloo, R.* (2019) Oral and aural problems in Australian Special Olympics athletes. *Special Care in Dentistry*, 39(5): 478-484. <https://doi.org/10.1111/scd.12406>

Rossi-Fedele, G., Kahler, B.* & Venkateshbabu, N. (2019) Limited evidence suggests benefits of single visit revascularization endodontic procedures – a systematic review. *Brazilian Dental Journal*, 30(6): 527-535. <https://doi.org/10.1590/0103-6440201902670>

Ruospo, M., Palmer, S., Graziano, G., Natale, P., Saglimbene, V., Petruzzi, M. et al. (2019) Oral mucosal lesions and risk of all-cause and cardiovascular mortality in people treated with long-term haemodialysis: the ORAL-D multinational cohort study. *PLoS One*, 14(6). <https://doi.org/10.1371/journal.pone.0218684>

Salga, M, Tseng, H., Alexander, K., Jose, B., Vaquette, C.* , Debaud, C. et al. (2019) Blocking neuromuscular junctions with botulinum toxin A injection enhances neurological heterotopic ossification

development after spinal cord injury in mice. *Annals of Physical and Rehabilitation Medicine*, 62(3): 189-192. <https://doi.org/10.1016/j.rehab.2019.01.005>

Sayed, M., Mousa, H., El-Aassar, M., El-Deeb, N., Ghazaly, N., Dewidar, M. et al. (2019) Enhancing mechanical and biodegradation properties of polyvinyl alcohol/silk fibroin nanofibers composite patches for cardiac tissue engineering. *Materials Letters*, 255. <https://doi.org/10.1016/j.matlet.2019.126510>

Scott, R., Arias, A., Macorra, J., Govindjee, S. & Peters, O.* (2019) Resistance to cyclic fatigue of reciprocating instruments determined at body temperature and phase transformation analysis. *Australian Endodontic Journal*, 45(3): 400-406. <https://doi.org/10.1111/aej.12374>

Sexton, C.*; Lalloo, R.*; Stormon, N.*; Pateman, K., van der Mei, I., Campbell, J.* et al. (2019) Oral health and behaviours of people living with Multiple Sclerosis in Australia. *Community Dentistry and Oral Epidemiology*, 47(3): 201-209. <https://doi.org/10.1111/cdoe.12445>

Shakibaie, F.*; Law, K. & Walsh, L.* (2019) Improved detection of subgingival calculus by laser fluorescence over differential reflectometry. *Lasers in Medical Science*, 34(9): 1807-1811. <https://doi.org/10.1007/s10103-019-02777-6>

Shmroukh, A., Radwan, A., Abdal-hay, A., Serageldin, A. & Nasr, M. (2019) New configurations for sea water desalination system using Ranque-Hilsch vortex tubes. *Applied Thermal Engineering*. <https://doi.org/10.1016/j.applthermaleng.2019.113757>

Siddiqi, A., Zafar, S.*; Sharma, A. & Quaranta, A. (2019) Diabetic patient's knowledge of the bidirectional link: are dental healthcare professionals effectively conveying the message? *Australian Dental Journal*, 64(4): 312-326. <https://doi.org/10.1111/adj.12721>

Sowa, P.*; Keller, E.*; Stormon, N.*; Lalloo, R.* & Ford, P.* (2019) The impact of a sugar-sweetened beverages tax on oral health and costs of dental care in Australia. *European Journal of Public Health*, 29(1): 173-177. <https://doi.org/10.1093/eurpub/cky087>

Stormon, N.*; Ford, P.*; Kisely, S.*; Bartle, E.* & Eley, D.* (2019) Depression, anxiety and stress in a cohort of Australian dentistry students. *European Journal of Dental Education*, 23(4): 507-514. <https://doi.org/10.1111/eje.12459>

Stormon, N.*; Ford, P.* & Lalloo, R.* (2019) Community-level predictors of Australian children's dental caries and injury. *Australian Dental Journal*, 64(3): 263-272. <https://doi.org/10.1111/adj.12706>

Stormon, N.*; Ford, P.* & Lalloo, R.* (2019) Oral health in the Longitudinal Study of Australian Children: an age, period and cohort analysis. *International Journal of Paediatric Dentistry*, 29(4): 404-412. <https://doi.org/10.1111/ipd.12485>

Stormon, N.*; Kazantzis, N.*; Ford, P.* & Lalloo, R.* (2019) Children's oral health in Australia: the past decade's research agenda. *Community Dentistry and Oral Epidemiology*, 47(2): 153-161. <https://doi.org/10.1111/cdoe.12438>

Stormon, N.* & Lalloo, R.* (2019) Monitoring the extent of water fluoridation coverage in Australia. *Health promotion journal of Australia : official journal of Australian Association of Health Promotion Professionals*. <https://doi.org/10.1002/hpja.288>

Tadakamadla, S., Tadakamadla, J., Kroon, J., Lalloo, R.* & Johnson, N. (2019) Effect of family characteristics on periodontal diseases in children and adolescents: A systematic review. *International Journal of Dental Hygiene*, 18(1): 3-16. <https://doi.org/10.1111/idh.12398>

Taing, M.*; Firth, N.*; Ford, P. & Freeman, C.* (2019) Exploring oral healthcare management across Australian community pharmacies using case vignettes. *Community Dentistry and Oral Epidemiology*, 47(3): 225-235. <https://doi.org/10.1111/cdoe.12448>

Thattaruparambil Raveendran, N.*; Vaquette, C.*; Meinert, C., Samuel Ipe, D. & Ivanovski, S.* (2019) Optimization of 3D bioprinting of periodontal ligament cells. *Dental Materials*, 35(12): 1683-1694. <https://doi.org/10.1016/j.dental.2019.08.114>

- Tinanoff, N., Baez, R., Diaz Guillory, C., Donly, K., Feldens, C., McGrath, C. et al. (2019) Early childhood caries epidemiology, aetiology, risk assessment, societal burden, management, education, and policy: global perspective. *International Journal of Paediatric Dentistry*, 29(3): 238-248. <https://doi.org/10.1111/ipd.12484>
- Vaquette, C.* , Saifzadeh, S., Farag, A.* , Hutmacher, D. & Ivanovski, S.* (2019) Periodontal tissue engineering with a multiphasic construct and cell sheets. *Journal of Dental Research*, 98(6): 673-681. <https://doi.org/10.1177/0022034519837967>
- Varcin KJ, Nangle MR, Henry JD, Bailey PE, Richmond JL (2019). Intact spontaneous emotional expressivity to non-facial but not facial stimuli in schizophrenia: An electromyographic study. *Schizophrenia Research* 206:37-42. [doi: 10.1016/j.schres.2018.12.019](https://doi.org/10.1016/j.schres.2018.12.019).
- Walsh, L.* (2019) Resistance of a novel alkaline endodontic cement to microbial penetration. *Acta Scientific Dental Sciences*, 3(3): 69-73.
- Walsh, L. & Healey, D. (2019) Prevention and caries risk management in teenage and orthodontic patients. *Australian Dental Journal*, 64(S1): S37-S45. <https://doi.org/10.1111/adj.12671>
- Wright, P.* , Cooper, C., Kahler, B.* & Walsh, L.* (2019) From an assessment of multiple chelators, clodronate has potential for use in continuous chelation. *International Endodontic Journal*, 53(1): 122-134. <https://doi.org/10.1111/iej.13213>
- Wright, P.* , Kahler, B.* & Walsh, L.* (2019) The effect of heating to intracanal temperature on the stability of sodium hypochlorite admixed with etidronate or EDTA for continuous chelation. *Journal of Endodontics*, 45(1): 57-61. <https://doi.org/10.1016/j.joen.2018.09.014>
- Wright, P.* , Scott, S., Kahler, B.* & Walsh, L.* (2019) Organic tissue dissolution in clodronate and etidronate mixtures with sodium hypochlorite. *Journal of Endodontics*, 46(2): 289-294. <https://doi.org/10.1016/j.joen.2019.10.020>
- Wright PP, Scott S, Kahler B, Walsh LJ (2020) Organic tissue dissolution in clodronate and etidronate mixtures with sodium hypochlorite. *Journal of Endodontics* 46, 289-294.
- Xu, C.* , Lei, C.* & Yu, C.* (2019) Mesoporous silica nanoparticles for protein protection and delivery. *Frontiers in Chemistry*, 7(APR). <https://doi.org/10.3389/fchem.2019.00290>
- Yang, S., Xu, Y., Lin, Q., Bai, Y., Zan, X. & Ye, Q.* (2019) A bio-inspired, one-step but versatile coating onto various substrates with strong antibacterial and enhanced osteogenesis. *Chemical Communications*, 55(14): 2058-2061. <https://doi.org/10.1039/c8cc09986c>
- Zachar, J.* , Huang, B. & Yates, E. (2019) Awareness and knowledge of oral cancer amongst adult dental patients attending regional university clinics in New South Wales, Australia: a questionnaire-based study. *International Dental Journal*. <https://doi.org/10.1111/idj.12533>
- Siddiqi A, Zafar S.* , Sharma A, Quaranta A. Diabetic patient's knowledge of the bidirectional link: are dental healthcare professionals effectively conveying the message? *Australian Dental Journal* 2019. doi:10.1111/adj.12721.
- Lau J, Ng L, Siddiqi A, Zafar S.* Paediatric Dentists Treating Children on Bisphosphonates: A Cross-Sectional Questionnaire-Based Study. *Pediatric Dentistry* 2019 41 (4): 3-8.
- Kan S, Ho V, Siddiqi A, Zafar S.* The prevalence of percutaneous exposure incidents among staff and students treating paediatric patients Accepted for publication in the *Journal of Dentistry for Children* 2019; 86 (2); 81-87.

5. Edited Books & Chapters

Bogen, G. & Chandler, N. (2019) Vital pulp therapy. In Ilan Rotstein, John I. Ingle (Eds.), Ingle's Endodontics 7th ed ed. (pp. -). Raleigh, United States: PMPHUSA.

Gómez-Cerezo, N., Arcos, D. & Vallet-Regí, M. (2019) Mesoporous bioactive glasses for biomedical composites. In Valentina Grumezescu, Alexandru Mihai Grumezescu (Eds.), Materials for biomedical engineering: bioactive materials, properties, and applications (pp. 355-391). Amsterdam, The Netherlands: Elsevier. <https://doi.org/https://doi.org/https://doi.org/10.1016/b978-0-12-818431-8.00011-8>

Lowe, B., Guastaldi, F., Müller, M., Gootkind, F., Troulis, M. & Ye, Q. (2019) Nanobiomaterials for Bone Tissue Engineering. In (Eds.), Springer Series in Biomaterials Science and Engineering (pp. 1-20). Singapore: Springer Publishing.

Prabhu, S. R. (2019) Clinical Diagnosis in Oral Medicine-A case-based Approach. In Jaypee Brothers (Eds.), Medical Publishers, The Health Sciences Publisher, New Delhi, India

Shakibaie, F. & Walsh, L. (2019) Optical diagnostics to improve periodontal diagnosis and treatment. In Jane Manakil (Eds.), Periodontology and dental implantology (pp. 73-86). Osijek, Croatia: Intech. <https://doi.org/10.5772/intechopen.76888>

Khojasteh A, Hosseinpour S. Challenges in the Rehabilitation Handling of Large and Localized Oral and Maxillofacial Defects. In: Applications of Biomedical Engineering in Dentistry 2020 (pp. 239-262). Springer, Cham.

Staples, Reuben, Ivanovski, Sašo and Vaquette, Cedryck (2019). Scaffolds for engineering tooth-ligament interfaces. In Masoud Mozafari, Farshid Sefat and Anthony Atala (Ed.), Handbook of tissue engineering scaffolds (pp. 595-613) Duxford, United Kingdom: Woodhead Publishing. <https://doi.org/10.1016/B978-0-08-102563-5.00028-9>

5.1 Letters to the Editor

Hides, J., Murphy, M., Jang, E., Blackwell, L., Sexton, M., Sexton, C. et al. (2019) Answer to the Letter to the Editor of P. Kent et al. concerning "Predicting a beneficial response to motor control training in patients with low back pain: a longitudinal cohort study" by Hides JA, et al. Eur Spine J. 2019, 28(10): 2432-2432. <https://doi.org/10.1007/s00586-019-06126-7>

5.2 Editorial

Nagendrababu, V., Murray, P., Ordinola-Zapata, R., Peters, O.*, Rôças, I., Siqueira, J. et al. (2019) Improving the design, execution, reporting and clinical translation of laboratory-based studies in Endodontology. International Endodontic Journal, 52(8): 1089-1089. <https://doi.org/10.1111/iej.13122>

5.3 DClinDent Theses

Goh, P. (2019) Treatment duration by morphology and location of impacted maxillary canines: a retrospective, multipractitioner study. <https://doi.org/10.14264/uql.2019.777>

Costello, C. (2019) The incidence and severity of root resorption following orthodontic treatment with Invisalign.

Shailendran, A. (2019) Accuracy and reliability of tooth widths and Bolton ratios measured by ClinCheck Pro.

Simanovic, B. (2019) The changes in the facial skeletons of 11-12 year-old children over a generation from the 1980s.

Benton, S. (2019) The influence of vaping on clinical periodontal parameters and inflammatory biomarkers: A literature review and pilot study.

5.4 Patents

Walsh, L. & Athanassiadis, B. (2019) Alkaline compositions and their dental and medical use.

6. Abstract Publications

Sawyers, J., Baig, M. & El Masoud, B.* (2019). Effect of Multiple Use of Impression Copings and Scanbodies on Implant Cast Accuracy. In International Journal of Oral & Maxillofacial Implants. IADR/AADR/CADR General Session, San Francisco, CA United States, (891-898). 24 March 2017. <https://doi.org/10.11607/jomi.6945>

7. Conference, Oral & Poster Presentations

Invited Oral Presentations

K. Gulati. Nano-Engineered Titanium Dental Implants with Dual Micro-Nano Features for Tailored Local Therapy. Symposium ‘Micro- and nano-engineered solutions for enhanced dental implant therapy and tissue regeneration’. **Symposium Organizer, Oral Presentation and Chair**. 4th Asia Pacific Regional Congress of the International Association for Dental Research (IADR). 28-30 November 2019, Brisbane, QLD, Australia.

K. Gulati et al. Customizable Nano-Engineered Titanium Dental Implants. Drug Delivery Australia 2019 Conference by Controlled Release Society (CRS). 18-19 Nov 2019, Brisbane, QLD, Australia.

K. Gulati et al. Dual Micro-Nano Titanium Dental Implants towards Tailored Therapy. APICAM 2019 - Asia-Pacific International Conference on Additive Manufacturing - June 30 to July 3 - RMIT University, Melbourne, VIC, Australia.

K. Gulati et al. Nano-Engineered Titanium Dental Implants for Enhanced Local Therapeutic Action. ‘Biomaterials for Therapeutic Delivery’ Symposium. Tissue Engineering & Regenerative Medicine International Society – AP Chapter and the 7th Asian Biomaterials Congress (TERMIS-AP + ABMC7 2019). 14 – 17 of October 2019, Brisbane, Australia.

K. Gulati. Implant surface modification for enhanced soft tissue integration. The ‘Peri-implant soft tissue seal-an update on clinical research’ symposium. 2019 IADR/AADR/CADR General Session: IADR-IRG **Symposium Speaker Invitation**. General Session of the IADR (International Association for Dental Research) Meeting, Vancouver, BC, Canada, 19-22 June 2019.

R.Laloo (Symposium Chair) *Taking the long view of dental longitudinal research: opportunities, challenges and real world implications* (Symposium Chair). 28th - 30th November 2019: 4th Meeting of the IADR Asia Pacific Region, Brisbane, Australia.

R. Lalloo (Symposium Chair) *The future oral health workforce* (Symposium Chair). 28th - 30th November 2019: 4th Meeting of the IADR Asia Pacific Region, Brisbane, Australia.

O'Malley L, Macey R, Allen T, Brocklehurst P, Rigby J, **Lalloo R**, Murphy G, Birch S, Tickle M. *Workforce Planning Models in Oral Healthcare: A systematic Review*. 97th IADR General Session and Exhibition, Vancouver, Canada 19th – 22nd June 2019.

Oral Presentations

K. Gulati and S. Ivanovski. Nano-Engineered Dental Implants and Abutments towards Tailored Bioactivity. UQ Dentistry Research Day 2019, at School of Dentistry, The University of Queensland, Herston, QLD, 23 Aug 2019.

K. Gulati and S. Ivanovski. Fit and forget: nano-engineered dental implants. Brisbane Life Science EMCR Symposium (BLISS) 2019. Brisbane, Australia, 7 June 2019. *Only 20 abstracts selected from >100 submissions from ECRs.*

K. Gulati et al. Nanoporous Dental Implants towards Simultaneous Soft-Tissue Sealing, Osseo-Integration and Immunomodulation. General Session of the IADR (International Association for Dental Research) Meeting (**Oral Session Chair**), Vancouver, BC, Canada, 19-22 June 2019.

A. Abdal-hay, **K. Gulati**, S. Ivanovski. *In vitro* Characterizations of PCL/Magnesium Hydroxide Nanocomposites 3D Printed Scaffold. APICAM 2019 - Asia-Pacific International Conference on Additive Manufacturing - June 30 to July 3 - RMIT University, Melbourne, VIC, Australia.

L Harrison-Barry. 4th Meeting of the International Association of Dental Research, Asia Pacific Region - abstract accepted for oral presentation, 28-30 November 2019 (28/11/2019) *Increasing Maternal Knowledge and Infant Oral Health Care Through Education*

- L. Harrison-Barry^{1,2}, K. Elsworthy¹, S. Leishman¹, J. Palmer¹, M. Pukallus², Helen Boocock², Laurence Walsh¹, Wan Kim Seow¹
- ¹School of Dentistry, The University of Queensland, Brisbane QLD Australia
- ²Metro South Oral Health, Metro South Health, Brisbane QLD Australia.

Sepanta Hosseinpour, Laurence J Walsh, Chun Xu Large pore core-cone mesoporous silica nanoparticles for plasmid DNA delivery.. 4th Meeting of the International Association of Dental Research Asian Pacific Region (IADR/APR), Brisbane, Australia (November 28-30, 2019).

N. Thattaruparambil Raveendran: "Biofunctionality of Bioprinted Osteoblast in Gelatine Methacryloyl Hydrogel" at Tissue Engineering & Regenerative Medicine International Society - AP Chapter and the 7th Asian Biomaterials Congress at the Brisbane Convention and Exhibition Centre, Australia, October 14-17, 2019.

N. Thattaruparambil Raveendran: "*Development of a Photo-Crosslinkable Gelatin Based Bioink for 3D Bioprinting of Bone Cell*" at The 2nd Asia-Pacific International Conference on Additive Manufacturing (APICAM) at RMIT University, Melbourne, Australia, June 30- July 03, 2019.

R Staples – presentation at IADR Asia Pacific, Brisbane –

Wright PP. The art and the science of continuous chelation, an alternative irrigation technique. Australian Society of Endodontology (Qld), October 18, 2019

Zafar S, Sexton C, Siddiqi A. Dental students' perceptions on preclinical paediatric dentistry experience gained in Simodont® Haptic Dental Simulator. In: 4th Meeting of the International Association for Dental Research Asia Pacific Region, Brisbane, 28-30 November 2019.

Yang V, Shih E, Tran K, Sexton C, El Masoud B, **Zafar S**. Assessing Inter- and Intra-rater Reliability of Romexis Compare® Software. In: 4th Meeting of the International Association for Dental Research Asia Pacific Region, Brisbane, 28-30 November 2019.

Poster Presentations

Carr A – presentation at TERMIS –

T. Guo, **K. Gulati**, P. Han and S. Ivanovski. Optimization of Titanium Abutment Nanotopography via Anodization for Enhanced Bioactivity. 4th Asia Pacific Regional Congress of the International Association for Dental Research (IADR). 28-30 November 2019, Brisbane, QLD, Australia.

K. Gulati *et al.* Fabrication of dual micro-nano dental implants towards tailored bioactivity. Biomimetics in Bioengineering Conference 2019, Brisbane, Australia, 4-6 August 2019.

Sepanta Hosseinpour, Reza Fekrazad, Qingsong Ye. Photobiomodulation and Adipose Derived Stem Cells for Rats bone Defects. The Continental European & Scandinavian divisions of the International Association for Dental Research (CED/IADR-NOF) , Madrid, Spain (September 19-21, 2019).

Kisely, S., Cockburn, N., Pradhan, A., Taing, M. & Ford, P. (2019). The Importance of Oral Health and How Psychiatrists Can Help. In Australian and New Zealand Journal of Psychiatry. RANZCP 2019 Congress, Cairns, QLD Australia, (127-127). 12–16 May 2019.

Low, C., Liu, C., Justin Kim, S. & Stormon, N. (2019). Exploring student knowledge and attitudes towards saliva screening for HIV in a dental setting: a mixed methods study. In School of Dentistry Student Research Conference 2019. School of Dentistry Student Research Conference 2019, UQ Oral Health Centre. 14 November 2019.

Lowe, B., Walsh, LJ., High throughput screening of stem cell material surface interactions for bone regeneration, International Association of Dental Research, 2019, Brisbane, Australia. (poster presentation)

Lowe, B., Guastaldi, FPS., Ottensymer, M. Troulis, MJ, Tissue-engineered bone using three-dimensionally fabricated constructs for reconstruction of large biocortical mandibular defect in porcine model, 24th International Conference on Oral and Maxillofacial Surgery 2019, Rio de Janeiro, Brazil. (Oral presentation)

Ma, F., Lim, L., Zhang, H., Lalloo, R. & Stormon, N. (2019). Association between infant feeding practices and early childhood caries in Aboriginal and Torres Strait Islander children. In School of Dentistry Student Research Conference 2019. School of Dentistry Student Research Conference 2019, UQ Oral Health Centre. 14 November 2019.

Vignesh Selvaprithiviraj, Cedryck Vaquette, Michal Bartinkowski, Saso Ivanovski. 4th International Association for Dental Research Asia Pacific Region 2019 (IADR-APR) Brisbane. 'Injectable Carrageenan based Swelling Hydrogels for Soft Tissue Expansion'

R Staples – presentation at TERMIS –

Stormon, N. (2019). Oral side effects of common medications. In ADOHTA Queensland Conference. ADOHTA Queensland Conference, Brisbane, QLD, Australia. 29-30 March 2019.

Stormon, N., Anderson, J., Butson, C. & Ford, P. (2019). Optimising access to dental care for people experiencing homelessness. In 11th Health Services and Policy Research Conference. 11th Health Services and Policy Research Conference, Auckland, New Zealand. 4-6 December 2019.

Stormon, N., Ford, P. & Eley, D. (2019). The well-being of oral health students: a transnational investigation. In Annual Meeting of the College of Oral Health Academics. Annual Meeting of the College of Oral Health Academics, Rockhampton, QLD, Australia. 25-26 November 2019.

Stormon, N., Sexton, C., Peres, K. & Hong, C. (2019). Taking the long view of dental longitudinal research: opportunities, challenges and real-world implications. In 4th Meeting of the International Association for Dental Research Asia Pacific Region. 4th Meeting of the International Association for Dental Research Asia Pacific Region, Brisbane, QLD, Australia. 28-30 November 2019.

N. Thattaruparambil Raveendran "Optimization of 3D cell printing for periodontal tissue engineering" at 4th Meeting of the International Association for Dental Research Asia Pacific Region at Brisbane Convention and Exhibition Centre, Australia, November 28-30, 2019.

N. Thattaruparambil Raveendran. "The impact of 3D bioprinting on in vitro cementogenic differentiation of periodontal ligament cells" at Nature conference: Biomimetics in Bioengineering at Queensland University of Technology, Brisbane, Australia, August 4-6, 2019.

Yang, V., Shih, E., Tran, K., Tran, K., El Masoud, B. & Zafar, S. (2019). Assessing inter- and intra-rater reliability of Romexis Compare® software. In International Journal of Dental Research. 4th Meeting of the International Association for Dental Research Asia Pacific Region, Brisbane, QLD Australia. 28-30 November 2019.

Yokota, K., Ping, T., Yu, S. & Stormon, N. (2019). Dental anxiety in Australians experiencing homelessness. In School of Dentistry Student Research Conference 2019. School of Dentistry Student Research Conference 2019, UQ Oral Health Centre. 14 November 2019.

Walsh LJ. Challenges from down under: Early childhood caries and tongue tie surgery. SDL 13 - Senior Dental Leaders, Harvard University, Boston MA, USA. 27 March 2019.

Walsh LJ. Prebiotics and their use in high caries patients. ANZ Academy of Special Needs Dentistry, Adelaide. 29 April 2019.

Walsh LJ. New applications of CPP-ACP: white spot lesion reversal and plaque ecological change. NZ Oral Health Therapists/Dental Hygienists conference, Auckland, NZ. 2 May 2019

Walsh LJ. Black and White: Lightening, Whitening and Charcoal. NZ Oral Health Therapists/Dental Hygienists conference, Auckland, NZ. 3 May 2019

Walsh LJ. Geriatric dentistry, Australian Dental Industry Association, Brisbane. 12 October 2019.

Walsh LJ. Oral health in older patients, Australian Dental Prosthetists Association National Conference, Brisbane, 23 August 2019.

Walsh LJ. Oral Health and prebiotics, Dental Hygienists Association of Australia, Darwin, 22 June 2019.

Wright PP, Kahler B, Walsh LJ. The effect of temperature on the stability of sodium hypochlorite admixed with clodronate. 4th Meeting of the IADR Asia Pacific Region, Brisbane, Australia, November 2019.

Zafar, S., Sexton, C. & Siddiqi, A. (2019). Dental students' perceptions on preclinical paediatric dentistry experience gained in Simodont® Haptic Dental Simulator. In International Journal of Dental Research. 4th Meeting of the International Association for Dental Research Asia Pacific Region, Brisbane, QLD Australia. 28-30 November 2019.

8. Postgraduate Research

8.1 Higher Degree by Research Student Scholarships

- Tulio Fernandez - UQ Graduate School Scholarship (International)
- Tianqi Guo - UQ Graduate School Scholarship (International)
- Nithin Manchery - UQ Graduate School Scholarship (International)
- Nimal Raveendran - UQ Graduate School Scholarship (International)

- Srinivas Ramachandra - UQ Graduate School Scholarship (International)
- Nebu Philip - UQ Graduate School Scholarship (International)
- Vignesh Selvaprithiviraj - UQ Graduate School Scholarship (International)
- Nicole Stormon - UQ Graduate School Scholarship (Domestic)
- Reuben Staples - UQ Graduate School Scholarship (Domestic)
- Yvonne Lai – UQ Graduate School Scholarship (Domestic)

8.2 Higher Degree by Research – Completed PhD Student in 2019

- David Joo - *Surface Optimization of Elastomeric Impression Materials*
 - Principal Advisor: Professor Laurie Walsh
 - Associate Advisor: Dr Sowmya Shetty

8.3 Higher Degree by Research – Ongoing PhD Students in 2019

- Nicolie Jenkins - *Oral Health Workforce*
 - Principal Advisor: Associate Professor Ratilal Laloo
 - Associate Advisors: Professor Pauline Ford, Professor David Brennan
- Andrea Kazoullis - *Interaction of Candida albicans and innate immune cells in vitro*
 - Principal Advisor: A/Professor Robert Ashman
 - Associate Advisors: Dr Glenn Duval, Professor Lakshman Samaranayake
- Vishal Kapoor - *Tongue tie surgery in infants (Through the UQ School of Public Health)*
 - Principal Advisor: A/Professor Peter Hill
 - Associate Advisor: Professor Laurie Walsh
- Baboucarr Lowe - *High-Throughput screening of stem cell-surface interactions*
 - Principal Advisor: Professor Laurie Walsh
 - Associate Advisor: Professor Yin Xiao
- Gillian McGregor - *Development of serious games technology to enhance teaching and learning of professional psychology skill*
 - Principal Advisor: Dr Emma Bartle
 - Associate Advisor: Professor Bernadette Watson
- Nebu Philip – *Ecological Approaches to Dental Caries Prevention: Alternations of Biofilms by Natural Products and Casein Phosphopeptide-Amorphous Calcium Phosphate*
 - Principal Advisor: Professor Laurie Walsh
 - Associate Advisors: Dr Nihal Bandara, Dr Shaneen Leishman
- Arosha Weerakoon - *Evaluation of micro and macroscopic properties of etch and rinse, self-etch and glass ionomer cements on bonding to young and sclerotic dentine*
 - Principal Advisor: Associate Professor Anne Symons
 - Associate Advisors: Professor Ian Meyers, Dr David Thomson, Professor Pauline Ford
- Patricia Wright - *Improved irrigation and disinfection systems in endodontic*
 - Principal Advisor: Professor Laurie Walsh
 - Associate Advisor: Dr William Kahler
- Amelia Carr - *Development of bone-ligament-bone construct for orthopaedic surgery application in small joints*
 - Principal Advisor: Dr Cedryck Vaquette
 - Associate Advisor: Professor Saso Ivanovski
- Tulio Fernandez - *Vertical Bone Augmentation Using Platelet Rich Plasma- PCL 3d Printed Construct*
 - Principal Advisor: Professor Saso Ivanovski
 - Associate Advisors: Dr Cedryck Vaquette, Professor Dietmar Hutmacher
- Tianqi Guo - *Nano-engineered Titanium Dental Abutments for Enhanced Soft Tissue Integration*
 - Principal Advisor: Professor Saso Ivanovski, Dr Karan Gulati

- Associate Advisors: Dr Pingping Han
- Miriam Lee - *A comparison of periodontitis and peri-implantitis treatment modalities using fibrous and granulate biomaterials impregnated with Azithromycin in a porcine model*
 - Principal Advisor: Professor Saso Ivanovski
 - Associate Advisor: Dr Cedryck Vaquette
- Nithin Manchery - *Oral Health and Cognitive Function*
 - Principal Advisor: Dr Matthew Nangle
 - Associate Advisors: Professor Julie Henry, Professor Perminder Sachdev
- Vignesh Selvaprithiviraj - *3D Bioprinted electrospun scaffold/hydrogel based multiphasic constructs for periodontal regeneration*
 - Principal Advisor: Professor Saso Ivanovski
 - Associate Advisors: Dr Cedryck Vaquette, Dr Michal Bartnikowski
- Reuben Staples - *The controlled manufacturing of fibre guiding scaffold for promoting functional periodontal ligament attachment*
 - Principal Advisor: Dr Cedryck Vaquette
 - Associate Advisor: Professor Saso Ivanovski
- Nicole Stormon - *Predictors of oral health in Australian children*
 - Principal Advisor: A/Professor Ratilal Laloo
 - Associate Advisor: Professor Pauline Ford
- Srinivas Ramachandra - *Anti-microbial & host modulating properties of systemically administered azithromycin in periodontal diseases resistant to conventional therapy*
 - Principal Advisor: Professor Saso Ivanovski
 - Associate Advisors: Dr Ryan Lee, Dr Pingping Han
- Nimal Raveendran - *3D cell printed scaffolds for periodontal regeneration*
 - Principal Advisor: Professor Saso Ivanovski
 - Associate Advisors: Dr Cedryck Vaquette, Dr Michal Bartnikowski

8.4 Higher Degree by Research – New Commencements PhD Students in 2019

- Bilal El-Masoud - *Investigation of a novel zirconia dental implant*
 - Principal Advisor: Professor Saso Ivanovski
 - Associate Advisor: Dr Michal Bartnikowski
- Sepanta Hosseinpour Dougolsar - *The potential application of anti-stromal derived factor-1 (SDF-1) antibody and anti-vascular endothelial growth factor (VEGF) antibody for bone regeneration*
 - Principal Advisor: Professor Laurie Walsh
 - Associate Advisor: Dr Chun Xu
 - Associate Advisor: Dr Tianqing Liu
- Yvonne Lai - *Improving the dental quality of life of individuals with Rett syndrome*
 - Principal Advisor: Dr Sobia Zafar
 - Associate Advisor: A/Prof Helen Leonard
 - Associate Advisor: Professor Laurie Walsh
 - Associate Advisor: A/Prof Jenny Downs
- Alison Nation - *Does early access to public oral health services from 6 months of age prevent caries experience in children?*
 - Principal Advisor: A/Prof Ratilal Laloo
 - Associate Advisor: Dr Kathryn Elsworth
 - Associate Advisor: Prof Wan Seow

8.5 Higher Degree by Research – Ongoing MPhil Student in 2019

- Joshua Mitchell - *Vertical bone augmentation: observing extra-skeletal bone formation and resorption patterns in animal models*
 - Principal Advisor: Dr Cedryck Vaquette
 - Associate Advisor: Professor Saso Ivanovski
- Ashwin Nanda - *Repairing bone defects with bioceramics using 3D printing*
 - Principal Advisor: Dr Chun Xu
 - Associate Advisor: Professor Adam Ye

8.6 Higher Degree by Research – New Commencement MPhil Student in 2019

- Aya Alali - *The effects of nano-pillar titanium surface modification on biofilm and oral tissue cells*
 - Principal Advisor: Dr Ryan Lee
 - Associate Advisor: Professor Benjamin Fournier
 - Associate Advisor: Professor Saso Ivanovski
- Tom Hogerheyde – *Stainless steel crowns in paediatric dentistry*
 - Principal Advisor: Dr Sobia Zafar
 - Associate Advisor: Prof Laurie Walsh

8.7 Completed 2019 Doctor of Clinical Dentistry Candidates

- Sarah Benton - *The Association of Smoking Compared to Vaping On Clinical Periodontal Parameters And Inflammatory Biomarkers*
 - Advisor: Professor Saso Ivanovski
- Christopher Costello - *Root Resorption following Orthodontic Treatment with Invisalign*
 - Advisors: Dr Brett Kerr, Associate Professor David Healey, Dr Tony Weir
- Phillip Goh - *Treatment duration by morphology of impacted maxillary canines: a retrospective, multi-practitioner study*
 - Advisors: Professor Paul Monsour, Professor Richard Olive
- Arun Vels Shailendran - *Accuracy and reliability of tooth widths and Bolton ratios estimated by ClinCheck® Pro*
 - Advisors: Dr Elissa Freer, Dr Brett Kerr, Associate Professor David Healey, Dr Tony Weir
- Borjana Simanovic - *The impact of changing advice regarding infant sleeping position on craniofacial morphology: a retrospective study*
 - Advisors: Dr Elissa Freer, Professor Richard Olive

8.8 Ongoing 2019 Doctor of Clinical Dentistry Candidates

- Haylea Blundell - *Predictability of overbite control with the Invisalign® appliance*
 - Advisors: Dr Elissa Freer, Dr Brett Kerr, Dr Tony Weir
- Janice Chuang – *General dentist willingness to provide care for elderly patients*
 - Advisors: Professor Laurie Walsh, Dr Archana Pradhan
- David Fu - *Utilisation of General Anaesthesia and Conscious Sedation for Patients with Special Needs in Queensland*
 - Advisors: Professor Laurie Walsh, Dr Archana Pradhan
- Raj Kumar Gaddam - *Reliability of Labiolingual Incisor Inclination Changes with the Invisalign Appliance*
 - Advisors: Dr Elissa Freer, Dr Brett Kerr, Dr Tony Weir

- Aaron Gascoigne - *A novel disinfectant delivery system involving controlled release of Octenidine from silica based nanoparticles*
 - Advisors: Dr Unni Kunjukrishna Pillai, Associate Professor Alex Moule
- Shenna Ho – *Oral health therapist utilization in nursing homes*
 - Advisors: Professor Laurie Walsh, Dr Archana Pradhan
- Kiran Kumar - *Root canal cleaning in complex canals using agitated fluids*
 - Advisors: Professor Laurie Walsh, A/Professor Alex Moule, Dr George Bogan
- Soo Jin Lim - *The effect of azithromycin containing medical grade polycaprolactone membrane on human oral biofilm*
 - Advisors: Professor Saso Ivanovski, Dr Ryan Lee
- Amesha Maree - *Clinical expression of programmed rotation and uprighting of maxillary winged central incisors with the Invisalign® appliance*
 - Advisors: Dr Elissa Freer, Dr Brett Kerr, Dr Tony Weir
- Dayea Oh - *Survey of Australian Oral Maxillofacial Surgeons in Imaging Use for Maxillofacial Bone Fracture Assessment*
 - Advisors: Professor Paul Monsour, Dr Alyssa Zhang
- Kavita Rana - *Effect of repeated screw joint closing and opening cycle on preload and screwhead and screw thread morphology of an angled and straight channel screw abutment*
 - Advisors: A/Professor David Thomson, Professor Laurie Walsh, Dr Bilal El Masoud
- Jake Samuels - *The cross-sectional morphology of the mandible in the premolar region: A cone beam study*
 - Advisors: Professor Paul Monsour, Dr Alyssa Zhang
- Akila Vithanage - *Lipidome analysis of gingival health, biofilm induced gingivitis, and stage III and IV periodontitis: A prospective clinical trial*
 - Advisors: Professor Saso Ivanovski, Dr Ryan Lee

8.9 Commencing 2019 Doctor of Clinical Dentistry Candidates

- Janice Chunag - Oral care provision for frail older adults - Singapore dentists' perspectives.
 - Advisors: Professor Laurie Walsh
- Remy Head - Effect of anatomical viewing alignment on the perceived distance between mandibular third molars and the inferior dental canal on cone beam data sets.
 - Advisors: Professor Paul Monsour, Dr Alyssa Zhang
- Sheena Ho - Inter-professional collaboration through the utilisation of Oral Health Therapists (OHTs) in nursing homes in Singapore: Perspectives of nursing home staff and OHTs.
 - Advisors: Professor Laurie Walsh, Dr Archana Pradhan, Dr Claudia Lopez Silva, Dr Yang Jingrong
- Jimmy Hsiao - Diabetes and its effect on wound healing and histomorphological changes in the epithelial-connective tissue interface of the gingiva.
 - Advisors: Dr Ryan Lee, Professor Saso Ivanovski
- May Lam - Current Trends in Adoption of Cone Beam Computed Tomography and Panoramic Machines across Australia.
 - Advisors: Professor Paul Monsour, Dr Alyssa Zhang
- Anthony Puljich - Bio-Oss Collagen and the periodontal attachment benefits following mandibular third molar extraction.

- Advisors: Professor Saso Ivanovski, Dr Ryan Lee
- Andy Tsai - Investigating the effect of root canal irrigants, medicaments and antifading agents on dentine fluorescence.
 - Advisors: Professor Laurie Walsh, Associate Professor Roy George
- Dinusha Thalagala - The Impact of Alveolar Ridge Preservation on Surgical and Prosthetic Outcomes in Implant Supported Restoration.
 - Advisors: Professor Saso Ivanovski, Dr Jamil Alayan

9. Undergraduate Research

9.1 Year 5 BDS Sc Dental Student Research Projects

Exploring Student Knowledge and Attitudes towards Saliva Screening for HIV in a Dental Setting: a Mixed Methods Study

Researchers: Chui Yi Sarah Low, Cyril Liu, Sung-Beom Justin Kim **Supervisor:** Nicole Stormon

Background: Early detection of Human Immunodeficiency Virus (HIV) allows antiretroviral therapy to commence leading to better patient outcomes. Screening for HIV with saliva testing can be undertaken by dental practitioners, and previous research has found the procedure to be fast, less invasive and better accepted by patients than traditional blood tests. However, lack of knowledge of saliva screening for HIV, time constraints and providing follow-up for positive results were identified as barriers to implementation for dental practitioners.

Objective: This study aimed to investigate dental students' knowledge of HIV and their attitude towards implementing saliva screening for HIV.

Methods: Convenience sampling was used to recruit four focus groups of six to nine dentistry students each from the University of Queensland. Participants completed a pre-focus group survey and were asked about their knowledge, attitudes and experiences with HIV and saliva testing.

Results: Thirty-three students participated in the focus groups. Students recognised their knowledge of HIV was limited and 46% (n= 15) reported having treated a HIV-positive patient in the last year. During focus group discussions, many students were unaware saliva testing could be used to screen for HIV, but believed the test could be useful for both the dental practitioner and patient. Students identified factors such as stigma, cost, and time restraints as barriers to implementing the test. Opinions varied on if the screening test was within a dental practitioner's scope of practice.

Conclusions: While students were open to implementing saliva screening for HIV in practice, factors such as lack of training, time and cost were prominent barriers limiting implementation. Education on saliva screening for HIV, patient counselling and referral pathways could be integrated further into dentistry curriculums. Further investigation is needed into the cost-effectiveness of implementing screening in a dental setting.

Association between infant feeding practices and early childhood caries in Aboriginal and Torres Strait Islander children

Researchers: Fiona Ma, Li Y. Lim, Haotian Zhang **Supervisors:** Nicole Stormon, A/Professor Ratilal Laloo

Background: Aboriginal and Torres Strait Islander children report higher levels of early childhood caries (ECC) than non-Indigenous counterparts. Early risk factors need to be identified to reduce the burden of disease. Current literature provides limited or inconsistent evidence on the relationship between infant feeding practices and ECC.

Objective: This study aims to investigate associations between early feeding habits and ECC in Indigenous children.

Methods: Data from the Longitudinal Study of Indigenous Children was extracted for retrospective analyses. Descriptive analyses, χ^2 tests and bivariate logistic regression analyses were performed to identify significant differences in the prevalence of carer-reported caries at ages 4½-6 years across feeding variables at ages ½-2 years.

Results: Of 1,010 Indigenous children involved in the study: Breastfeeding (OR 1.55 CI 1.04-2.31), cordial consumption (OR 1.78 CI 1.27-2.52) and nocturnal fruit juice consumption (OR 1.97 CI 1.07-3.63) were significantly associated with increased ECC odds. Formula feeding was significantly associated with decreased ECC odds (OR 0.63 CI 0.42-0.93).

Conclusions: The findings support the importance of early feeding interventions to reduce ECC risk in Indigenous children. Future studies should account for the multifactorial nature of caries by controlling confounders and should rely on assessments performed by health professionals to increase data validity.

Dental anxiety in Australians experiencing homelessness

Researchers: Kumiko Yokota, Tara Tan Ping, Sheng Wey Yu **Supervisor:** Nicole Stormon

Background: People experiencing homelessness in Australia suffer from poorer oral health compared to the general population. High dental anxiety is a major barrier to accessing oral health care and has been shown to be experienced to a higher extent in the homeless population. Currently, no such studies have been performed in Australia.

Objective: This study aimed to explore dental anxiety in Australian people experiencing homelessness. The prevalence, severity and nature of dental anxiety in this population were determined and compared to the general Australian population. This study also investigated the relationships between high dental anxiety against demographic and oral health factors.

Methods: The Dental Anxiety Questionnaire (DAQ) and the Index of Dental Anxiety and Fear (IDAF-4C⁺) module questionnaire were completed by people experiencing homelessness in Brisbane, Australia. Demographic and oral health factors data were also obtained, followed by oral health screenings.

Results: A higher prevalence of high dental anxiety (28.2%) and dental-related phobia (6.6%-23.9%) were found in those experiencing homelessness compared to the Australian norm. A higher mean IDAF-4C summed score at 18.02 (CI 15.60-20.43) and a higher mean score in regards to feeling embarrassed or ashamed as anxiety-inducing at 2.27 (CI 1.89-2.64) were reported in people experiencing homelessness compared to the general population. No significant findings were established between high dental anxiety against demographic and oral health factors.

Conclusion: This study reported a higher severity and prevalence of dental anxiety in the homeless population which was different in nature compared to the general Australian population. Consequently, it is imperative to develop a more tailored approach to identifying and managing dental anxiety while providing oral health care to those experiencing homelessness.

Factors influencing a patient's search for a dental clinic

Researchers: Michelle Chen, Roland Yen Weng Foo, Dylan Feng Wei Fu **Supervisors:** Christopher Sexton, Dr Sandra March

Background: Digital information is competing with the traditionally trusted word-of-mouth referrals as an information source. Evidence is lacking in how this has impacted a person's search strategy during the search for a dental clinic. Current literature focuses on dentist preferences based on retrospective experiences.

Objective: The study investigated the important information sources, facility, service and dentist factors during the Brisbane adults' search and selection process for a dental clinic prior to their initial visit.

Methods: We surveyed 146 Brisbane adults in public areas situated around Brisbane.

Results: Recommendations from family members (93.2%), friends (88.4%) and healthcare professionals (84.2%) were the most important sources of information, accounting for the majority (61.6%) of the initial information source used. Important digital sources of information were in the form of online reviews (61.6%) and dental clinic websites (58.2%). The most important factors influencing the search of a dental clinic were the ability to book an appointment within a short time period (95.9%), cost of treatment (93.2%) and dentist's years of experience (80.8%).

Conclusions: Word of mouth remains the most important source of information during the search for a dental clinic. While digital media is a significant source of information, it was more limited to younger people. Important facility and service factors were related to convenience and cost. Years of experience was the only important dentist characteristic. In the future, dental care providers can consider improving their word-of-mouth reputation, as well as increasing the convenience of attendance and appointment booking.

The role of social media in 21st century dentistry

Researchers: Angela Chen, Haneul Kim, Li En Ang **Supervisor:** Dr Emma Bartle

Background: The growth of social media has revolutionised the way dentists connect with the community. With increased ease of communication and convenience, it can also attract potential patients through marketing tactics. However, little is known regarding dentists' behaviours on social media and opinions regarding professional use.

Objective: This study explored the role of social media for dentists in Australia and New Zealand. It aimed to investigate the current usage patterns of social media for professional purposes, to explore their preferences of various social media platforms and rationale behind such choices and to identify the advantages and disadvantages of using social media for professional purposes from a dentist's perspective.

Methods: Dentists registered with the Dental Board of Australia and New Zealand were invited to complete an online questionnaire from Facebook dental forum 'Dental Product Review (DPR)'. Respondents were questioned on their social media usage and attitudes toward professional applications of social media.

Results: Over 90% of respondents utilised social media accounts daily, with the most popular platforms being Facebook and Instagram. Respondents used social media mainly for personal purposes, while only 21% employed dental practice marketing. Despite a generally positive attitude towards social media, some dentists have raised concerns about consent privacy and quality control.

Conclusions: Social media and its use by dentists will continue to grow and have a greater future impact. Clearer guidance on how to utilise social media in an effective and professional manner should be highlighted by governing dental bodies. This will allow dentists to maximise their social media engagement and reap its benefits.

Knowledge, oral hygiene behaviours and clinical periodontal parameters among periodontal patients

Researchers: Cindy Pham, Zhi Hao Tan, Henrietta Wu **Supervisor:** Dr Kelly McGowan

Background: Patient education is often provided in periodontal therapy on the assumption that oral health behaviours and decision making is dependent on the patient's understanding of their disease. However, no previous studies have explored knowledge of periodontal disease and oral health status in patients diagnosed with periodontitis.

Objective: This study developed an instrument to quantitatively measure patient knowledge of periodontal disease and assessed for possible associations between periodontal knowledge, oral hygiene behaviours and clinical periodontal status in patients diagnosed with periodontal disease

Method: A cross-sectional pilot study involving 30 adult patients diagnosed with periodontitis was conducted at the University of Queensland Herston Oral Health Centre. A questionnaire was administered to quantitatively measure patient knowledge of periodontal disease, and assess for associations between knowledge scores, self-reported oral hygiene behaviours and clinical periodontal status. Univariate and multivariate linear regression analyses were used to analyse the data.

Results: An analysis of questionnaire responses demonstrated knowledge deficits across all themes among patients diagnosed with periodontal disease. Statistically significant associations were demonstrated between knowledge scores and self-reported ability to clean teeth, the number of remaining natural teeth, and self-reported periodontal knowledge in the univariate analyses.

Conclusion: The results of the study cannot demonstrate whether knowledge of periodontal disease is correlated with oral hygiene behaviours and clinical periodontal status. Further research on the effect of knowledge on treatment outcomes is recommended with a prospective study and larger sample size.

Survey of postgraduate periodontal clinic patients: Patient-reported quality of life prior to non-surgical periodontal treatment

Researchers: Alexandra Coombs, Jack O'Neill, Jessica Atalla **Supervisors:** Dr Kelly McGowan, Dr Troy McGowan, Professor Saso Ivanovski

Background: At present, no valid instrument exists for assessing the value of non-surgical periodontal treatment for patients within a Patient Reported Outcome Measure (PROM) framework.

Objective: This study aimed to pilot a quality of life (QoL) questionnaire tailored for periodontal patients to determine how periodontitis impacts on their daily lives and where the value in periodontal treatment lies from a patient perspective.

Methods: A cross-sectional QoL survey of patients presenting for their first appointment at a post-graduate periodontal clinic was conducted. Demographic data and clinical periodontal parameters were recorded from the dental record. Linear regression models were used to examine associations between demographic and clinical variables and QoL.

Results: Twenty-six participants met the inclusion criteria and consented to complete the questionnaire. The mean \pm standard deviation (SD) QoL was 22.8 ± 8.0 , with 36 being the highest possible score and indicating the maximum impact on QoL. The most commonly reported QoL concerns related to losing teeth (82%), perceived looseness of teeth (70%), and sensitive teeth and/or gums (63%). Self-reported knowledge of periodontitis (6.9; 95% CI 2.2, 11.5; $p < 0.01$) and age (-0.3; 95% CI 0.5, -0.0; $p = 0.02$) were associated with QoL in the adjusted linear regression model.

Conclusions: Periodontitis has a considerable impact on the QoL of patients. High-value periodontal care from a patient perspective should include education and reassurance about the likely loss of teeth, splinting where indicated to address subjective mobility, and desensitisation treatments where needed. Future prospective studies are needed to determine whether QoL improves after periodontal treatment.

Reasons for tooth extraction in emergency and general courses of care at a public dental service

Researchers: Ying Yuen Timothy Chin, Cloe C. Hui, Likai Poh **Supervisors:** Dr Kelly McGowan, Dr Troy McGowan, Dr Jessica Zachar

Background: High demand for dental services and finite funding mean patients who seek emergency care through the public system are ineligible for multiple appointments or complex treatments. This influences treatment planning and periodontally compromised teeth may be extracted due to limited available treatment options and the inability to provide follow-up care.

Objectives: This study aimed to determine the reported reasons for tooth extraction in patients seeking dental treatment in West Moreton Oral Health Service, to determine whether the nature of and reasons for tooth extraction varied between general and emergency courses of care and investigate the clinical justification for the decision to extract periodontally compromised teeth.

Methods: A retrospective audit of extracted teeth from the West Moreton Oral Health Service was conducted using ADA item codes and clinical notes from January 2018 – December 2018. The primary reason for extraction, age, course of care, location and type of tooth was recorded. One month of data was randomly selected and clinical records for patients seen in September 2018 were reviewed to determine the clinical diagnosis of extracted teeth. The clinical measurements used for periodontal extractions were also recorded and chi-squared tests were used to determine statistical significance.

Results: In 2018, 9469 teeth were extracted. In September 2018 (N=506), caries was the most common reason for extraction (46%), followed by periodontal disease (14%). The primary reason for extraction was found to be significantly different ($p < 0.001$) between emergency and general courses of care. Mobility was recorded as a justification in 90.1% of periodontal extractions.

Conclusions: Patients often present for emergency care with severe disease and are ineligible for complex treatment to save teeth. Caries was the most common reason for extraction. Periodontally compromised teeth were more likely to be extracted in emergency appointments. Many periodontal extractions were based on non-prognostic indicators such as mobility.

Emergency Department Presentations for Dental Conditions in West Moreton

Researchers: Anderson Wong, Ian Pang, Janice Wu **Supervisors:** Dr Kelly McGowan, Dr Ellen Gielis, Dr Jessica Zachar, Professor Pauline Ford

Background: Dental conditions are the fourth leading cause of potentially preventable hospitalisations (PPH) in Australia. The aim of this study is to investigate the nature and frequency of PPHs for dental conditions in West Moreton Hospital and Health Service (WMHHS).

Objectives: To determine the number of potentially preventable dental hospitalisations and cost incurred at Ipswich Hospital Emergency Department (ED) in the 2017-2018 financial year along with potential strategies to reduce the number of these presentations in the West Moreton Hospital and Health Service (WMHHS).

Methods: A retrospective cohort study was conducted at Ipswich Hospital (IH) Emergency Department (ED) from 1st October 2017- 30th September 2018. Patients were identified through IH Emergency Department Information System and their dental records were obtained from the Information System for Oral Health database. Data were then tabulated and chi square tests were used to investigate any significant differences between abscesses/cellulitis and less severe presentations.

Results: Overall, 417 of the 541 dental related presentations could have been prevented in a general dental setting. Patients who presented to the ED with abscess/cellulitis spent more time in ED and were less likely to have attended a dental appointment in the 12-month prior. Overall, 77% of all presentations to ED were discharged home on the same day with only 13 patients admitted into hospital. The total cost attributable to potentially preventable dental hospitalisations (PPDH) was AUD\$258,177.

Conclusions: The majority of dental presentations to ED are due to dental abscess and toothache. These conditions are preventable and could have been diagnosed earlier and treated in a general dental setting rather than the ED. Understanding and removing the barriers to timely dental care in the community would reduce the financial burden of PPHs for dental conditions in WMHHS.

Nature and cost of dental treatment provided under general anaesthesia in West Moreton Hospital Health and Service

Researchers: Jiman Han, Khai S Chieng, Shan Y Ong **Supervisors:** Dr Kelly McGowan, Dr Ellen Gielis, Professor Pauline Ford

Background: Dental general anaesthesia (DGA) increases the risk of complications for the patient and treatment cost for the health system. This study aimed to determine the demographic and clinical characteristics of patients who require DGA in West Moreton Hospital and Health Service (WMHHS) and associated costs.

Objective: This study assessed the nature and cost of dental treatment provided under general anaesthesia in West Moreton Hospital Health and Service

Methods: A retrospective cohort study of patients admitted to Ipswich Hospital for DGA from October 2017 to September 2018 was conducted. Patients were identified through the Information System for Oral Health (ISOH) database where demographic and treatment data were recorded. Chi-square tests were used to compare the nature and frequency of treatment across 4 age groups.

Results: 194 patients received DGA over the 12-month study period, of which 73% were aged between 0-9 years. Patients averaged more than 4 restorations and 4 extractions per DGA and the average treatment cost provided was \$1,605.10 ± 210.76. Provision of DGA in hospital cost nearly 4 times more compared to local anaesthesia in a dental clinic.

Conclusions: The majority of patients receiving DGA in WMHHS were children with high rates of dental disease. The biological and financial costs of DGA are significant and highlight the importance of alternative options and improving preventative strategies for early childhood decay.

Effect of clinician experience and image inversion on contrast thresholds for caries detection using digital bitewing radiographs

Researchers: Monica Farrelly, Tracy Tang, Joyce Wong **Supervisor:** Professor Laurence J Walsh

Background: Bitewing radiographs aid diagnosis of dental caries. Detection of dental caries on radiographs requires distinction of a contrast between carious and adjacent sound tooth structure. The threshold for discernable contrast varies between individuals and correlates to a certain stage of caries progression. Digital radiographic enhancement has potential to assist the detection of caries at earlier stages.

Objective: This study investigated the effect of clinician experience and image inversion on the contrast threshold for detection of caries-like lesions on digital bitewing radiographs.

Methods: Radiographs were edited digitally to show artificial carious lesions with predetermined differences in greyscale value, corresponding to known percentages of volume loss. Undergraduate second and fourth year dental students and postgraduate Doctor of Clinical Dentistry students at the University of Queensland assessed standard and inverted radiographs in a random sequence. The latter had 5-12 years of clinical experience.

Results: The diagnostic accuracy for second year (n=23), fourth year (n=36) and postgraduate students (n=5) was 0.721, 0.724 and 0.809, respectively, for standard images, then 0.626, 0.628 and 0.912 for inverted. The threshold for radiographic detection was the contrast produced by 30% volume loss for second and fourth year undergraduates, and 20% for postgraduates, corresponding to 38% and 24% change in greyscale, respectively.

Conclusions: Post-graduation clinical experience improves performance in detecting contrast changes on radiographs indicating caries. Image inversion only benefits experienced clinicians. A commitment to education and ongoing training that enforces clinical application is required to improve the diagnostic ability of both students and practitioners.

Factors Influencing Bacterial Levels in Dental Unit Waterlines at South-East Queensland Dental Clinics

Researchers: Yu Chieh Chou, Eun Jae Lee, Yao Sheng Ng **Supervisor:** Professor Laurence Walsh

Background: Bacteria in dental unit waterlines may affect health of patients, especially the immunocompromised individuals, as well as dental staff. While many factors have been shown to affect bacterial count in dental unit waterlines, there is limited literature in this field from Australia, and particularly from South-East Queensland.

Objective: This exploratory study aimed to identify the potential effects of dental chair brand and age, along with dental unit waterlines management schemes that could affect the bacterial count in dental unit waterlines. Additionally, the results of the study can contribute to current recommendations that could be directly applicable to practices in South-East Queensland.

Methods: The age, brand of the chair and cleaning protocols were identified via questionnaires. Additionally, bacterial counts were measured with dental dipslide agar culture plates and expressed as colony-forming units.

Results: Forty practices participated in this study. Bacterial colony count was significantly higher in older dental chairs ($P > 0.05$) and silver-based protocol or no chemical-based treatment ($P > 0.05$), while chair brand observed insignificant contribution to the bacterial colony count ($P < 0.05$).

Conclusion: Overall, higher colony-forming units counts were found in older dental chairs, and in those which did not use chemical agents for water treatment. This information provides some directions for profiling dental chairs at risk of having high levels of dental unit waterlines bacteria.

Investigating the latest enzymatic pre-sterilisation adjuncts and nanotechnology in removing dentine bioburden from rotary endodontic files

Researcher: Benjamin Sheng Li Seow, Eleanor Churchill **Supervisor:** Professor Laurence J Walsh

Background: The landmark Parashos protocol for rotary endodontic file disinfection that uses the enzymatic agent EmPower™ (Metrex®) has been employed since 2003. This study aimed to improve existing methods for cleaning rotary files by investigating variations to the Parashos protocol.

Objective: This study assessed the cleaning performances of EmPower™ alternatives, namely MetriZyme™ (Metrex), Genesis®, Proxy C+®, Sonex® (Whiteley Corporation) and NanoClean™ B3 nanocellulose fibers (NovaFlux Technologies) for a modified Parashos protocol, to determine if these could yield similar or more effective outcomes.

Methods: Rotary files that were heavily contaminated by instrumenting extracted teeth were subjected to six variations of the Parashos protocol, retaining the original steps of plunging into wet sponging, and then soaking and ultrasonication in the test agent – but with abbreviated times or alternative agents. Files were scored under 45x magnification at each stage for the presence of debris. Cumulative mean cleaning scores for each adjunct were calculated and compared.

Results: Alternative modern commercial agents (MetriZyme™ (Metrex) and Genesis®, Proxy C+®, and Sonex® (Whiteley)) all showed similar or greater effectiveness than EmPower™ (Metrex) but the extent of improvement was not statistically significant. On the other hand, NanoClean™ B3 nanocellulose fibers were superior to all commercial agents (two-tailed t-test; $p=0.00011$).

Conclusions: The use of NanoClean™ and alternative agents would be suitable as alternatives to the established enzymatic cleaner EmPower™, when using the Parashos protocol. More research involving clinically contaminated files is needed to further refine protocols for cleaning rotary files.

Nanoparticle-assisted smear layer removal: An explorative study

Researchers: Barbara Lee, Tiffany Ji-Yun Chang, Nur Sakinah Kamarul Zaki **Supervisor:** Professor Laurence J Walsh

Background: Endodontic instrumentation generates smear layer which needs to be removed for disinfection and sealing of the root canal. As the conventional syringe irrigation method does not completely remove smear

layer, various enhancement methods have been proposed. Addition of nanoparticles to the irrigant may facilitate smear layer removal by creating sheer stress and thus mechanically disrupting the debris.

Objective: The main aim of this study was to assess if a combination of nano-structured cellulose (NanoClean) and EDTA removes smear layer better than EDTA alone. The supplementary objectives were to assess the extent of dentinal erosion and NanoClean residue on the root canal wall.

Methods: 42 extracted permanent teeth were instrumented with rotary NiTi files, and allocated into 4 groups based on the irrigant used (0%, 1%, 2 %, and 5% (v/v) NanoClean in EDTA). The irrigants were ultrasonically agitated. Scanning electron microscopy was used to visualise the root canal walls. To assess smear layer removal, the percentage area of open dentinal tubules (%AODT) was calculated. Dentinal erosion and NanoClean residue were assessed using qualitative scoring systems. The Kruskal-Wallis and Dunn's tests ($p < 0.05$) were used to compare the groups.

Results: There was no significant difference in %AODT nor dentinal erosion scores when using a combination of EDTA and NanoClean compared to EDTA alone. NanoClean residue was noted in middle and apical third regions of 2% and 5% samples.

Conclusions: In the given treatment conditions, addition of NanoClean to EDTA does not enhance smear layer removal nor cause dentinal erosion. Using higher concentrations of NanoClean may leave residues behind in the root canal space. Further investigations are required to optimise the specifications of nanoparticle-assisted irrigation.

The Effect of Endodontic Irrigants on the Microhardness and Hydration Characteristics of Biodentine

Researchers: Lauren Gilkison, Ying Jia Pua, Chunyang Jiang **Supervisor:** Dr Unni Pillai

Background: Tricalcium based materials minutes are the material of choice for repairing root perforations but have varying setting times ranging from 12- 180 minutes. Materials with short setting time such as Biodentine make it possible to continue the chemomechanical preparation of the root canal system in the same sitting after the perforation repair. Endodontic irrigants are used for chemomechanical preparation of root canal space. However, the effect of endodontic irrigants, particularly newer ones such as Octenidine dihydrochloride on Biodentine is not known.

Objective: To determine if exposure of Biodentine to 4% sodium hypochlorite (NaOCl), 17% ethylenediaminetetraacetic acid (EDTA) and 0.1% octenidine dihydrochloride (OCT) has any effect on its microhardness and hydration characteristics.

Methods: A total of 48 Biodentine samples ($n=12$) were allowed a 15 minute set before exposure to their respective irrigants for 30 minutes (Control, NaOCl, EDTA or OCT). Microhardness was measured with a Vicker's indenter. Data analysis for microhardness was performed using One-way ANOVA and post hoc Tukey tests. $P=0.01$ was defined as statistically significant. A single sample from each group was randomly selected to undergo x-ray diffraction using Rigaku Smartlab. Phases were identified and Rietveld refinement was used to calculate relative weight percentages. Peak intensities were normalised using EVA (Bruker, V5).

Results: EDTA had a significant effect on both the microhardness ($P<0.01$) and hydration characteristics of Biodentine, while OCT appears to have the least effect on the properties of Biodentine compared to the control ($P=0.439$). NaOCl had significant reduction in microhardness ($P<0.01$).

Conclusions: The microhardness and hydration characteristics of Biodentine appears to be minimally affected by Octenidine dihydrochloride and significantly affected by exposure to EDTA.

CBCT analysis of residual dentin thickness (RDT) after virtual post placement in the palatal roots of maxillary permanent first molars

Researchers: An Yan Tan, Lawrence Poon, Michelle EL Ng **Supervisors:** Dr George Bogen, Dr Bilal M El Masoud, Professor Alexander Moule, Professor Paul Monsour

Background: Previous research has shown a bucco-palatal curvature tendency in the palatal roots of some maxillary permanent first molars, which cannot be assessed using conventional 2D imaging. The effect of

placing parallel-sided posts at various depths on residual dentin thickness (RDT) in palatal roots of maxillary permanent first molars has not been well examined using CBCT.

Objective: To investigate the RDT of palatal roots of maxillary permanent first molars following the placement of digital post analogues of different diameters at different depths.

Methods: This digital radiographic simulation study assessed 122 de-identified existing CBCT datasets containing both maxillary permanent first molars. Digital parallel-sided post analogues of different diameters were superimposed onto CBCT images of maxillary first molars at various depths. The minimum RDT for each analogue was determined and grouped into one of three groups: no RDT, inadequate RDT, and adequate RDT. The results were analysed with Friedman, Conover post hoc and Cohen's kappa statistical tests.

Results: At all tested depths and diameters of post analogues, there were significant differences in RDT ($P < .001$). The majority of teeth ($>50.0\%$) had inadequate or no RDT. The depth of the post ($P < .001$) had a greater impact on RDT than the diameter of the post ($P > .05$) used. There was no relation between the RDT of contralateral maxillary permanent first molars in the same patient.

Conclusions: The risk of insufficient RDT ($<1\text{mm}$) after the placement of parallel-sided posts in the palatal roots of maxillary permanent first molars is minimised if the post is inserted to a depth equalling the height of the crown, compared to 5 mm, 4 mm, and 3 mm from the radiographic apex. The RDT of the palatal roots of maxillary permanent first molars on one side is not a reliable predictor of RDT of the contralateral first molar.

Prevalence and Radiographic Presentation of Incidental Soft Tissue Calcifications in the Maxillofacial region detected by Cone Beam Computed Tomography

Researchers: Hamdan Ghalib Abdat, Felix To, Nathan Nguyen **Supervisors:** Dr Alyssa Zhang, Dr Jake Samuels, Dr Dayea Oh, Professor Paul Monsour

Background: Soft tissue calcifications (STC) are common incidental findings in cone beam computed tomography (CBCT) imaging but can present asymptotically. There are several instances where these require monitoring or treatment, due to an underlying disease or gradual progression towards a more life-threatening condition. Currently there is a lack of undergraduate training in the use of three-dimensional (3D) imaging software.

Objective: To evaluate the prevalence of incidental STC findings and provide a summarised pictorial atlas of each calcification, as detected in the maxillofacial region with CBCT scans.

Methods: A retrospective analysis of 255 CBCT scans was completed. CBCT scans were classified by field of view (FOV) captured and assessed for the presence of STCs. A summarised pictorial atlas was created to demonstrate varying presentations of each STC.

Results: Of the 255 scans reviewed, 188 STCs were detected in 133 patients. Pineal gland calcifications (23.40%), palatine tonsilloliths (21.96%), laryngeal cartilage calcifications (16.67%) and stylohyoid ligament calcifications (14.12%) were the most prevalent. A pictorial atlas summarising the spectrum of presentations for different STCs has been provided.

Conclusion: The high prevalence of STCs, lack of training in 3D imaging software and an increasing use for CBCT emphasizes the importance for dentists to understand the location and presentation of different STCs. Our pictorial atlas summarizes these in a systematic manner in hopes of providing a good guide for the modern dentist to accurately interpret CBCT images for common STCs.

Social cognitive function and mental health in student populations

Researchers: Calvin Kim, Tristen Yuen Kai Lim, Matthew Wei-Ren Tan **Supervisors:** Dr Matthew Nangle, Professor Julie Henry, Dr Sarah Grainger

Background: Completing an undergraduate dental degree has been linked with an increased risk of poor mental health. A better understanding of the risk factors that predict poorer mental health would be beneficial for informing the development of interventions and strategies that might be applied as part of undergraduate training programs.

Objective: The objective of the study was to investigate the role of social cognitive function in understanding mental health and wellbeing in dental students.

Method: Undergraduate Dental students from the University of Queensland were invited to complete an online questionnaire testing various psychosocial traits of participants. The results were then used to quantify and assess the emotion regulation and social cognitive functioning of subjects, from which correlations between variables were drawn.

Results: Students who scored higher in the Interpersonal Reactivity Index for Personal Distress (IRI-PD) were found to score higher in the Hospital Anxiety and Depression Scale (HADS Anxiety). Students who scored higher in the Interpersonal Reactivity Index for Perspective-Taking (IRI-PT) were found to score lower in the Apathy Evaluation Scale (AES). A negative correlation was also found between The Awareness of Social Inference Test (TASIT) and AES. Other correlations that were found were not significant.

Conclusion: Undergraduate dental students that demonstrate higher levels of affective empathy, specifically the personal distress domain of the Interpersonal Reactivity Index, are predicted to have higher levels of anxiety. Theory of mind is suspected to be more significant in predicting apathy than current evidence suggests.

Patient knowledge of lip cancer and oral cancer

Researchers: Li-chen Yang, Lin Na Chen, Alan Yang **Supervisors:** A/Professor Norman Firth, A/Professor Soorebettu R. Prabhu

Background: Early diagnosis of lip and oral cancers allows for less aggressive treatment and improves quality of life and is the most effective means to increase survival rates. Patient knowledge of risk factors and signs and symptoms associated with lip cancer and oral cancer is crucial for increasing the likelihood of patient presentation for opportunistic screening and reducing delay in patient appraisal for early detection.

Objective: This study assessed patient knowledge regarding the risk factors and signs and symptoms for lip cancer and oral cancer and identified the socio-demographic factors that influenced knowledge.

Methods: A convenience sample of 213 adult dental patients who attended the Herston Oral Health Centre or Stafford Dental Clinic in Brisbane between July and August 2019 were invited to participate in the self-administered survey. Data analysis was performed using the chi-square test and multinomial logistic regression to identify predictors for lip and oral cancer knowledge.

Results: Smoking was the most commonly identified risk factor for lip cancer and oral cancer (81.9% and 84.4% respectively). The association between sun exposure and lip cancer was also well-known (81.9%). However, knowledge surrounding other risk factors and the signs and symptoms for both lip and oral cancers were poor. Symptomatic signs and symptoms, associated with later stages of cancer, were recognised by a greater proportion of patients compared to asymptomatic signs and symptoms. Education level was the main significant knowledge predictor for both lip and oral cancers.

Conclusions: The findings suggest the need for more targeted approaches to increase public knowledge of lip and oral cancers. Further research is required to optimise patient education and public health promotion in reducing the gaps in knowledge.

Arch Form Changes in Invisalign® Treatment: Predicted versus Achieved

Researchers: Joshua ZH Chua, Farish A Auleear **Supervisor:** Dr Tony Weir

Background: Invisalign® has been marketed as a viable alternative option to conventional braces. Increasing numbers of patients have chosen Invisalign® with the hope of employing a more aesthetic orthodontic appliance. In 2013, the company that founded Invisalign, Align Technology, introduced a new aligner material, SmartTrack®, to replace the previously employed Ex30®. Since the introduction of this new material, there have been few, if any, detailed studies carried out comparing this new material to Ex30.

Objective: To determine if there is a significant difference between the predicted virtual treatment plan known as ClinCheck® and the clinically achieved treatment for these two materials.

Methods: A sample of 50 patients that underwent Invisalign® treatment were studied. Maxillary and mandibular intercanine width, intermolar width and arch depth were measured on the stereolithography (.stl) files of the pre-treatment and post-treatment casts as well as the corresponding final ClinCheck® models. The mean differences obtained between the final ClinCheck® projection and the actual post-treatment casts were calculated and compared.

Results: There was statistically significant difference ($P < 0.05$) for maxillary intercanine width and mandibular arch depth between the two materials. There was no clinical difference between the two materials.

Conclusion: Further studies are needed to verify and extend the findings of the current study. Overcorrection of the prescribed result and aligner treatment augmentation with inter- arch elastics appear to be beneficial in achieving the desired outcome.

Assessing Inter- and Intra-rater Reliability of Romexis Compare® software

Researchers: Wen Shih, Kenny Tran, Vivian Yang **Supervisors:** Dr Sobia Zafar, Dr Bilal El Masoud

Background: Since the introduction of digital dental assessment systems, there has been a shift toward this trend as it appears to provide a more accurate, reliable, time efficient and reproducible assessment. The Planmeca Emerald™ scanner coupled with Romexis Compare® software allows students and staff to objectively assess individual crown preparations, receive numerical values of key dimensions, and subsequently undergo comparison with ideal crown preparation dimensions.

Objectives: To measure the inter- and intra-rater reliability using the intra-oral scanner and Romexis Compare® for prosthodontic crown preparation, and to evaluate the possible implementation of this software as a grading and self-assessment tool in a preclinical setting.

Methods: The Planmeca Emerald scanner and Romexis Compare® were used to compare the difference between thirty experimental preparations ($n=15$ anterior teeth, $n=15$ posterior teeth) with their respective unprepared typodont teeth. Three examiners independently scanned the plastic teeth in pre-formed standardised and non-standardised putty jigs. Each preparation was measured from facial, lingual, incisal/occlusal and margin surfaces. A second trial was completed after two weeks to assess intra-rater reliability. The data was tabulated, graphed and analysed using SPSS® and GraphPad Prism.

Results: The results of the study show greater consistencies in inter-operator measurements for anterior teeth. Some variations, however, were found in posterior teeth measurements between the operators. The results of the intra-rater measurements appear to be relatively consistent.

Conclusions: With some limitations, Romexis Compare® can be used as a reliable and repeatable method for objective and consistent evaluation of student prosthodontic preparations in a preclinical setting.

10. Research Day 2019 abstracts

Keynote speakers:

Economics of a referral management & triage programme for minor oral surgery referrals in primary care dentistry

Professor Stephen Birch

Stephen Birch is Director of the Centre for the Business and Economics of Health at the University of Queensland and part time professor in health economics at the University of Manchester (UK). Prior to moving to Australia in 2018 he spent 30 years as **professor of health economics at McMaster University where he continues as emeritus professor. Previously he worked at the Medical Care Research Unit, Sheffield University, UK and at the Centre for Health Economics, York University, UK. He has held honorary appointments at universities in Toronto (Canada), Malmö (Sweden) and Cape Town (South Africa) and Sydney (Australia).** He has a doctorate in economics from York University, a Master's degree in fiscal studies from Bath University and a Bachelor's degree in economics from Sheffield University. He served as publicly appointed board member on the Ontario Health Professions' Regulatory Advisory Council, the Hamilton, Niagara, Haldimand, Brant Local Health Integration Network and the York District Health Authority Community Health Council. He was appointed to the Canadian Academy of Health Sciences expert panel on improving access to oral health care for vulnerable people living in Canada. He has served on many committees and advisory boards on health workforce and health service planning and evaluation as well as consultant to WHO, World Bank and several national and state health ministries. He has published in a wide range of scientific journals and has particular interests in the economics of oral health care, needs-based health service and health workforce planning, access to care in underserved populations and needs-based allocation of resources and provider remuneration. He served as Senior Editor for Social Science and Medicine for 15 years and continues to serve on the editorial advisory board. He received the IADR Aubrey Sheiham award in 2017 and the IADR Distinguished Scientist award for behavioural, epidemiologic and health services research in 2019.

The Biology of Gingival Scar-free Healing

Benjamin Fournier

Oral Biology Department (Head), Paris University, Dental Faculty Garanciere, France Rothschild Hospital - Reference Centre for Rare Oral Diseases

My research group predominately focuses on oral healing. We have been working for 10 years on gingival fibroblasts and stem cells and their effects on healing. We studied their multipotency properties and their healing related characteristics. As such, I have developed a special interest with the oral mucosa *ad integrum* healing model. To also understand its distinct immune and inflammatory reactions, we exposed the tissue and the corresponding cells with microbiological aggressions. My work includes the embryological cartography of oral structures investigating their specificities of transcriptomes and proteomes, in particular matrisome, i.e. the extracellular matrix omics, due to its importance in the healing reaction. Therefore, these omics data will enable us to further understand rare oral diseases, especially ones associated with mutated genes identified as key factors in *ad integrum* healing.

The VOTIS – A Video Observation Tool for Assessment of Interprofessional Skills

E. Bartle¹, A. Hill², J. Copley², K. Luetsch³, R. Dunwoodie², T. Barnett^{1,2}, R. Olson⁴, A. Zuber²

¹*School of Dentistry, The University of Queensland,* ²*School of Health and Rehabilitation Sciences, The University of Queensland,* ³*School of Pharmacy, The University of Queensland,* ⁴*School of Social Science, The University of Queensland*

Objectives: There is increased understanding amongst the dental profession of the importance of bringing the oral healthcare team into overall healthcare planning for an individual for effective patient-centred care. Acknowledging this, internationally, explicit competencies related to teamwork skills and interprofessional (IP) approaches to health care are now included within program accreditation requirements.

To ensure students achieve these competencies by graduation, dental education has to be reformed to include meaningful learning opportunities for students to develop the knowledge and skills related to IP practice. However, assessing interprofessional skills is challenging due to practical difficulties and a dearth of scholarship and robust assessment tools. This presentation will report on a developed assessment tool, the VOTIS, for the assessment of observable interprofessional behaviours in a clinic-based setting.

Method: The VOTIS was developed following an audit of profession-specific IP requirements within physiotherapy, occupational therapy, audiology, speech pathology and dentistry, as well as a general review of literature in the areas of competencies required for IP practice and IP assessment tools. The VOTIS was piloted in a range of IP settings and student and clinical educator perceptions of the tool have been used to inform the revision of the VOTIS.

Results: A Clinical Educator Reference Group has been recruited to review the revised tool for relevance and useability. The revised tool is being trialled and further validated within a range of interprofessional clinics across the disciplines of dentistry, physiotherapy, speech pathology, occupational therapy, pharmacy, general practice and psychology.

Conclusion: While clinic-based learning activities in undergraduate dental curricula have traditionally focussed on student acquisition of technical skills, there is now a need to expand the focus to include development of teamwork and communication skills. The VOTIS is an authentic assessment model which can be embedded into existing clinic-based learning activities.

Dental students' perceptions on preclinical paediatric dentistry experience gained in Simodont® Haptic Dental Simulator

Sobia Zafar and Christopher Sexton

The University of Queensland School of Dentistry, Australia

It is essential that dental students must first reach adequate competency by preclinical simulated practice before performing invasive clinical procedures on patients. The Moog Simodont® Dental Trainer provides a virtual dental simulation environment to help train dental students.

Objectives: This cross-sectional questionnaire-based study compared the student's perception of the preclinical paediatric dentistry training gained in Simodont® and conventional simulation environment.

Methods: The dental students who completed pulpotomies and stainless steel crowns (SSCs) training in Simodont® and conventional preclinical simulation laboratory were invited to complete a questionnaire on their experience in both environments. The percentages for the distribution of responses to statements about the student's Simodont® experience and comparison of the conventional simulation training were analysed, tabulated or graphed using Stata Version 14.2.

Results: One hundred students completed the survey (59 female and 41 male participants) with an age ranges of 21-40 years. Thirty-five percent students agreed that they felt more confident about their manual dexterity skills and 29% felt more prepared to drill on paediatric teeth after working on Simodont®. Generally, participants felt more comfortable with simulation training compared to Simodont® for both exercises. Sixty-two percent of the participants agreed that working on Simodont® before simulation helped improve their preclinical skills. However, a vast majority (88%) of the students disagreed that Simodont® should replace simulation in preclinical training for pulpotomy and SSC exercises.

Conclusions: The study suggests that Simodont® could be used as an adjunct in training dental students for preclinical paediatric dentistry restorative exercises.

Dental students' knowledge and attitudes towards saliva screening for HIV

C.Y. Low¹, S.B. Kim¹, C. Liu¹, N. Stormon¹

¹The University of Queensland, School of Dentistry, Oral Health Centre, 288 Herston Road, Herston, Brisbane

Objectives: Early detection of Human Immunodeficiency Virus (HIV) allows antiretroviral therapy to commence leading to better patient outcomes. Screening for HIV with saliva testing can be undertaken by dental practitioners, and previous research has found the procedure to be fast, less invasive and better accepted by patients than traditional blood tests. However, lack of knowledge of saliva testing, time constraints and providing follow-up for positive results were identified as barriers to implementing for dental practitioners. This study aimed to investigate dental students' knowledge of HIV and their attitude towards implementing saliva testing.

Methods: Convenience sampling were used to recruit four focus groups of six to nine dentistry students from the University of Queensland. Participants completed a pre-focus group survey and were asked about their knowledge, attitudes and experiences with HIV and saliva testing. Focus group themes were mapped using Leximancer software.

Results: Thirty-three students participated in the focus groups and were mostly representative of the dentistry cohort (females= 42%, mean age= 23). Students recognised their knowledge of HIV was limited and 46% (n= 15) reported having treated a HIV-positive patient in the last year. In the focus group discussions many students were unaware saliva testing could be used to screen for HIV but believed the test could be useful for both the dental practitioner and patient. Students identified factors such as stigma, cost, and time restraints as barriers to implementing the test. Opinions varied on if the screening test was within a dental practitioner's scope of practice and believed training during their degree was needed during clinical phases of their studies.

Conclusions: This study explored dentistry students' knowledge and attitudes towards saliva screening for HIV. While students were open to implementing saliva testing in practice, our findings suggest organisational factors such as time and cost were prominent barriers. Education on saliva testing for HIV, patient counselling and referral pathways could be integrated into dentistry curriculums. Further investigation is needed into the cost- effectiveness of implementing screening in a dental setting.

Assessing Inter- and Intra-Operator Reliability of Romexis Compare® software

Shih E, Tran K and Yang V, C Sexton, El Masoud B, Zafar S

School of Dentistry, The University of Queensland School of Dentistry, Australia

Since the introduction of digital dental assessment systems, there has been a shift toward this trend as it appears to provide a more accurate, reliable, time efficient and reproducible assessment. The Planmeca Emerald™ scanner coupled with Romexis Compare® software allows students and staff to objectively assess individual crown preparations, receive numerical values of key dimensions, and subsequently undergo comparison with ideal crown preparation dimensions.

Objectives: To measure the inter- and intra-operator reliability using Planmeca Emerald™ and Planmeca Romexis Compare® software for prosthodontic crown preparation, and to evaluate the possible implementation of this software as a grading and self-assessment tool in a pre-clinical setting.

Methods: The Planmeca Emerald™ and Planmeca Romexis Compare® software were used to compare the difference between thirty experimental preparations (n=15 anterior teeth, n=15 posterior teeth) with their respective sound teeth. Three examiners independently scanned the plastic teeth in pre-formed standardised and non-standardised putty gigs. Each preparation was measured from facial, lingual, incisal/occlusal and margin surfaces. A second trial was completed to assess intra-operator reliability. The data was tabulated, graphed and analysed using SPSS and Stata.

Results: The results of the study show greater consistencies in measurements between the operators for anterior teeth. Some variations, however, were found in posterior teeth measurements between the operators. The results of the intra-operator measurements appear to be relatively consistent.

Conclusion: With some limitations, the Planmeca Emerald™ and Planmeca Romexis Compare® software can be used as a reliable and repeatable method for objective and consistent evaluation of student prosthodontic preparations in a pre-clinical setting.

Nano-Engineered Dental Implants and Abutments towards Tailored Bioactivity

K. Gulati and S. Ivanovski

The University of Queensland, School of Dentistry, Herston QLD 4006, Australia

Objectives:

- a. To modify commercial titanium dental implants/abutments using electrochemical anodization to fabricate TiO₂ nanopores, with appropriate mechanical stability.
- b. To test adhesion, proliferation and gene expression of human gingival fibroblasts and osteoblasts *in vitro* on modified surfaces.
- c. To promote macrophage immunomodulation *in vitro*.
- d. To arrive at the most optimized nano-engineered surface which simultaneously caters to integration (soft-tissue and bone) and immunomodulation.

Methods: A recently optimized electrochemical anodization (EA) technique, representing a simple, cost-effective and scalable technology, was employed to modify commercial Ti dental screws and abutments, to fabricate TiO₂ nanopores of various diameters. SEM, AFM and nanoindentation testing was used to determine surface topography and mechanical properties of the modified implants. In separate experiments, primary human gingival fibroblasts, osteoblasts and macrophages were cultured onto modified implants *in vitro*, along with controls of as-received and micro-rough Ti surfaces. Various diameters of TiO₂ nanopores were studied to evaluate soft-tissue sealing, osseointegration and immunomodulatory properties, at pre-determined time intervals (1h-7days).

Results: Findings confirmed stable formation of nanopores of various diameters onto Ti surfaces, with preserved underlying micro-roughness: yielding dual micro-and nano surfaces. Without the use of any therapeutic or bioactive agents, the nano-engineered surface alone augmented the activity of fibroblasts and osteoblasts, potentially translating into effective soft-tissue sealing and osseointegration. Furthermore, the macrophage functions were selectively modulated to achieve polarization towards enhanced healing.

Conclusions: The nano-engineered dental implants and abutments were capable of simultaneous orchestration of fibroblast, osteoblast and macrophage function, towards enhancing early stability and long-term success of current dental implants. Such approaches, which are simple and cost-effective, may be particularly applicable in achieving improved outcomes in sites with poor bone quality/quantity.

Highly ordered melt electrospinning writing scaffolds for periodontal attachment

Reuben Staples, Saso Ivanovski, Cedryck Vaquette

University of Queensland, School of Dentistry, University of Queensland

Objectives: Periodontitis results in soft and hard tissue destruction leading to periodontal attachment loss. Periodontal regeneration requires the coordinated healing of alveolar bone, cementum and periodontal ligament (PDL) for the establishment of new attachment characterized by the insertion of oblique collagen fibres in opposing mineralized tissues. This project advocates the use of a fibre guiding biphasic Melt Electrospinning Writing (FG-MEW) scaffold composed of a periodontal compartment designed to guide the oblique re-insertion of PDL tissues into the root surface and a bone compartment designed to enable rapid vascularization enabling osteogenesis.

Methods: Soft tissue guidance in the periodontal compartment was achieved by stacking several melt electropun fibres for creating MEW micro-channels (100 µm width). The guidance efficacy of the micro-channels was compared to two configurations; MEW without channels (200 µm pore size) and an amorphous sponge. The bone compartment consisted of a MEW pore size gradient (200 - 1200 µm).

Results: In vitro culture demonstrated the capacity of the micro-channels to spontaneously induce collagen and actin fibre and nuclei alignment. This was further assayed using an ex vivo periodontal model using a dentine slice cultured for 4 weeks with human periodontal ligament under osteogenic differentiation conditions, onto which a biphasic scaffold (previously cultured with hPDL for 4 weeks in ascorbic acid) was placed and subsequently secured using a suture. This assembled system was further cultured for 1 and 2 week. The histology displayed oblique alignment and attachment of periodontal ligament-like tissues onto the dentin surface. The presence of the channels resulted in high levels of oblique attachment and was reproducibly achieved over the entire dentin-biphasic scaffold interface.

Conclusion: The FG-MEW scaffold was capable of inducing systematic alignment in this ex vivo assay resembling the attachment of the native periodontium. Further in vivo studies will be carried out to confirm this finding.

Buccal Fat Pad: An untapped stromal/stem cell source for regenerating the oral and dental periodontal tissues.

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Objectives: The non-cultured fraction obtained from a fatty tissue in the oral cavity called Bichat's fat pad or the buccal fat pad (BFP) called the stromal vascular fraction (SVF) has properties of immunomodulation, anti-inflammation and angiogenesis as that of the MSCs only [1]. Freshly isolated SVF from fat tissues will usually contain up to 3% of stem/precursor cells and this is a 2500 fold higher number than the stem/precursor cells found in the bone marrow (0.002%). Furthermore, SVF treatment is suitable for autologous patient therapy for periodontal regeneration, as the procedure is less time consuming and carry less regulatory burden.

Methods: Porcine Buccal, Intrascapular (IS) and subcutaneous (SC) fat was removed and processed. Briefly, 15gms of BFP was minced and put in digestion medium for 45 min. The samples were then centrifuged and pellet resuspended in ACK lysis buffer, centrifuged again, resuspended in culture medium and passed through a 100µm cell strainer. The cells were counted and plated in T-75 flasks for 7 days. The isolated cells were put for proliferation *in vitro* and also their colony forming units (CFU) were assayed. FACS was carried out to analyse for CD 90, CD 44, CD29, CD 34 and 4. The cells were also put into for differentiation into the adipo and osteo lineages to check for their MSC like abilities.

Results: Adherent cells were obtained post processing and culture of BFP, IS and SC fat pad. BFP derived stromal/stem cells were able to proliferate in vitro and form colony forming units as generally is seen in case of MSCs. The adherent cells were also able to differentiate into the adipogenic and osteogenic lineages proving their similarity with their MSC counterparts. As analysed by FACS, the cells positively expressed the necessary MSC markers CD 90, 44 and 29 and did not express the hematopoietic markers CD 34 and 45.

Conclusions: The isolation and culture of buccal fat pad, its characterization and its ability to form osteogenic lineage clearly illustrates its use in regenerating the periodontal tissue complex

From an assessment of multiple chelators, clodronate shows potential for use in continuous chelation.

Patricia P Wright¹, Bill Kahler¹, Laurence J Walsh¹

¹The University of Queensland School of Dentistry,

Objectives: To identify chelators which when mixed with sodium hypochlorite (NaOCl) are stable, exhibiting minimal loss of free available chlorine (FAC) and can remove smear layer.

Methods: 0.25M EDTA, 0.25M EGTA (egtazic acid), 0.25M CDTA (cyclohexanediaminetetraacetic acid), 0.25M DTPA (pentetic acid), 0.5M ATMP (aminotri(methylene phosphonic acid)) and 1M HPAA, (hydroxyphosphonoacetic acid), all at alkaline pH, were mixed equally with 5% sodium hypochlorite (NaOCl). 0.5M alkaline clodronate and 0.5M Na₄etidronate were mixed equally with 10% NaOCl. The pH and temperature were measured over 80 minutes and additionally for the clodronate mixture over 18 hours. Iodometric titration was used to measure the FAC. Smear layer removal was assessed in: 1M clodronate+10% NaOCl, 0.5M clodronate+10% NaOCl, 1M etidronate+10% NaOCl, 0.5M clodronate+10% NaOCl and the sequences 5% NaOCl/17% EDTA/5% NaOCl and 5% NaOCl/17% EDTA. The area fraction occupied by open dentinal tubules as a percentage of the total area (% AF) from scanning electron microscopy micrographs was calculated using Image J. The results were statistically analysed with alpha set at 0.05.

Results: Compared to its control, the mixture 0.5M clodronate+10% NaOCl lost no FAC over 18 hours ($p > 0.05$). Other chelator mixtures lost FAC rapidly except for 0.25M CDTA

+5% NaOCl which fell to 96%, 92%, 75% and 4.9% at 20, 40, 60 and 80 minutes respectively. Temperature rises were observed in all cases except in the etidronate and clodronate mixtures. Only in the clodronate mixture did the pH remain above pH 12. Although smear layer was removed, the % AF in 1M clodronate+10% NaOCl, 0.5M clodronate+10% NaOCl, 1M etidronate+10% NaOCl was less than for 0.5M etidronate+10% NaOCl and 5% NaOCl/17% EDTA/5% NaOCl and 5% NaOCl/17% EDTA.

Conclusions: 0.5M clodronate +10% NaOCl, has potential for use in continuous chelation, Further research is needed to establish its efficacy and safety.

Small extracellular vesicles miRNAs as biomarkers in periodontal disease

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Objectives: This pilot study aims to investigate whether salivary small extracellular vesicles (sEVs) microRNAs could act as potential biomarkers for periodontal diseases.

Materials and methods: This study recruited 29 participants (10 healthy, 9 gingivitis, 10 stage III/IV periodontitis) and unstimulated whole saliva samples were collected. Salivary sEVs were isolated using a commercial size-exclusion chromatography (SEC) column and characterised by transmission electron microscopy (TEM), Western Blot and Nanoparticle Tracking Analysis (NTA). The mature miRNAs in salivary sEVs and saliva were evaluated using RT-qPCR. The discrimination power of miRNAs as biomarkers in gingivitis, periodontitis versus healthy controls was evaluated by the Receiver Operating Characteristics (ROC) curves.

Results: Salivary sEVs were comparable on sEVs morphology, mode, size distribution and particles concentration in healthy, gingivitis and periodontitis. Compared to miRNAs in saliva, three significantly increased miRNAs (has-miR-140-5p, has-miR-146a-5p and has-miR-628-5p) were only detected in sEVs in periodontitis comparing to that from healthy controls, with a good discrimination power for periodontitis diagnosis.

Conclusions: Our study demonstrated that salivary sEVs are a non-invasive source of miRNAs for periodontitis diagnosis. Three miRNAs selectively enriched in sEVs of periodontitis patients could be potential biomarkers.

Dentine changes associated with patient age and cavity site.

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Objective: To examine variations in collagen distribution and cross-linking, and mineral distribution and composition in dentine related to depth in young and mature teeth.

Methods: Posterior (n=8/ age group) were collected from Young (≤ 27 years) and Mature (≥ 52 years) patients. Teeth were sectioned mesio-distally, then prepared to shallow (0.5-0.75 mm below the dentine-enamel junction) and deep (0.5-0.75 mm above pulp chamber roof) regions within the coronal dentine. The dentine specimens were used to examine collagen (n=10/age group) or mineral (n=6/age group). For examination of collagen, dentine sections were stained with Picrosirius Red F3BA before observation using polarized and fluorescent light. For examination of dentine mineral, sections were observed using the backscatter detector on a Zeiss Sigma VP field emission Scanning Electron Microscope and analysed using Energy Dispersive X-ray Spectroscopy (SEM-EDS). Photomicrographs were first segmented using machine learning before using a custom, automated analytical script to measure segmented regions of interest before performing suitable statistical analyses on each group.

Results: Collagen cross-linking increased with patient age and dentine depth. However collagen distribution remained constant irrespective of patient age, dentine depth and site. In contrast, dentine mineral content and distribution changed with patient age, depth and site. Specifically, the peritubular cuff mineral intensity increased with age irrespective of cavity location. Although, this increase in intensity may not reflect an increase in mineral content. Analysis from SEM-EDS indicates that Calcium and Phosphorus peaks were greatest in intertubular dentine regardless of age and site, with the exception of young shallow dentine, where the peritubular mineral peaks were relatively higher as determined by SEM-EDS measurements.

Conclusion: Human dentine collagen and mineral characteristics vary with patient age and site. These findings indicate that physical variations within dentine are fundamental for the development of successful therapies used to repair or restore teeth following pathology. Thus, dental material developers and researchers should consider age-related changes in anatomical variation in dentine when developing, testing and applying regenerative and restorative products.

Oral health findings from the Australian Longitudinal Survey of Women Health

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Objectives: Longitudinal data provides an opportunity to measure the changes in oral health status across time. Changes to oral health status and the relationship with potential determinants, such as socioeconomic status, private health insurance, access to a healthcare card, rurality and smoking status were investigated.

Methods: Data from the Australian Longitudinal Study on Women's Health from approximately 10,000 women born 1946-51 were used to investigate changes in oral health across four survey waves with the baseline conducted in 2007 when they were aged about 59 and culminating when they were almost 70. Self-rated oral health was measured at each wave and the association with potential explanatory variables as measured at baseline.

Results: Across the four waves, 14.4% of participants reported their oral health as remaining constant at Excellent to Very Good and 16.8% improved. Approximately one-third of the participant's ratings fluctuated across the waves. Dental consultations in the previous 12 months was associated with better self-rated oral health. Participants that were non-smokers (OR = 2.3 (95% CI: 2.0, 2.6)), had private health insurance (OR = 2.0 (95% CI: 1.8, 2.2)), from a higher socioeconomic status (OR = 1.9 (95% CI: 1.7, 2.1)), and live in metropolitan areas (OR = 1.4 (1.0, 1.9)) were more likely to have better self-rated oral health. Participants with no problems in their mouth (eg. toothache) reported higher oral health.

Conclusions: A significant proportion of women (42%) rated their oral health as either consistently good or better; or improving over a period of ten years. Participants who had problems in their mouth and sought treatment were more likely to rate their oral health positively compared to those who did not seek treatment.

Influence of macrophage secretion on a 3D gingival connective tissue model

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Objectives: In the literature, simple and reproducible *in-vitro* models to understand the mechanisms of gingivitis physiopathology are lacking. Melt-electrospun polycaprolactone (PCL) 3D scaffolds represent structural similarity to natural extracellular matrix (ECM) which makes them an appropriate environment to emulate gingival connective tissue. This study aims to mimic the initial inflammation and the gingival tissue reaction by culturing fibroblasts on 3D PCL models with innate immunity effectors, such as macrophage secretion.

Methods: Melt electrospun PCL scaffolds were fabricated via a direct printing approach. Human gingival fibroblasts were seeded on scaffolds either with macrophage conditioned media or alone. Macrophages were modelled using a THP-1 cell line, stimulated with PMA as naïve macrophages (M0) and then with specific cues to polarize them either to M1 or M2. Live/Dead assessed cell viability and mortality, while Alamar blue assessed the cell mitochondrion metabolism. Picogreen evaluated cell density and DAPI/Actin informed us about the cell proliferation and morphology.

Results: Live/dead assay showed no significant difference in the cell viability and mortality of fibroblast with/without innate immunity effectors at day 1. At day 7 however, cell viability and density were significantly lower for fibroblasts in macrophage conditioned media environment, as was cell proliferation and mitochondrion metabolism.

Conclusions: This study compared the human fibroblast cell activity on 3D PCL models with/without innate immunity effectors. We demonstrated that macrophage secretion in an *in-vitro* connective tissue environment increased the cell mortality while decreasing fibroblast metabolism and proliferation. These results are in accordance with *in-vivo* observations during the acute gingival inflammatory reaction when macrophages extravasate within the connective tissue. Detailed understanding of advanced relationships between fibroblast and macrophage in an *in-vitro* model will help the development of novel therapies and the understanding of the initial phases of periodontitis.

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