



UNIVERSITY OF OTAGO
FACULTY OF DENTISTRY
**SIR JOHN WALSH
RESEARCH INSTITUTE**
TE POKAPŪ RAKAHAU O TĀ JOHN WALSH

Research Report

2013-2014

Sir John Walsh Research Institute Research Report 2013-14

The Sir John Walsh Research Institute (SJWRI), a Research Centre of the University of Otago, advances research and increases knowledge for the improvement of oral health in New Zealand, and provides a national focus for dental research. The Institute's innovative, future-focused, interconnected research programmes cover the spectrum of oral health research, from the molecular, through biological systems to the health of populations. The SJWRI is integral to New Zealand's only Faculty of Dentistry, ranked in the top ten internationally, and its members have well-established productive collaborations across the University and with other institutions in New Zealand and worldwide. Our mission is to undertake research that underpins our teaching and clinical practice, and that translates discoveries into measurable health improvements for all New Zealanders. The Institute is named after Sir John Walsh, Dean of Dentistry from 1946 to 1971, a strong advocate for research in dentistry and oral health.

Mission

- Advance research and increase knowledge for the improvement of oral health in New Zealand
- Support and represent the oral health research community in New Zealand
- Facilitate the communication and application of our research findings for the benefit of oral and general health worldwide

Values

- Research for Public Benefit – we are committed to carrying out research that leads to new methods for disease prevention, diagnosis, and treatment, in order to improve people's oral and general health
- Excellence – we are committed to the pursuit of excellence in research for the development of dental care to enhance the oral health of the public
- Integrity – we are committed to integrity, honesty and consistently high standards in research and in all our interactions, both internally and externally
- Accountability – we believe that we are accountable for our actions and we are prepared to submit ourselves to appropriate scrutiny
- Equity – we will ensure that our policies and practices do not discriminate unfairly or lead to other forms of unfair treatment

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We hope you enjoy this *Research Report of the Sir John Walsh Research Institute*, a full account of our research activities and achievements for 2013-14. Further details on our research programmes, activities and outputs, and individual researcher profiles are available on our website: otago.ac.nz/sjwri.

Dr James Smith

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Compiled by James Smith

Many thanks to Professor Richard Cannon, Nicole Summerfield, Donnella Aitken-Ferguson, and the staff and students of the Sir John Walsh Research Institute

Dedicated to the memory of Professor Jules Kieser, 1950-2014

Introduction from the Dean



It is an absolute pleasure to write my first introduction to the Research Report of the Sir John Walsh Research Institute.

As colleagues will know, the Faculty of Dentistry at the University of Otago has just been ranked as the 8th best Dental School in the world, which is the first time that the QS rankings have included Dentistry as a stand-alone subject. I would hold the view that this is in no small part due to the excellent research that takes place within the Sir John Walsh Research Institute. Hard on the heels of this excellent news a new building has been announced by the University and in four to five years time we will be moving into a new clinical teaching and research facility which I am sure colleagues will agree is long overdue.

Against this backdrop we are preparing for the next Performance Based Research Funding (PBRF) round which is due to take place in 2018. The University is currently running an internal round in preparation that will allow us to focus our energies and resources on achieving the best possible outcome for the Faculty.

The Research Programmes within the SJWRI continue to be strong, the addition and further expansion of a practice based research network continues apace. This will reach out and engage practitioners throughout New Zealand, bridging the gap between academia and clinical practise, allowing for a variety of challenge-led research questions to be investigated. This development will complement the already existing research that takes place within the Institute.

I congratulate Professor Richard Cannon and all the team involved within the Institute for their accomplishments and wish them all the very best for the future.

Professor Paul Brunton
Dean, Faculty of Dentistry
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Report from the Director



The mission of the Sir John Walsh Research Institute (SJWRI) is to advance research and increase knowledge for the improvement of oral health in New Zealand. This Research Report summarises our efforts over the period 2013 and 2014 to achieve this goal. There are many metrics that can be used to measure research output and performance. These include tangible, and easily quantified, outputs such as the number of publications, amount of contestable research funding awarded, and number of postgraduate degree completions. In addition, there are less tangible measures of research performance such as research collaborations, research prizes awarded, contributions to international conferences and public lectures. We have tried to capture and present these metrics in this report.

Other less tangible measures of research performance include the quality of our graduates and the reputation of our academics. This is why the result of the QS World University Rankings metric, referred to in the Dean's introduction, is so significant. In addition to measuring how many times research articles are cited by other scientists, the metric is based on academic reputation (by academics from other universities) and on how employers of graduates rate the university. This metric ranked the University of Otago Faculty of Dentistry as the eighth best Dental School in the world. This ranking reflects not only the quality of teaching within the Faculty, but also the quality of our graduates and our research.

Such research quality is not achieved within a two-year period and I would like to acknowledge the leadership and research activity within the SJWRI since its establishment in 2007. In particular, I would like to recognize the vision and enthusiasm of the inaugural SJWRI Director, Professor Jules Kieser, from whom I took over as Director in May 2014. Sadly Jules passed away in June 2014, and an obituary for Jules can be found in this Research Report.

The research required for the provision of optimal oral care is continually changing as new materials, processes and technologies become available. It is important, therefore, that the SJWRI continually adapts in order to provide the research to understand, develop, apply, and evaluate new technologies, and to underpin the training of dental students in the use of these technologies. It is noteworthy in this respect that a new SJWRI research programme was established in 2014. It is the *Craniofacial biology and clinical oral physiology* research programme led by Professor Mauro Farella. A description of this new programme is included in this report.

An important part of the mission of the SJWRI is to improve oral health in New Zealand. The Institute has recognized that this is best accomplished in partnership with oral health professionals. This is why a particular focus of the SJWRI over the last two years has been the establishment of a Practice-Based Research Network within the Clinical Research programme. We hope that a greater interaction between SJWRI researchers and the dental profession through undertaking practice-based research together will help resolve real issues for dentists and provide evidence for improved oral care.

In 2014 the SJWRI entered the world of social media under the capable moderation of SJWRI Manager James Smith. If you would like to keep up with our research news and developments please *like* the SJWRI on Facebook and *follow* @SJWRI on Twitter. The SJWRI is committed to meeting the needs of the users of dental research and we welcome feedback on our current research efforts and ideas of new ways to advance research and increase knowledge for the improvement of oral health in New Zealand.

Professor Richard Cannon
Director, Sir John Walsh Research Institute
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Sir John Walsh KBE

Sir John Walsh made such a remarkable contribution to dentistry in New Zealand that Chapter 8 of Tom Brooking's *A History of Dentistry in New Zealand* is entitled the 'Walsh Era 1947-1972.' After graduating with a first class honours degree in dentistry (followed by a medical degree), and then serving as a medical officer in the Royal Australian Air Force, this self-described 'brash Australian' was appointed as the third Dean of the School of Dentistry at the University of Otago in 1946.

Walsh was a powerful advocate for research. Staff in the Faculty of Dentistry were encouraged to undertake PhD study. The School of Dentistry set out to grow its own researchers by introducing the highly successful MDS (Master of Dental Surgery) graduate programme. Some fifty years later this degree was replaced by the Doctorate in Clinical Dentistry (DClinDent) featuring a considerably expanded research component. This increased the research experience and clinical expertise of graduates in a world where biological knowledge, and its impact on clinical practice, are changing at an unprecedented rate. This initiative undoubtedly would have been endorsed by Walsh.

One of his most significant, but least well-known achievements, was developing a high-speed dental handpiece. Early electric drills were inefficient and caused considerable discomfort to patients. While testing the hearing of Australian airmen Walsh not only identified frequencies that caused pain but also those that did not. This led to the hypothesis that the vibrational frequencies from drills of sufficiently high speeds could minimise patient discomfort.

With the assistance of H.F. Simmons from the University of Otago Department of Physics, an existing air-powered low-speed drill was modified to operate initially above the 42,000 rpm vibrational threshold, and then at 60,000 rpm. In 1947, Walsh persuaded the Ministry of Science and Industry to underwrite the development of the air turbine handpiece at the Dominion Physics Laboratory in Lower Hutt.

By 1949, a prototype was made, Walsh then obtained the results that contributed to his DDSc (Doctorate of Dental Science) from the University of Melbourne, and a New Zealand patent. Although the prototype overcame the pain problem, its high-pitched noise, excessive exhaust of air into the patient's mouth, and the too-frequent seizure of its primitive bearings (due to overheating) made it difficult to obtain further support from government or commercial sources. American and Swedish researchers had overcome the technical problems in the mid 1950s to produce the Borden Airtor.

Walsh expanded research activity within the Faculty by attracting research funding. He established the Biochemical Research Unit within the Dental School in 1960, now the Molecular Biosciences Laboratory, and supported an electron microscopy suite, now reflected in the Otago Centre for Electron Microscopy.

Walsh's appointment advanced dentistry at many levels. He served as a spokesperson for dentistry at the World Health Organisation. He led a campaign that overcame vociferous opposition to fluoridate water supplies. After 10 years of struggle he succeeded in building the iconic, heritage-listed glass curtain building that now houses the Faculty of Dentistry and bears his name.



Sir John Walsh, shown here at his desk at the Otago Dental School, 1940s. Hocken Collections, Uare Taoka o Hākēna, University of Otago. (Reference S11-534d)

Professor Jules Kieser, 1950-2014



Staff and students of the Faculty of Dentistry and Sir John Walsh Research Institute were saddened by the sudden and unexpected death of Professor Jules Kieser on 10 June 2014.

Jules was a dynamic academic who made outstanding contributions to teaching and research at the University of Otago and to forensic services in New Zealand and abroad.

He established and ran the popular forensic biology summer school paper FORB201. Several students were inspired by this course to pursue postgraduate forensic biology research under Jules' supervision.

Jules was the inaugural Director of the Sir John Walsh Research Institute, which encompasses all research undertaken within the Faculty of Dentistry. He moulded the Institute into the successful research centre that it is today. He had many research interests including oral biomechanics, anatomy, forensics, paleoanthropology and paleopathology. He was instrumental in the establishment of the annual Biomouth conference.

Jules was a valuable member of the Dunedin forensic odontology team. In addition to assisting local police with forensic investigations he received commendations for his contribution to disaster victim identification after the Boxing Day tsunami in 2004 and the Christchurch earthquake in 2011.

Jules is remembered by many for his humour, his wry smile, his passion for research and his genuine concern for his colleagues and students.

Biography

Professor Jules A Kieser

BSc BDS PhD DSc FLS FDSRCS(Ed) FFSSoc FICD FFOMP(RCPA)

Born in Pretoria, South Africa, in December 1950, Jules obtained a BSc from the University of the Witwatersrand, and qualified as a dentist in 1975.

Having completed a compulsory Army year, he went into practice first in the outback of South Africa and subsequently in London and Johannesburg. While in practice, he received a PhD in 1989 and was appointed as Reader in Craniofacial Biology and also Honorary Professor of Anatomy at Witwatersand.

In 1996 Jules was appointed to the Chair in Oral Biology, and Head of the Department of Oral Sciences, University of Otago. Subsequently he obtained a DSc in 2001 and was awarded an ad hominem Fellowship in Dental Surgery from the Royal College of Surgeons, Edinburgh. In recent years he was elected as a professional Fellow of the Forensic Science Society (UK).

In 2009 he was appointed as the inaugural Director of the Sir John Walsh Research Institute.

The Jules Kieser Memorial Trust

To honour Jules, the University of Otago Faculty of Dentistry and Sir John Walsh Research Institute established the Jules Kieser Memorial Trust.

The Trust will be used to provide an enduring tribute to his memory, by supporting PhD student research projects and providing for two undergraduate research prizes – one in oral biology and one in forensic biology.

To donate to the Professor Jules Kieser Memorial Trust, or to learn more about the Trust, please visit otago.ac.nz/jktrust.

With your help, this fund will provide a perpetual and growing tribute to a man who gave so much to dental education and research, forensic sciences and the dental profession.

A photograph of the Walsh Building at the University of Otago, featuring a modern facade with large glass windows and a section with light-colored panels. The building is partially obscured by green trees and a blue geometric overlay in the upper right. The text 'Our Highlights' is overlaid in white on the left side.

Our Highlights

UNIVERSITY OF OTAGO
FACULTY OF DENTISTRY

The Walsh Building, home of the University of Otago
Faculty of Dentistry since 1961.

Publications and Research Funding, 2013-14

Publications Summary, 2013-14

Note: To avoid double counting, unique publication counts are used when a publication has authorship from more than one department; e.g. for a publication with authors from more than one department, each department's contribution is allocated proportionally.

Clinical Services	2013	2014
Conference Contribution - Verbal presentation and other Conference outputs	0	0.33
Total	0	0.33
Office of the Dean (Dentistry)	2013	2014
Authored Book - Research	1	0
Journal - Research Article	13.14	7.45
Journal - Research Other	1	0.82
Conference Contribution - Published proceedings: Full paper	0.25	0
Conference Contribution - Published proceedings: Abstract	9.29	1.62
Conference Contribution - Poster Presentation (not in published proceedings)	0.25	0.33
Conference Contribution - Verbal presentation and other Conference outputs	0.92	3.58
Total	25.85	13.8
Oral Diagnostic & Surgical Sciences	2013	2014
Chapter in Book - Research	0.5	0
Journal - Research Article	8.63	7.88
Journal - Research Other	0.67	1.2
Journal - Professional & Other Non-Research Articles	2	0
Conference Contribution - Published proceedings: Full paper	0	1
Conference Contribution - Published proceedings: Abstract	10.22	7.17
Conference Contribution - Poster Presentation (not in published proceedings)	0	2.5
Conference Contribution - Verbal presentation and other Conference outputs	2.03	0.5
Film/Video/CD	4	0
Other Research Output	1.5	0
Total	29.55	20.25
Oral Rehabilitation	2013	2014
Chapter in Book - Research	1	1
Journal - Research Article	30.15	29.88
Journal - Research Other	3	4.33
Journal - Professional & Other Non-Research Articles	7	1
Conference Contribution - Published proceedings: Full paper	0	1.25
Conference Contribution - Published proceedings: Abstract	16.07	12.36
Conference Contribution - Poster Presentation (not in published proceedings)	1.08	5.95
Conference Contribution - Verbal presentation and other Conference outputs	2.17	1
Other Research Output	2	0
Total	62.47	56.77
Oral Sciences	2013	2014
Journal - Research Article	44.68	42.58
Journal - Research Other	5.33	7.78
Journal - Professional & Other Non-Research Articles	2	0
Conference Contribution - Published proceedings: Abstract	28.59	13.1
Conference Contribution - Poster Presentation (not in published proceedings)	3.77	6.58
Conference Contribution - Verbal presentation and other Conference outputs	4.1	3.75
Total	88.46	73.79

Sir John Walsh Research Institute (PhD students and research-only staff)	2013	2014
Journal - Research Article	0	8.53
Journal - Research Other	0	0.25
Journal - Professional & Other Non-Research Articles	0	0
Conference Contribution - Published proceedings: Abstract	0.22	7.19
Conference Contribution - Poster Presentation (not in published proceedings)	0.25	4.6
Total	0.47	20.57
Total for Sir John Walsh Research Institute/Faculty of Dentistry	206.8	185.52

Research Funding Summary, 2013-14

This table summarizes all external research funding awarded to Sir John Walsh Research Institute researchers in 2013-14, including competitive grants and commercial contracts.

Funding source	Amount
ANZAOMS Research & Education Foundation	\$11,380
Arthritis New Zealand National Research Fund	\$20,000
International agrichemical company	\$1,431,483
Biomet 3i LLC	\$112,000
Cure Kids Research Fund	\$130,292
DENTSPLY Australia Pty Ltd Research Fund	\$543
Downie Stewart Solicitors (Fuller Scholarships in Dentistry)	\$29,966
Estadio de Sa University (Research subcontract)	\$5,000
FORENZAO Charitable Trust	\$22,943
Health Research Council of NZ (HRC)	\$1,340,416
Massey University (Research subcontract)	\$3,000
Maurice and Phyllis Paykel Trust	\$26,000
Ministry of Health Oral Research Fund (administered by the NZDA Research Foundation)	\$90,729
New Zealand Dental Association Central Districts Branch (NZDA-CD Postgraduate Scholarship)	\$5,996
New Zealand Dental Association Research Foundation	\$216,454
New Zealand Lottery Grants Board	\$228,875
Otago Medical Research Foundation	\$30,000
Resorba Medical GmbH	\$53,430
Royal Society of New Zealand Marsden Fund	\$773,913
Syngenta Limited	\$41,618
Universiti Malaya (Research subcontract)	\$9,000
University of Otago Research Committee (including University of Otago Research Grants)	\$408,774
Wishbone Trust	\$13,913
Total research funding, 2013-14	\$5,005,725

News and Events

2013 SJWRI Research Day

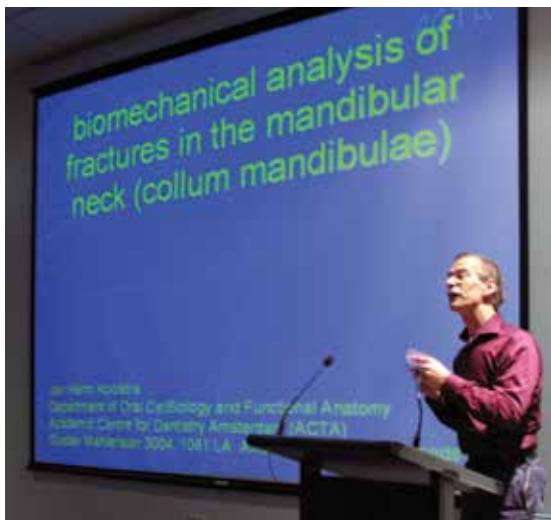
On Wednesday July 31, 2013, the Sir John Walsh Research Institute held its seventh annual research day, held for the first time at the Dunedin Public Art Gallery. Students, practitioners, and academics from around the campus and around the world joined us for a day that celebrated the



research achievements of the staff, students and collaborators of the SJWRI. The day's proceedings were opened by Professor Jules Kieser (1950-2014), then Director of the SJWRI, followed by an opening address by Professor Richard Blaikie, Deputy Vice-Chancellor (Research and Enterprise) and an address by the Dean of the Faculty of Dentistry, Professor Gregory Seymour.

Our invited keynote speaker this year was Associate Professor Jan Harm Koolstra of the Department of Functional Anatomy, Academic Centre for Dentistry Amsterdam (ACTA), who presented his research on *Biomechanical analysis of fractures in the mandibular neck (collum mandibulae)*. A common side-effect of non-surgical treatments to heal fractures of the mandibular neck is the development of an open bite, even in cases where the jaw has been wired in place to heal. Jan's group have developed biomechanical models *in silico* to predict consequences of fractures and healing techniques on future masticatory function.

More on Associate Professor Koolstra's research: acta.nl/en/research/scientific-staff-alfabetical-order/staff-member-i-l/koolstra-j-h/index.asp



Professor Jan Koolstra

Our second keynote speaker was the SJWRI's Professor Richard Cannon, 2011 winner of the supreme Sir John Walsh Research Award for sustained research excellence. Richard presented a summary of his group's work investigating resistance to antifungal drugs in the oral fungal pathogens *Candida albicans* and *Candida glabrata*. The objective of this work is to understand mechanisms of drug resistance mechanisms in *Candida*, and to discover ways of overcoming this resistance.

More on Prof Cannon's research: otago.ac.nz/healthsciences/expertise/profile/index.html?id=204

Our Student Guest Speaker was Carolina Loch Santos de Silva, whose PhD research was co-supervised by the late Prof Jules Kieser of the SJWRI and Prof Ewan Fordyce of the Department of Geology. Carolina's presentation was on her research into the morphology, structure and evolution of teeth in fossil and modern odontocetes (dolphins and related Cetacea.) Carolina used a multidisciplinary approach, with techniques ranging from morphological description and measurement, to scanning electron microscopy, nanoindentation, geochemical analyses and micro-CT scanning.

More on Carolina's research: sjwri.otago.ac.nz/students/craniofacial_biomechanics/carolina_loch_silva.php

The award for Best Student Speaker was won by Ellie Knight, who was in her final year of a Doctorate of Clinical Dentistry in Periodontology for her presentation *Quantifying the diabetes-periodontitis association*. Ellie's DClInDent research, supervised by Prof Murray Thomson, Dr Jonathan Leichter and Dr Andrew Tawse-Smith, investigated the putative association between self-reported diabetes and periodontitis in the New Zealand adult population. Ellie is pictured being presented with her award by 3M ESPE Scientific Affairs Manager, Stephen Langdon.



Ellie Knight and Stephen Langdon

The 2013 SJWRI Research Day also served as the launch for our 2011-2012 SJWRI Research Highlights, a magazine-style digest of our traditional bi-annual Research Report, released later in 2013. Copies of Research Highlights were available to all attendees.

As in previous years, the 2013 SJWRI Research Day was made possible by the generous support of 3M ESPE.

2013 Research Day Programme/abstract book:
otago.ac.nz/sjwri/otago076770.pdf

2011-2012 SJWRI Research Highlights:
otago.ac.nz/sjwri/otago076771.pdf

Celebrating research excellence: SJWRI Research Day 2014

On Thursday July 31, 2014, the Sir John Walsh Research Institute held its eighth annual research day, again at the Dunedin Public Art Gallery. Students, practitioners, and academics from around campus and around the world joined us for a day that celebrated the research achievements of the staff, students and collaborators of the SJWRI, and paid tribute to the legacy of the late Professor Jules Kieser (1950-2014), founding Director of the Institute.

The day's proceedings were opened by Acting Dean of the the Faculty of Dentistry, Professor Alison Rich, followed by a Māori welcome by Professor John Broughton and an opening address by Professor Richard Blaikie, Deputy Vice-Chancellor (Research and Enterprise).

Keynote research presentations were delivered by Dr Brian Monk (Oral Sciences), 2012 Sir John Walsh Research Award winner, on *Antifungal drug discovery – insights, highlights and reality*; Dr Don Schwass (Oral Rehabilitation) and Dr Carla Meledandri (Chemistry), on *Delivering the silver bullet: Development of a silver nanoparticle application for treating dental caries*; and Dr Jonathan Broadbent (Oral Rehabilitation), on *Fluoridation in Dunedin*.

In keeping with this year's theme of *Celebrating research excellence*, our postgraduate research students were invited to present their research. The award for Best Student Speaker was shared between Sophie Gray, who is in her final year of a Doctorate of Clinical Dentistry in Orthodontics, and forensic biology PhD student Anne-Christine (Anki) Lindström. Sophie's research, supervised by Professor Mauro Farella and the late Professor Jules Kieser, was on validation of the Cervical Vertebral Maturation method for predicting mandibular growth peak. Anki's research, also supervised by the late Prof Jules Kieser in collaboration with A/Prof Jurian Hoogewerff (Chemistry), Dr Zuzana Obertova (University of Auckland), Dr Josie Athens (Preventative and Social Medicine), A/Prof Warwick Duncan (Oral Sciences) and Dr Neil Waddell (Oral Rehabilitation), was on gunshot residue preservation in seawater.



Sophie Gray and Anki Lindstrom

The 2014 Research Day also saw the introduction of a Poster Competition for staff, undergraduate and postgraduate students. Congratulations to the winners:

Award	Name	Title	Authors
Undergraduate	Catherine Edwards	Effectiveness of single-use BDS tips for dental air-water syringes	C Edwards, V Bennani, N Chandler, B Lowe
Postgraduate	Janine Tiu	Evaluating clinical molar preparations – Using the coordinate geometry method	J Tiu, B Al-Amleh, JN Waddell, WJ Duncan
Staff	Don Schwass	Enhanced antimicrobial activity and penetration of micelle-stabilised silver nanoparticles into dentine with iontophoresis	D Schwass, C Meledandri

As in previous years, the 2014 SJWRI Research Day was made possible by the generous support of 3M ESPE. Please download the SJWRI Research Day 2014 Programme and Abstracts book for more information on our keynote and student research presentations: otago.ac.nz/sjwri/otago076766.pdf

Gallery of images from SJWRI Research Day 2014: otago.ac.nz/sjwri/news/otago078783.html

SJWRI Three Minute Thesis Competitions

Congratulations and thanks to all SJWRI PhD students who participated in our inaugural 3MT (Three Minute Thesis) Competitions in 2013 and 2014.

The SJWRI 3MT challenges participants to present their research in an engaging manner that can be understood by an intelligent audience with no background in the research area. This competition develops our PhD students' research communication skills, as well as giving them the chance to tell the Institute at large a little more about their project.

Entrants are required to present for no longer than three minutes, with the support of one slide, on the topic of their thesis. The presentation should describe the research, but should also communicate enthusiasm and the significance of the work. Presentations were judged on the following criteria:

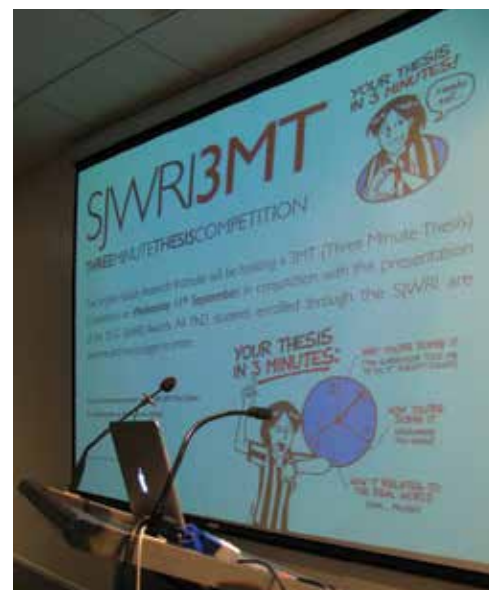
- 1. Communication style**
Was the thesis topic and its significance communicated in language appropriate to an intelligent but non-specialist audience?
- 2. Comprehension**
Did the presentation help the audience understand the research?
- 3. Engagement**
Did the oration make the audience want to know more?

In both years, PhD students presented on topics ranging right across the spectrum of SJWRI research, from the isolation of stem cells from gum tissue,

to the depictions of forensic science in the crime fiction of NZ writer Ngaio Marsh. All presentations were of an excellent standard and communicated their subject matter well.

The inaugural SJWRI 3MT Competition was held on Tuesday 10th September, 2013, and the winner was: Mohammad Alansary, PhD candidate, Oral Molecular and Immunopathology. His presentation was titled *Stem cells and the tooth fairy*, and described his work isolating and characterising multipotent cells from primary human teeth pulp at different stages of tooth resorption. otago.ac.nz/sjwri/research/oral-molecular-immunopathology/otago081397.html

The 2014 SJWRI3MT Competition for PhD students, was held on Friday May 30, 2014. The winner of the \$500 first prize was Dara Shearer, of the Dental Epidemiology and Public Health programme, for her presentation *Trajectories of Glycated Haemoglobin and Periodontitis – a.k.a. "Gums and Glucose"*. otago.ac.nz/sjwri/people/profile/otago082340.html



Sir John Walsh Research Institute Awards

Each year the Sir John Walsh Research Institute, on behalf of the Faculty of Dentistry, acknowledges and celebrates excellence in research by presenting a number of awards to staff and students.

Sir John Walsh Research Award

To acknowledge excellence in research over an extended period of time (more than 10 years) by a member of staff. The recipient receives \$3,000 towards professional development.

Basic Research Award

To acknowledge and promote basic research by a member of staff or postgraduate student. This award is to support a research development initiative that could make a contribution to the strategic direction of research within the Institute. The recipient receives \$5,000 towards their proposed research.

Clinical Research Award

To acknowledge and promote clinical research by a member of staff or postgraduate student. This award is to support a research development initiative that could make a contribution to the strategic direction of research within the Institute. The recipient receives \$5,000 towards their proposed research.

Research Publication Award

For the best paper published, or accepted for publication, in the previous calendar year. Its purpose is to recognise excellence in research by acknowledging the research calibre and effort required to produce a paper for the highest ranking journals in science or dentistry. The recipient receives \$1,000 towards professional development.

Postgraduate Research Publication Award

For the best paper published, or accepted for publication, in the previous calendar year by a Doctoral or Masters student. Its purpose is to encourage young researchers completing their masters or doctorate to publish an article in a professional refereed journal that will enhance their research portfolios. The recipient receives \$500.

Research Support Award

To recognise the excellent support provided by general staff to research groups, units and/or departments within the Faculty of Dentistry. The recipient receives up to \$2,000 for conference travel.

The Institute congratulates the following award recipients:

SJWRI Awards for 2012

Presented following the SJWRI 3MT Competition, September 10, 2013

Sir John Walsh Research Award: Dr (now Associate Professor) Monk, Molecular Microbiology
otago.ac.nz/sjwri/people/profile/?id=617

Basic Research Award: Dr Basil Al-Amleh, Biomechanics and Oral Implantology
otago.ac.nz/sjwri/research/clinical/otago061173.html

Clinical Research Award: Dr Vincent Bennani, Biomechanics and Oral Implantology
otago.ac.nz/sjwri/people/profile/index.html?id=359

Research Publication Award: Prof Murray Thomson, Dental Epidemiology and Public Health
otago.ac.nz/sjwri/people/profile/index.html?id=196

Postgraduate Research Publication Award: Darnell Kennedy, PhD candidate, Molecular Microbiology/Forensic Biology (primary supervisor: Prof Jules Kieser)
otago.ac.nz/sjwri/people/forensic-biology/otago054508.html

SJWRI Awards for 2013

Presented at SJWRI Research Day, July 31, 2014

Basic Research Award: Dr Neil Waddell, Biomechanics and Oral Implantology
otago.ac.nz/sjwri/people/profile/index.html?id=252

Clinical Research Award: Dr Lyndie Foster Page, Dental Epidemiology and Public Health
otago.ac.nz/sjwri/people/profile/index.html?id=405

Research Support Award: Kate Wheeler, Dental Epidemiology and Public Health (research group of Dr Jonathan Broadbent)
otago.ac.nz/sjwri/people/profile/index.html?id=362

2013 Postgraduate Publication Award: Kai Chun (KC) Li, PhD candidate, Biomechanics and Oral Implantology (primary supervisor: Assoc Prof Neil Waddell)
otago.ac.nz/profiles/otago034889.html



Left to right: Dr Basil Al-Amleh (Winner, Basic Research Award), the late Professor Jules Kieser (Director, SJWRI) and Mohammed Alansary (Winner, SJWRI 3MT Competition).

SJWRI Clinical Research Symposia

2013 SJWRI Clinical Research Symposium: *When practice meets research - a future full of possibilities*

The 2013 SJWRI Clinical Research Programme Symposium was held at the Dunedin Public Art Gallery on June 28, and provided an interesting and collegial day of CPD for those who attended.

The topics covered by our speakers were both informative and thought provoking, highlighting areas where our clinical decisions are more empirical than evidence-based, and forward-looking in providing glimpses of what technology can offer. Professor Mike Morgan of the University of Melbourne gave insight into eviDent, the Melbourne Dental Practice-Based Research Network, and Professor Janet Clarkson gave an entertaining podcast of the Scottish PBRN.

The feedback received has been very positive and a number of practitioners have expressed an interest in joining our Practice-Based Research Network. PBRNs foster relationships between practitioners and academics by investigating research questions of relevance to daily clinical practice. Benefits most often cited include collegiality, learning opportunities and improved patient care.

Our 2013 Symposium speakers included:

Suzanne Hanlin – Digital dentistry in Prosthodontics. From CAD/CAM to Webcam and everything in between

Basil Al-Amleh – Ceramic fractures and their origins

Andrew Tawse-Smith – Challenges of oral implant maintenance

Mike Morgan – Practice based research networks: eviDent

Jan Clarkson – Practice based research networks: The UK experience (Podcast)

Jonathan Broadbent – The animated dental chart

Bernadette Drummond – Management for molar-incisor hypomineralisation with and without enamel breakdown

Lara Friedlander – The use of contemporary endodontic techniques to improve patient outcomes

For more information on our 2013 Clinical Research Symposium speakers, including biographies and outlines of their presentations, please visit otago.ac.nz/sjwri/research/clinical/otago061173.html

2014 SJWRI/ARCH Clinical Research Symposium: *Starting in research: Let's get it right!*

The SJWRI and ARCH Network Clinical Research Symposium was held at the University of Otago on 14 Feb 2014. The symposium was aimed at academic staff, postgraduate research students and dental practitioners interested in participating in clinical research in oral health and dentistry.

ARCH (Applied Research through Clinicians' Hands) is a new Dental Practice-Based Research Network (PBRN) which is being established through the SJWRI Clinical Research Programme. PBRNs foster relationships between practitioners and academics by investigating research questions of relevance to daily clinical practice.

Suzanne Hanlin, Director of the ARCH Network gave an introduction and welcome to the attendees, which was followed by a presentation by Neil Pickering (Senior Lecturer, Bioethics Centre) on *Key issues in research ethics*.

Gary Witte, Manager of Academic Committees for the University of Otago Ethics Committee, gave a presentation on *Human Participant Research Ethics: Frameworks and Practicalities*.

Following afternoon tea, Trish Leishman, Health Sciences Librarian gave a talk on *Getting your teeth into research: tools and skills for finding information*.

More on our Clinical Research programme: otago.ac.nz/sjwri/research/clinical/index.html

More on the ARCH Network: otago.ac.nz/arch/index.html

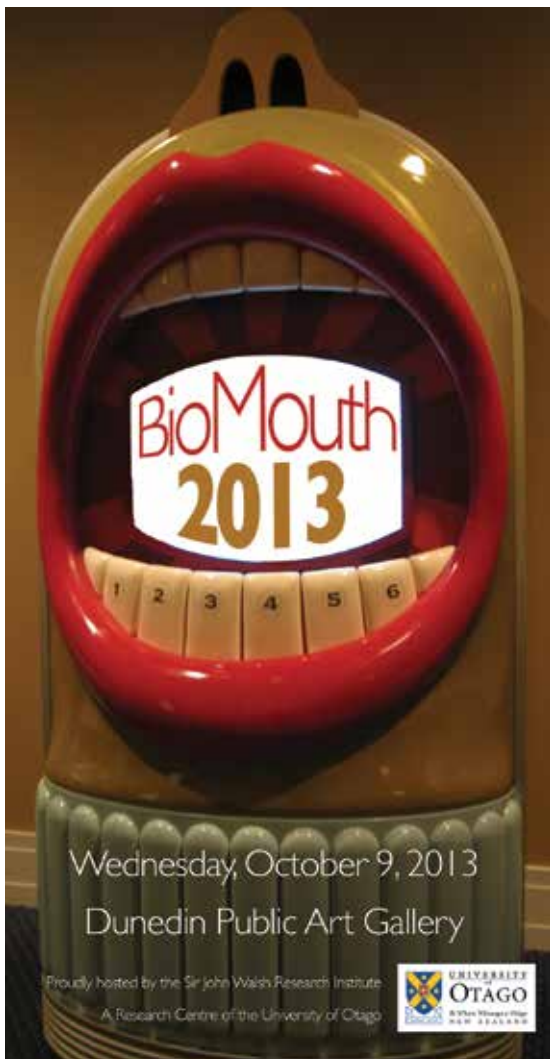
If you are a dental practitioner and are interested in joining our PBRN, or would like further information, please contact the ARCH Network by emailing arch.dentalpbrn@otago.ac.nz



Suzanne Hanlin presenting at the 2014 Clinical Research Symposium.

SJWRI hosts 9th NZ Biomouth Conference

The Sir John Walsh Research Institute hosted the 9th NZ Biomouth Conference at the Dunedin Public Art Gallery on the 9th October, 2013. The Biomouth Research Group is a collaborative collection of researchers from institutions across New Zealand, all of whom are interested in various aspects of human mastication, jaw mechanics, food development, dentistry, and other related areas of research. The accent of this year's conference was again on student participation, with a wonderful turnout (17 presentations) from all over New Zealand. The invited overseas keynote speaker for the 9th Biomouth Conference was Jianshe Chen, of the School of Food Science and Nutrition, University of Leeds, who spoke on *Oral capability of food handling and bolus swallowing*.



Jianshe Chen

The Biomouth Research Group was established in 2004, and includes researchers from across New Zealand unified by their interest in various aspects of human mastication. The group includes researchers from the University of Otago, the University of Canterbury, Massey University, the University of Auckland and the Plant and Food Research Crown Research Institute. The Biomouth Research Group aims to:

- Foster communication and collaboration between existing research groups within New Zealand that are involved or interested in mastication, jaw mechanics, food development, dentistry, and other related areas.
- Raise our profile and showcase our research locally and internationally.
- Seek collaboration with overseas laboratories.
- Actively seek research funding for collaborative Biomouth research projects.

For more information, please visit the Biomouth website at biomouth.org

2013 HRC Funding Round success for Dr Brian Monk

Sir John Walsh Research Institute research is helping pave the way for novel antifungal drugs designed to overcome the world-wide problem of increasing resistance to current treatments.

In July 2013, Dr (now Associate Professor) Brian Monk of the SJWRI's Molecular Microbiology research programme was awarded a three-year Project grant worth \$1.19M in the 2013 HRC Funding Round, for his project *Structure-directed antifungal discovery*. Other named investigators from the SJWRI involved in this project are Professor Richard Cannon and Dr Mikhail Keniya, along with Dr (now Associate Professor) Joel Tyndall of the School of Pharmacy.



Associate Professor Brian Monk

Fungal infections by organisms such *Candida*, *Aspergillus* and *Cryptococcus* play an increasingly significant role in disease. Infections such as thrush

affect premature babies, the elderly, females of reproductive age, individuals with dry mouth and terminal cancer patients. They can be fatal; 1.4 million people die annually due to fungal infections made worse by co-infections with tuberculosis and AIDS or by medically-induced immune deficiency. To date, efforts to expand the array of antifungal treatments available have been hindered by the lack of molecular-level understanding of potential drug targets and mechanisms causing drug resistance.

Dr Monk described the project as follows:

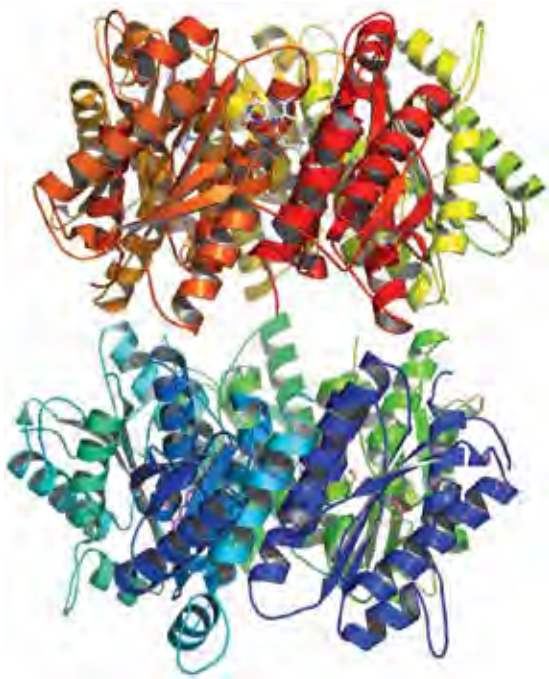
“There is an urgent need to augment the widely-used and well-tolerated but drug resistance-susceptible triazole drugs with broad-spectrum antifungals that target fungal lanosterol 14-alpha-demethylase (Erg11p) and not human CYP51. We have obtained high-resolution X-ray crystal structures of yeast Erg11p with substrates and triazole inhibitors bound. We will apply our unique knowledge of cytochrome P450 structure and function and use a comprehensive set of screens to identify new antifungals. Our research will confirm key biochemical properties of the enzyme, identify a product egress pathway, and resolve the structures of the Erg11ps of several important fungal pathogens and human CYP51. Computer-aided drug design, yeast-based high throughput screens, secondary screens, counterscreens plus a combinatorial chemistry capacity will be used to identify efficiently optimal hits as Erg11p-specific drug candidates. The identification of new classes of antifungals will provide models for drug discovery and development that circumvent the ubiquitous activities of cytochrome P450 enzymes.”

In July 2013, SJWRI Molecular Microbiology PhD student Madhu Shankar, jointly supervised by Dr (now Associate Professor) Monk of the SJWRI and Dr (now Associate Professor) Joel Tyndall of the National School of Pharmacy, published the crystal structure of the enzyme lumazine synthase from the fungal pathogen *Candida glabrata* in the highly regarded biological crystallography journal *Acta Crystallographa D*, which has an Impact Factor of 14.1. This is the first crystal structure of a protein published by researchers working in the SJWRI.

Candida glabrata has emerged as an important fungal pathogen with intrinsic resistance to azole drugs, and this is driving the need to identify new drug targets. Lumazine synthase is part of the riboflavin-

biosynthesis pathway, which is essential to fungi and bacteria and is a potential drug target for the development of broad-spectrum antifungal drugs.

The X-ray crystal structure of recombinant lumazine synthase from *C. glabrata* was obtained at 2.24 Angstrom resolution, and revealed a dimer of homopentamers, with one in five subunits containing a product molecule from the catalytic reaction.



X-ray crystal structure of recombinant enzyme lumazine synthase from *C. glabrata*, complexed with the product of catalysis. Image via Madhu Shankar, PhD student.

Otago discovery aids in fight against antifungal drug resistance

In February 2014, researchers led by Associate Professor Monk working with colleagues at the University of California San Francisco, published the complex structure of a full-length lanosterol 14 α -demethylase, a key cell membrane protein involved in sterol metabolism and drug resistance, in the prestigious US journal *Proceedings of the National Academy of Sciences* (PNAS). Lanosterol 14 α -demethylase is a membrane monospanning cytochrome P450 of the CYP51 family that catalyzes the first postcyclization step in ergosterol biosynthesis, and is inhibited by triazole drugs. Dr Monk says the research team's feat will provide new insights into mechanisms underlying fungal resistance to triazole drugs and aid in efforts to develop new broad-spectrum drugs with minimal side-effects.

"Membrane proteins in general are important molecules in cells, and represent around 70 per cent of all drug targets. However, they are notoriously tricky for scientists to extract from cells and successfully study, so we are delighted that we have been able to do so."

The structure reveals new features likely to be held in common with many known membrane proteins, including closely related proteins that modify the action of commonly prescribed drugs.

"They tell us how the fungal enzyme and its relatives interact with the membrane and provide important clues about relationships with substrates, inhibitors and products that have broad implications for biology, drug design and personalised medicine."

2014 was the United Nations-sanctioned International Year of Crystallography in honour of a century of multidisciplinary contributions. Yet, despite their biological significance, less than 0.5% of the protein structures so far determined worldwide are for membrane proteins, due to the difficulties with ordered crystallization of these proteins. Membrane proteins of the type investigated by Assoc Prof Monk and coworkers (bitopic membrane proteins with one transmembrane helix) were, prior to this publication, absent from Protein Data Bank repositories, which has limited understanding of how single-transmembrane helices orient enzymes and sensors at the membrane surface.

The next steps for Assoc Prof Monk and colleagues are further study of the membrane protein in several important fungal pathogens and use state-of-the-art screening technology to identify new broad-spectrum drugs that target this protein.

The research was supported by the US National Institutes of Health, the Marsden Fund of New Zealand, and the Otago Medical Research Foundation. The ongoing research, as noted above, is supported by the Health Research Council of New Zealand.

Assoc Prof Monk's international co-authors on the PNAS paper include Dr Thomas Tomasiak and Professor Robert Stroud of the University of California, San Francisco and Associate Professor Jeffrey McDonald of the University of Texas Southwestern Medical Center. Local co-authors include Professor Richard Cannon, Associate Professor Joel Tyndall, Dr Mikhail Keniya and PhD student Franziska Huschmann.

Publication Details:
pnas.org/content/111/10/3865

More on Assoc Prof Monk's research:
otago.ac.nz/healthsciences/expertise/profile/index.html?id=617

More on the Molecular Microbiology research programme:
otago.ac.nz/research/sjwri/research/molecular_microbiology.php

Marsden success for Professor Richard Cannon

The SJWRI congratulates Professor Richard Cannon, Dr Erwin Lamping and their group within the Molecular Microbiology research programme for their success in the 2013 Marsden Fund round, announced in late October. Professor Cannon and colleagues were awarded \$773,913 over three years, commencing 2014, for their proposal *'Fungal drug resistance - not as simple as A-B-C'*.

Multi-drug-resistant fungal infections of humans have high mortality rates. This resistance is usually caused by the overexpression of pleiotropic drug resistance (PDR) ATP-binding cassette (ABC) membrane protein transporters that have a distinct topology compared to other well-studied classes of ABC protein. PDR pumps are predicted to contain large extracellular loops that are not present in other ABC proteins.

Professor Cannon's group has extensive preliminary evidence from the analysis of both site-directed and resistance-conferring mutations that existing models of PDR transporters are inaccurate. They have proposed that the extracellular loops form 'lids', and transmembrane segments form 'gates', essential for substrate selection/transport and inhibitor binding.

To test this hypothesis, they will employ molecular genetic, biochemical, and biophysical techniques in three complementary approaches to show that the lid and gate structures contribute to a novel ABC protein transport mechanism, and represent unique, specific, targets for clinically important PDR proteins.

Further information:

Professor Richard Cannon's research profile:
otago.ac.nz/sjwri/people/profile/index.html?id=204

The SJWRI's Molecular Biosciences Laboratory, home of Professor Cannon's research group:
otago.ac.nz/sjwri/research/molecular-microbiology/otago054692.html

Marsden fund supports \$13 million worth of Otago research (University Media Release):
otago.ac.nz/news/news/otago058112.html



Professor Richard Cannon

Joseph Antoun awarded Emerging Researcher First Grant by the Health Research Council



Joseph Antoun

In May 2013, Joseph Antoun of the SJWRI and the Department of Oral Sciences was awarded a highly prestigious Health Research Council Emerging Researcher First Grant. The award, worth \$149,462 over three years, was made for his project *The genetics of dentofacial growth anomalies* with Professor Mauro Farella and Professor Murray Thomson of the SJWRI, and Associate Prof Tony Merriman of Biochemistry.

Having completed his Doctorate of Clinical Dentistry in 2013, Joseph is a senior lecturer in the Department of Oral Sciences, and a member of the Craniofacial Biology and Clinical Oral Physiology research programme,

established in 2014 and led by Prof Farella. The objective of Joseph's research is to investigate the relationship between selected candidate genes and specific forms of the face (e.g. underdeveloped lower jaws) that often leads to functional and aesthetic problems requiring orthodontic or surgical treatment.

The research will recruit individuals with clinically important facial anomalies (i.e. typical orthodontic patients), as well as control participants. DNA samples will be used to analyse and compare genetic differences in candidate genes between the two groups.

His research will investigate the relationship between selected candidate genes and such specific forms of the face.

He aimed to establish a genetic data base and ultimately hoped "to substantially improve our understanding of the biological basis of facial growth".

The possible effects of an interaction between genetic and environmental factors, such as oral habits (e.g. thumb-sucking), will also be investigated. This project will establish a genetic database that can be followed up longitudinally and may substantially improve our understanding of the biological basis of facial growth.

More on Joseph's research:

otago.ac.nz/sjwri/people/profile/index.html?id=1704

More on the Craniofacial Biology and Clinical Oral Physiology research programme:

otago.ac.nz/sjwri/research/otago089660.html

Fluoridating water does not lower IQ: Otago research

University of Otago research out of the world-renowned Dunedin Multidisciplinary Study, published in May 2014, does not support claims that fluoridating water adversely affects children's mental development and adult IQ.

The researchers were testing the contentious claim that exposure to levels of fluoride used in community water fluoridation is toxic to the developing brain and can cause IQ deficits. Their findings were published in the highly respected *American Journal of Public Health*.

The Dunedin Study has followed nearly all aspects of the health and development of around 1000 people born in Dunedin in 1972-1973 up to age 38.



Dr Jonathan Broadbent

Lead author Dr Jonathan Broadbent says the new research focused on Study members' fluoride exposure during the first five years of their lives, as this is a critical period in brain development, after which IQ is known to be relatively stable.

Dr Broadbent and colleagues compared IQs of Study members who grew up in Dunedin suburbs with and without fluoridated water. Use of fluoride toothpaste and tablets was also taken into account.

They examined average IQ scores between the ages of 7-13 years and at age 38, as well as subtest scores for verbal comprehension, perceptual reasoning, working memory and processing speed. Data on IQ were available for 992 and 942 study members in childhood and adulthood, respectively.

Dr Broadbent says the team controlled for childhood factors associated with IQ variation, such as socio-economic status of parents, birth weight and breastfeeding, and secondary and tertiary educational achievement, which is associated with adult IQ.

“Our analysis showed no significant differences in IQ by fluoride exposure, even before controlling for the other factors that might influence scores. In line with other studies, we found breastfeeding was associated with higher child IQ, and this was regardless of whether children grew up in fluoridated or non-fluoridated areas.”

Dr Broadbent says that studies that fluoridation opponents say show that fluoride in water can cause IQ deficits, and which they heavily relied on in city council submissions and hearings, have been reviewed and found to have used poor research methodology and have a high risk of bias.

“In comparison, the Dunedin Multidisciplinary Study is world-renowned for the quality of its data and rigour of its analysis,” he says.

“Our findings will hopefully help to put another nail in the coffin of the complete canard that fluoridating water is somehow harmful to children’s development. In reality, the total opposite is true, as it helps reduce the tooth decay blighting the childhood of far too many New Zealanders.”

This work was supported by the New Zealand Ministry of Education, the New Zealand Department of Health, the New Zealand National Children’s Health Research Foundation, US National Institute of Dental and Craniofacial Research Grant R01 DE-015260-01A1, UK Medical Research Council Grant MR/K00381X/1, US National Institute on Aging Grant AG032282, and a programme grant from the Health Research Council (HRC) of New Zealand. The Dunedin Multidisciplinary Health and Development Research Unit is supported by the HRC.

Publication details:

Community Water Fluoridation and Intelligence: Prospective Study in New Zealand

Jonathan M. Broadbent, PhD, W. Murray Thomson, BSc, PhD, Sandhya Ramrakha, PhD, Terrie E. Moffitt, PhD, Jiaxu Zeng, PhD, Lyndie A. Foster Page, BSc, PhD, and Richie Poulton, PhD
Am J Public Health. doi:10.2105/AJPH.2013.301857

Otago Dental Professor receives international distinguished scientist award

On 24 June 2014 the International Association for Dental Research (IADR) presented Professor Murray Thomson with the 2014 IADR Distinguished Scientist Award in Geriatric Oral Research during the Opening Ceremonies of the 92nd IADR General Session & Exhibition in Cape Town, South Africa. In doing so, Professor Thomson became the first New Zealander ever to win two prestigious awards from the IADR.

Murray Thomson is a professor of dental epidemiology and public health. He earned his BSc, BDS and Master of Community Dentistry degrees from the University of Otago, an MA from the University of Leeds, UK, and a PhD from the University of Adelaide on a longitudinal study of dry mouth and tooth decay in older people.

Professor Thomson entered academia in 1994 after five years in general dental practice in New Zealand and England, and seven years in this country’s public dental sector. He has been at Otago in his academic and research role since 1996.

He has received numerous awards for his work, including the Alan Docking Award for Distinguished Research in Dentistry (2009), and the IADR H. Trendley Dean Distinguished Scientist Award in Epidemiology and Public Health (2010).

His epidemiological and clinical research covers a wide range of subjects and has been supported by grants from several funding bodies in the US and New Zealand. These include the US National Institutes of Health, Bethesda; the New Zealand Dental Association; the Health Research Council of New Zealand; and the New Zealand Ministry of Health. Currently, he is editor of the New Zealand Dental Journal and an associate editor for Gerodontology and for Special Care in Dentistry

The Geriatric Oral Research Award consists of a monetary prize of USD\$3,500 and plaque. The award is designed to stimulate, encourage, and recognize outstanding research accomplishments in the field of geriatric oral research, is one of the 16 IADR Distinguished Scientist Awards, and is one of the highest honours bestowed by IADR.



Professor Murray Thomson

About the International Association for Dental Research

The International Association for Dental Research (IADR) is a nonprofit organization with nearly 11,500 individual members worldwide, dedicated to: (1) advancing research and increasing knowledge for the improvement of oral health worldwide; (2) supporting and representing the oral health research community, and (3) facilitating the communication and application of research findings.

For more information on the IADR, please visit iadr.org

Colgate NZ IADR Student Poster and Travel Awards

Each year, the SJWRI and the Faculty of Dentistry in conjunction with the IADR New Zealand Section holds a research poster competition to select students to represent NZ at that year's IADR Australia/New Zealand Annual Scientific Meeting. In both 2013 and 2014, two prizes of \$NZ2000 were kindly made available by Colgate New Zealand, with two further IADR ANZ Division Travel Grants, supported by the Faculty of Dentistry, also being awarded.

Congratulations to the winners of the 2013 Colgate NZ IADR Student Poster Competition and Travel Awards, held on Friday 19 April, with the awards made by the Dean on Tuesday 23 April:

Colgate Award, Undergraduate

Dhara Tilwala, *New Zealand Dental Therapists' knowledge and beliefs regarding child maltreatment*. Supervisors: Dr Jonathan Broadbent, Colleen Murray.

Colgate Award, Postgraduate

Janine Tiu, *Objectively evaluating crown margins and core design – a pilot study*. Supervisors: Dr (now A/Prof) Neil Waddell, Prof Michael Swain.

IADR ANZ Division Travel Grant, Undergraduate

Deepa Mistry, *Molecular analysis of Candida albicans ABC transporter Cdr1p*. Supervisors: Dr Kyoko Niimi, Dr Masakazu Niimi, Prof Richard Cannon.

IADR ANZ Division Travel Grant, Postgraduate

Diogo Zanicotti, *Human adipose-derived stem cells on titanium surfaces*. Supervisors: Dr Dawn Coates, Prof Greg Seymour, A/Prof (now Prof) Warwick Duncan.

On Tuesday 20 May 2014, the 2014 Colgate IADR NZ Section Student Poster Competition winners were announced.

Colgate Award, Undergraduate

Catherine Edwards, *Effectiveness of single-use tips for dental air-water syringes*. Supervisors: Dr Vincent Bennani, A/Prof Nick Chandler, Dr Bronwyn Lowe (Applied Sciences)

Colgate Award, Postgraduate

Joanne Choi, *Continuous measurement of intraoral pH and temperature: development and validation of an appliance*. Supervisors: Dr (now A/Prof) Neil Waddell, Prof Michael Swain.

IADR ANZ Division Travel Grant, Undergraduate

Linda Hwang, *Effect of air-polishing treatment on titanium surfaces: an in vitro study*. Supervisors: Dr Vincent Bennani, Dr Andrew Tawse-Smith, Prof Richard Cannon, Dr Geoffrey Tompkins, Dr George Dias (Anatomy).

IADR ANZ Division Travel Grant, Postgraduate

Alia Sagatova, *Erg11p structure of triazole resistant and susceptible strains of yeast*. Supervisors: Dr (now A/Prof) Brian Monk, Dr (now A/Prof) Joel Tyndall, Dr Mikhail Keniya



Left to right: Colgate postgraduate award winner Joanne Choi, Colgate Scientific Affairs Manager Dr Rebecca Schipper, and Colgate undergraduate award winner Catherine Edwards.

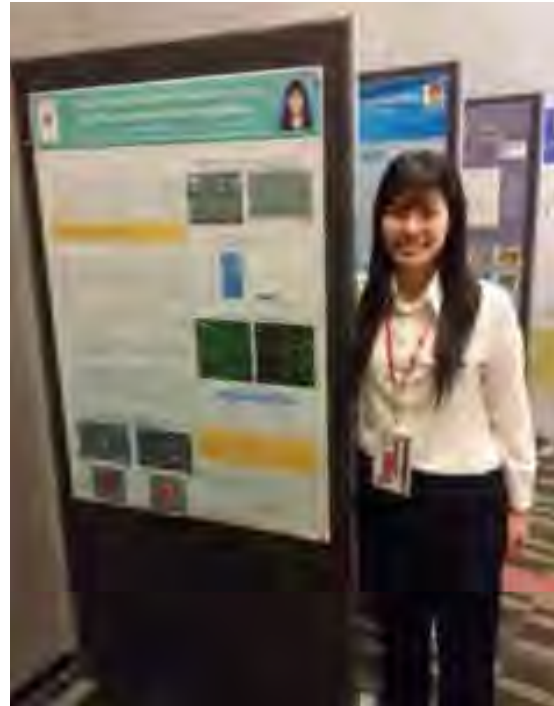
Thanks to judges Dr Jonathan Broadbent, Associate Professor Nicholas Chandler and Dr Geoffrey Tompkins, and all who entered.

Student success at IADR ANZ Annual Scientific Meetings 2013 and 2014

BDS student Deepa Mistry won the IADR Australia/ NZ divisional student poster competition (junior category) at the IADR ANZ Division meeting in Bangkok, August 2013. Deepa's project was titled *Molecular analysis of Candida albicans ABC transporter Cdr1p*, and involved mutational analysis of Cdr1p for functional and structural analysis. She was a summer student in the Molecular Microbiology Programme in 2012-13 supervised by Dr Kyoko Niimi, Dr Masakazu Niimi and Professor Richard Cannon, and winner of an IADR ANZ Division Travel Grant in the 2013 Colgate IADR NZ Student Poster Competition. Following her success, Deepa presented her work at the international meeting of the IADR in Cape Town, South Africa in 2014.

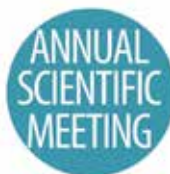
BDS student Linda Hwang was the winner of the Junior Colgate Award for the best undergraduate research poster at the 54th Annual Scientific Meeting of the International Association for Dental Research Australia & NZ Division in Brisbane, in October 2014. The title of Linda's poster was *Effect of air-polishing on titanium surfaces, biofilm and biocompatibility*. As part of her prize, Linda was supported to present her work at the General Session of the IADR in Boston in 2015. Congratulations to Linda, and her supervisors Dr Vincent Bennani, Dr Andrew Tawse-Smith, Prof Richard Cannon, Dr Geoffrey Tompkins and Dr George Dias (Anatomy).

Also representing the SJWRI at IADR ANZ 2014 were PhD students Joanne Choi, Norhasnida Nordin and Alia Sagatova, DCLinDent students Noor Othman and Wan Thani, BDS student Catherine Edwards, Professor John Broughton, Acting Dean Professor Alison Rich, and SJWRI Research Manager James Smith.



Linda Hwang

During the closing ceremony of the meeting, Dunedin was announced as host city for IADR ANZ 2015, the 55th Annual Scientific Meeting of the IADR ANZ Division, which will be held at the Dunedin Public Art Gallery from August 23-26 next year. Dental and oral health researchers from across Australasia are warmly invited to combine cutting-edge research with culture, adventure, and Southern hospitality at IADR ANZ 2015, the 55th Annual Scientific Meeting of the International Association for Dental Research Australia and New Zealand Division, which will take place in Dunedin this August at the Dunedin Public Art Gallery. For more information, please visit otago.ac.nz/iadrantz2015



Drill-free dentistry may cure kids of dental fears

An HRC-funded feasibility study led by Dr Lyndie Foster Page of the SJWRI has demonstrated that children significantly prefer a new way of treating tooth decay that doesn't involve needles or drills. Tooth decay is the most common chronic disease affecting children worldwide. Dr Foster Page and colleague Ms Dorothy Boyd, a specialist paediatric dentist, have been investigating the application of a promising new approach, the Hall technique, to arrest dental decay in primary teeth.

"Many children in New Zealand suffer from poor oral health. Tooth decay is the most common chronic disease affecting children worldwide," says Dr Foster Page.

Dr Foster Page and Ms Boyd trained 10 Hawkes Bay dental therapists to use the 'Hall technique', which involves placing a stainless steel crown over a baby molar tooth to seal the decay in, rather than the conventional method of removing the decay with a drill and then placing a filling. Starved of nutrients, the decay then stops or slows down. The crown remains in place until the tooth falls out naturally around age 10.

The Hall technique, which was developed by Scottish dentist Dr Norna Hall, involves placing a stainless steel crown over a baby molar tooth to seal the decay in, rather than the conventional method of removing the decay with a drill and then placing a filling. Starved of nutrients, the decay then stops or slows down. The crown stays in place until it falls out naturally with the tooth at about age 10.

Of the nearly 190 children between 5 and 8 years old who took part in the Hawke's Bay study, just over half were Māori. Nearly 100 children received treatment for their decayed teeth using the Hall technique, while the remainder were treated using conventional methods. Many of the children already had six or seven fillings in their mouth, and two-thirds came from low socio-economic status areas.

Dr Foster Page said the study showed that children treated in the new way, which doesn't require anaesthetic, reported less dental anxiety than those who had received conventional care. Interestingly, almost all (90 per cent) of those treated with the Hall technique reported enjoying their clinic visit; among those conventionally treated, the figure was 52 per cent.

Dental phobias are generally thought to develop in childhood, and a traumatic experience may leave a person feeling anxious about visiting the dentist. "If children don't fear going to the dentist, we believe

they'll be more inclined to go regularly for check-ups when they are adolescents and adults, but there is more work to do to understand exactly why the children said they preferred the new technique." As well as reducing the fear factor, the Hall technique was, on average, up to 20 minutes quicker than conventional treatment, and it had a much higher success rate.

"After six months, children who had conventional treatment had twice as many dental abscesses and nearly three times as many replacement fillings as those who were treated with the Hall technique," says Dr Foster Page.

"There's a strong shift in dentistry towards not removing all the decay in the tooth. We know that when we drill a tooth, the tooth doesn't like it; you get an inflammatory response. If the decay is close to the nerve then perhaps it's best to leave it."

The study is the first in the world where dental therapists have placed stainless steel crowns using the Hall technique. A five-year randomised control trial in Scotland (where dentists instead of dental therapists carried out the procedure) also showed that parents, children and dentists preferred this method of treatment.

"At first, some parents were concerned that people might judge children who had these crowns because of the way the crowns look. Many people today want white fillings. However, after the treatment, we found that the overall positive response of children to the treatment, and the fact that children didn't need an injection or to go back for replacement restoration work, seemed to far outweigh this concern."

Crowns cost more than conventional amalgam or white fillings, but Dr Foster Page says they could work out more economically in the long term.

"Replacing a filling two or more times during a tooth's life may actually cost more than a crown in the long term with labour costs included – and then there's the cost to children's well-being."

The success of the feasibility study has been reported widely in the national media, including in the New Zealand Herald and Otago Daily Times, as well as on national radio.

Dr Foster Page and Ms Boyd presented the findings of this feasibility study to the Hawke's Bay District Health Board and at the International Association for Dental Research in Seattle (USA). With the securing of further funding (see sidebar), they are now carrying out a randomised control trial of the Hall technique in New Zealand children.



Dr Lyndie Foster Page with fellow 2013 Early Career Award winners Dr Karen Brounéus (National Centre for Peace and Conflict Studies) and Dr Carla Meledandri (Chemistry).

Dr Lyndie Foster Page was one of five up-and-coming University of Otago academics whose outstanding research contributions were recognised through the 2013 Early Career Awards for Distinction in Research. Dr Foster Page, along with Dr Karen Brounéus (National Centre for Peace and Conflict Studies (Faculty of Dentistry), Dr Carla Meledandri (Chemistry), Dr Suetonia Palmer (Medicine, Christchurch), and Dr Virginia Toy (Geology) were selected based on their impressive research achievements at an early stage of their career. Announcing the awards, Deputy Vice-Chancellor (Research and Enterprise) Professor Richard Blaikie said that the five are shining examples of the depth and breadth of talent amongst the University's strong body of up-and-coming researchers.

"I warmly congratulate each on their notable contributions within their disciplines, work which is already creating new knowledge that underpins improvements in health, technology, social wellbeing and our understanding of environmental processes."

Professor Blaikie says that not only do these talented staff play an important role in the University's current research effort, they are also well-placed to be among Otago's future research leaders. The Early-Career Award for Distinction in Research includes a \$5000 grant for the recipient to use for research and scholarly development. Recipients also become members of the University's O-Zone Group of early-to-mid-career researchers.

In December 2013, the SJWRI's Dr Lyndie Foster Page, Dorothy Boyd, Professor Murray Thomson, Dr Jonathan Broadbent and Associate Professor Warwick Duncan were awarded a Cure Kids Research Grant for their proposal entitled "Transform a tooth with a 'transformer tooth.' A novel approach for child oral health." Dr Foster Page and team were awarded \$98,510 (plus GST) over three years, commencing 2014. The proposed project aims to evaluate the

effectiveness of a new method to arrest dental caries in the primary teeth of children.

In their three-year Cure Kids proposal, Dr Foster Page and team intend to build on the results of their HRC feasibility study by performing a randomised clinical trial (RCT) to systematically assess the efficacy and performance of the Hall technique in the NZ dental care environment, compared with the existing approach. Up to 1,000 children between the ages of 3 and 7 will be recruited from the Whanganui District Health Board catchment. Half of those with cavities in their baby molars will be given fillings and the other half will have their teeth capped. An estimated 776 children are expected to be involved in the study. If this technique is found to be a suitable alternative to traditional care, it has the potential to revolutionise dental care for children, and will provide better health outcomes for children with caries.

2014 World Oral Health Day (March 20) saw further research funding success for Dr Lyndie Foster Page and her team within the Dental Epidemiology and Public Health Research Programme of the SJWRI, looking at prevalence of and new treatments for childhood caries. Following their award of nearly \$100,000 in funding from Cure Kids in late 2013, Dr Foster Page and team were announced as recipients of \$80,000 in Lottery Health Research funding for a related clinical research project investigating the potential of the Hall Technique in preventing caries in childhood populations.

In the 2014 round, University of Otago researchers gained just over \$1.9m in funding from the Lottery Grants Board to support studies aimed at improving the health status of New Zealanders. The grants support the purchase of scientific equipment, PhD scholarships, and the pursuit of translational research projects aimed to quickly translate into meaningful health outcomes and community benefit.

SJWRI and Faculty of Dentistry farewell retiring Dean and Clinical Research Director



Greg Seymour and Mary Cullinan

The Sir John Walsh Research Institute and the Faculty of Dentistry farewelled our Dean, Professor Gregory Seymour, and our foundation Clinical Research Director, Associate Professor Mary Cullinan, at the end of January 2014. After eight years at the University of Otago, Professor Seymour and Associate Professor Cullinan are retiring to Queensland to be closer to family.

Professor Seymour's achievements as Dean of the Faculty of Dentistry included overseeing the establishment of the Sir John Walsh Research Institute in 2007 under the Directorship of Professor Jules Kieser (1950-2014). The growth in research capability and productivity in the Faculty since the establishment of the Institute is demonstrated by the Faculty's strong performance in the most recent Performance Based Research Funding quality assessment.

As researchers, both Professor Seymour and Associate Professor Cullinan were highly productive and successful and made significant contributions to their research fields, to the Oral Molecular and

Immunopathology research programme (which Professor Seymour co-directed), and to oral health research in New Zealand and internationally. Together with Professor Seymour, Associate Professor Cullinan was a driving force behind the establishment of the SJWRI's Clinical Research Programme, and of the practice-based research network ARCH (Applied Research through Clinicians' Hands).

Pro-Vice Chancellor of the Division of Health Sciences, Prof Peter Crampton said Prof Seymour had been an "agent for change" over the past eight years and contributed a "huge amount" to the school.

This included advocating for a replacement of the university's ageing dental school facility – now in the planning stages and scheduled to begin construction in late 2015. Other achievements included overseeing the establishment of the Sir John Walsh Research Institute and growing the faculty's research capability, which resulted in it performing "extraordinarily well" in the 2012 Performance Based Research Funding round.

He also oversaw the introduction of two new degrees, in particular the research-focused Doctorate of Clinical Dentistry degree for specialist dentist qualifications, replacing the traditional Master of Dental Surgery. He also helped build a relationship with the International Medical University in Malaysia, resulting in a large number international students coming to Otago.

"A really important achievement for Greg has been the establishment of relationships with Māori oral health providers up and down the country," Prof Crampton said.

His personal research contribution resulted in him in 2008 becoming only the second dentist to be elected as a fellow of the Royal Society of New Zealand – the first being Sir John Walsh who, among other achievements, invented the first high-speed drill.

Prof Seymour stepped down as Dean at the end of January 2014, with Prof Alison Rich serving as Acting Dean until the appointment of Prof Paul Brunton later in 2014.



Portrait of Professor Greg Seymour, commissioned by the Faculty and the Division, and unveiled at his and Associate Professor Cullinan's official University farewell on 12 December 2013.

Professor Greg Seymour's research profile

Qualifications

BDS MDSc PhD FRCPATH FFOP(RCPA) FRACDS FICD FADI

Position

Retired from Dean, Faculty of Dentistry, and Professor of Periodontology in December 2013

Research summary

Primary dentistry and oral health

Professor Seymour's research had two major themes:

- The relationship between oral disease and systemic conditions, primarily atherosclerosis
- The immunopathology of periodontal and oral mucosal diseases using immunological and molecular techniques

Investigations of the relationship between periodontal disease and atherosclerosis focused on molecular mimicry as the link. This work was central to a major collaboration with the University of Queensland, Australia, and the University of Niigata, Japan.

Investigations of the immunopathology of oral diseases focused on relating the nature of the inflammatory infiltrate together with the cytokine and gene expression profiles. An emerging theme in this research was the effect of environmental factors such as smoking and the use of bisphosphonates on gingival gene expression profiles.

Associate Professor Mary Cullinan's research profile

Qualifications

BDS MSc FADI

Position

Retired from Research Associate Professor in December 2013

Research summary

Periodontology and oral health

Associate Professor Cullinan's research was predominantly in periodontics, encompassing clinical, basic science and epidemiological studies.

A prominent theme was the inter-relationship between chronic periodontitis and systemic diseases such as cardiovascular disease, diabetes and ankylosing spondylitis, particularly in terms of the impact of oral infection and the immune response to oral organisms on systemic diseases. Other themes include the oral microbiota in health and disease (chronic periodontitis, peri-implantitis, dental caries) and the effect of bisphosphonates on gene expression in oral tissues. The long-term effects of triclosan on thyroid function and the oral microbiota in terms of the development of bacterial resistance have also been investigated.

Studies in collaboration with colleagues at the University of Queensland have demonstrated that in cardiovascular patients, periodontitis and the infection burden of *Porphyromonas gingivalis* and *Tannerella forsythia* were related to serum antibody levels to human heat shock protein 60 (HSP60). In patients at high risk of cardiovascular disease (6 risk factors), an improvement in periodontal health resulted in a reduction in anti-HSP60 (HSP60 and GroEL) antibody levels. Further collaboration with the Medical School, University of Queensland, investigated thyroid function and bacterial resistance after long-term use of triclosan in toothpaste and found no untoward effects.

In collaboration with Professor Lisa Heitz-Mayfield from the University of Western Australia, and Associate Professor Sheila Williams (Social and Preventive Medicine), data on the microbiota in patients with peri-implant disease was analysed and compared with two bacterial detection methods (qRT-PCR and Checkerboard DNA-DNA hybridization). The data originated from an international multicentre, randomised controlled trial.

Otago appoints leading UK academic as Faculty of Dentistry Dean



A leading UK dental researcher and educator has been selected as the new Dean of the Faculty of Dentistry.

Professor Paul Brunton was appointed as Dean from his previous position of Director of Student Education at the University of Leeds' School of Dentistry, serving on its senior management team. He took up his position at Otago at the end of 2014.

Announcing the appointment, University Vice-Chancellor Professor Harlene Hayne says that Professor Brunton has an outstanding record as a researcher, teacher and senior administrator. He is a Professor of Restorative Dentistry whose research interests include operative dentistry, specifically tooth preparation and tooth whitening, and early diagnosis and treatment of tooth wear.

In his role of Director of Student Education he has provided strategic leadership to curricula development and innovation at the School at both undergraduate and postgraduate levels. He is also clinical project lead of e-Den, a national e-learning resource in dentistry that has more than 20,000 users.

Professor Brunton is currently President of the British Society for Restorative Dentistry and contributes to several UK national committees. These include the Research Committee of the Royal College of Surgeons of England, and he is also a board member of the Faculty of the Dental Surgery of that College. Additionally he advises and works with NHS England by chairing the Pathways Group, which is part of the implementation of the new dental contract in Primary Dental Care in England.

After graduating from the Leeds School of Dentistry in 1984, Professor Brunton obtained his MSc in restorative dentistry in 1992 and his PhD in 1996 from the University of Manchester. He was granted his fellowship in dental surgery from The Royal College of Surgeons of Edinburgh in 1995.

He was subsequently awarded Fellowship ad eundem of the Faculty of General Dental Practice (UK) of the Royal College of Surgeons of England in 2005 and of the Faculty of Dental Surgery of the College in 2009.

Before taking up his appointment at Leeds in 2004, Professor Brunton was a clinical lecturer, and since 1997, a clinical senior lecturer, in restorative dentistry at the University of Manchester. His other earlier roles include Clinical Director of Dental Services for the Combined Healthcare NHS Trust in Stoke-on-Trent.

Professor Brunton is a regular speaker at national and international conferences and a referee for a number of national and international journals and grant-awarding bodies. He is on the editorial board of Journal of Dentistry and Operative Dentistry, both top-tier journals in their field. His strong research publication record includes more than 70 journal articles appearing in peer-reviewed journals, and he has written four textbooks, and edited another four, in restorative dentistry.

Otago Health Sciences Pro-Vice-Chancellor Professor Peter Crampton says he is delighted that Professor Brunton has accepted the role of Dean of the School.

“Paul Brunton’s wealth of experience as an innovative leader in dental education and research means he is very well-placed to build on Otago’s existing strengths in these areas,” Professor Crampton says.

Professor Brunton says he is greatly looking forward to further developing the Faculty of Dentistry and cementing its status as a centre of excellence for research, education and healthcare serving the needs of the population of New Zealand, but also extending its reach and influence within Australasia and beyond.

“Dentistry is changing very quickly and it’s important we keep our research and education at the very cutting edge of the discipline, both by adopting new practices but also leading the way in developing novel technologies and materials that will be of benefit to our patients. A vital part of this is clinical and translational research, which is my background, and this is an area that I look forward to developing within the School.”

“A faculty’s environment is incredibly important in achieving success, and one of my first priorities will be to work closely with the University to realise the planned major upgrade of the Faculty of Dentistry’s facilities.

“I look forward to working with my colleagues and our students both in the School and the wider University to realise our ambitions for the Faculty of Dentistry,” Professor Brunton says.

While new, expanded facilities for the Faculty sit high on his wish-list, Professor Brunton is also keen to see it become a centre for oral health in New Zealand.

“I want us to have much more of an external face and have more influence within New Zealand and beyond,” Professor Brunton says. “We have many experts in this building who know a great deal about oral health for this country. So you’d expect Government to be seeking their advice and for us to have more of an influence on oral health and general health policies.”

“We have many experts in this building who know a great deal about oral health for this country. So you’d expect Government to be seeking their advice...”

Alongside teaching, research has remained a key component of his work. He would like Otago to become more involved in translational research and can also see scope for collaboration with other departments.

“My own research at the moment is moving into the direction of oral health and general health and the interface between the two. So I want to work with colleagues in nutrition and general medicine - those that are dealing with diabetes and obesity particularly - and looking at the links between those and oral health.”

The prospect of a new Dental School building is also exciting: “I believe environment is really important. If you’re going to get people to flourish and really be world class they need a world class environment so a new school is high on my list and hopefully the University will be giving that final approval in the near future.”

SJWRI PhD student Jenny McDowell wins AMP National Scholarship

The SJWRI is delighted that forensics PhD student Jenny McDowell was awarded a \$10,000 AMP Scholarship at a ceremony at the Auckland War Memorial Museum on December 4, 2014.



As a teenager, Jenny overcame the debilitating after-effects of a shark attack which inspired her interest in anatomy and forensic anthropology, which led to beginning a PhD in the SJWRI under the mentorship of the late Professor Jules Kieser. Following in Jules' footsteps, Jenny's aim is become a world expert in marine forensics and disaster victim identification, and to be the first in New Zealand to obtain international accreditation in forensic anthropology.

After completing her undergraduate studies at the University of Otago, she finished a Masters of Physical Anthropology at the University of Pretoria, South Africa. During her study, she helped exhume the bodies of freedom fighters killed by police and buried in unmarked graves in apartheid-era South Africa.

She is now in her second year of study for a PhD in marine forensics at the SJWRI, looking at the chemical and morphological changes which happen in juvenile bone when exposed to a marine environment as a means of understanding marine decomposition of human body parts in a forensic context. However, to get accredited as forensic anthropologist, Jenny will need to do more field work abroad; with the scholarship money, she would attend a field school, possibly in Somaliland, East Africa.

"They are doing war-crime excavation and research – mass grave stuff."

Another option would be returning to South Africa to work at an anthropology research centre.

"It is one of the busiest forensic labs in the world and they get cases from police and do everything from homicides to missing persons to fire victims – it is a real smorgasbord."

The work included constructing a biological profile of an unidentifiable person, providing estimates of age, sex and ancestry.

The aim of the AMP National Scholarship scheme is to support 'Kiwis who want to do their thing'. Each scholarship is worth up to \$10,000. Unlike research-related funding which SJWRI students typically pursue, there are no limits around what this scholarship can be awarded for. This year's recipients were from fields as diverse as cancer rehabilitation to fashion to BMX racing.

We are extremely proud of Jenny and thrilled that the AMP award, together with support from the SJWRI, will help her finish her PhD and achieve her dream of becoming an internationally accredited forensic anthropologist.

Professorial promotion for SJWRI Clinical Research Director Warwick Duncan

SJWRI Clinical Research Director Warwick Duncan was among a select group of fifteen leading University of Otago academics who were promoted to full professorships at the end of 2014, on the basis of their world-class research, teaching and service to the University and community.

Professor Duncan, who also serves as Associate Dean (Facilities and Clinical Services) in the Faculty of Dentistry, was the first Otago-qualified periodontist to be promoted to Professor at the University. His primary research interests are in periodontics (the treatment of gum diseases) and implantology (the replacement of missing teeth with dental implants). This work has extended from preliminary trials in animal disease models, to validation in human clinical trials, and have included the development of new bone replacement grafting materials, new metals and surfaces for osseointegration of oral implants, stem-cell therapy for bone regeneration, novel approaches to the treatment of periodontal and peri-implant diseases, and new technologies for diagnostic imaging of gum and bone around teeth and implants. Through collaboration with the late Professor Jules Kieser, he developed research interests in forensic biology and victim identification.

A further 39 University of Otago academics were promoted to Associate Professor, including SJWRI researchers Brian Monk and Jonathan Leichter (Oral Sciences), and Neil Waddell (Oral Rehabilitation, Director of our Biomechanics and Oral Implantology research programme).

Professor Duncan's research profile:
otago.ac.nz/sjwri/people/profile/index.html?id=198

More on the Clinical Research research programme:
otago.ac.nz/sjwri/research/clinical/index.html

Student highlights

Hannah Jack, SJWRI DCLinDent graduate, receives the John McDonald Medal from Royal College of Surgeons

July 2013

Following completion of her Doctorate of Clinical Dentistry in Orthodontics at the end of 2012, Hannah Jack was awarded the John McDonald Medal for having the highest overseas mark in the Membership in Orthodontics (MOrth) examination in July 2013. This examination is run by the Dental Council of the Royal College of Surgeons of Edinburgh, with those passing the exam being granted acceptance to the College. There are a number of sittings of these exams, one in Edinburgh, Adelaide (where Hannah sat), Hong Kong, Dubai and Cairo, and Hannah scored the best mark from these overseas exams. As part of the assessment procedure Hannah was expected to submit some of her own orthodontic cases as well as being examined on other orthodontic topics.

More on Hannah's DCLinDent research:

otago.ac.nz/sjwri/people/craniofacial-biomechanics/otago054459.html

Belinda Hsu wins 2013 ADA/Dentsply Student Clinician American Dental Association regional prize

The 35th Australian Dental Congress was held at the Melbourne Convention and Exhibition Centre on 4 April 2013 and included the Student Clinician Research Programme which is run by the ADA/Dentsply in 35 countries involving 17 student clinician programmes.

After her success in the NZ competition, Belinda Hsu was chosen to represent in Australia and went on to win the 2013 ADA/Dentsply Student Clinician American Dental Association (SCADA) regional prize (Australasia).

Belinda's research project *The Antimicrobial activity of Gingival Retraction Products* was conducted through a SJWRI Summer Studentship in conjunction with her supervisors Dr Donald Schwass and Dr Geoffrey Tompkins.

More on Belinda's research:

dentistry.otago.ac.nz/news/gfx/BH_poster.pdf

SJWRI PhD graduate Sara Hanning profiled in the Otago Daily Times

The research of recent SJWRI PhD graduate Sara Hanning, whose doctoral project was supervised by the late Professor Jules Kieser in partnership with Associate Professor Natalie Medicott of the University of Otago's National School of Pharmacy, was profiled in the Otago Daily Times in January 2014. Sara's research looked into ways to make the life of xerostomia patients more comfortable, through the development of more effective saliva substitutes.

odt.co.nz/news/dunedin/288860/dry-mouth-cure-hope

Xerostomia is a condition in which saliva production is drastically reduced, leading to a dry mouth. This can lead to difficulties with speech, eating and infection of the oral mucosa. Also, as the protective effect of the saliva on the enamel of the teeth is no longer present, the risk of developing cavities is considerably increased. Xerostomia is often found in cancer patients who have undergone radiotherapy of the neck and throat areas.

The aim of Sara's project was to investigate oily formulations for the treatment of dry mouth and its associated high risk of tooth caries. Oily formulations were investigated as water alone often quickly drains or evaporates away, resulting in persistence of the condition. Emulsions of oil and water were shown to be much more effective in reducing the effects of dry mouth.

Having completed her project and graduated from the University with a PhD, Sara is now heading to University College London to take up a postdoctoral research position. Her work is being built upon by a SJWRI Doctorate of Clinical Dentistry research student, Olivia Apperley, who is investigating clinical applications of Sara's saliva substitute in a small-scale clinical trial amongst xerostomia patients in Christchurch. This work is being conducted in collaboration with Dr Maggie-Lee Huckabee of the Van Der Veer Institute, University of Canterbury, as part of the Biomouth Research Group.

SJWRI success at Division of Health Sciences Research Forum

SJWRI staff and students joined University of Otago Health Science research colleagues from across the country for the 2014 Division of Health Sciences Research Forum, held on 16 September at the Dunedin Public Art Gallery. This year's Forum, 'Learning Different Research Languages', centred on themes of collaborative and multidisciplinary research.

SJWRI Clinical Research Programme Director, Associate Professor Warwick Duncan, was invited to present in the opening session of the conference, and gave an excellent and well-received presentation, reflecting on his experiences in translational dentistry and collaborative clinical research.

SJWRI students performed exceedingly well in the student poster competition, making up six of the 33 entrants across the Division, with Biomechanics and Oral Implantology PhD students Joanne Choi and Janine Tiu making it to the final round of the competition, a 'two minute thesis' style presentation of the research on their poster in front of the Forum attendees.

Janine's poster *Evaluating clinical molar preparations using the Coordinate Geometry Method* won our SJWRI Research Day postgraduate student poster award and finished second in the subsequent University of Otago Postgraduate Expo competition. Her research assesses the geometry of molar crown preparations generated in dental practice using a new measuring system developed by Janine and her supervisors, to investigate whether this may have consequences for the clinical longevity of dental crowns placed by dentists. Janine's poster finished equal third in the competition.

Joanne's poster, *Continuous and simultaneous measurement of intraoral pH and temperature*, presented her research on the development of a novel in-dwelling intraoral pH and temperature measuring device, in order to assess the impact of intraoral pH and temperature changes on the development of conditions such as dental erosion. Joanne's poster was awarded second place in the competition.

Our congratulations to Joanne and Janine, and our thanks to all six of our student competition entrants.

SJWRI students scoop OCEM awards

Congratulations to Jenny McDowell and Gemma Cotton, two PhD students carrying out research within the Sir John Walsh Research Institute, on being awarded Otago Centre for Electron Microscopy (OCEM) Student Research Awards in the September 2014 round.

Jenny McDowell is a forensic biology PhD student, whose award-winning research project *An evaluation of the chemical and morphological changes to juvenile bone when exposed to a marine environment* is supervised by SJWRI Director Prof Richard Cannon, Prof Abby Smith of the Department of Marine Science, and forensics expert Prof Sue Black of the University of Dundee. Jenny's research looks at how juvenile pig bones decompose when placed in marine environments, as a means of understanding marine decomposition of human body parts in a forensic context.

Gemma Cotton of the Department of Chemistry, whose PhD research is co-supervised by Dr Carla Meledandri of Chemistry and Dr Don Schwass of the SJWRI, also won an award for her project *Application of antibacterial silver nanocomposite materials for treatment and prevention of dental caries and periodontal disease*. This research looks at a novel way of using silver nanoparticles as a means of eliminating bacteria around dental fillings.

The OCEM Student Awards are presented biannually, and support novel student research projects in electron microscopy. The Awards cover up to 15 hours electron microscope usage and technical support time.



Our Programmes

Enamel crystals imaged by a scanning electron microscope.

1µm

Biomechanics and Oral Implantology

Programme Directors – Associate Professor Neil Waddell and Professor Warwick Duncan

Our work has two main themes, biomechanics and oral implantology. Within the area of biomechanics we conduct experimental and observational research in:

- Dental materials – development of new dental restorative materials for dental CAD/CAM systems.
- Silver and gold nanomaterial technology group – developing nanoparticles for use in a range of therapeutic technologies and toughening of advanced ceramics.
- Cranio-facial biomechanics – prosthodontic failure mechanisms and adhesion of dental restorations and materials.
- Sub-concussive brain injury research – *in vitro* modelling of the effects of blunt force trauma to the head on accumulative damage to the brain.
- Dental hard tissues and evolutionary oral biology - using animal teeth to gather a wide range of information about the biology, evolution and interactions with the environment of fossil and recent species.
- Forensic biology – *in vitro* modelling of blunt force trauma, forensic odontology, wounding and ballistic blood splatter analysis, development of simulant materials for forensic modelling.

Within the area of oral implantology our research focuses on:

- Grafting and regenerative therapies.
- Surface treatments of implant fixtures for enhanced osseointegration.
- The effects of implant fixture corrosion products on periodontal structures.
- Developing ultrasonic diagnostic devices for dentistry.
- In vitro modelling of masticatory forces on implant overdentures, their supporting sub-structures and surrounding bone.

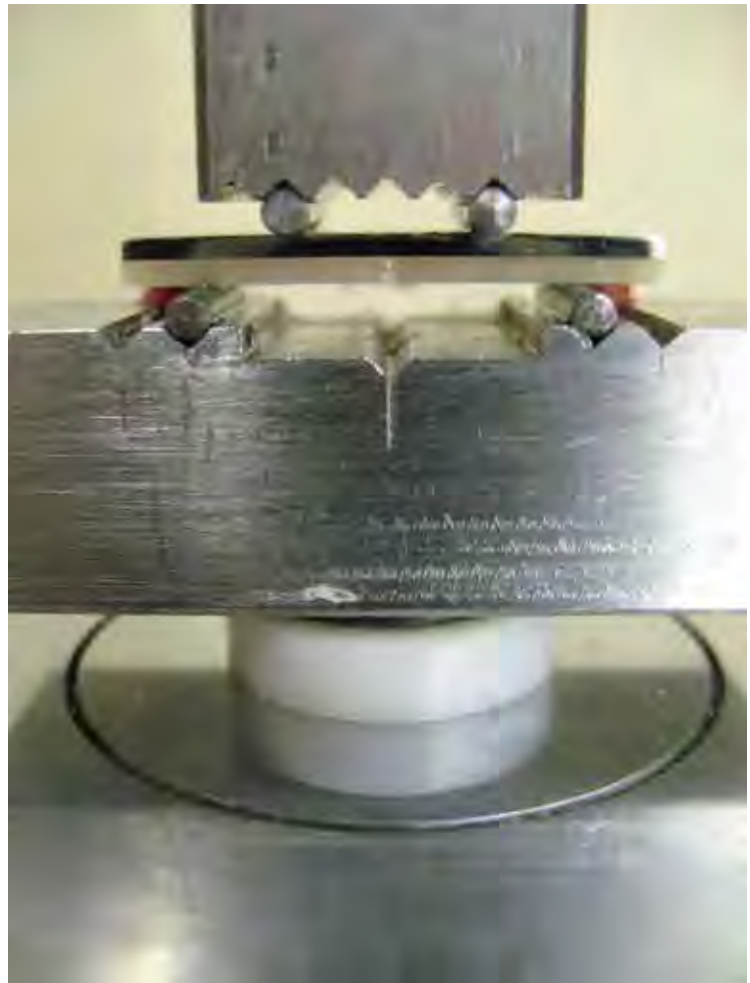
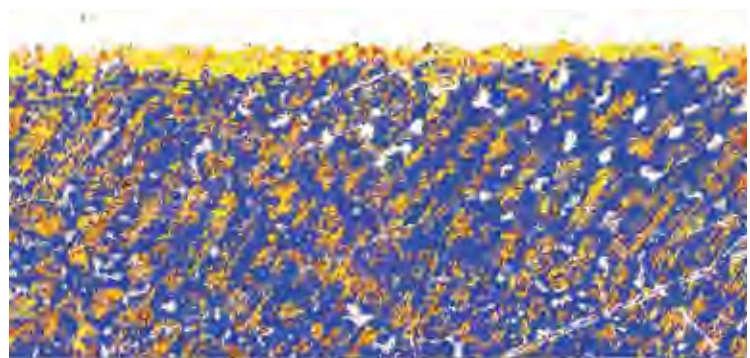


Image showing 4-point bend test measuring the energy of adhesion between a porcelain-fused-to-metal (CoCr) bilayer.



Electron backscatter diffraction map showing the metallic phases in the CoCr alloy at the porcelain-fused-to-metal bilayer interface.

Key Personnel and Collaborations

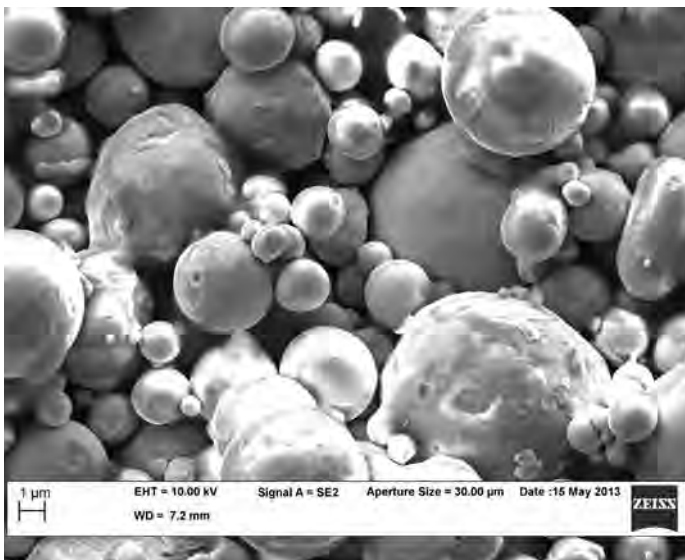
Staff

Professor J Kieser (deceased)
Professor MV Swain
Professor WJ Duncan
Professor KM Lyons
Associate Professor JN Waddell
Associate Professor DC Tong
Dr DR Schwass
Dr B Al-Amleh
Dr AA Tawse-Smith
Dr S Ma
Dr S Hanlin
Dr C Loch
Mr L Jansen van Vuuren
Mrs W Jansen van Vuuren

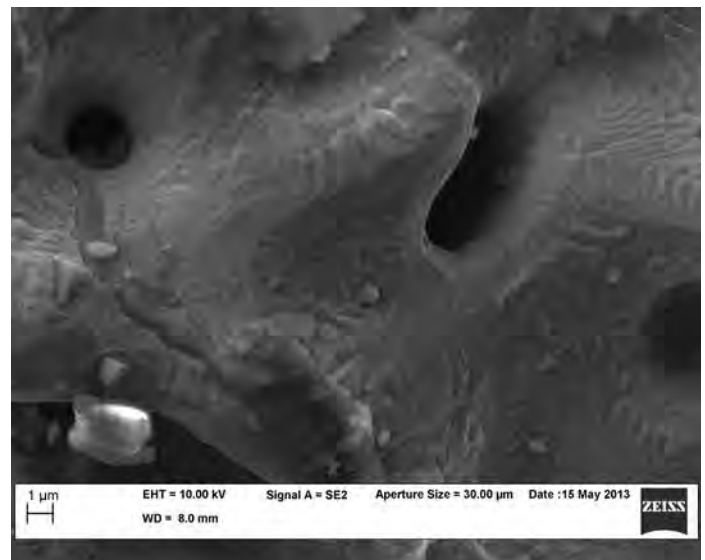
Postgraduate Students

Ajay Sharma	Hamish Milmine
Allauddin (Dini) Siddiqi	Janine Tiu
Amanda George	Joanne Choi
Andrea Coldea	Kai Chun Li
Andrew Quick	Mohammed Alrashed
Andrew Tawse-Smith	Momen Atieh
Anne-Christine Lindstrom	Patrick Wong
Carolina Loch Santos da Silva	Rami Farah
Darnell Kennedy	Reham Osman
Diogo Zanicotti	Shuo Li
Donald Schwass	Sunyoung Ma
Erin Hutchinson	Therese De Castro

Our work involves a multi-disciplinary approach and we collaborate with a wide group of researchers within; the Faculty of Dentistry; the University of Otago (Department of Geology, Department of Chemistry, Department of Anatomy and Structural Biology, Department of Zoology, Department of Marine Sciences); nationally (Department of Mechanical Engineering, University of Canterbury, Van Der Veer Institute, University of Canterbury, Department of Engineering Sciences, Auckland University, Forensic Science Department of Environmental Science and Research, South Island Brain Injury Research Group (SIBIRG)) and internationally (Smithsonian Institution, New York Institute of Technology College of Osteopathic Medicine, Hampden-Sydney College, University of Adelaide School of Dentistry, South Australian Museum, Museo de Historia Natural de Santiago and Universidade Federal de Santa Catarina, Biomechanics and Mechanobiology Research Group at the University of Stuttgart, Centre for Advanced Tribology at Southampton (nCATS), Impact and Armour Group, Cranfield University / Defence Academy of the United Kingdom, Shrivenham, University of Kansai, Osaka, University of the Witwatersrand, Johannesburg, South African Nuclear Energy Corporation in Palindaba, Tokyo University of Agriculture and Technology, Tokyo).



SEM image showing particle distribution of pre-sintered CoCr alloy powder from a compacted powder metallurgy CAD/CAM milling block.



SEM image showing CoCr alloy surface after sintering of the compacted powder metallurgy particles.

Current Research

Activity 1. Dental Materials

Description: Evaluating specific issues associated with the range of dental materials from composite resin systems to advanced ceramics. One of the groups has a focus on mechanical properties of dental ceramics and their reasons for failure, with a particular interest in fractography and analysis of failure in brittle materials. A more recent novel area is the silver and gold nanomaterial technology group, which is developing nanoparticles for use in a range of therapeutic technologies and toughening of high strength ceramics.

Aim: Provide basic information about these materials that enables a better basis for understanding their usage in clinical settings and the development of new treatment technologies and materials.

Source(s) of funding: New Zealand Dental Association Research Foundation, Fuller Scholarship for Dentistry, Otago Innovation, University of Otago Research Grant, Sir John Walsh Research Institute and proprietary funding.

Activity 2. Sub-concussive Brain Injury

Description: Concussive and subconcussive injury is a global phenomenon, which has been likened to a silent epidemic due to the large numbers of young people who sustain head injuries in sports and military activities. The objective of this research is to quantify the impact forces transmitted through the various levels of scalp, skull and brain at values below what is predictive of concussion. Once these data are obtained, clinical evaluations of neurologic function using established methodology can be used to correlate the effects of these impact forces for further research, but the main objective for this research study is the quantification of these forces.

Aim: Can the impact forces involved with subconcussive head injury be quantified in order to determine a threshold or range of impact forces that may be predictive of sub-concussion?

Source(s) of funding: University of Otago Research Grant. University of Otago Health Sciences Division Sandpit Funding Grant. ANZAOMS Research and Education Trust.



Moulding process of the brain cavity in the development of a simulant skin/skull/brain anatomical model for sub-concussive brain injury force transfer research.

Activity 3. Soft and Hard Tissue Biomechanics and Forensic Biology

Description: Investigating the basic properties of skin, teeth and bone related to the craniofacial region and forensic issues.

Aims: Teeth and bone are special in that they preserve a record of their formation in the adult end-product. Hence, an examination of adult morphology can be used to reveal some of the processes that were involved, as well as some of the perturbations of such processes. This knowledge can then be linked to clinical findings that will (hopefully) result in better therapeutic outcomes. Our research has mainly been focused on the structure and function of enamel in different species, the forces generated during swallowing, and the behaviour of skin and bones during events such as ballistic and blunt force trauma.

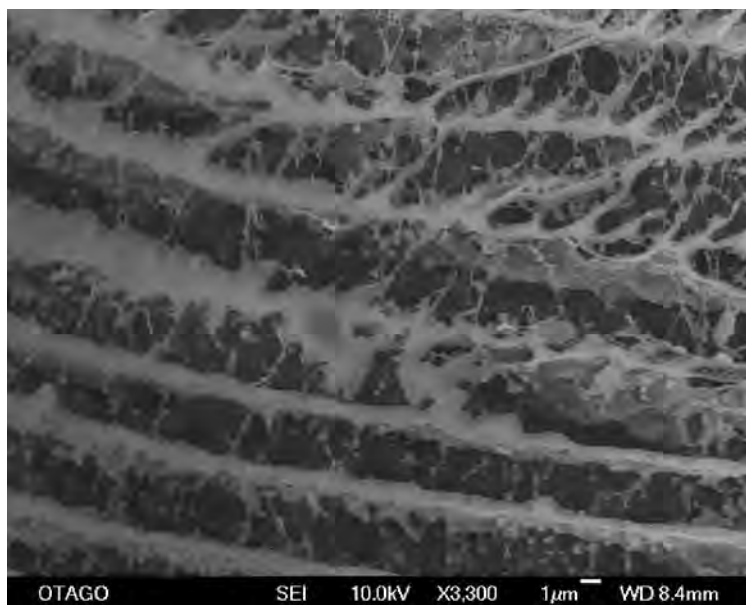
Sources of funding: New Zealand Dental Association Research Foundation, United States Department of Justice, ESR Capability Development Fund.

Activity 4. Oral Implantology and Associated Superstructures

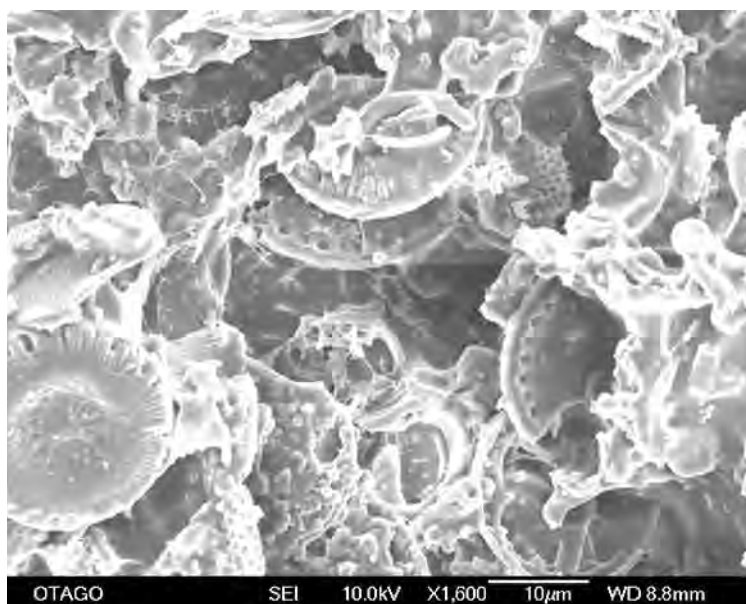
Description: Our research teams have expertise with respect to conducting clinical (human) and preclinical (animal) trials and laboratory-based research relating to oral implants. Currently, funded research is being conducted into different oral implant systems, materials, surfaces, superstructures, and surgical and restorative protocols, as well as supporting biological and regenerative products. Our research encompasses immediate placement and/or loading of single implants and implant-supported over-dentures, fit of zirconia prostheses, implant analysis using micro-CT, and analysis of different implant systems and bone placement grafts in sheep femur and maxillary sinus models, in vitro modelling of strain distribution within implant overdentures and their supporting sub-structures and bone, in vivo analysis of implant fixture corrosion.

Aims: Evidence-based treatment that reduces the interval between oral implant placement and loading, by optimising the implant design and the surgical and prosthodontic protocols and materials.

Source(s) of funding: New Zealand Dental Association Research Foundation; JF Fuller Foundation; International Team for Oral Implantology ITI Switzerland; Straumann AG, Switzerland; NobelBiocare Australia; Southern Implants, South Africa; Korea Science and Engineering Foundation (KOSEF), Megagen Co Ltd., South Korea; Osstem Co. Ltd, South Korea; Neoss Australia Ltd; Keratec Ltd. New Zealand.



SEM image of the polymer chains with secondary crosslinking in an irreversible alginate impression material.



SEM image of diatomaceous earth filler diatoms in an irreversible alginate impression material.

Key Projects and Funding Successes

\$35,591. Tong DC, Waddell JN, Bennett AC:

Quantification of impact forces in the prevention of sub-concussive head injury using a forensic head model. University of Otago Research Grant.

\$3,642. Tong DC: South Island Brain Injury Research Group - Strategic planning for research collaboration. University of Otago Health Sciences Division Sandpit Funding Grant.

\$11,380. Tong DC, Waddell JN, Winter T, Bennett AC: Quantification of impact forces to the head using a forensic model. ANZAOMS Research and Education Trust.

\$21,000. Schwass D, Meledandri CJ. Pre-seed funding support from Otago Innovation.

\$64,400. Schwass D, Meledandri CJ. Evaluating the efficacy of a topical antimicrobial gel formulation for treating peri-implantitis in a sheep model. University of Otago Research Grant.

\$3,000. Schwass D, Meledandri CJ. Mechanical properties and Antibacterial Effects of a silver nanoparticle modified glass ionomer restorative material. Fuller Scholarship for Dentistry.

\$66,340. Duncan WJ and Schmidlin P, Resorba Medical GmbH, Germany.

\$10,000. Duncan WJ, Coates D, Ye Naung N, Zannicotti D, De Silva RK. Maurice and Phyllis Paykel Trust.

\$ 5,000 Duncan WJ, Waddell JN, Chandler N, Harris P, Petherick R, Wu D, Ultrasonic diagnostic devices for dentistry, University of Otago Health Sciences Division Sandpit Funding Grant.

\$40,000. Duncan WJ, Waddell JN, Chandler N, Harris P, Petherick R, Wu D, Ultrasonic diagnostic devices for dentistry, University of Otago Health Sciences Division Sandpit Funding Grant. (follow-on grant).

\$16,744. Duncan WJ, Sharma A, Effect of electrochemically modified Titanium-Zirconium (TiZr) alloy implant surface on osseointegration: an in vitro and in vivo study. NZ Orthopaedic Association Wishbone Trust.

\$23,800. Duncan WJ, Sharma A, Effect of electrochemically modified Titanium-Zirconium (TiZr) alloy implant surface on osseointegration: an in vitro and in vivo study. Lotteries Health.

\$5,000. Al-Amleh B, Establishing fracture toughness tests on dental ceramics using the surface crack in flexure method. University of Otago, Sir John Walsh Research Institute – 2013 Basic Research Award.

\$5,000. Waddell JN, Toughening of advanced ceramics. University of Otago, Sir John Walsh Research Institute – 2014 Basic Research Award.

\$82,757. Tong DC and Waddell JN. Otago Innovation Ltd., University of Otago, Temporary Inter-Maxillary Stabilisation (TIMS) Device – Research, Development and Commercialisation.



Image showing 4-point bending flexural strength testing of a fresh deer femur.

Dental Education

Research in dental education focuses on the study of factors that affect learning and teaching. Researchers in the Dental Education Research Programme typically examine educational experiences in the Faculty and other dental education environments, and look for evidence of what is working well, and what can be improved. We seek to use this information to identify strategies that can improve experiences and support for students and teachers, both within the Faculty and in other education environments.

A number of individuals have included research into aspects of education as part of their academic portfolios. These projects address several of the University's core values and strategic imperatives; in particular those of achieving excellence in research and teaching, and facilitating outstanding campus environments and student experiences.

In June 2014, a relaunch event was held for the Dental Education Research Programme. This event provided interested staff and postgraduate students in the Institute with an opportunity to get together and discuss what format and directions they would like the Dental Education research group to take. As well, it provided an opportunity to network with researchers involved in Higher Education from outside the Faculty.

The discussion, over a light lunch, was led by Dental Education Research programme leader Dr Janet Rountree, who took over the role from the retiring Professor Tom Kardos in 2013. Examples of current dental education research projects were discussed, with researchers talking about their ideas for collaboration. There was an excellent turnout to the event, and the potential for new projects and collaborations appears very strong. Attendees were surveyed on their keenness to participate in regular meetings to discuss dental education projects, which was well received. At the event, researchers shared their current projects and discussed ideas for collaboration, both with staff from within the Faculty, and with staff involved in Higher Education research outside of the Faculty. As a consequence of these conversations, new education research projects are beginning to be developed and executed.



Dental Education Research Programme relaunch, June 2014.

Dental Education Research Fellows

2013 Dr Janet Rountree

2014 Dr Janet Rountree, Lee Adam

Publications

Anderson, V. (2014). 'World-travelling': A framework for re-thinking teaching and learning in internationalised higher education. *Higher Education* 68(5), 637-652. doi: 10.1007/s10734-014-9736-y

Anderson, V. R., McGrath, T., & Butcher, A. (2014). Asia-born New Zealand-educated business graduates' transition to work. *Asia Pacific Journal of Education* 34(1), 65-79. doi: 10.1080/02188791.2013.823378.

Anderson, V. (2013). 'Impure community': A framework for contact in internationalised higher education? *Journal of Intercultural Studies* 34(1), 34-54. doi: 10.1080/07256868.2013.751903

Foster Page, L. A., Kang, I., Anderson, V. R., Thomson, W. M., Meldrum, A. M., & Moffat, S. M. (2013). Changes in Bachelor of Oral Health students' perceptions of their dental education environment. *New Zealand Dental Journal*, 109(4), 134-140.

Gambetta-Tessini, K., Mariño, R., Morgan, M., Evans, W., & Anderson, V. (2013). Stress and health-promoting attributes in Australian, New Zealand, and Chilean dental students. *Journal of Dental Education*, 77(6), 801-809.

Golding, C., & Adam, L. (2014). Evaluate to improve: Useful approaches to student evaluation. *Assessment & Evaluation in Higher Education*. Advance online publication. doi: 10.1080/02602938.2014.976810

Kang, I., Foster Page, L. A., Anderson, V. R., Thomson, W. M., & Broadbent, J. M. (2014). Changes in students' perceptions of their dental education environment. *European Journal of Dental Education*. Advance online publication. doi: 10.1111/eje.12112

Murray, C. M., & Chandler, N. P. (2014). Undergraduate endodontic teaching in New Zealand: Students' experience, perceptions and self-confidence levels. *Australian Endodontic Journal*, 40(3), 116-122. doi: 10.1111/aej.12084

Subramanian, J., Anderson, V. R., Morgaine, K. C., & Thomson, W. M. (2013). Effective and ineffective supervision in postgraduate dental education: a qualitative study. *European Journal of Dental Education*, 17(1), e142-e150. doi: 10.1111/j.1600-0579.2012774.x

Subramanian, J., Anderson, V. R., Morgaine, K. C., & Thomson, W. M. (2013). Improving the quality of educational strategies in postgraduate dental education using student and graduate feedback: findings from a qualitative study in New Zealand. *European Journal of Dental Education*, 17(1), e151-e158. doi: 10.1111/eje.12006

Subramanian, J., Anderson, V. R., Morgaine, K. C., & Thomson, W. M. (2013). The importance of 'student voice' in dental education. *European Journal of Dental Education*, 17(1), e136-e141. doi: 10.1111/j.1600-0579.2012773.x

Tan, A. S., Anderson, V. R., & Foster Page, L. A. (2013). Second and third year oral health and dental student perceptions of future professional work. *European Journal of Dental Education*, 17(4), 241-250. doi: 10.1111/eje.12057

Research grants

Prof. A. Rich, Dr J. Rountree, Prof. G. Seymour (University of Otago), Dr D. Lekkas, A/Prof. T. Winning and Prof. G. Townsend, (University of Adelaide).

Do multifaceted admission processes predict performance of students in two Australasian dental programmes?

UMAT Consortium Grant, \$100,000

Dr S. Gallagher, Dr J. Rountree, Prof. B. Drummond, Dr J. Millichamp, Dr M. Stubbe

Developing reflective practitioners through online video-based self-reflection

University of Otago Teaching Development Grant, \$20,035



Dr Lyndie Foster Page presenting a poster on research into first year students' perceptions of their educational environment

Dr L. Foster Page, Dr J. Rountree, Dr A. Tawse-Smith, Dr V. Anderson (University of Otago), Prof. L. Uden (Staffordshire University)

Aligning and improving Problem Based Learning in cariology teaching in undergraduate dentistry at IMU and Otago

University of Otago Internationalisation Grant, \$10,356

L. Adam, Dr J. Rountree, Ms A. Meldrum, Prof. A. Rich (University of Otago), Dr A. McLean (Simon Fraser University)

Guidelines for providing feedback in the clinical dental setting

University of Otago Teaching Development Grant, \$10,075

Dental Education Researchers

Lee Adam
Vivienne Anderson
Jonathan Broadbent
Mike Brosnan
Richard Cannon
Peter Cathro
Nick Chandler
Harsha De Silva
Rohana Kumara De Silva
Lyndie Foster-Page
John Hamilton
Suzanne Hanlin

Wendy-Ann Jansen van Vuuren
Karl Lyons
Alison Meldrum
Kate Morgaine
Colleen Murray
Kate Newsham-West
Alison Rich
Janet Rountree
Don Schwass
Jayaram Subramanian
Andrew Tawse-Smith
Murray Thomson



Dental Epidemiology and Public Health

Programme Director: Professor Murray Thomson

Overview

Our work has the two main strands of (1) dental epidemiological research and (2) dental health services research. In our *dental epidemiological research*, we study the occurrence, determinants and natural history of the common oral conditions. To do this, we employ a number of standard dental epidemiological approaches (most notably the prospective cohort study and the cross-sectional survey) and techniques. Our *dental health services research (HSR)* work is concerned with how the dental healthcare system works (including dental workforce research), and the extent to which users are benefitting from it. Key activities are measuring oral health outcomes and increasing understanding of how (and why) people use (or do not use) dental services. Our group also continues to play an important role in the development and epidemiological validation of self-report measures, working in collaboration with a number of overseas researchers. We are also one of only three WHO Collaborating Centres in oral health in our particular WHO region; the other two are in Niigata (Japan) and Beijing (China).

Key personnel and collaborations

Professor WM Thomson

Professor JR Broughton

Dr JM Broadbent

Dr LA Foster Page

Ms DM Shearer (funded by an HRC programme grant; working on oral-general health)

Dr J Zeng (funded by an HRC programme grant; biostatistician; 2013-14)

Dr KC Morgaine (left in mid-2014)

Our collaborations are very important to the work and impact of the group. Current collaborations include institutions in New Zealand (including Raukura O Hauora Tainui and the Waikato-Tainui College for Research and Development), Australia (the Universities of Adelaide and Melbourne), Canada (the University of Toronto, McGill University), Japan (Osaka University), Malaysia (Universiti Malaya), the USA (Duke University, the University of Michigan and the University of North Carolina), Britain (GKT Dental Institute, the University of London, Sheffield University, Dundee University), Chile (University of Chile) and Brazil (Federal University of Pelotas).

Current research projects and focus areas

Activity 1. Life-course research in oral health (the Dunedin Study)

Description: Prospective observational research into the natural history of oral health and disease in a representative birth cohort now in adulthood

Aim: Unprecedented information on the natural history of oral health and disease

Source(s) of funding: NZ HRC, US NIH, Otago Medical Research Foundation

Outcomes during 2013-14: Work in this area continues to attract international attention and to be published in the top international journals: 5 papers were published, and a number of conference presentations were made. We concentrated on working through the second 3 years of the 6-year programme grant. The funded aims of the dental research component for age 38 are: (1) to document the natural history of oral health and disease from childhood through to early midlife; (2) to determine the nature of the relationship of those conditions and associated SES inequalities with antecedent characteristics and exposures; (3) to investigate the relation between chronic periodontitis and cardiovascular risk; and (4) to identify gene-by-environment associations in oral health and disease.



Activity 2. Other dental epidemiological and clinical research

Description: Dental epidemiological studies in NZ and overseas.

Aims: Various – enhancement of the knowledge base for dental epidemiology, dental public health, and clinical practice.

Source(s) of funding: Various – including NZ Ministry of Health, the International Collaborative Indigenous Health Research Partnership, NZDA Research Foundation, the Health Research Council of NZ, Dental Council of NZ.

Outcomes during 2013-14: 13 papers were published.

Activity 3. Dental health services research

Description: Dental health services research in NZ, including ongoing, systematic dental workforce research.

Aims: Enhancement of the knowledge base for dental public health and clinical practice.

Source(s) of funding: Various – including NZDA Research Foundation, the Health Research Council of NZ, Dental Council of NZ.

Work in this area uses both quantitative and qualitative approaches, and continues to be diverse and productive.

Outcomes during 2013-14: 15 papers were published (this total includes a number of dental educational research papers which are included here because they do not fit the other categories).

Activity 4. Development of new dental epidemiological, clinical and health services researchers and research capacity

Description: Training of new researchers for NZ and the Asia-Pacific region.

Aim: to build research capacity in our field.

Outcomes during 2013-14: successful postgraduate completions comprised one Doctor of Philosophy, five Doctors of Clinical Dentistry, and two Masters degrees. We also continue to informally mentor colleagues working in the wider health sector.

2013-14 highlights

Papers published and conference presentations made

In total, 41 papers were published in the peer-reviewed international scientific literature during 2013-14. The total number of conference presentations made was 55 (including 6 keynote addresses).

Other publishing-related activity

Professor Thomson served as a member of the Expert Panel for the report *Health effects of water fluoridation: a review of the scientific evidence*. Wellington: Royal Society of New Zealand (2014).

Professor Thomson was Editor of the *New Zealand Journal* until retiring from that post in June 2014 because he was to take up the Editor-in-Chief position for *Community Dentistry and Oral Epidemiology* in January 2015. He was Associate Editor for Gerodontology until December 2014, and remains as Associate Editor for the *European Journal of Oral Sciences*.

Postgraduate student completions 2013-14

Doctor of Philosophy: David Healey

Doctor of Clinical Dentistry: Hadeel Ibrahim, Joanne Ngo, Joseph Antoun, Victoria Beck, Ellie Knight.

Master of Community Dentistry: Bethy Turton, Kathy Fuge.



DClinDent student Hadeel Ibrahim presenting at Research Day 2014.

External funding secured

2014. Ministry of Health Research Fund. *Supervised toothbrushing trial in Northland Intermediate Schools*. Dr LA Foster Page (PI), Professor WM Thomson, E Clarke and SS Ali (Northland DHB). \$NZ40,766.

2014. Lottery Health. *Transform a tooth with a "transformer tooth". A novel approach for child oral health*. Dr LA Foster Page (PI), Ms DH Boyd, Professor WM Thomson and Dr JM Broadbent. \$NZ80,000 (plus GST).

2013. Cure Kids. *Transform a tooth with a "transformer tooth". A novel approach for child oral health*. Dr LA Foster Page (PI), Ms DH Boyd, Professor WM Thomson, Dr JM Broadbent and Associate Professor WJ Duncan. \$NZ98,510 (plus GST).

2013. NZDA Research Foundation. *Does the Immunoscore Predict the Behavior of Oral Cancer?* Mr A Avadhani, Professor AM Rich, Dr VP Parachuru, Dr JM Broadbent, Professor GJ Seymour. \$NZ14,934.

Internal funding secured

2013. Internationalisation of the Curriculum Initiative Grants. *Aligning and improving Problem Based Learning in cariology teaching in undergraduate dentistry at Otago and IMU.* Dr LA Foster Page (PI), Dr J Rountree, Dr A Tawse-Smith, Dr VR Anderson, Professor TC Gait. \$NZ10,357.

2014. University of Otago Research Grant. *To drill or not to drill.* Dr JM Broadbent (PI), Dr LA Foster Page, Ms CM Murray, Dr D Schwass. \$NZ33,340.

Honours/awards

In 2014, **Dr Broadbent** received the *Building Bridges Award* from the Association for Psychological Science and the National Institute of Dental and Craniofacial Research (USA).

Dr Foster Page received a Fulbright Travel Award in 2014.

Dr Foster Page received the Sir John Walsh Research Institute Clinical Research Award in 2014.

Dr Foster Page received a University of Otago Early Career Research Award in 2013.

Professor Thomson was awarded a second IADR Distinguished Scientist Award (the 2014 Award in Geriatric Oral Research, for outstanding research accomplishments in the field of geriatric oral research) at the 2014 General Session of the International Association for Dental Research, Cape Town, June 2014. He is only the second New Zealander to have received two IADR Distinguished Scientist Awards; the other was Professor Basil Bibby (University of Rochester, NY).

Professor Thomson received the Sir John Walsh Research Institute 2013 Research Publication Award in September 2013 (for the paper Thomson WM, Mejia GC, Broadbent JM, Poulton R. Construct validity of Locker's global oral health item. *Journal of Dental Research* 91: 1038-1042, 2012).

On 19 August 2014, Professor Thomson was awarded the honour of Fellow of the New Zealand Dental Association for his contribution to the NZDA, primarily in his role as Editor of the *New Zealand Dental Journal* from July 2007 to June 2014.

Key publications

Dr JM Broadbent

Broadbent JM, Foster Page LA, Thomson WM, Poulton R. Permanent dentition caries through the first half of life. *British Dental Journal* 215: E12. doi:10.1038/sj.bdj.2013.991 (2013).

McKay S, Farah R, Broadbent JM, Tayles N, Halcrow SE. Is it health or the burial environment: differentiating between hypomineralised and post-mortem stained enamel in an archaeological context. *PLoS ONE* 10.1371/journal.pone0164573: (2013).

Thomson WM, Broadbent JM, Foster Page LA, Poulton R. Antecedents and associations of root surface caries experience among 38-year-olds. *Caries Research* 47: 128-134 (2013).

Tilwala D, Murray C, Farah R, Broadbent JM. New Zealand dental therapists' beliefs regarding child maltreatment. *Australia New Zealand Journal of Public Health* 10.1111/1753-6405.12238 (2014).

Professor JR Broughton

Broughton JR, Person M, Maipi J TeH, Cooper-Te Koi R, Smith-Wilkinson A, Tiakiwai S, Kilgour J, Berryman K, Morgaine KC, Jamieson LM, Lawrence HP, Thomson WM. Ūkaipō niho: the place of nurturing for oral health. *New Zealand Dental Journal* 110: 18-23 (2014).

Ben J, Jamieson LM, Priest N, Parker EJ, Roberts-Thomson KF, Lawrence HP, Broughton JR, Paradies Y. Experience of racism and tooth brushing among pregnant Aboriginal Australians: exploring psychosocial mediators. *Community Dental Health* 31: 1-8 (2014).
Broughton JR, Maipi JTeH, Person M, Thomson WM, Morgaine KC, Tiakiwai S-J, Kilgour J, Berryman K, Lawrence HP, Jamieson LM. Reducing disease burden and health inequalities arising from chronic disease among Indigenous children: an early childhood caries intervention in Aotearoa/New Zealand. *BMC Public Health* 13: 1177 (2013).



Professor Murray Thomson giving a keynote address, Adelaide, April 2014.



Professor John Broughton greeting a First Nations colleague, Toronto, March 2015.

McBride, D., Cox, B., Broughton, J., and Tong, D. "The mortality and cancer experience of New Zealand Vietnam war veterans: a cohort study." *BMJ Open* 3:e003379 (2013). doi:10.1136/bmjopen-2013-003379.

Dr LA Foster Page

Foster Page LA, Thomson WM, Marshman Z, Stevens K. The potential of the Child Health Utility 9D Index as an outcome measure for child dental health. *BMC Oral Health* 14:90 (2014). DOI: 10.1186/1472-6831-14-90.

Foster Page LA, Boyd DH, Davidson SE, McKay SK, Thomson WM, Innes NP. Acceptability of the Hall Technique to parents and children. *New Zealand Dental Journal* 110:12-18 (2013).

Foster Page LA, Thomson WM, Ukra A, Baker SR. Clinical status in adolescents: is its impact on oral-health-related quality of life influenced by psychological characteristics? *European Journal of Oral Sciences* 121:182-187 (2013).

Foster Page LA, Boyd H, Thomson WM. Do we need more than one Child Perceptions Questionnaire for children and adolescents? *BMC Oral Health* 13:26 (2013).

Dr KC Morgaine

Henzell MR, Knight AM, Morgaine KC, Antoun JS, Farella M. A qualitative analysis of orthodontic-related posts on Twitter. *Angle Orthodontist* 84: 203-207 (2014).

McKelvey VA, Morgaine KC, Thomson WM. Adults with intellectual disability: a mixed-methods investigation of their experiences of dental treatment under general anaesthetic. *New Zealand Dental Journal* 110: 58-64 (2014).

Subramanian J, Anderson VR, Morgaine KC, Thomson WM. Effective and ineffective supervision in postgraduate dental education: a qualitative study. *European Journal of Dental Education* 17: e142-e151 (2013).

Subramanian J, Anderson VR, Morgaine KC, Thomson WM. The importance of 'student voice' in dental education. *European Journal of Dental Education* 17: e136-e141 (2013).

Ms DM Shearer

Zeng J, Williams SM, Fletcher DJ, Cameron CM, Broadbent JM, Shearer DM, Thomson WM. Re-examining the periodontal effects of smoking and periodontitis in the Dunedin study with an enhanced analytical approach. *Journal of Periodontology* 85: 1390-1397 (2014).

Thomson WM, Shearer DM, Broadbent JM, Foster Page LA, Poulton R. The natural history of periodontal attachment loss during the third and fourth decades of life. *Journal of Clinical Periodontology* 40: 672-680 (2013).

Professor WM Thomson

Thomson WM, Foster Page LA, Gaynor WN, Malden PE. Short-form versions of the Parental-Caregivers Perceptions Questionnaire (P-CPQ) and the Family Impact Scale (FIS). *Community Dentistry and Oral Epidemiology* 41: 441-450 (2013).

Thomson WM, Shearer DM, Broadbent JM, Foster Page LA, Poulton R. The natural history of periodontal attachment loss during the third and fourth decades of life. *Journal of Clinical Periodontology* 40: 672-680 (2013).

Thomson WM, JM Broadbent, LA Foster Page, R Poulton. Antecedents and associations of root surface caries experience among 38-year-olds. *Caries Research* 47: 128-134 (2013).

Thomson WM, Foster Page LA, Malden PM, Gaynor WN, Nordin N. Comparison of the ECOHIS and short-form P-CPQ and FIS scales. *Health and Quality of Life Outcomes* 12: 36 (2014). (doi: 10.1186/1477-7525-12-36)

Dr J Zeng

Zeng J, Williams SM, Fletcher DJ, Cameron CM, Broadbent JM, Shearer DM, Thomson WM. Re-examining the periodontal effects of smoking and periodontitis in the Dunedin study with an enhanced analytical approach. *Journal of Periodontology* 85: 1390-1397 (2014).

Molecular Microbiology

Programme Directors: Professor Richard Cannon (to June 2013)
Dr Geoffrey Tompkins (2013-14)

Overview

Molecular Microbiology research within the SJWRI encompasses microbiological investigations applied to a variety of disciplines including endodontics, periodontics and implantology, cariology and treatment with antimicrobials, antifungal drug development, microbial genomics and forensics.

Major funding supporting research within the Theme during 2013-2014 (more than \$3 million) came from the Marsden Fund (Royal Society of New Zealand), University of Otago Research Committee, New Zealand Dental Research Foundation, Ministry of Health Oral Health Research Fund, New Zealand Health Research Council, Maurice and Phyllis Paykel Trust, the Fuller Scholarship, Dentsply, Syngenta and other commercial concerns.

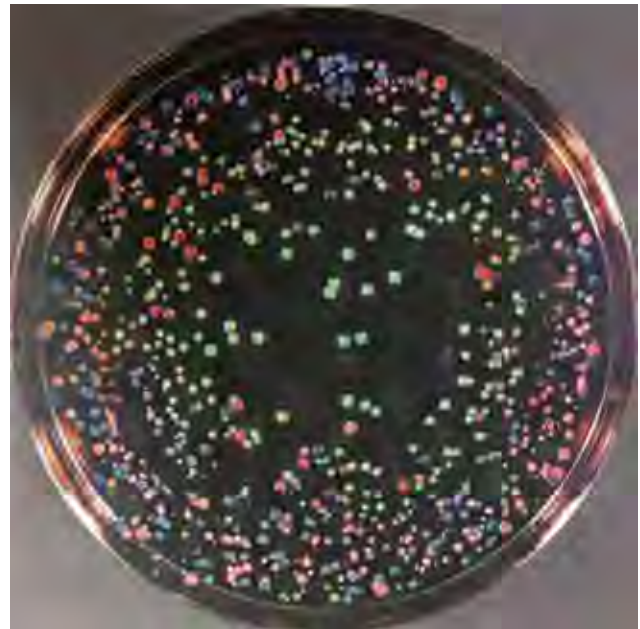
Personnel

Staff

Professor Richard Cannon
Associate Professor Nick Chandler
Dr Nick Heng
Dr Ann Holmes
Dr Mikhail Keniya
Dr Erwin Lamping
Dr Hee Ji Lee
Professor Robert Love
Professor Karl Lyons
Dr Li Mei
Associate Professor Brian Monk
Dr Kyoko Niimi
Dr Masakazu Niimi
Ms Manya Sabherwal
Dr Don Schwass
Dr Andrew Tawse-Smith
Dr Geoffrey Tompkins
Jenine Upritchard
Dr Rajni Wilson
Dr Matthew Woods

Postgraduate Students

Gemma Cotton (PhD)
Sujan Gowda (PhD)
Franziska Huschmann (PhD)
Darnell Kennedy (PhD)
Juhi Muthuplackal (MSc)
Bikiran Pardesi (PhD)
Ely Rodrigues (PhD)
Alia Sagatova (PhD)
Syarida Safii (PhD)
Mohamad Al-Dujaili (DClinDent)
Shreya Agarwhal (DClinDent)
James Dawson (DClinDent)
Arpana Devi (DClinDent)
Siddhanta Dhruvad (DClinDent)
Niveathanan Kamalendran (DClinDent)
Nick Knight (DClinDent)
Yeen Lim (DClinDent)
Lydia Meredith (DClinDent)
Kathryn Newsham-West (DClinDent)
Wan Syasliza Mohamed Thani (DClinDent)



Yeast colonies cultured from the saliva of a denture wearer on CHROMagar Candida agar plate (Nick Knight, DClinDent student).

Visiting Scientists

Professor Alistair Brown, Aberdeen University, UK

Professor Susumu Kajiwaru, Tokyo Institute of Technology, Tokyo, Japan

Extramural Collaborators

Dr Stewart Bisset, AgResearch, Palmerston North

Dr Ariya Chindamporn, Chulalongkorn University, Bangkok, Thailand

Dr Edmund Fleischer, MicroCombiChem, Weisbaden, Germany

Dr Anette Klinger, MicroCombiChem, Weisbaden, Germany

Associate Professor Lucio Gonçalves, Estácio de Sá University, Rio de Janeiro, Brazil

Dr Michael Gottesman, National Cancer Institute, NIH, Bethesda, USA

Professor Susumu Kajiwaru, Tokyo Institute of Technology, Tokyo, Japan

Dr Kurt Lackovic, Walter and Eliza Hall Institute, Melbourne, Australia

Professor Amarila Malik, Universitas Indonesia, Jakarta, Indonesia

Associate Professor Alok Mitra, Auckland University, Auckland

Associate Professor Koshy Philip, Universiti Malaya, Kuala Lumpur, Malaysia

Professor Rajendra Prasad, Jawaharlal Nehru University, New Delhi, India

Dr Jan Schmid, Massey University, Palmerston North

Professor Larry Sklar, University of New Mexico, Albuquerque, USA

Professor Robert Stroud, UCSF, San Francisco, USA

Dr Thomas Tomasiak, UCSF, San Francisco, USA

Dr Silas Villas-Bôas University of Auckland, Auckland

Associate Professor Maggie-Lee Huckabee, University of Canterbury, Christchurch

Current research

Structure-directed antimicrobial discovery

PI Associate Professor Brian Monk

This group is focused on identifying drug targets in microorganisms, studying their structure and function and using these properties to obtain drugs that can circumvent the almost inevitable emergence of drug resistance. We use bioinformatics to identify potential drug targets. Bacterial and yeast expression systems are then used to screen for drugs and undertake physiological, biochemical and structural analysis. In recent years we have identified compounds that inhibit targets involved in yeast energy metabolism and multidrug efflux mediated by plasma membrane pumps. One of these compounds is being used in studies aimed at developing an endodontic dressing. Other molecular targets under development include bacterial DNA gyrase and we have also obtained the X-ray crystal structure of lumazine synthase from the pathogenic yeast *Candida glabrata*. Oral fungi can develop resistance to the widely used azole antifungal drugs. We have crystallized and obtained high resolution X-ray structures of the azole drug target Erg11p from the model yeast *Saccharomyces cerevisiae*. We are using this structure, the first full-length structure for a eukaryotic plasma membrane-bound cytochrome P450 or a monospanning bitopic membrane protein, to guide the design of improved antifungal drugs for use in medicine and agriculture.



Dr Mikhail Keniya, Associate Professor Brian Monk and PhD student Alia Sagatova at Research Day 2014.

Candida adherence and drug-resistance

PI Professor Richard Cannon

Microbial biofilms are implicated in many diseases. An obvious example is dental plaque which can cause caries. Another important oral biofilm forms on the silicone voice prostheses used by patients who have received laryngectomies. These biofilms interfere with valve function necessitating their frequent replacement and associated morbidity. Interestingly, the predominant microbial species in the biofilms on voice prostheses is *Candida albicans*. We have shown that certain saliva proteins are selectively bound to silicone, including SPLUNC2, which acts as a receptor for *C. albicans* adherence. The early binding of *C. albicans* from saliva to new prostheses may explain the prevalence of *C. albicans* in these biofilms.

The main cause of high-level azole drug resistance in *C. albicans* clinical isolates is over-expression of ATP-binding cassette (ABC) membrane proteins that efflux the drugs from cells. We have used our patented *Saccharomyces cerevisiae* system for heterologously expressing membrane proteins to study *C. albicans* efflux pump Cdr1p. Alanine-scanning mutagenesis has been used to investigate the role of amino acids in pump function. We have also used the expression

system to study human ABC proteins that contribute to the chemotherapy-resistance of melanomas.

Heme acquisition by periodontal bacteria

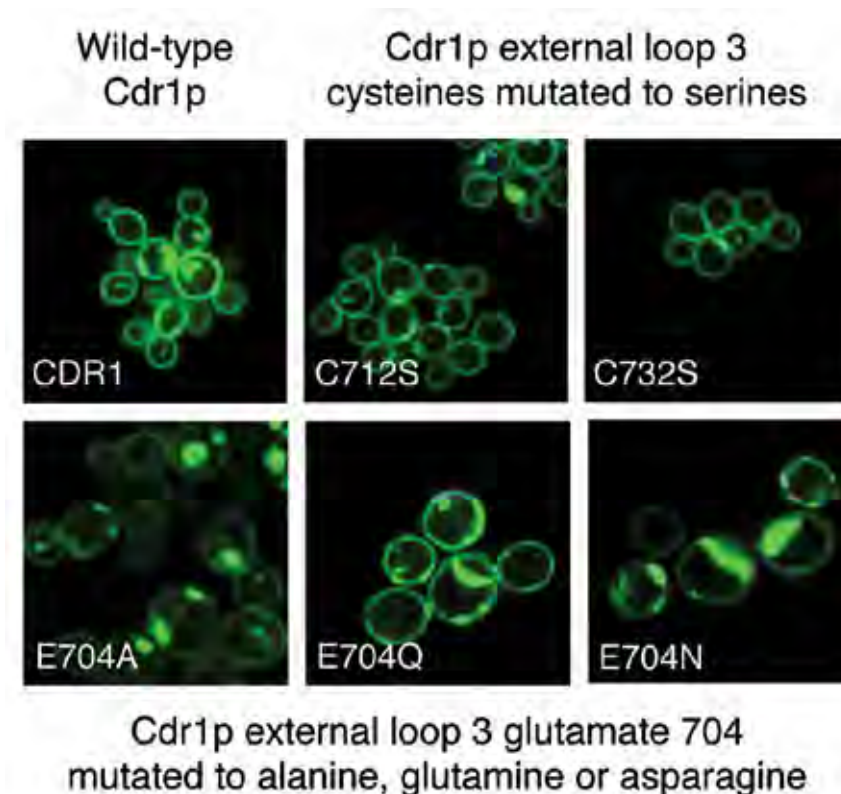
PI Geoffrey Tompkins

Heme is thought to be an essential growth factor for certain gram-negative bacteria implicated in the pathogenesis of periodontal disease. Establishing how these organisms acquire heme from their human host will aid in understanding how the disease develops, who may be susceptible and how we might intercede to prevent this widespread condition.

Microbial profiling and genome sequencing using next-generation DNA sequencing technology

PI Dr Nick Heng

The oral cavity of each human and animal harbours its own distinctive community of microbes, termed the "oral microbiota". The human oral microbiota is estimated to comprise over 700 species of microbes. Many species have been associated with disease such as *Streptococcus mutans* (dental caries) and *Porphyromonas gingivalis* (periodontal disease), are there any other species that may either contribute to disease progression or are associated with good oral health? Bacterial profiling of oral samples from



Effect of amino acid substitutions on the localisation of *Candida albicans* efflux pump Cdr1p expressed in *Saccharomyces cerevisiae* (Dr Hee Ji Lee, Dr Kyoko Niimi and Dr Erwin Lamping).

healthy or diseased participants using high-yield next-generation DNA sequencing technology may help identify some of these species. This research group is also interested in revealing the genomic secrets of cultured species such as the antimicrobial-producing probiotic *Streptococcus salivarius* and a new streptococcal species isolated from the mouth of New Zealand brushtail possums.

Other research programmes undertaken within the Molecular Microbiology Theme are described in respective staff members' profiles in the 2013-14 SJWRI Research Report.

Highlights

Research Prizes

Belinda Hsu (BDS student) was awarded first place in the Australian Dental Association competition for undergraduate research (2013).

Deepa Mistry (BDS student) won an IADR NZ section IADR poster prize (2013), IADR ANZ Division Colgate Poster Prize (2013), Otago Medical Research Foundation Renshaw Prize (2014), and the New Zealand Dental Research Foundation Prize (2014).

Darnell Kennedy (PhD student) won the Sir John Walsh Research Institute Post-Graduate publishing prize (2013).

Associate Professor Brian Monk was awarded the Sir John Walsh Research prize (2013).

Alia Sagatova (PhD student) won an IADR NZ section IADR poster prize (2014).

Lynda Hwang (BDS student) was the winner of the Junior Colgate Award at the Australia-New Zealand meeting of the International Association for Dental Research (2014) and also won the New Zealand Dental Research Foundation Prize (2014).

Graduations

Sujan Gowda (PhD 2014)
Madhu Shankar (PhD 2013)
Darnell Kennedy (PhD 2013)
Franziska Huschmann (PhD 2014)
Ely Rodrigues (PhD 2013)
Madhu Shankar (PhD 2013)
Juhi Muthuplackal (MSc 2014)
Kathryn Newsham-West (DClinDent 2013)
Nick Knight (DClinDent 2014)
Yeen Lim (DClinDent 2014)

Notable Publications

Monk, B.C, Tomasiak M.K., Keniya M.V., Huschmann, F.U., Tyndall J.D.A., O'Connell III, J.D, Cannon, R.D., McDonald, J.D., Rodriguez, A., Finer-Moore, J.S., and Stroud, R.M. (2014) Architecture of a single membrane spanning cytochrome P450 suggests constraints that orient the catalytic domain relative to a bilayer. *Proc. Nat. Acad. Sci. USA* 111: 3865-3870.

Kennedy, D. M., J. A. Stanton, J. A. Garcia, C. Mason, C. J. Rand, J. A. Kieser, and G. R. Tompkins. Microbial analysis of bite marks by sequence comparison of streptococcal DNA. *PLoS One* 7:e51757 (2012).

Keniya, M.V., Holmes, A.R., Niimi, M., Lamping, E., Gillet, J.-P., Gottesman, M.M. and Cannon, R.D. (2014) Drug resistance is conferred on the model yeast *Saccharomyces cerevisiae* by expression of full length melanoma-associated human ABC transporter ABCB5. *Molecular Pharmaceutics* 11:3452-3462

Han, T.-L., Tumanov, S., Cannon, R.D. and Villas-Bôas, S.G. (2013) Metabolic response of *Candida albicans* to phenylethyl alcohol under hyphae-inducing conditions. *PLoS One* 8(8): e71364

Lamping, E., Niimi, M. and Cannon, R.D. (2013) Small, synthetic, GC-rich mRNA stem-loop modules 5' proximal to the AUG start-codon predictably tune gene expression in yeast. *Microbial Cell Factories* 12:74

Rawal, M.K., Khan, M.F., Kapoor, K., Goyal, N., Sen, S., Saxena, A.K., Lynn, A.M., Tyndall, J.D., Monk, B.C., Cannon, R.D., Komath, S.S. and Prasad, R. (2013) Insight into PDR ABC pump drug transport through mutagenesis of Cdr1p transmembrane domains. *Journal of Biological Chemistry* 288:24480-24493

Oral and Molecular Immunopathology

Programme Leaders: Professor Greg Seymour and Professor Alison Rich (2013)
Professor Alison Rich (2014)

Current information about cellular and molecular mechanisms involved in the pathogenesis of chronic oral diseases and in development and healing allows advancement of diagnostic and treatment modalities. Our group uses a range of cellular, molecular, immunological and pathological tools including cell culture, genomic and focused micro-arrays, real time PCR, laser microdissection and immunohistochemistry to investigate a range of dental and oral mucosal conditions. Of major interest is regulation of the microenvironment in oral squamous cell carcinoma with respect to local and nodal immune regulation, influences on local invasion, angiogenesis and the reaction to endoplasmic stress and epigenetic effects. The interest in angiogenesis extends to pulpal tissues in terms of continued root development following pulp injury, as well as to the effect of bisphosphonates and the pathogenesis of bisphosphonate related osteonecrosis of the jaw (BRONJ). Cell lines have been developed from pulp and periosteum to gather information on the presence of progenitor cells in these tissues.

Key Personnel and Collaborations

Staff

Dawn Coates
Mary Cullinan
Bernadette Drummond
Norman Firth
Lara Friedlander
Lynda Horne
Sharla Kennedy
Trudy Milne
Praveen Parachuru
Alison Rich
Benedict Seo (also PhD student)
Gregory Seymour
Andrew Tawse-Smith (also PhD student)

PhD and DCLinDent students

Muhammad Al-Ansary	Olive Allsobrook
Avadhoot Avadhani	Kullasit Chutipongpisit
Sarah Drake	Osea Gavidì
Simon Guan	Ramya Jawadi
Hina Narayan	Noel Ye Naung
Suraya Sinon	Muhammed Yakin
Sobia Zafar	Diogo Zaniccotti

We have international collaborative studies with the Oral Cancer Research and Coordinating Centre, University of Malaya, Malaysia
malaysiaoralcancer.org



Sarah Drake, DCLinDent student.

Current Research Projects

Activity 1. Angiogenesis

- Angiogenesis and pulp biology
- Angiogenesis in inflammatory hyperplasias
- Angiogenesis and oral squamous cell carcinoma
- Lymphangiogenesis and oral squamous cell carcinoma

Activity 2. Endoplasmic reticulum stress and the unfolded protein response

- In an inflammatory model-periodontal diseases
- In a neoplastic model-oral squamous cell carcinoma
- In relation to signalling pathways-STAT3

Activity 3. Regulation of immune responses

- In periodontal diseases
- In oral squamous cell carcinoma-regulatory T cells
- In oral squamous cell carcinoma-IL17 and invasion
- In an immune-mediated lesion-oral lichen planus

Activity 4. Epigenetics

- In periodontal diseases
- In squamous cell carcinoma

Highlights 2013 and 2014

Funding successes

Does the immunoscore predict the behaviour of oral cancer? A Avadhani, AM Rich, VPB Parchuru, JM Broadbent, GJ Seymour. Funding: NZDRF 2013-2015 \$14,934.

BRONJ – The effects of zoledronic acid on the VEGF receptors and implications for osteoblast growth and maturation. DE Coates, K McLaughlin, M Cullinan, GJ Seymour Funding: NZDRF 2013-2015 \$14,073.

Primary tooth pulp as a source of progenitor cells for tooth regeneration. BK Drummond, M Alansary, DE Coates, GJ Seymour, LT Friedlander, DG Zaniccotti. Funding: NZDRF 2013-2015 \$14,981.

Expression of Cyclin D1 in normal oral mucosa, oral dysplasia and oral squamous cell carcinoma. NA Firth, S Guan, R Love. Funding: NZDRF 2013-2015 \$4,624.

Endoplasmic Reticulum Stress proteins in the development of oral squamous cell carcinoma. BL Seo, DE Coates, AM Rich, GJ Seymour. Funding: NZDRF 2013-2015 \$15,000.

Lymphangiogenesis in the oral squamous cell carcinoma microenvironment. K Chutipongpisit, V Parachuru, AM Rich. Funding: NZDRF 2014-2016 \$9,285.

Primary tooth pulp as a source of progenitor cells for permanent tooth pulp-dentine regeneration. D Coates, M Alansary, BK Drummond, GJ Seymour, LT Friedlander, DG Zaniccotti Funding: NZDRF 2014-2016 \$13,221.

MicroRNA expression profile in healthy and diseased gingival tissues. V Parachuru, R Katare, AM Rich, W Duncan, GJ Seymour. Funding: NZDRF 2014-2016 \$15,000.

Role of interleukin 17 in invasion of oral cancer. AM Rich, A Avadhani, T Milne, GJ Seymour. Funding: NZDRF 2014-2016 \$14,697.28

Effect of cigarette smoke on DNA methylation in human gingival fibroblasts in vitro. AM Rich, H Narayan, T Milne, GJ Seymour. Funding: MOHOHRF 2014-2016 \$14,179.

The use of periosteum-derived mesenchymal multipotent progenitor cells for bone regeneration on titanium surfaces. W Duncan, Y Naung, DE Coates, DG Zaniccotti, R. De Silva. Funding: Arthritis New Zealand 2014-2016 \$20,000.

The use of periosteum-derived mesenchymal multipotent progenitor cells for bone regeneration on titanium surfaces. W Duncan, Y Naung, DE Coates, DG Zaniccotti, R. De Silva. Funding: Wishbone Trust of New Zealand 2014-2016 \$16,000.

The use of periosteum-derived mesenchymal multipotent progenitor cells for bone regeneration on titanium surfaces. W Duncan, DE Coates, Y Naung, DG Zaniccotti, R. De Silva, GJ Seymour. Funding: Maurice and Phyllis Paykel Trust 2014-2016 \$10,000.

Publications

In 2013 and 2014 members of the group published 14 papers in international peer reviewed journals. Eighteen conference presentations were made. Full details are available online.

Honours and Awards

2013: Diogo Zaniccotti was the Postgraduate Award winner of the New Zealand Section of the International Association for Dental Research and won a trip to present his poster at the International Association for Dental Research, Bangkok.

2013: Maurice and Phyllis Paykel Trust – Travel Award for attendance at the International Association for Dental Research, Bangkok. D. Coates, S. Zafar, M. Cullinan, B. Drummond, G. Seymour. \$1000.

Postgraduate Student Completions

Praveen Parachuru (PhD, 2013)

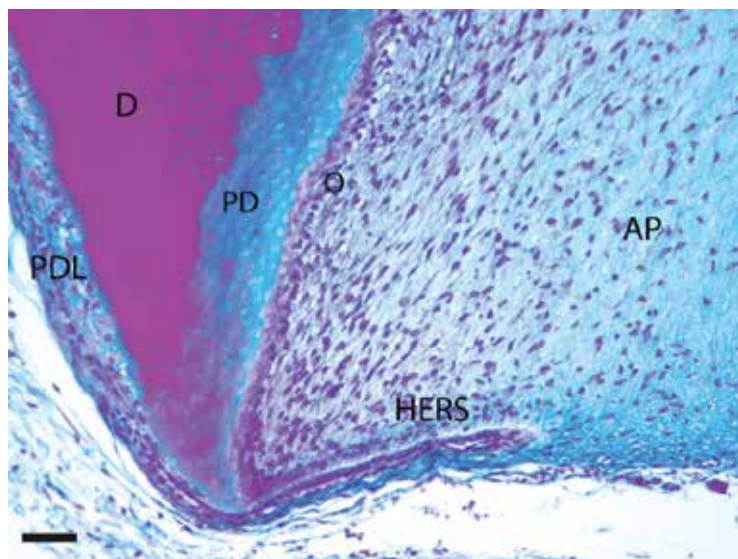
Lara Friedlander (PhD, 2014)

Osea Gavidì (DClinDent Oral Pathology, 2013)

Olive Allsobrook (DClinDent Oral Pathology, 2014)

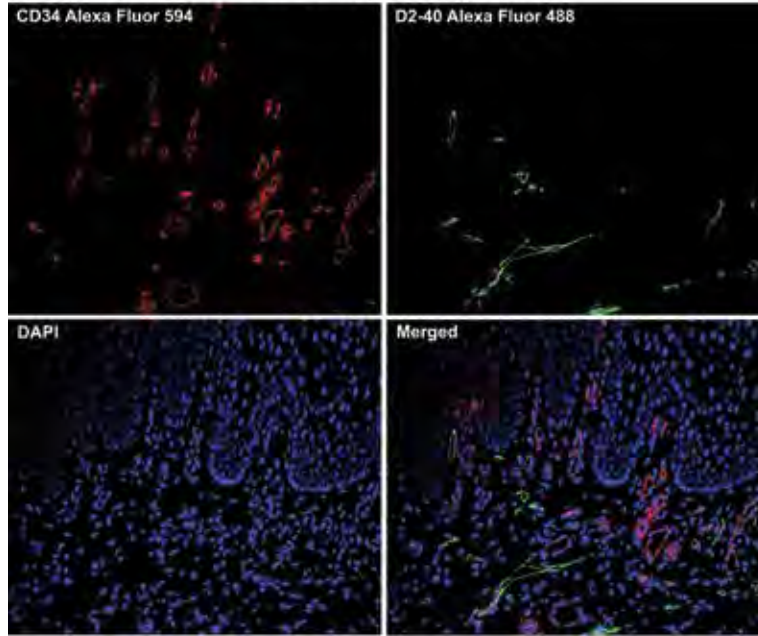
Ramya Jawadi (DClinDent Oral Pathology, 2014)

Simon Guan (DClinDent Oral Medicine, 2014)



Masson's trichrome stain of the apical region of an immature permanent tooth root showing cell rich areas and the apical papilla tissue. This tissue has the potential to participate in apexogenesis and healing following pulp injury. (Lara Friedlander).

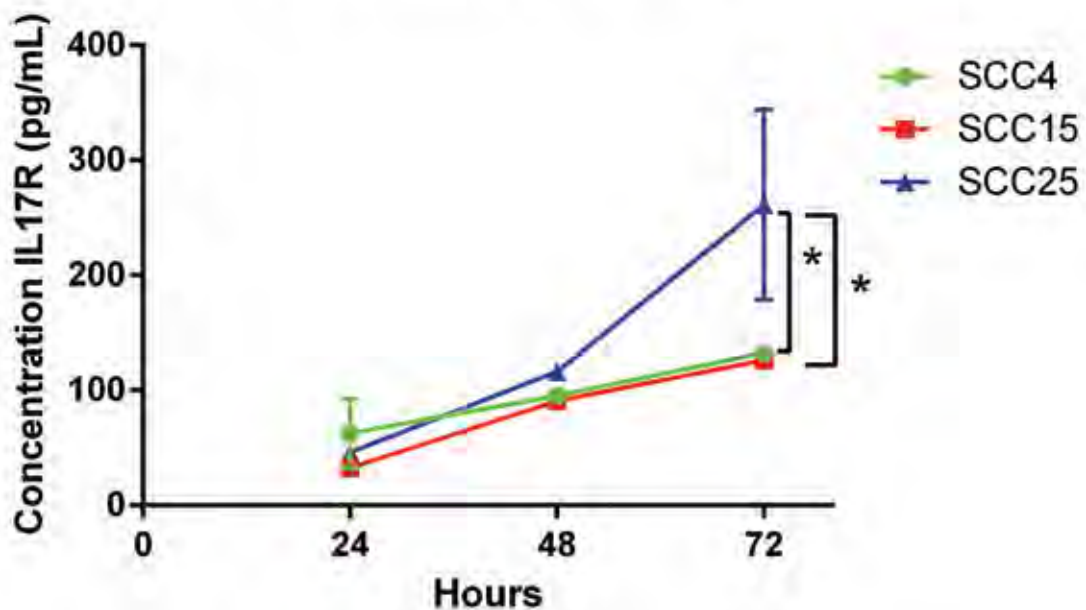
Case 1 - Lymphangioma



CD34 - blood vessel endothelial cell marker
D2-40 (podoplanin) - lymphatic vessel endothelial cell marker

CD34/D2-40 double immunofluorescence staining assists in differentiating between blood and lymphatic vessel endothelial cells. This photomicrograph is of a lymphangioma, a benign tumour of lymphatic vessels. The top left image shows the expression of CD34, a marker for blood vessel endothelial cells (red). Top right image shows the expression of D2-40 (green), a marker for lymphatic vessel endothelial cells. Bottom left image shows the DAPI counterstain. Bottom right image is a merge of all the other images in the panel and allows the distinction of blood and lymphatic vessels. (Kullasit Chutipongpisit, DCLinDent Oral Pathology student, and Praveen Parachuru).

IL17 soluble receptors



Graph demonstrating that soluble IL17 receptors were detected in all OSCC cell lines tested and that their expression increased in a time dependent manner. (Avadhoot Avadhani, PhD student, and Trudy Milne).

Emerging research programmes

CLINICAL RESEARCH

Programme Directors: Associate Professor Mary Cullinan (2013)
Professor Warwick Duncan (2014)

The Clinical Research Programme (CRP) was established in 2013 following the awarding of University of Otago Research Centre status to the SJWRI. Clinical research aims to improve patient care and to achieve better outcomes for patients. A major ongoing initiative of the CRP is the development of a dental practice-based research network, Applied Research through Clinicians' Hands (ARCH).

Practice Based Research Networks (PBRNs) foster relationships between practitioners and academics by investigating research questions of relevance to daily clinical practise. The types of studies that may be undertaken range from retrospective studies using dental records, observational studies of routine care, case-control studies, through to clinical trials.

PBRNs have been operating successfully in a number of countries in recent years. For example, the US has the National Dental Practice-Based Research Network with a mission *To improve oral health by conducting dental practice-based research and by serving dental professionals and their patients through education and collegiality*. Research carried out through PBRNs in the US has examined a range of topics including: outcomes of cracked teeth and of single tooth endodontic and restorative treatment, repair or replacement of defective restorations, remineralisation of white spot lesions following removal of orthodontic brackets, and medications and dry mouth.

In 2011, the Victorian Branch of the Australian Dental Association, in conjunction with the Oral Health Cooperative Research Centre of the University of Melbourne, set up a PBRN named eViDent. Some of the projects undertaken by eViDent members include a retrospective study of implant complications in private practice, general practice prescribing and xerostomia, molar/incisor hypomineralisation, and periodontal diagnosis, treatment and maintenance in general practice.

PBRN practitioners in the US and Australia feel the experience offers them benefits in terms of improving patient care, providing collegiality and learning opportunities, and that they can give something back to the profession. Many are enthusiastic about the research and find it empowering. They also find that patients are willing to participate in something that will improve treatments and outcomes.

The last two years have seen considerable progress with the establishment of the practice-based research network ARCH (otago.ac.nz/arch), within the Clinical

Research programme. This has been achieved with the support of the University of Otago through SJWRI Research Centre funding. Collaborative links have been developed with the University of Otago Bioethics Centre to develop a blended learning module in ethics for practitioners undertaking clinical research. Collaboration is being undertaken with HEDC to develop an on-line platform for information sharing and clinical research. The SJWRI has worked closely with the NZDA and the Melbourne-based eViDent Foundation to put in place the training and support structures needed to involve dental practitioners in dental research. ARCH provides an exciting opportunity to address clinically relevant research needs identified by dental practitioners. As the PBRN develops and matures, there is increased scope for research-informed practice and practice-informed research projects and the potential to access new external funding opportunities from government and industry. The types of studies that have initially been undertaken include retrospective studies using dental records, and it is anticipated that the second phase of the PBRN will undertake observational studies of routine care, case-control studies, clinical trials and other issues of relevance to dentists here in New Zealand. The group is also offering scholarships to support postgraduate clinical research.



Key Personnel

Assoc Prof Mary Cullinan (to end 2013)
Professor W Duncan
Dr B Al-Amleh
Mr M Brosnan
Professor P Brunton
Mr H De Silva
Professor B Drummond
Professor M Farella
Dr L Friedlander
Ms D Hanlin
Ms S Ma
Ms C Murray

Research projects and themes established:

- Direct pulp capping practices in New Zealand – A PBRN study
- Vital pulp therapy (VPT) in general practice.
- The understanding of undergraduate dental students and clinical tutors around VPT.
- Research ethics for practitioners undertaking clinical research.
- A retrospective assay of implant outcomes in New Zealand Dental Practice.

Awards

Otago Medical Research Award

2013 – Kate McElroy (supervisors Dr Lara Friedlander, Suzanne Hanlin, Dr Ben Daniel, Assoc Prof Mary Cullinan)

Summer Research Project – Direct pulp capping practices in New Zealand – A PBRN study

NZDRF Grant

2014 – Friedlander L, Hanlin S, Daniel B

Direct pulp capping in New Zealand general dental practice – A Practice Based Research Network (PBRN) study

New Zealand Dental Research Foundation and Continuing Dental Education Research Award

\$14,970

Collaborative links

With eviDent Foundation, HEDC and the Bioethics centre to develop a blended learning module in ethics for practitioners undertaking clinical research.

Collaboration with HEDC to develop an on-line platform for information sharing and clinical research.

2013 activities

The 2013 SJWRI Clinical Research Symposium: *When practice meets research – a future full of possibilities* was held at the Dunedin Public Art Gallery on June 28, providing an interesting and collegial day of CPD for those who attended. The topics covered by our speakers were both informative and thought provoking, highlighting areas where our clinical decisions are more empirical than evidence based, and forward-looking in providing glimpses of what technology can offer. Professor Mike Morgan of the University of Melbourne gave insight into eviDent, the Melbourne Dental Practice Based Research Network, and Professor Janet Clarkson gave an entertaining podcast of the Scottish PBRN. The feedback received has been very positive and a number of practitioners have expressed an interest in joining our Practice Based Research Network ARCH. Benefits most often cited from involvement in a PBRN; include collegiality, learning opportunities and improved patient care.

Our Symposium speakers included:

Suzanne Hanlin – Digital dentistry in Prosthodontics. From CAD/CAM to Webcam and everything in between

Basil Al-Amleh – Ceramic fractures and their origins

Andrew Tawse-Smith – Challenges of oral implant maintenance

Mike Morgan – Practice based research networks: eviDent

Jan Clarkson – Practice based research networks: The UK experience (Podcast)

Jonathan Broadbent – The animated dental chart

Bernadette Drummond – Management for molar-incisor hypomineralisation with and without enamel breakdown

Lara Friedlander – The use of contemporary endodontic techniques to improve patient outcomes

For more information on our 2013 Clinical Research Symposium speakers, including biographies and outlines of their presentations, please visit

otago.ac.nz/sjwri/research/clinical/otago061173.html

In September 2013, Assoc Prof Mary Cullinan, Suzanne Hanlin and SJWRI Research Manager James Smith travelled to Melbourne to visit eviDent. The significant achievement of this trip was the establishment of a collaboration with eviDent for information sharing regarding PBRN establishment, structure and governance, recruitment of practitioners, research project management and collaborative projects (eg development of new training resources for participating practitioners in terms of research ethics and practice).

2014 activities

The SJWRI and ARCH-PBRN held a Clinical Research Symposium *Starting in research? – Let's get it right!* at the University of Otago on 14 Feb 2014. The symposium was aimed at academic staff, postgraduate research students and dental practitioners interested in participating in clinical research in oral health and attracted dental practitioners from Otago and Southland.

Suzanne Hanlin, Director of the ARCH Network gave an introduction and welcome to the attendees, which was followed by a presentation by Neil Pickering (Senior Lecturer, Bioethics Centre) on *Key issues in research ethics*. Gary Witte, Manager of Academic Committees for the University of Otago Ethics Committee, presented on *Human Participant Research Ethics: Frameworks and Practicalities*.

Following afternoon tea, Trish Leishman, Health Sciences Librarian spoke on *Getting your teeth into research: tools and skills for finding information*.

A PBRN governance symposium for key stakeholders was held in Dunedin in May 2014 at the HD Skinner

Annex, Otago Museum and included representation from the New Zealand Dental Association (NZDA), Ministry of Health (MoH), Southern District Health Board (SDHB), Accident Compensation Corporation (ACC), and South Island dental professionals. This event was designed to get buy-in from representatives of oral health in New Zealand and assist in establishing a validated governance model. Dr Denise Bailey (eviDent; Melbourne) chaired the meeting and outlined the development of evident highlighting the potential and pitfalls involved in developing and then supporting an active PBRN.

Topics covered included:

- Development of a research network- the Australian experience.
- Broad overview of the projects that have been completed.
- The role of a research advisory panel.
- Support for clinical research in New Zealand
- An open forum discussed engagement and potential roles of stakeholders in PBRN



HD Skinner Annex, Otago Museum, venue for the 2014 SJWRI/ARCH Clinical Research Symposium.

Engagement with stakeholders around the ARCH concept

Dr Lara Friedlander and Ms Suzanne Hanlin met with NZDA Executive (Wellington) on behalf of the ARCH-PBRN in October to present the case for a collaborative partnership. A highly productive discussions indicated NZDA support for the PBRN initiative and discussions regarding ongoing levels of support are ongoing.

Also in October, SJWRI Research Manager James Smith represented ARCH at the eviDent AGM in Melbourne, to discuss collaborative projects and governance with eviDent researchers.

In the highly contested 2014 NZDA Research Foundation grant round, Dr Lara Friedlander and colleagues secured funding to expand the dental pulp capping PBRN study to a second phase. This project involved a focus group with dental practitioners from across NZ and was planned for March 2015. These focus groups will be followed by site visits to dental practices to more fully understand the engagement and support that is required to undertake productive practice based clinical research. These visits are planned for July 2015.

Student projects 2014

ARCH currently has an BDS5 honours student Jeffrey Ong who is supervised by Dr Lara Friedlander, Ms Suzanne Hanlin and Dr Ben Daniel (HEDC) and is undertaking a practice based research project related to *Philosophies and practices of vital pulp therapy in general practice*.

SJWRI Grant Round

In 2014 seeding funds were made available through SJWRI/ARCH-PBRN to support a practice based research project at the Faculty of Dentistry (applications close early 2015). A larger round to support student projects in clinical research will be conducted in mid 2015.

Establishing a tissue bank to support clinical research

Infrastructure was put in place to establish a tissue bank to support clinical research within the SJWRI: an ultra low temperature freezer (-80°C) and racks to house the Tissue Bank has been purchased, and liquid nitrogen storage and computer resources are in place. The establishment of the Tissue Bank was put on hold while the Division of Health Sciences reviewed Tissue Banks across the Division through 2013-14, with the possible outcome that they may be centralised. This process having run its course, the Tissue Bank will be established within the Institute from 2015 using best practice identified by the Division of Health Sciences in its review.

More on our Clinical Research programme:
otago.ac.nz/sjwri/research/clinical/index.html

More on the ARCH Network:
otago.ac.nz/arch/index.html

If you are a dental practitioner and are interested in joining our PBRN, or would like further information, please contact the ARCH Network Director, Suzanne Hanlin by emailing arch.dentalpbrn@otago.ac.nz



PBRN research team: Dr Ben Daniel (Higher Education Development Centre), Ms Suzanne Hanlin, Dr Lara Friedlander.

CRANIOFACIAL BIOLOGY AND CLINICAL ORAL PHYSIOLOGY

Programme Director: Professor Mauro Farella

Established in late 2014, *The Craniofacial Biology and Clinical Oral Physiology* research programme encompasses a diverse range of exciting fields, including the basic and molecular sciences relevant to craniofacial growth, the impact of malocclusions on jaw function and psychological wellbeing, and the understanding of the peripheral and central mechanisms of orofacial pain with their clinical correlates.

Several research approaches are used to study topics relevant to craniofacial biology, including cell response to mechanical loading, animal models, and clinical genetics. The latter focuses on identifying genetic markers for some dentofacial anomalies which could potentially provide us with a clinically important window of opportunity to predict abnormal growth patterns at an early age and, possibly, to provide personalized orthodontic treatments.

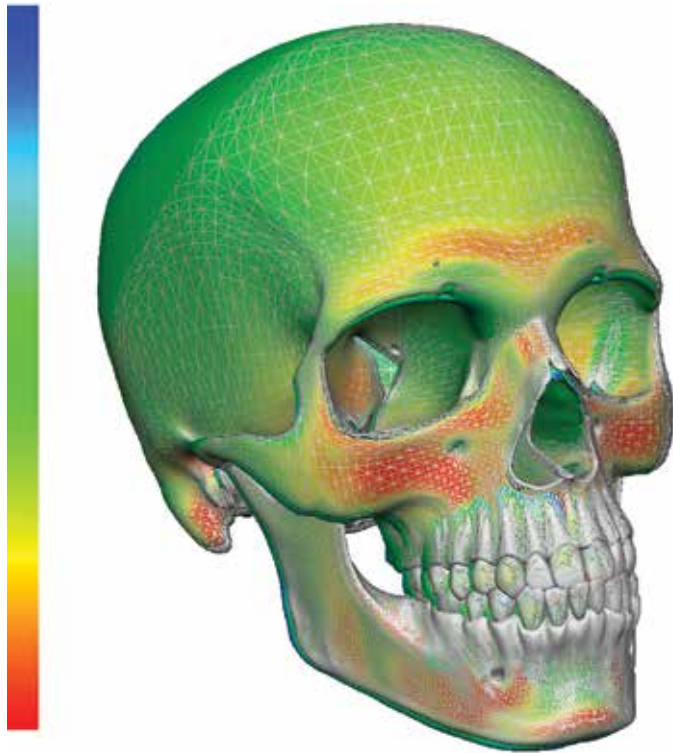
An additional area of active research is focusing on the development of novel treatment strategies for clinical problems such as craniofacial syndromes, jaw

discrepancies and misaligned teeth. Furthermore, the impacts of craniofacial anomalies and smile problems are quantitatively and qualitatively assessed at population and individual level using survey methods including social media. Social media enables us to gather opinions from the public about the importance of smiles for individuals themselves and also the perspective of their peers.

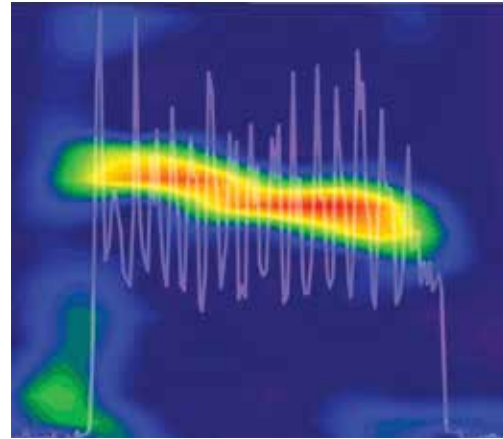
Research in the field of clinical oral physiology examines mastication and jaw kinematics, bruxism and non-functional oral behaviours, sleep disordered breathing including snoring and sleep apnea, intra-oral tongue pressure changes, dysphagia, tooth wear and novel food products. We are currently using wired and wireless sensors to monitor intraoral pH and jaw activity for the purpose of identifying and evaluating ways of overcoming orofacial pain, jaw dysfunction, jaw clicking sounds, and dental wear. We also use monitoring equipment to improve the quality of sleep in New Zealand children and adults.



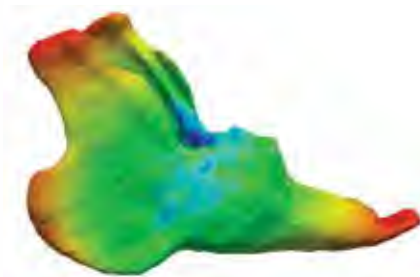
Developing intraoral sensors to monitor pH, temperature and jaw activity.



Heat map of pressure in the skull associated with jaw movement



EMG (Electromyogram) of bruxism episode in the time-frequency domain.



Three-dimensional image of mandibular growth in a rabbit.

The programme is led by Professor Mauro Farella, and includes the following Key Personnel:

Dr Joseph Antoun	Florence Bennani
Prof Richard Cannon	A/Prof Nick Chandler
A/Prof Rohana De Silva	Dr Harsha De Silva
Prof Warwick Duncan	Professor Mauro Farella
Dr Sophie Grey	Winifred Harding
Dr Nick Heng	Dr Hannah Jack
Dr Li Mei	Prof Karl Lyons
Dr Trudy Milne	Dr Christopher Robertson
Dr Benedict Seo	Suzan Stacknik
Prof Murray Thomson	A/Prof Neil Waddell

Other University of Otago Researchers

Dr Azam Ali (Department of Applied Sciences)

Dr Claire Cameron (Department of Preventive & Social Medicine)

A/Prof George Dias (Department of Anatomy)

Julia Horsfield (Department of Pathology)

A/Prof Barbara Galland (Department of Women's and Children's Health)

A/Prof Michael Paulin (Department of Zoology)

A/Prof Igor Meglinski (Department of Physics)

A/Prof Tony Merriman (Department of Biochemistry)

A/Prof Sylvia Sander (Department of Chemistry)

Prof. Steven Robertson (Department of Women's and Children's Health)

Dr Bernard Venn (Department of Human Nutrition)

Visiting scientists and students

Prof Luigi Gallo (University of Zurich)

A/Prof Vyacheslav Kalchenko (Weizmann Institute of Science, Israel)

Prof Murray Meikle (NZAO Visiting Professor)

Emeritus Prof Sandro Palla (University of Zurich)

Dr Roberto Rongo (University of Naples Federico II)

Postgraduate students

Azza Al-Ani (DClinDent)
Mohamad Al-Dujaili (DClinDent)
Joseph Antoun (DClinDent, PhD)
Victoria Beck (DClinDent)
Gareth Benic (DClinDent)
Catherine Carleton (DClinDent)
Joanne Choi (PhD)
Sophie Gray (DClinDent)
Erin Hutchinson (PhD)
Ghassan Idris (PhD)
Yana Itskovich (DClinDent)
Austin Kang (MHealSc)
Shaz Khayami (DClinDent)
Jennifer Lee (DClinDent)
Andrew Parton (DClinDent)
Coreen Loke (DClinDent)
Lydia Meredith (DClinDent)
Andrew Quick (PhD)

Research collaborations

The research group actively collaborates with other renowned scientific groups within the University of Otago such as:

- Center for Bioengineering and Nanomedicine
- Department of Anatomy
- Department of Chemistry
- Department of Computer Science
- Department of Human Nutrition
- Department of Physics
- Department of Zoology
- Genetics Otago
- Neuroscience Programme
- Otago Zebrafish Facility

The programme also collaborates with the New Zealand Biomouth Research Group, and internationally works closely with the Department of Neuroscience at the University of Naples Federico II (Italy) and the Laboratory for Jaw Biomechanics at the University of Zurich (Switzerland).



Research Projects

- A new approach to engineering 3-dimensional constructs of human bone matrix in a mechanically-active environment
- The genetics of dentofacial growth anomalies
- Finding the missing link of hypodontia
- A novel model for exploring the causes and treatments of craniofacial birth defects
- Growth factor expression in the rat condyle: implications for craniofacial development
- Efficacy of oral probiotics for the management of dental plaque and oral malodor during orthodontic treatment
- Intra-oral monitoring of oral pH and bruxism
- Mandibular growth in 3D: CBCT analysis in a rabbit model.
- Intraoral pressure changes upon varying the vertical facial dimension.
- Merging anatomical and fluorescence molecular imaging to investigate craniofacial growth
- Predictive factors of orthodontic pain
- Can we really grow mandibles? An appraisal of the validity of historical controls used in contemporary clinical trials
- Morphometric analysis of cervical vertebrae in relation to mandibular growth

2013-2014 Highlights and External Funding Secured

In total 26 articles were published in the peer-reviewed scientific literature. For details, please refer to the Publications data in the 'Our Achievements' section of the 2013-14 SJWRI Research Report.

Total research funding (external) obtained in 2013-2014 amounted to \$427,650.

ERDG/FORENZAO Charitable Trust Intraoral pressure changes upon varying the vertical dimension (Shaz Khayami, Mauro Farella, Jules Kieser) \$4,130

ERDG/FORENZAO Charitable Trust Mandibular growth in 3D: CBCT analysis in a rabbit model (Andrew Parton, Mauro Farella, Warwick Duncand, Jules Kieser) \$7,170

ERDG/FORENZAO Charitable Trust Short-Term Efficacy of the Twin-Block Appliance on Obstructive Sleep Apnea and Snoring In Children: A Cross-Over Randomized Clinical Trial \$10,100

ERDG/FORENZAO Charitable Trust The influence of enamel surface roughness on bacterial adhesion (Li Mei, Richard Cannon, Lydia Meredith, Mauro Farella) \$1,540

Health Research Council Genetics of dentofacial anomalies (Joseph Antoun, Mauro Farella, Tony Merriman, Murray Thomson) \$149,462

Maurice Phyllis Paykel Trust Genetics of dentofacial anomalies, equipment grant (Joseph Antoun, Mauro Farella, Tony Merriman, Murray Thomson) \$3,000

Ministry of Oral Health Research Fund Efficacy of a Mandibular Advancement Appliance on Sleep Disordered Breathing in Children (Mauro Farella, Ghassan Idris, Barbara Galland, Christopher Robertson) \$24,374

Ministry of Oral Health Research Fund Efficacy of the oral probiotic *Streptococcus salivarius* in managing biofilm formation in patients wearing fixed orthodontic appliances (Li Mei, Gareth Benic, Mauro Farella, Nick Heng) \$11,410

New Zealand Dental Association Research Foundation A novel model for exploring the causes and treatments of craniofacial birth defects (Julia Horsfield, Joseph Antoun, Mauro Farella, Catherine Carleton) \$10,400

New Zealand Dental Association Research Foundation A new approach to engineering 3D constructs of human bone matrix in a mechanically active environment (Murray Meikle, Trudy Milne, Yana Itskovich, Mauro Farella, Richard Cannon) \$11,862

New Zealand Dental Association Research Foundation Growth factor expression in the rat condyle: Implications for craniofacial development (Trudy Milne, Mauro Farella, Li Mei, Richard Cannon, Mohamad Al-Dujaili) \$14,042

New Zealand Dental Research Foundation Wireless monitoring of oral pH and bruxism. (Mauro Farella, Sylvia Sander, Jules Kieser and Michael Paulin) \$15,000

New Zealand Lottery Grants Board Wireless monitoring of oral pH and bruxism. (Mauro Farella, Jules Kieser and Michael Paulin) \$49,500

Otago Medical Research Foundation A novel model for exploring the causes and treatments of craniofacial birth defects (Julia Horsfield, Joseph Antoun, Mark Hampton) \$30,000

University of Otago Research Grant Merging anatomical and molecular imaging to investigate craniofacial growth in 3D (Mauro Farella, Warwick Duncan, Igor Meglinski, Jules Kieser) \$35,000

University of Otago Research Grant The influence of enamel surface roughness on bacterial adhesion. (Li Mei, Richard Cannon, Lydia Meredith, Mauro Farella) \$10,660

University of Otago Research Grant Wireless monitoring of oral pH and bruxism (Mauro Farella, Jules Kieser and Michael Paulin) \$40,000

Our People

Why are new antifungals needed?

- Fungal infections affect the young, the old and the debilitated. Potentially lethal opportunistic disseminated infections occur when physical or immunological barriers are compromised.
- 1.4 million people have been estimated to die annually due to fungal infections.
- Of 4 main classes of antifungals are used in the clinic, the triazole drugs (FLC, VZC, ITC and PCZ) are well-tolerated and most widely used. However these drugs are susceptible to both target- and efflux-mediated resistance.

Staff research profiles



LEE ADAM

BEd DipTeach PGDipArts (Otago)
Dental Education Research Fellow, Office of the Dean, Dentistry
Programme Director, Dental Education

Research Interests

Lee's research is focused on enhancing teaching and learning in higher education. In particular, she is interested in how understanding students' experiences at university can help inform and improve teaching. Lee's current research includes the following: understanding students' experiences of plagiarism; students' and staff understandings of text matching software; providing effective feedback in the clinical dental setting; and using students' feedback to improve teaching.

Research Achievements and Collaborations

Current research includes:

Providing effective feedback in the clinical dental education setting. This research is in collaboration with Dr Janet Rountree, Dr Angela McLean (Simon Fraser University), Mrs Alison Meldrum and Prof Alison Rich, and is funded by a University of Otago Teaching Development grant.

Lee has also been completing her PhD on university students' understandings of plagiarism.

Recent Publications

Golding, C., & Adam, L. (2014). Evaluate to improve: Useful approaches to student evaluation. *Assessment & Evaluation in Higher Education*. Advance online publication. doi: 10.1080/02602938.2014.976810



BASIL AL-AMLEH

BDS DCLinDent(Otago) MRACDS(Pros)
Senior Lecturer, Department of Oral Rehabilitation

Research Interests

Basil's research involves Dental Biomaterials and their applications in clinical practice. His research focus is on mechanical properties of dental ceramics and their reasons for failure. He is particularly interested in fractography (the study of materials fracture surfaces), where patterns left on the surface of a failed specimen can tell the investigator the origin of fracture, how and why it fractured, and how much energy was needed to cause the fracture. Basil is currently leading the strategic development of research on this theme, by establishing the facility to conduct internationally standardised materials testing methods at the Faculty. He was successful in receiving the Basic Research Award in 2013 from the Sir John Walsh Research Institute to help fund this project.

Furthermore, Basil is involved in developing a unique software that allows accurate and objective digital analyses of dental crown preparations. This software has been validated by a number of studies and is being explored as a teaching tool for dental students in the simulation clinic.

Research Achievements and Collaborations

Basil was successful in receiving the Basic Research Award in 2013 from the Sir John Walsh Research Institute.

Recent Publications

Tiu J, Waddell JN, Al-Amleh B, Jansen van Vuuren W, Swain M. (2014). Coordinate Geometry Method for Capturing and Evaluating Crown preparation geometry. *Journal of Prosthetic Dentistry*; 112:481-487

Al-Amleh B, Waddell JN, Lyons K, Swain M. (2014) Influence of veneering porcelain thickness and cooling rates on residual stresses in zirconia molar crowns. *Dental Materials*; 30:271-280



JOSEPH ANTOUN

BDS DCLinDent (Otago)

Senior Lecturer, Department of Oral Sciences

Research Interests

Joseph's current research interests include craniofacial growth and development, clinical genetics, and the impact of malocclusions and their treatments on quality of life and psychological well-being. He is also particularly interested in emerging digital technologies that can be used in clinical orthodontics and craniofacial research. Recently, Joseph's work has focused on the clinical, etiological and psychological aspects of the long face morphology – a relatively common phenotype that is characterized by an excessive lower face height. Joseph has a particular interest in both the environmental and genetic causes of the long face morphology.

Research Achievements and Collaborations

In 2013-14, Joseph published seven peer-reviewed articles in reputable dental journals, and authored or co-authored six conference proceedings. Joseph has also been awarded several competitive grants, including an Emerging Researcher First Grant by the Health Research Council (PI, 2013) and an Otago Medical Research Foundation Grant (AI, 2014). The HRC grant helped establish a clinical database and genetic biobank, which is currently being used to investigate the underlying environmental, and genetic factors involved in a wide range of dentofacial conditions. In 2013, Joseph also received his Doctor of Clinical Dentistry Degree, which included a dissertation entitled "The Clinical and Psychological Aspects of the Long Face Morphology".

Joseph works closely with Professor Mauro Farella on a wide range of research projects relating to clinical orthodontics and craniofacial growth. In addition, he has several active collaborations within the University of Otago. He is currently working with Associate Professor Tony Merriman (Department of Biochemistry) on the identification of common genetic variants involved in a wide range of dentofacial conditions; Associate Professor Julia Horsfield (Department of Pathology) on the role of oxidative stress in inducing orofacial clefts in the Zebrafish model, and the potential for antioxidants to rescue these jaw defects; Dr Claire Cameron (Department of Preventative & Social Medicine) on the evidence for secular trends in craniofacial growth; and, Dr Azam Ali (Department of Applied Sciences) on novel biomaterials in orthodontics. In addition, Joseph works with Dr Peter Fowler (Canterbury District Health Board) on the evaluation of quality of life in patients with severe malocclusions and dentofacial deformities; and, Dr Kate Morgaine (Oxford Brookes University) on the psychological and social impact of malocclusions using a qualitative approach.

Recent Publications

Antoun JS, Lawrence C, Leow A, Rongo R, Dias G, Farella M. A three-dimensional evaluation of Māori and New Zealand European faces. *Aust Orthod J* 2014;30:169-75

Rongo R, Antoun JS, Lim YX, Dias G, Paduano S, Farella M. Three-dimensional evaluation of the relationship between jaw divergence and face dimensions. *Angle Orthod* 2014;84:788-94

Henzell MR, Knight AM, Morgaine KC, Antoun JS, Farella M. A qualitative analysis of orthodontic-related posts on Twitter. *Angle Orthod* 2014;84:203-7

McNee C, Kieser JK, Antoun JS, Bennani H, Gallo LM, Farella M. Neck and shoulder muscle activity of orthodontists in natural environments. *J Electromyogr Kinesiol.* 2013;23:600-7



VINCENT BENNANI

DDS (Reims) Doctorat d'Universite (Nice Sophia Antipolis) CertAdvPros (Tufts) CertAdvImpl (Bordeaux)

Senior Lecturer, Department Of Oral Rehabilitation

Research Interests

Dr Bennani is actively involved in several collaborative projects with multiple faculties nationally, such as the Faculty of Dentistry, Faculty of Chemistry, and Faculty of Medicine but also internationally. He is currently investigating the use of zirconia in implantology and soft tissues management around implants which is a collaborative project involving the industry.

Research Achievements and Collaborations

National Collaborations:

2014 – present. Research collaboration with Physics Department, University of Otago.

2013. Research Collaboration with the Centre for Neuroendocrinology, Department of Physiology, University of Otago School of Medical Sciences.

2012 – present. Research Collaboration with Department of Mechanical Engineering, Centre of Advanced Composite Materials, University of Auckland, New Zealand .

2011 – present. Research Collaboration with Faculty of Chemistry, Centre for Trace Element Analysis, University of Otago.

2011 – present. Research Collaboration with MacDiarmid Institute for Advanced Materials and Nanotechnology, University of Otago,

2010 – present. Research Collaboration with Clinical Anatomy Research Group, Otago School of Medical Sciences, University of Otago.

2010 – present. Research Collaboration with Otago Centre for Confocal Microscopy, University of Otago.

2010 – present. Research collaboration with the Applied Sciences Department, Clothing & Textile Sciences, University of Otago,

2009 – present. Research Collaboration with Department of Chemical and Materials Engineering, University of Auckland

2007 – present. Research Collaboration with Otago Centre for Scanning Electron Microscopy, University of Otago

International Collaborations:

2014 - present. Collaborative clinical research with Tufts University School of Dental Medicine, Boston USA, Postgraduate Aesthetic Advanced Dentistry

2014 - present. Collaborative clinical research with postgraduate department of Prosthodontics, Faculty of Dentistry, University of Bordeaux, France.



Recent Publications

Shamiri R, Das R, Aarts JM, Bennani V. Finite element analysis of an implant-assisted partial removable dental prosthesis during bilateral loading: Occlusal rests position. *J Prosthet Dent* 2014; 5:1126-1133

Inger M, Bennani V, Farella M, Bennani F, Cannon RD. Efficacy of air/water syringe tip sterilization. *Aust Dent J* 2014; 59:87-92

Bennani V, Inger M, Aarts J. Comparison of pressure generated by cordless gingival displacement techniques. *J Prosthet Dent* 2014; 112:163-167

Shahmiri R, Aarts JM, Bennani V, Atieh MA, Swain MV. Finite element analysis of an implant-assisted removable partial denture. *J Prosthodont* 2013; 22:550-555



JONATHAN BROADBENT

BDS PGDipComDent PhD (Otago)
Senior Lecturer, Department Of Oral Rehabilitation

Research Interests

Dr Broadbent's research includes projects involving the epidemiology of dental caries, tooth loss, and periodontal disease (with emphasis upon longitudinal research), and particularly upon social inequalities that exist in oral health. He also carries out research on the New Zealand dental workforce.

Research Achievements and Collaborations

Dr Broadbent's research in 2013-14 was focused on outputs relating to lifecourse health, reporting on data from the Dunedin Multidisciplinary Health and Development study. Dr Broadbent collaborates in a number of interdisciplinary projects with researchers in New Zealand and overseas. In recognition for the quality of his cross-disciplinary dental/psychology research, Dr Broadbent was awarded a NIDCR 'Building Bridges award' at a 2014 conference of the Association for Psychological Science (USA).

Recent Publications

Broadbent, J. M., Thomson, W. M., & Poulton, R. (2014). Oral health in the first half of life: An update on the Dunedin Study. *Annals of the Royal Australasian College of Dental Surgeons*, 22, 88-90.

Broadbent, J. M., Foster Page, L. A., Thomson, W. M., & Poulton, R. (2013). Permanent dentition caries through the first half of life. *British Dental Journal*, 215, E12. doi: 10.1038/sj.bdj.2013.991

Thomson, W. M., Broadbent, J. M., Foster Page, L. A., & Poulton, R. (2013). Antecedents and associations of root surface caries experience among 38-year-olds. *Caries Research*, 47(2), 128-134. doi: 10.1159/000345078

Thomson, W. M., Shearer, D. M., Broadbent, J. M., Foster Page, L. A., & Poulton, R. (2013). The natural history of periodontal attachment loss during the third and fourth decades of life. *Journal of Clinical Periodontology*, 40(7), 672-680. doi: 10.1111/jcpe.12108



JOHN BROUGHTON

ED JP BSc (Massey) BDS PhD PGDipComDent DipGrad (Otago)
Professor of Māori Health, Department Of Oral Diagnostics and Surgical Sciences
(Joint with Preventive and Social Medicine)
Associate Dean, Māori

Research overview

Oranga niho or Māori oral health. Māori do not enjoy the same oral health status as non-Māori over all age groups and therefore engaging in oral health research activities that not only lead to improved oral health outcomes for Māori, but for all New Zealanders. Two research projects involve research collaborations with Māori iwi-based organisations.

Reducing disease burden and health inequalities arising from chronic dental disease among Indigenous children: an early childhood caries intervention. This is an International Collaborative Indigenous Health Research Partnership being conducted in New Zealand, Australia and Canada. The New Zealand collaborators are Raukura Hauora O Tainui and The Waikato-Tainui College for Research and Development. Funded by the HRC \$2.4M for 5 years. University of Otago personnel are Professor John R Broughton (PI), Professor W M Thomson and Dr. Richard Egan. Dr. Kate Morgaine left the Faculty to take up a position at Oxford University. This is an interventional study of Māori mothers and their babies which involves provision of dental care to mothers during pregnancy; fluoride varnish application to the teeth of the children; anticipatory guidance and motivational interviewing. The study has one further year to run.

Other research publications on teaching Māori oral health in the undergraduate BDS curriculum and Veteran's Health. Creative works: stage plays.

Publications

Ben, J., Jamieson, L.M., Priest, N., Parker, E.J., Roberts-Thomson, K.F., Lawrence, H.P., Broughton, J.R., and Paradies, Y. "Experience of racism and tooth brushing among pregnant Aboriginal Australians: exploring psychosocial mediators." *Community Dental Health* (2014) 31, 1-8. doi:10.1922/CDH_3298Ben08

Broughton JR, Person M, Maipi JTeH, Cooper-Te Koi R, Smith-Wilkinson A, Tiakiwai S, Kilgour J, Berryman K, Morgaine KC, Jamieson LM, Lawrence HP, Thomson WM. "Ūkaipō niho: the place of nurturing for oral health." *New Zealand Dental Journal*, 110, No 1: 18-23; March 2014.

Broughton JR, Maipi JT, Person M, Thomson WM, Morgaine KC, Tiakiwai SJ, Kilgour J, Berryman K, Lawrence HP, Jamieson LM. "Reducing disease burden and health inequalities arising from chronic disease among indigenous children: an early childhood caries intervention in Aotearoa/New Zealand." *BMC Public Health*. 2013;13:1177. (13 December 2013)

McBride, D., Cox, B., Broughton, J., and Tong, D. "The mortality and cancer experience of New Zealand Vietnam war veterans: a cohort study." *BMJ Open* 2013;3:e003379. doi:10.1136/bmjopen-2013-003379



MICHAEL BROSINAN

BDS (NUI) MDentSci (Leeds) FRCD (Can)
Senior Lecturer, Department of Oral Sciences

Research Interests

Research interests are around the oral health care of adolescents in New Zealand. This includes the quantitative analysis of the perceptions of oral health care workers who treat this patient group. This research is also focussing on the oral health care needs of this group and how they can be met.

Another interest lies around the orofacial characteristics of children who have a history of snoring and those who do not. This project is being undertaken with a postgraduate student.

A further topic of interest lies around sources of referral to paediatric dental departments as well as a comparison of treatment needs and funding available for children referred for restorative dental care under general anaesthesia

The field of behaviour management in the clinical setting is another area of research which will be further developed.

Lastly a research interest lies in investigating opinions and practices regarding sugar in paediatric medicines among pharmacists.

Research Achievements and Collaborations

A clinical audit of sources of referral to the Paediatric Dental Department at the University of Otago School of Dentistry over a six month period has been completed. A paper on this findings has been accepted for a poster presentation at the International Association of Paediatric Dentistry in Glasgow U.K. in July 2015.

A research project investigating the oral health status of adolescents in New Zealand and perceptions of the oral health care providers for this group has been initiated. This is in collaboration with Professor Murray Thomson, Professor Bernadette Drummond and Dr. Lyndie Foster Page. This will take the form of a quantitative and qualitative study to be rolled out in 2015.

Collaboration has also taken place with A/Prof Barbara Galland, Department of Paediatrics, in connection with the study on the orofacial characteristics of children who snore.

Recent Publications

Brosnan MG, Natarajan AK, Campbell JM, Drummond BK. (2014) Management of the pulp in primary teeth – an update N Z Dent J. Dec;110(4):119-23.

Brosnan M. A review of behaviour management techniques in paediatric dentistry. (2014). NZDA News July;169:36-4



PAUL BRUNTON

BChD (Leeds) MSc PhD (Manchester) FDSRCS(Edin) FDSRCS(Eng) FFGDP(UK)
Professor and Dean, Faculty of Dentistry

Research Interests

Professor Brunton has two distinct themes to his research, which are: operative dentistry principally in the areas of tooth whitening and tooth preparation techniques and practice based research in General Dental Practice. He has been involved in several multi-centre international trials of novel restorative materials and whitening systems. The research into tooth preparation and whitening techniques, particularly the development of experimental methodologies was unique. This has been recognized and reflected in the increasing number of invitations to referee and comment of research in this area for journal editors and publishers. More recently his role has been in the leadership of research and developing junior colleagues. This was evidenced by the award of the National Institute Health Research grant and the In-Practice research fellowship to members of his team in the UK.

Research Achievements and Collaborations

Professor Brunton collaborates with a large number of academics in the UK and Europe with increasing collaboration in New Zealand. Current collaborations include the Universities of Leeds, Birmingham and King's College London in the UK, several universities in Europe via the European Section of the Academy of Operative Dentistry and the University of Michigan in the USA.

Recent Publications

Gibson M, Sharif MO, Smith AB, Saini P and Brunton PA. A practice-based randomised controlled trial of the efficacy of three interventions to reduce dentinal hypersensitivity. *J. Dent.*, 2013; 41:668-674

Brunton PA, Davies RPW, Burke JL, Smith A, Aggeli A, Brookes SJ and Kirkham J. Treatment of early caries lesions using biomimetic self-assembling peptides – a clinical safety trial *Br. J Dent*, 2013; 215:E6

Keeling AJ, Brunton PA, Holt RJ. An in vitro study into the accuracy of a novel method for recording the mandibular transverse horizontal axis. *J Dent.*, 2014; 42:122-8

T.P. Hyde, H.L. Craddock, J.C. Gray, S.H. Pavitt, C. Hulme, M. Godfrey, C. Fernandez, N. Navarro-Coy, S. Dillon, J. Wright, S. Brown, G. Dukanovic, P.A. Brunton, A Randomised Controlled Trial of complete denture impression materials. *J Dent.*, 2014, DOI:10.1016/j.jdent.2014.02.005



RICHARD CANNON

BA, PhD (Cantab)

Professor of Molecular Microbiology, Department of Oral Sciences

Associate Dean, Research

Director, Sir John Walsh Research Institute


Research Interests

Professor Cannon is a molecular microbiologist who is primarily interested in how microorganisms cause oral diseases and in how treatments for patients with these diseases can be improved. His research has a number of themes, one being oral adhesion. He has studied how oral microbes, particularly yeast, adhere and colonize surfaces in the oral cavity. He has found that saliva increases the adhesion of the yeast *Candida albicans* to several oral surfaces, including denture acrylics and voice prosthesis silicone. *C. albicans* is a diploid yeast that was, until recently, thought to be asexual. The yeast can, however, undergo sexual recombination *in vitro*, and Professor Cannon is currently investigating whether *C. albicans* strains can mate in the oral cavity and if so, whether the offspring can out-compete their parents. *C. albicans* is a polymorphic fungus that grows mainly as yeast or mycelia. Professor Cannon is using metabolomics to investigate the changes in metabolism that are associated with the change from yeast to hyphal growth. A major focus of his research is the drug resistance of human fungal pathogens. He has found that clinically significant fungal drug resistance is due to energy-dependent drug efflux from the cell. His research group has developed a unique system for expressing and studying these efflux pumps in baker's yeast *Saccharomyces cerevisiae*. They are currently using *S. cerevisiae* strains expressing fungal, and other, efflux pumps to study pump function and to search for pump inhibitors.

Research Achievements and Collaborations

Professor Cannon has demonstrated that the *S. cerevisiae* expression system can be used to express efflux pumps from a variety of organisms. In collaboration with Dr Michael Gottesman at the National Cancer Institute, NIH, Bethesda, USA, he has shown that a pump implicated in the drug resistance of human melanoma, ABCB5, can be expressed in *S. cerevisiae*. It confers drug resistance on the yeast opening the possibility of screening for inhibitors of the pump that may overcome the chemotherapy resistance of melanoma tumours. Professor Cannon has also shown that efflux pumps which contribute to the drench resistance of nematodes infecting sheep and cattle can be functionally expressed in *S. cerevisiae*. He is currently undertaking, with Professor Larry Sklar of the University of New Mexico, USA, a high-throughput screen of drug libraries in order to identify potential pump inhibitors.

Professor Cannon has had a long-term collaboration with Dr Jan Schmid from Massey University. They have recently demonstrated that although *C. albicans* undertakes sexual reproduction only rarely, a small benefit from mating between mating-competent cells is being selected by evolution. *C. albicans* grows predominantly in two forms: as yeast and as mycelia. The transition from yeast to mycelial growth is thought to be a virulence factor for the organism. In collaboration with Associate Professor Silas Villas-Boas, University of Auckland, Professor Cannon has investigated metabolic pathways during the yeast to hyphal morphological transition. This has indicated some enzymes that may be important in morphogenesis and possibly in pathogenesis. Professor Cannon has initiated a collaboration with Associate Professor Marina Bakri, University of Malaya, Malaysia, that will use RT-PCR to investigate the involvement of cation channel expression in pain transduction in inflammation of the dental pulp and mucosa. Professor



Cannon continues to collaborate with Associate Professor Brian Monk and his research group on the HRC-funded structural analysis of the fungal azole drug target Erg11 (Cyp51).

Professor Cannon has progressed his study of the role of ABC efflux pumps in the azole resistance of fungal pathogens. Professor Susumu Kajiwara, Tokyo Institute of Technology, Japan, has cloned and expressed drug efflux pumps from the industrial yeast *Candida utilis* and the human pathogen *Penicillium marneffeii* in the *S. cerevisiae* expression system. Professor Cannon is helping with the functional analysis of these efflux pumps. Professor Cannon and Dr Erwin Lamping were awarded a Marsden grant in 2014 to further investigate the structure and function of the major *C. albicans* efflux pump Cdr1. Together with Dr Hee Ji Lee, Associate Professor Alok Mitra, Auckland University, and international collaborators Dr Masakazu Niimi, Chulalongkorn University, Bangkok, Thailand, and Professor Rajendra Prasad, Jawaharlal Nehru University, New Delhi, India, they are examining the role of Cdr1 protein domains in drug binding and transport.

Recent Publications

Holmes, A.R., Rodrigues, E., van der Wielen P.A., Lyons, K.M., Haigh, B., Wheeler, T.T., Dawes, P.J.D. and Cannon, R.D. (2014) Adherence of *Candida albicans* to silicone is promoted by the human salivary protein SPLUNC2/PSP/BPIFA2. *Molecular Oral Microbiology* 29:90-9

Keniya, M.V., Holmes, A.R., Niimi, M., Lamping, E., Gillet, J.-P., Gottesman, M.M. and Cannon, R.D. (2014) Drug resistance is conferred on the model yeast *Saccharomyces cerevisiae* by expression of full length melanoma-associated human ABC transporter ABCB5. *Molecular Pharmaceutics* 11:3452-3462

Monk, B.C., Tomasiak, T.M., Keniya, M.V., Huschmann, F.U., Tyndall, J.D.A., O'Connell III, J.D., Cannon, R.D., McDonald, J.G., Rodriguez, A., Finer-Moore, J. and Stroud, R.M. (2014) Architecture of a single membrane spanning cytochrome P450 suggests constraints that orient the catalytic domain relative to a bilayer. *Proceedings of the National Academy of Sciences USA* 111:3865-3870

Rawal, M.K., Khan, M.F., Kapoor, K., Goyal, N., Sen, S., Saxena, A.K., Lynn, A.M., Tyndall, J.D., Monk, B.C., Cannon, R.D., Komath, S.S. and Prasad, R. (2013) Insight into PDR ABC pump drug transport through mutagenesis of Cdr1p transmembrane domains. *Journal of Biological Chemistry* 288:24480-24493



PETER CATHRO

MDS(Otago) PG CertTertT(Otago)
Senior Lecturer, Department of Oral Rehabilitation

Research Interests

Peter's principal research interest is the stress response of endodontic pathogens to the harsh conditions found in the root canal(s) of teeth subsequent to infection, pulpal necrosis and attempts at disinfection. In particular the methods developed to isolate and identify the membrane associated proteins of *E.faecalis* has provided a useful tool for further investigation of how these integral proteins are expressed in response to a changing external environment.

Peter's second area of research is the investigation of stress encountered by dental students in the clinical setting. Whilst it has been acknowledged that a career in Dentistry is considered to be one of the most stressful health professions and that dental students are under the most stress when learning new procedures, there is only limited information quantifying the stress. Investigations into stress have mainly used surveys such as the Dental Environment Stress (DES) Questionnaire and there seems to be no validation with physiological measurements. The main aim of this research theme is to quantify the stress that students experience in the clinical situation compared to daily activities using Heart Rate as a measure of stress. A second aim is to compare the Heart Rate data with a questionnaire such as the DES to determine whether questionnaires such as these are valid indicators of stress. It is anticipated that the study will be extended to include students in the preclinical setting and also practicing dentists.

Research Achievements and Collaborations

Peter is in the final stages of completing his PhD and is working in collaboration with the departments of Oral Microbiology and Proteomics at the University of Adelaide.

Peter is also a co-supervisor in the following DCLinDent & PhD projects at the University of Adelaide:

- An evaluation of the scavenging effect of thiourea on hydroxyl radicals released during intracoronral bleaching of blood-stained root-filled teeth
- Improving students' learning and performance in pre-clinical endodontics
- Efficacy of laser and ultrasonic activated irrigation on eradicating a mixed species biofilm grown in the mesial roots of human mandibular molars
- A study of an endodontic regeneration protocol in a sheep model.
- An in vitro evaluation of the effect of bacterial contamination on teeth stained with blood in vitro.

Recent Publications

Wilson, C. E., Cathro, P., Rogers, A. H., Briggs, N., & Zilm, P. S. (2014). Clonal diversity in biofilm formation by *Enterococcus faecalis* in response to environmental stress associated with endodontic irrigants and medicaments. *International Endodontic Journal*. Advance online publication. doi: 10.1111/iej.12301

Yap, B., Zilm, P. S., Briggs, N., Rogers, A. H., & Cathro, P. R. (2014). The effect of sodium hypochlorite on *Enterococcus faecalis* when grown on dentine as a single- and multi-species biofilm. *Australian Endodontic Journal*. Advance online publication. doi: 10.1111/aej.12073

Li X, Zhu X-f, Zhang C-f, Cathro P, CJ S, Shen S. (2013) Endodontic bacteria from primary and persistent endodontic lesions in Chinese patients as identified by cloning and 16S ribosomal DNA gene sequencing. *Chinese Medical Journal*;126(4);634-639



NICHOLAS CHANDLER

BDS PhD (Lond) MSc (Manc) LDSRCS (Eng) MRACDS (Endo) FDSRCPS (Glas) FDSRCS (Edin) FFDRCSI

Associate Professor, Department of Oral Rehabilitation

Research Interests

Associate Professor Chandler is a specialist in endodontics with a research focus on the diagnosis of dental pulp disease, root canal anatomy and endodontic surgery. His interest in pulp sensitivity and vitality testing continue in orthodontic studies on predicating factors for orthodontic pain.

Vision and visual illusions in dentistry continues to be a major part of his research endeavours.

Postgraduate DClinDent completions: Muhamad Sharifuddin Mat Daud. Working lengths and root canal fillings in immature permanent teeth: a radiographic study (Endodontics 2014), and Victoria Beck. Factors associated with orthodontic pain (Orthodontics 2013).

Research Achievements and Collaborations

A collaboration with Professor Nevin Kartal, University of Marmara, Istanbul and 5 other researchers from 4 Turkish universities has resulted in three publications. A study of visual illusions in dentistry with Professor R O'Shea of Southern Cross University has appeared in PLoS ONE, and surveys of vision were carried out among all BDS undergraduates and clinical teachers at the School in 2014.

Dr Adeleke Oginni (Obafemi Owolowo University, Nigeria, a former Postgraduate Visiting Fellow) continues to collaborate, with a paper on apical periodontitis accepted for publication.

Two chapters in American textbooks have been co-authored with Dr George Bogen, a specialist endodontist practicing in Beverly Hills.

Recent Publications

Chandler, N.P., Pitt Ford, T.R. & Monteith, B.D. (2014) Laser light passage through restored and carious posterior teeth. *Journal of Oral Rehabilitation* 41: 630-634

Aydemir, S., Cimilli, H., Mumcu, G., Chandler, N.P. & Kartal, N (2014) Crack formation on resected root surfaces subjected to conventional, ultrasonic and laser root-end cavity preparation. *Photomedicine and Laser Surgery* 32: 351-355

O'Shea, R.P., Chandler, N.P. & Roy, R. (2013) Dentists make larger holes in teeth than they need to if the teeth present a visual illusion of size. *PLoS ONE* 8 (10) e77343

Russell, A.A., Chandler, N.P., Hauman, C.H.J., Siddiqui, A.Y. & Tompkins, G.R. (2013) The butterfly effect: an investigation of sectioned roots. *Journal of Endodontics* 39: 208-210



DAWN COATES

BSc, PhD (Otago)

Research Fellow, Department of Oral Diagnostic and Surgical Sciences

Research Interests

Dr Coates is a molecular and cellular biologist with significant expertise in angiogenesis (blood vessel growth) and stem cell biology. Projects examining angiogenesis have continued with a particular focus on angiogenic genes and proteins involved in Bisphosphonate-Related Osteonecrosis of the Jaw (BRONJ), and angiogenesis within the pulp of teeth. Stem cell research has examined cells from adipose and their ability to form bone, and stem cells in primary teeth and palatal periosteum. The role of the unfolded protein response and gene expression during tumorigenesis is a new field. In addition Dr Coates has continued to be involved with research investigating motivational interviewing in the context of the Community Oral Health Service and nurses within GP clinics giving oral health advice.

Research Achievements and Collaborations

The publication of four papers over this period are in the areas of; osteogenesis within periodontal defects, the effects of zoledronic acid on gene expression, the immune response in periodontal disease, and patients readiness to improve their oral hygiene behaviors. Dr Coates assist PhD students who won prizes, which included Mohammad Alansary who won the University of Otago 3-minute thesis competition and Diogo Zanicotti who won the IADR poster competition allowing him to attend the IADR conference in Bangkok. Dr Coates was involved with eight abstracts and their associated posters or verbal presentations.

Dr Coates was assisted with successful grants from Arthritis NZ, Wishbone Trust of NZ, Maurice and Phyllis Paykel Trust and the NZ Dental Association Research Foundation. She co-supervised six PhD and two DClindent students, of which two have completed and one has submitted. She has collaborated with the Southern District Health Board, Dr Chunyi Li (Changchun, China), Professor Alison Rich, Professor Gregory Seymour, Ms Susan Moffat, Mrs Alison Meldrum, Dr Trudy Milne, Professor Warwick Duncan, Professor Bernadette Drummond, Assoc Professor Rohanna De Silva, and Assoc Professor Mary Cullinan.

Recent Publications

Baharuddin, N.A., Coates, D.E., Cullinan, M., Seymour, G. and Duncan, W. (2014) Localization of RANK, RANKL and osteoprotegerin during healing of surgically created periodontal defects in sheep. *Journal of Periodontal Research*. doi:10.1111/jre.12196.

Zafar, S., Coates, D.E., Cullinan, M.P., Drummond, B.K., Milne, T. and Seymour, G.J. (2014) Zoledronic acid and geranylgeraniol regulate cellular behaviour and angiogenic gene expression in human gingival fibroblasts. *Journal of Oral Pathology & Medicine*. 43: 711-721.

Parachuru, V.P.B., Coates, D.E., Milne, T.J., Hussaini, H.M., Rich, A.M. and Seymour, G.J. (2014) Forkhead box P3-positive regulatory T-cells and interleukin 17-positive T-helper cells in chronic inflammatory periodontal disease. *Journal of Periodontal Research*. 49(6):817-826. doi:1111/jre.12169.

Wade, K.J., Coates, D.E., Gauld, R.D., Livingstone, V. and Cullinan, M.P. (2013) Oral hygiene behaviours and readiness to change using the TransTheoretical Model (TTM). *New Zealand Dental Journal*. 109(2): 64-68.



HARSHA DE SILVA

BDS(Sri Lanka), MS(Colombo), FDSRCS, FFDRCS

Senior Lecturer, Department Of Oral Diagnostics and Surgical Sciences

Research Interests

Harsha De Silva's primary research interest is the study of clinic-pathological predictors used in planning treatment for Oral potentially malignant disorders and for oral cancer. This is focussed towards identifying clinicopathological markers that could help individualize treatment for patients affected with malignant or potentially malignant treatment. His research further expands into clinic based studies looking at clinical issues of contemporary interest to the practicing dentists.

Research Collaborations

A collaborative study with a research team from a Tertiary Care Hospital in Sri Lanka is in progress looking at the role of *Candida albicans* in the clinicopathological behaviour of oral potentially malignant disorders. As an extension to this study further work is expected to commence soon investigating histopathological parameters of this cohort of patients.

He also contributes to ongoing research projects on "Dental pulp cells in mature and immature teeth" and in "measuring cell growth and survival characteristics in autoimmune disorders and in lymphoma associated with Sjogren's Syndrome".

Publications

Choi, H. J., De Silva, R. K., Tong, D. C., De Silva, H. L., Love, R. M., & Athens, J. (2013). The thickness of parietal bones in a New Zealand sample of cadaveric skulls in relation to calvarial bone graft. *Craniomaxillofacial Trauma & Reconstruction*, 6(2), 115-120

Ng, D., De Silva, R. K., Smit, R., De Silva, H., & Farella, M. (2013). Facial attractiveness of skeletal Class II patients before and after mandibular advancement surgery as perceived by people with different backgrounds. *European Journal of Orthodontics*, 35(4), 515-520.



ROHANA KUMARA DE SILVA

BDS (Sri Lanka), FDSRCPS (Glasgow), FFDRCS (Ireland), FDSRCS (England)
Associate Professor. Department of Oral Diagnostics and Surgical Sciences

Research Interests

Associate Professor Rohana Kumara De Silva has a special interest in Implant supported dentures and he is involved in exploring the avenues to find ways of rehabilitating partial and complete edentulous patients with economical use of dental implants. His main focus is to investigate the ways of rehabilitating patients in the shortest possible time following dental extractions using the minimum number of implant fixtures. He is also a member of the Implant Research Group of the Faculty of Dentistry. His research further expands into analysing the quality of life of individuals treated with dental implants and to find the feasibility of using metal-free implant fixtures.

Another area of his research interest is in the management of post-operative pain and other complications associated with surgical removal of wisdom teeth and to evaluate the metabolism of commonly used analgesics in the body. Double-blinded trials were conducted to compare different analgesics commonly used in the management of post-operative pain after surgical removal of wisdom teeth.

Research Collaboration

Two Collaborative studies were conducted in association with the department of Anatomy to evaluate the thickness of parietal bone and the position of lingual nerve in relation to the lower wisdom teeth.

He also contributes to ongoing research projects in the Department of Anatomy and Oral Rehabilitation of University of Otago, to identify and isolate primitive mesenchymal cells in the dental pulp of the mature and immature wisdom teeth and periosteum in relation to the impacted upper canine teeth.

Publications

Siddiqi, A., Kieser, J., Zafar, S., De Silva, R. K., & Mohammed, M. (2013). Surface characterisation of one-piece zirconia implants: SEM and EDS analysis. *Journal of Dental Research*, 92(Spec Iss B), 182078. Retrieved from dentalresearch.org

Siddiqi, A., Kieser, J. A., De Silva, R. K., Thomson, W. M., & Duncan, W. J. (2013). Soft and hard tissue response to zirconia versus titanium one-piece implants placed in alveolar and palatal sites: A randomized control trial. *Clinical Implant Dentistry & Related Research*. Advance online publication. doi: 10.1111/cid.12159

Siddiqi, A., Kieser, J. A., De Silva, R. K., McNaughton, A., Zafar, S., & Duncan, W. J. (2013). Trabecular bone microarchitecture in the median palate and maxillary premolar alveolar sites of edentulous elderly cadavers. *Journal of Oral & Maxillofacial Surgery*, 71(11), 1852.e1-1852.e11. doi: 10.1016/j.joms.2013.07.019

Siddiqi, A., Kieser, J. A., De Silva, R. K., & Duncan, W. J. (2013). Bone-implant contact of ceramic versus titanium implants: A histomorphometric analysis. *Journal of Dental Research*, 92(Spec Iss A), 2575. Retrieved from dentalresearch.org



BERNADETTE DRUMMOND

BDS(Otago) MS(Roch) PhD(Leeds) FRACDS FDSRCSEd
Professor, Department of Oral Sciences

Research Interests

Professor Drummond's research focus is on improvement of the oral health-related quality-of-life in children and adolescents. Ongoing studies with graduate students include investigation of the longer term outcomes in children with early childhood caries; the changing oral biofilm in children in health, disease and after treatment utilizing a metagenomic approach; structural changes and the management of teeth in molar incisor hypomineralisation (MIH); measurement of the changing pH in the mouth over 24 hours and with different foods; oral health of children with breathing disorders.

Research Achievements and Collaborations

Projects carried out during 2013-2014 included a postgraduate doctoral project to analyse bacteria in the oral biofilm of children undergoing dental care under general anaesthesia before the treatment and for three months following the treatment. This project is ongoing and will now investigate whether there were any differences in the bacteria of control caries-free children who subsequently went on to develop dental caries. The project is being done in collaboration with Dr Nick Heng and Dr Blair Lawley and Ms Anna Ota in the Department of Microbiology.

In collaboration with Professor Keith Gordon and Dr Sarah Fraser in the Department of Chemistry, two projects (one doctoral and one undergraduate) looking at defective dental enamel in MIH teeth and the timing of enamel development in primary first molar teeth were undertaken utilizing Raman spectroscopy.

Other projects included a successful doctoral project to develop a device to measure and capture pH in the mouth over a 24 hour period, and two undergraduate projects one of which surveyed young adults to find out their experience of dental trauma and another which surveyed dentists about their views on the management of dental trauma in children. A paper has been accepted for the IAPD meeting in July 2015.

In 2014 Professor Drummond co-edited a textbook with international collaboration on the management of dental enamel defects in children. This partly developed out of her research on MIH with graduate students. Drummond BK, Kilpatrick N. (editors). *Planning and care for children and adolescents with dental enamel defects. Etiology, research and contemporary management.* 2014; Springer, Heidelberg.

Recent Publications

Kamel, M. S., Thomson, W. M., & Drummond, B. K. (2013). Fluoridation and dental caries severity in young children treated under general anaesthesia: An analysis of treatment records in a 10-year case series. *Community Dental Health*, 30(1), 15-18.

Burton, J. P., Drummond, B. K., Chilcott, C. N., Tagg, J. R., Thomson, W. M., Hale, J. D. F., & Wescombe, P. A. (2013). The influence of the probiotic *Streptococcus salivarius* M18, on indices of dental health in children: A randomised double-blind placebo-controlled trial. *Journal of Medical Microbiology*, 62(6), 875-884.

Drummond, B. K., Meldrum, A. M., & Boyd, D. (2013). Influence of dental care on children's oral health and wellbeing. *British Dental Journal*, 214(11), E27.

Zafar, S., Coates, D. E., Cullinan, M. P., Drummond, B. K., Milne, T., & Seymour, G. (2014). Zoledronic acid and geranylgeraniol regulate cellular behaviour and angiogenic gene expression in human gingival fibroblasts. *Journal of Oral Pathology & Medicine*. Advance online publication.



WARWICK DUNCAN

ED BDS MDS PhD (Otago) FRACDS FICD

Associate Professor (Professor from 2015), Department of Oral Sciences
Associate Dean, Facilities and Clinical Services
Programme Director, Clinical Research

Research Interests

- Dental implant research including bone replacement grafting and stem cell research
- Periodontal research
- Forensic research
- Hard tissue imaging and analysis
- Development of animal models for human oral disease

Research Achievements and Collaborations

Associate Professor Duncan's research activities involve the fields of Periodontology and Dental Implantology. He leads a team of colleagues and graduate students who have established new animal models for testing therapeutic strategies in these fields, including novel surfaces for titanium and titanium alloy implants, new bone replacement grafting materials, and the use of stem cells for bone regeneration. He has international collaborations with Korea, Switzerland and Malaysia using these models, and has also conducted and supervised basic sciences and epidemiological research in Clinical Periodontics and Dental Implantology, in Forensic medicine and dentistry, in Biomaterials Science, Dental Technology and Orthodontics. His current work features collaboration with Callaghan Innovation and within the faculty, developing novel diagnostic and treatment strategies for peri-implantitis and periodontitis.

Recent Publications

Duncan, WJ. Modelling bone regeneration in *Ovis Aries*. In: *The Past, Present and Future of Periodontology*, PM Bartold, Jin LJ, eds., Asian Pacific Society of Periodontology: Adelaide, (2014) (ISBN 978-0-646-91944-7).

Schmidlin PR1, English H, Duncan W, Belibasakis GN, Thurnheer T. Antibacterial potential of Manuka honey against three oral bacteria in vitro. *Swiss Dent J*. 2014;124(9):922-4.

Philipp A, Duncan W, Roos M, Hämmerle CH, Attin T, Schmidlin PR. Comparison of SLA® or SLActive® implants placed in the maxillary sinus with or without synthetic bone graft materials--an animal study in sheep. *Clin Oral Implants Res*. 2014 Oct;25(10):1142-8. doi: 10.1111/clr.12255. Epub 2013 Sep 22.

Campbell, D. I., & Duncan, W. J. The effect of a keratin hydrogel coating on osseointegration: An histological comparison of coated and non-coated dental titanium implants in an ovine model. *J Maxillofac Oral Surg*, 2014, 13(2), 159-164.



MAURO FARELLA

DDS (Naples), PhD (Reggio Calabria), Specialist in Orthodontics (Naples) Specialist in Medical Statistics (Milan), PD (Zurich).

Professor of Orthodontics, Department of Oral Sciences

Associate Dean, Postgraduate Studies

Programme Director, Craniofacial Biology and Clinical Oral Pathology

Research Interests

Professor Farella's current main research interests include normal and abnormal craniofacial growth, three-dimensional craniofacial imaging, clinical oral physiology, orofacial pain, and craniomandibular function. Additional areas of his expertise include randomized clinical trials in dentistry, the relationship between dentofacial anomalies and psychological wellbeing, and the evaluation of patient-centred clinical interventions.

Furthermore, he has introduced, developed, championed and supervised new research streams at the Faculty of Dentistry of the University of Otago, which include craniofacial genetics, translational craniofacial research using animal models, long-term monitoring of intra-oral pH, and use of oral appliances for the management of obstructive sleep apnoea in children.

Research Achievements and Collaboration

In 2013-14, Professor Farella has published 24 full-length articles, and obtained 12 grants from various funding bodies, including HRC, Lottery Health Grant, UORG, NZDA, and NZAO. He has been acting as main supervisor or co-supervisor of five PhD projects, ten DCLinDent projects, one Master project, three Honours projects, and eight Elective undergraduate research projects. He has been appointed founding director of a new research programme in Craniofacial Biology and Clinical Oral Physiology of the Sir John Walsh Research Institute. He has served on the Editorial Board of the Journal of Dental Research and the Journal of Oral Rehabilitation and acts as reviewer for many international journals.

Professor Farella is a member of New Zealand Consortium for Medical Devices Technologies and the New Zealand Biomouth Research Group. He has an ongoing collaboration with the University of Napoli Federico II (Italy), the University of Zurich (Switzerland), and the University of Witwatersrand (South Africa). At the University of Otago, he is on the Management Committee of the Center for Bioengineering and a member of the Neuroscience Programme and of Genetics Otago. Furthermore, he has collaborative projects with the Department of Anatomy (A/Prof G. Dias), the Department of Applied Sciences (Azam Ali), the Department of Biochemistry (A/Prof T. Merriman), the Department of Chemistry (A/Prof S. Sander), the Department of Human Nutrition (A/Prof B. Venn), the Department of Physics (A/Prof I. Meglinsky), the Department of Women's and Children's Health (A/Prof Barbara Galland), the Department of Zoology (A/Prof M. Paulin), and the Otago Zebrafish Facility (A/Prof. J. Horsfield).

Recent Publications

Beck VJ, Farella M, Chandler NP, Kieser JA, Thomson WM. Factors associated with pain induced by orthodontic separators. *J Oral Rehabil.* 2014;41:282-8.

Rongo R, Antoun JS, Lim YX, Dias G, Valletta R, Farella M. Three-dimensional evaluation of the relationship between jaw divergence and facial soft tissue dimensions. *Angle Orthod.* 2014;84:788-94.

Po JM, Gallo LM, Michelotti A, Farella M. Comparison between the rhythmic jaw contractions occurring during sleep and while chewing. *J Sleep Res.* 2013;22:593-9.

McNee C, Kieser JK, Antoun JS, Bennani H, Gallo LM, Farella M. Neck and shoulder muscle activity of orthodontists in natural environments. *J Electromyogr Kinesiol.* 2013;23:600-7.



NORMAN FIRTH

BDS(Adel) MDS(Adel) FRACDS FFOP(RCPA) FFOMP(RCPA) MRACDS(OralMed)
Senior Lecturer, Department of Oral Diagnostics and Surgical Sciences

Research Interests

The most accurate information on the behaviour of oral lesions regarded as premalignant is based on epithelial dysplasia. Other indicators of behaviour include those related to apoptosis and cell proliferation. Other additional interests include investigations involving the immune response in oral premalignant and malignant lesions and metastases.

Other areas of interest include histological and immunohistochemical changes in oral mucosal lichen planus and the immune profile of recalcitrant periapical lesions. Clinical research includes the investigation and management of hyposalivation.

Recent Publications

Cannon R.D., Firth N.A. Fungi and fungal infections of the oral cavity. (2014) In *Oral Microbiology and Immunology*, Second Edition. Editors: Richard J. Lamont, George N. Hajishengallis, Howard F. Jenkinson. ASM Press. ISBN : 9781555816735, e-ISBN : 9781555818906 doi:10.1128/9781555818906

Sinon, S. H., Rich, A. M., Firth, N. A., & Seymour, G. J. (2013). Qualitative and quantitative assessment of immune cells in oral mucosal lichen planus (OMLP). *Sains Malaysiana*, 42(1), 65-71.

Sinon, S. H., Rich, A. M., Hussaini, H. M., Yoon, H.-S., Firth, N. A., & Seymour, G. J. (2013). Metastases to the oral region from pleural mesothelioma: Clinicopathologic review. *Head & Neck*, 35(4), 599-604. doi: 10.1002/hed.21942

Steyn, N., Heggie, A., MacGregor, D., Aldred, M. J., Talacko, A. A., Coleman, H., ... Firth, N. (2013). Clinical Pathologic Conference Case 4: A 15-year-old boy with radiographic changes in the left mandible. *Oral Surgery, Oral Medicine, Oral Pathology & Oral Radiology*, 116(1), (pp. e71-e75). doi: 10.1016/j.oooo.2013.01.053



LYNDIE FOSTER PAGE

BSc BDS MComDent PhD PGDipClinDent (Otago)

Senior Lecturer in Dental Public Health (since Sept 2014), Department of Oral Sciences

Research Interests

Now a dental epidemiologist and dental public health specialist, Dr Foster Page commenced her career in general dental practice in NZ, before working for 5 years in dental public health in NZ. Dr Lyndie Foster Page's research is concerned with improving oral health outcomes and reducing health inequalities, and has fostered links with both primary care and industry to reach these goals. However, much of her research is concerned with oral health-related quality of life in children and adolescents. Her epidemiological and clinical research encompasses a wide range of oral conditions, problems and settings, most notably in the fields of adolescent oral health and dental caries. She is also working with the Dunedin Multidisciplinary Health and Development Study and is also involved in cross-sectional surveys and a variety of health services research and clinical projects. Her other research interest is in dental education.

Research Achievements and Collaborations

In 2013-2014 Dr Foster Page has received grant funding from Cure Kids, Lotteries and the Ministry of Health Research funds. These grants provide funding for research into the investigation of novel caries management strategies in New Zealand children and involve a mixture of clinical trials, patient reported outcomes and qualitative research. She has been awarded a in 2014 a Fulbright Travel Award and the Sir John Walsh Research Institute Clinical Research Award 2014. In 2013 she received an University of Otago Early Career Research Award.

Dr Foster Page has ongoing collaborations with an international team in oral health-related quality of life in children and adolescents with the Universities of Sheffield and work with researchers in this field in Brazil, Brunei, Cambodia and Mexico. Caries management strategies still form a strong aspect of my research with collaborations with Prof Margherita Fontana, Dr Falk Schwendicke and Prof Sarah Baker (Michigan, Berlin and Sheffield respectively). Clinical caries research continues with novel approaches to caries management in children (key collaborations with D Boyd, C Loch, W Duncan, L Jansen van Vuuren, WM Thomson nationally and DMG, Fraunhofer Institute for Mechanics of Materials in Germany and N Innes, Dundee). Her dental education research is with the Tairaiwhiti Interprofessional education group and Dr Barry Gibson investigating students perceptions of IPE, dentistry and social accountability.

Recent Publications

Schwendicke F, Dorfer C, Schlattmann P, Foster Page LA, Thomson WM, Paris S (2014). Socioeconomic inequality and caries: A systematic review and meta-analysis. *Journal of Dental Research* 94: 10-18.

Foster Page LA, Thomson WM, Marshman Z, Stevens K (2014). The potential of the Child Health Utility 9D Index as an outcome measure for child dental health. *BMC Oral Health* 14:90 DOI: 10.1186/1472-6831-14-90.

Foster Page LA, Thomson WM, Ukra A, Baker SR. (2013) Clinical status in adolescents: is its impact on oral-health-related quality of life influenced by psychological characteristics? *European Journal of Oral Sciences* 121:182-187.

Foster Page LA, Boyd H, Thomson WM. (2013) Do we need more than one Child Perceptions Questionnaire for children and adolescents? *BMC Oral Health* 13:26



LARA FRIEDLANDER

MDS PhD(Otago), FRACDS

Senior Lecturer, Department of Oral Rehabilitation

Research Interests

Dr Friedlander is a researcher within the Oral Molecular & Immunopathology, Clinical, and Dental Education Research Groups. Her predominant area of interest is in endodontics encompassing pulpal biology, healing, clinical research and endodontic curriculum development. A prominent theme is around the role of angiogenesis in permanent tooth development, healing and endodontic disease. Other themes include the role of angiogenic factors, blood vessels and lymphatics in oral pathologies and malignancy. This basic research has also facilitated Dr Friedlander's interest and development of translational clinical research. In 2013, she became a founding board member for the development of Applied Research through Clinicians Hands, NZ's first dental practice based research network (PBRN). PBRNs are internationally recognised networks and involve research collaboration between private dental practitioners and academics to answer clinical questions and deliver research-led findings which are relevant NZ healthcare. Dr Friedlander has led the first three projects related to vital pulp therapy in permanent teeth in 2014 was awarded external research grant funding to expand this further.

Dr Friedlander supervises Clinical Doctorate students, BDS Honours students and summer research students to expand these research platforms and has been awarded substantial competitive funding grants associated with these as a principal investigator or contributing researcher. Recent funded studies include angiogenesis associated with oral pathology, broader clinical research pertaining to endodontic practice and disease, and practice based research.

Research Achievements and Collaborations

The projects during 2013-2014 have occurred within three main themes. In the Oral Molecular & Immunopathology group this has been around pulp stem cells and angiogenesis in tooth development and oral squamous cell carcinoma. The collaborators in these projects have been Professor Alison Rich, Associate Professor Mary Cullinan, Professor Gregory Seymour, Professor Bernadette Drummond, Dr Trudy Milne, Dr Dawn Coates, Dr Olive Allsobrook and Mohammad Alansary.

Clinical collaborations have occurred around practice based research with Dr Mike Morgan and Dr Denise Bailey, University of Melbourne, Evident PBRN for the development of ARCH and national collaborations have been made with interested general practitioners who have engaged with New Zealand's first dental PBRN. Collaborative research is also occurring with Suzanne Hanlin (Dentistry), Dr Neil Pickering and Dr Lynley Anderson from the Department of Bioethics and Dr Ben Daniel (HEDC) to develop a blended learning module in research ethics for practitioners involved in clinical research.

Dental education collaborations are ongoing with International Medical University, Malaysia where Dr Friedlander has led parallel projects to inform the translation of didactic understanding to clinical practice for third year IMU students transferring to the Otago BDS degree as part of the Faculty twinning programme. The collaborators in this project are Professor Toh, Ms Suzanne Hanlin and Dr Ben Daniel.



Recent Publications

Friedlander LT, Rich AM, Cullinan MP, De Silva H, De Silva GR, Seymour GJ (2014) Spatial localization of angiogenic growth factors and receptors in immature permanent teeth. *International Endodontic Journal*, 47: 96.

Lin YP, Love RM, Friedlander LT, Shang HF, Pai MH. (2013). Expression of Toll-like receptors 2 and 4 and the OPG–RANKL–RANK system in inflammatory external root resorption and external cervical resorption. *International Endodontic Journal* 46, 971-81.

Alothmani OS, Friedlander LT, Monteith BD, Chandler NP. (2013) Influence of clinical experience on the radiographic determination of endodontic working length. *International Endodontic Journal* 46, 211-217.

Firth FA, Friedlander LT, Parachuru VP, Kardos TB, Rich AM, Seymour GJ (2013). Regulation of immune cells in oral lichen planus. *Journal of Dental Research*, 92 (Spec Iss A), 2274.



SUZANNE HANLIN

BDS MDS PGDipHealInf (Otago) FRACDS MRACDS(Pros) FPFA FADI FICD (Prosthodontist)
Senior Lecturer, Department of Oral Rehabilitation
Director, ARCH Practice-Based Research Network

Research Interests

Suzanne has developed research interests in: practice based research networks; prosthodontic practice and education; implant dentistry and biomaterials. Suzanne is Director of the ARCH-PBRN (Applied Research Through Clinicians Hands – Practice Based Research Network). The network is designed to facilitate translational research between academia and dental practice and is a key clinical research theme within the Sir John Walsh Research Institute. Suzanne currently leads the board of ARCH. She has coordinated two successful symposia that were held in 2013 and 2014 to engage general dental practitioners from around New Zealand in the ARCH-PBRN and translational research. Focus groups have been undertaken in Dunedin with dentists from both North and South Islands and rural and urban practices. These focus groups have provided data that supports research into the understanding of New Zealand dentist around clinical and research ethics. In 2014 initial discussions were undertaken with the New Zealand Dental Association to promote support for the PBRN initiative at the University of Otago. This has resulted in NZDA support that will provide both the ARCH-PBRN and the SJWRI with a profile at the 2015 September NZDA conference in Auckland. The aims of this initiative are to introduce the concept of translational research and the practice based network to the dental profession.

Research Achievements and Collaborations

Suzanne has lead the ARCH – PBRN collaboration with the *eviDent* Foundation, a dental PBRN based in Melbourne, Australia. Suzanne is also leading a research collaboration between HEDC, Bioethics and the ARCH-PBRN to develop blended learning tools around research ethics that are designed to support clinicians engaging in practice based research. Suzanne is an associate researcher with Dr Lara Friedlander in a PBRN study investigating vital pulp therapy. This study was successful in attracting funding from the New Zealand Dental Research Foundation in 2014.

Recent Publications

Hanlin SM, Burbridge L, and Drummond BK. Restorative Management of Permanent Teeth Enamel Defects in Children and Adolescents. in *Planning and Care for Children and Adolescents with Dental Enamel Defects*. 2015 Edited by Bernadette K Drummond and Nicola Kilpatrick. Springer

Beumer III, J., Faulkner, R. F., Lyons, K., Ma, S., Hanlin, S. M., & Okabe, H. (2015). Restoration of edentulous mandibles with overdentures. In J. Beumer III, R. F. Faulkner, K. C. Shah, & P. K. Moy (Eds.), *Fundamentals of implant dentistry: Prosthodontic principles* (Vol. 1). (pp. 39-74). Hanover Park, IL: Quintessence.

Lau, A., Bennani, V., Chandler, N., Hanlin, S., & Lowe, B. (2014). Effect of air moisture content on adhesion to dentine: A comparison of dental air/water syringe tips. *European Journal of Prosthodontics & Restorative Dentistry*, 22(3), 137-141. doi: 10.1922/EJPRD_1337Bennani05

Hanlin, S. M. (2012). The mutilated dentition: Management of the debilitated dentition. *Annals of the Royal Australasian College of Dental Surgeons*, 21, (pp. 49-50).



NICHOLAS C.K. HENG

BSc(Hons) PhD (Otago)

Senior Lecturer, Department of Oral Sciences

Research Interests

Dr Heng's research expertise is in the field of molecular microbiology specialising in the following areas:

- i. The use of next-generation DNA sequencing technology for bacterial genomics (whole-genome sequencing).
- ii. The use of next-generation DNA sequencing technology to investigate changes in the oral microbiota (oral microbial populations) in relation to oral health and disease.
- iii. Characterisation of antimicrobial proteins (bacteriocins) produced by oral bacteria, mainly (but not limited to) members of the genus *Streptococcus*.

Research Achievements and Collaborations

The scope of research conducted by Dr Heng's group during 2013-2014 included:

- i. The use of Ion Torrent next-generation DNA sequencing technology to investigate changes in the oral microbiota (oral microbial populations) before and after comprehensive restorative treatment for severe dental caries, and in children with and without HIV;
- ii. Whole-genome sequencing of bacterial species such as *Streptococcus salivarius* and *Weissella confusa* (*Lactobacillus confusus*) in relation to bacteriocin production; and
- iii. Sequencing and characterising the genome of a new streptococcal species, provisionally named "*Streptococcus kieseri*" isolated from a New Zealand possum.

Within the Faculty of Dentistry, Dr Heng currently has ongoing collaborations with Professor B.K. Drummond (Discipline of Paediatric Dentistry) and Dr L. Mei (Discipline of Orthodontics) in relation to microbial diversity studies. In addition, he has ongoing research collaborations with (i) Dr B. Lawley (Department of Microbiology & Immunology, University of Otago - metagenomics), (ii) Professor A. Malik (Universitas Indonesia - *Weissella confusa* project), (iii) Associate Professor L.S. Goncalves (Universiti Estacio de Sa - children with HIV), (iv) Professor J.R. Tagg (BLIS Technologies - bacteriocins), and (v) a book collaboration with Professor G.J. Seymour and Associate Professor M.P. Cullinan ("*Methods in Molecular Biology: Oral Biology*").

Recent Publications

Hale JDF, Wescombe PA, Tagg JR, Heng NCK. Streptococcal bacteriocin-producing strains as oral probiotic agents. In M.A. Riley and R. Dorit (eds.), *Bacteriocins*, Horizon Press, U.S.A. (2014) (in press).

Cullinan MP, Bird PS, Heng NCK, West MJ, Seymour GJ. No evidence of triclosan-resistant bacteria following long-term use of triclosan-containing toothpaste. *Journal of Periodontal Research* 49:220-225 (2014).



ANN HOLMES

BSc (Hons) PhD (Lond)

Honorary Senior Research Fellow, Department of Oral Sciences

Research Interests

Dr Holmes' research field is the molecular biology of oral microbes, in particular of the oral commensal fungus, *Candida albicans*, which can cause mucosal and systemic infections of humans. Particular interests include the study of membrane transporter molecules that can contribute to resistance to antifungal and anticancer drugs, and adherence mechanisms of *C. albicans*.

Research Achievements and Collaborations

Following retirement in late 2012, Dr Holmes was appointed as an Honorary Senior Research Fellow. She has continued to play a small consulting part within the SJWRS research team led by Prof Richard Cannon in collaboration with Drs Brian Monk, Kyoko Niimi, Masakazu Niimi, Mikhail Keniya, Erwin Lamping and Hee Ji Lee, on an ongoing research project: "Antifungal drug efflux pumps", 2001-present. She has also undertaken contract research supervised by Prof Cannon, including transfer of techniques to new members of the group, co-supervising summer student projects and contributing to the completion of a commercial research contract.

Recent Publications

Keniya MV, Holmes AR, Niimi M, Lamping E, Gillet JP, Gottesman MM, Cannon RD. (2014) Drug resistance is conferred on the model yeast *Saccharomyces cerevisiae* by expression of full-length melanoma-associated human ATP-binding cassette transporter ABCB5. *Mol Pharm.* 11(10):3452-62. doi: 10.1021/mp500230b.

Bakri MM, Cannon RD, Holmes AR, Rich AM. (2014) Detection of *Candida albicans* ADH1 and ADH2 mRNAs in human archival oral biopsy samples. *J Oral Pathol Med.* 43(9):704-10. doi: 10.1111/jop.12193.

Holmes AR, Rodrigues E, van der Wielen P, Lyons KM, Haigh BJ, Wheeler TT, Dawes PJ, Cannon RD. (2014) Adherence of *Candida albicans* to silicone is promoted by the human salivary protein SPLUNC2/PSP/BPIFA2. *Mol Oral Microbiol.* 29(2):90-8. doi: 10.1111/omi.12048.

Weerasekera MM, Sissons CH, Wong L, Anderson S, Holmes AR, Cannon RD. (2013) Use of denaturing gradient gel electrophoresis for the identification of mixed oral yeasts in human saliva. *J Med Microbiol.* 62(Pt 2):319-30. doi: 10.1099/jmm.0.050237-0.



LUDWIG JANSEN VAN VUUREN

MTech DentTech (Tshwane UT); NatDip DentTech; BTech DentTech (Technikon Pret)
Lecturer, Department of Oral Rehabilitation

Research Interests

Mr Jansen van Vuuren's research interests are the mechanical properties and microstructure of bio-materials and dental hard tissues. He conducts experimental and observational research investigating the structure, microstructure and chemical composition of human, and various species of animal teeth and relating the arrangement of these structures to their mechanical properties and function.

Research Achievements and Collaborations

With his current research on dental hard tissues, he is working with researchers within the Sir John Walsh Research Institute and collaborating locally with researchers from the Department of Chemistry, Department of Geology, nationally with the Department of Chemical and Materials Engineering (University of Auckland) and internationally with the School of Anatomical Sciences (University of the Witwatersrand, South Africa).

Recent Publications

Ting, S., K. C. Li, J. N. Waddell, D. J. Prior, L. Jansen van Vuuren, M. V. Swain (2014). Influence of a tungsten metal conditioner on the adhesion and residual stress of porcelain bonded to cobalt-chromium alloy. *Journal of Prosthetic Dentistry* 112(3): 584-590.

He, L. H; Yin, Z. H; Jansen van Vuuren, L; Carter, E. A; Liang, X. W (2013). A natural functional graded biocomposite – Human enamel. *Acta Biomaterialia*; 9; 6330-6337

Loch, C; Swain, M. V; Jansen van Vuuren, L; Kieser, J. A; Fordyce, R. E (2013). Mechanical properties of dental tissues in dolphins. *Archives of Oral Biology*; 58; 773-779

Li, K. C; Waddell, J. N; Prior, D. J; Ting, S; Girvan, L; Jansen van Vuuren, L; Swain M. V (2013) Effect of multiple autoclaving cycles on the adhesion energy between yttria-stabilized zirconia veneered with porcelain. *Dental Materials*; 29:e263-e270



WENDY-ANN JANSEN VAN VUUREN

BTechDent NatDipDentTech (Technikon Pret)
Lecturer, Department of Oral Rehabilitation

Research Interests

Mrs Jansen van Vuuren's research interests are in the field of mechanical properties and strength testing of dental bio-materials and adhesives. She conducts experimental and observational research investigating the structure and mechanical properties of bio-materials under different functional conditions. She is also interested in the field of Digital Dentistry and the impact thereof on the quality of Dentistry.

Research Achievements and Collaborations

Wendy works with her colleagues in the Bio-materials research group within the Sir John Walsh Research Institute. She was recently the recipient of a Health Lotteries Research Equipment Grant, which will further enhance the quality of research within the institute.

Recent Publications

Tiu J, Waddell N, Al-Amleh B, Jansen van Vuuren W, Swain M, Coordinate geometry method for capturing and evaluating crown preparation geometry, *Journal of Prosthetic Dentistry*, 112(3) March 2014.



MIKHAIL KENIYA

MD Kandidat Nauk (Rostov State) (equivalent to PhD)
Research Fellow, Department of Oral Sciences

Research Interests

Dr Keniya's main scientific interests are in investigating mechanisms of microbial drug resistance and the structural biology of membrane transporters, based on his expertise in microbiology, protein chemistry, enzymology and molecular genetics. The current emphasis is in creating yeast producer and tester strains, and screening compound libraries for novel inhibitors. He is a full-time associate investigator in the project "Structure-directed antifungal discovery" (HRC of NZ grant, PI B C Monk). In part, this investigation is based on the discoveries made within the project "Multifunctional azoles: A triple whammy designed to defeat drug resistance" (Marsden Fund grant, PI B C Monk 2011-2015).

Research Achievements and Collaborations

In 2013-2014 Dr Keniya developed yeast-based screens for medium throughput identification of antagonists of a transcriptional regulator that controls efflux of triazole antifungals. In collaboration with Dr David Maass (Victoria University, Wellington) a primary screen of a representative library of 2540 small molecules obtained from National Cancer Institute, USA was performed and several hits found. The same library was subsequently successfully screened for inhibitors of yeast lanosterol 14 α -demethylase, a key enzyme involved in ergosterol biosynthesis and the target of the triazole antifungals in fungal pathogens.

Dr. Keniya was involved in purification of lanosterol 14 α -demethylase from *Candida albicans* which has led to the first X-ray crystal structure of a cytochrome P450 in pathogenic fungi.

Recent Publications

Keniya, M.V., Holmes, A. R., Niimi, M., Lamping, E., Gillet, J.-P., Gottesman, M. M., & Cannon, R. D. (2014). Drug resistance is conferred on the model yeast *Saccharomyces cerevisiae* by expression of full-length melanoma-associated human ATP-binding cassette transporter ABCB5. *Molecular Pharmaceutics*, 11(10), 3452-3462.

Monk, B.C., Tomasiak, T.M., Keniya, M.V., Huschmann, F.U., Tyndal, J.D., O'Connell, J.D 3rd., Cannon, R.D., McDonald, J.G., Rodriguez, A., Finer-Moore, J.S., Stroud, R.M. (2014) Architecture of a single membrane spanning cytochrome P450 suggests constraints that orient the catalytic domain relative to a bilayer. *Proc Natl Acad Sci U S A*. 111:3865-70.

Keniya, M.V., Cannon, R.D., Nguyễn, Á., Tyndall, J.D., Monk, B.C. (2013) Heterologous expression of *Candida albicans* Pma1p in *Saccharomyces cerevisiae*. *FEMS Yeast Res.* 13:302-11.



JONATHAN LEICHTER

BA (Connecticut) DMD (Tufts) CertPerio (Harvard)
Associate Professor (from 2015), Department of Oral Sciences

Research Interests

Associate Professor Leichter is recognized as a leader and expert in the field of laser dentistry, with publications relating to laser research in high-ranking dental journals in the fields of periodontology, cariology and endodontics. He plays a critical role in all laser-based research in the Faculty of Dentistry. His work with dental lasers is opening up novel treatment strategies for the treatment of peri-implantitis. He has demonstrated expertise in periodontology clinical trials through his work in project development, study design, investigator calibration and editing of research manuscripts. His research expertise in the field of dental implantology extends to the development of surgical protocols and computer aided image analysis of histological specimens and radiographs. Associate Professor Leichter provides translational research as the chief writer of the Oral Health Research Review, which has over 1500 subscribers. His research expertise has been clearly demonstrated through his supervision of both undergraduate and postgraduate students and the publications, presentations and awards that have arisen from this supervision. He has presented his research throughout New Zealand, Australia, Japan and the U.S.

Research Achievements and Collaborations

Evaluation of novel products for alveolar ridge preservation – an experimental study in sheep. This work is being conducted as part of the Biomechanics and Oral Implantology Group of the SJWRI.

Dental implant abutment-interface seals that prevent marginal bone loss: an intra-oral in vivo study in the mandible of sheep. This work is being conducted as part of the Biomechanics and Oral Implantology Group of the SJWRI.

Evaluation of novel bone replacement grafting products for tooth socket preservation and maxillary sinus elevation in a sheep animal model. This work is being conducted as part of the Biomechanics and Oral Implantology Group of the SJWRI.

Effect of diode laser irradiation on the viability of bacteria in an in-vivo biofilm formed on titanium surfaces. This research is being conducted as part of the Molecular Microbiology and Oral Implantology groups of the SJWRI

Evaluation of Cone-Beam computerized tomography and Micro CT for the determination of bone fill in a sheep sinus model. This work is being conducted as part of the Biomechanics and Oral Implantology Group of the SJWRI.

Recent Publications

Schwass D, Purton D, Leichter J and Swain M (2013). Evaluating the efficacy of caries removal using an Er:YAG laser driven by fluorescence feedback control. *Archives of Oral Biology* 58:603-610.

Al-Harathi L, Cullinan MP, Leichter JW and Thomson M (2013). The impact of periodontitis on oral-health-related quality of life: a review of the evidence from observational studies. *Australian Dental Journal* 58:274-277.

Al-Harathi L, Cullinan MP, Leichter JW and Thomson M (2013). Periodontitis among adults in the Arab World. *International Dental Journal* 63:7-11.

Atieh, M, Tawse-Smith A and Leichter J (2014). Peri-Implant bone loss and its uncommon causes: A case report. *Clinical Advances in Periodontics*. October 2104. 1-14. DOI:10.1902/cap.2014.140024 .



CAROLINA LOCH SANTOS DA SILVA

BSc (Santa Catarina) MSc (Paraná) PhD (Otago)
Research Assistant, Department of Oral Sciences

Research Interests

Since completing her PhD in 2013, Carolina is part of the Biomechanics and Oral Implantology Programme of the SJWRI. She has been developing an innovative research programme in evolutionary oral biology, using animal teeth to gather a wide range of information about the biology, evolution and interactions with the environment of fossil and recent species. Carolina is also interested in dental hard tissues processing and analysis using diverse analytical techniques.

Research Achievements and Collaborations

During 2013-14, Carolina was the lead author of 7 publications in international journals and had presented or was involved with 9 conference presentations in both national and international conferences. She has established ongoing multidisciplinary collaborations with researchers across the University (Department of Geology, Department of Chemistry, Department of Anatomy and Structural Biology, Department of Zoology, Department of Marine Sciences) and in overseas institutions (Smithsonian Institution, New York Institute of Technology College of Osteopathic Medicine, Hampden-Sydney College, University of Adelaide School of Dentistry, South Australian Museum, Museo de Historia Natural de Santiago and Universidade Federal de Santa Catarina).

Recent Publications

Loch C, Swain MV, Fraser S, Gordon KC, Kieser JA, Fordyce RE. 2014. Elemental and chemical characterization of dolphin enamel and dentine using X-ray and Raman microanalyses (Cetacea: Delphinoidea and Inioidea). *Journal of Structural Biology* 185(1): 58-68.

Loch C, Swain MV, Jansen Van Vuuren L, Kieser JA, Fordyce RE. 2013. Mechanical properties of dental tissues in dolphins (Cetacea: Delphinoidea and Inioidea). *Archives of Oral Biology* 58(7): 773-779.

Loch C, Duncan W, Simões-Lopes PC, Kieser JA, Fordyce RE. 2013. Ultrastructure of enamel and dentine in extant dolphins (Cetacea: Delphinoidea and Inioidea). *Zoomorphology* 132(2): 215-225.

Loch C, Grando LJ, Schwass DR, Kieser JA, Fordyce RE, Simões-Lopes PC. 2013. Dental erosion in south Atlantic dolphins (Cetacea: Delphinidae): a macro and microscopic approach. *Marine Mammal Science* 29(2): 338-347.



ROBERT LOVE

BDS MDS PhD (Otago) FRACDS

Professor and Head of Discipline (Endodontics), Department of Oral Rehabilitation

Research Interests

Professor Love's prime area of research is based on the mechanisms involved in dentine colonisation and infection of the root canal system, with an emphasis on molecular aspects of bacterial interactions with substances. This work is the only one to show that bacterial infection of dentine follows all of the principles of colonisation, an important concept to determine because understanding should lead on to prevention. Current research is focused on development of antimicrobial peptides targeted against bacteria and their invasion mechanisms and relating the microbial infection aspect of dentine/ endodontic infection to disease progression/ pathology, with the histopathological and immunological profile of refractory periapical lesions forming the basis of extension into this field.

Other significant collaborative work is focused on the development of a self assembling scaffold for endodontic regeneration and its effects at a cellular level.

Research Achievements and Collaborations

Research output over the period was driven by the completion of four DCLinDent students, one MDS and one PhD student exploring regenerative endodontics, antimicrobial peptides and history of oral and maxillofacial war trauma. Key collaborators are Associate Professor Brian Monk and Associate Professor George Dias (University of Otago) and Professor Howard Jenkinson (University of Bristol)

Recent Publications

Ling G.Y., Love R.M., MacFadyen E.E., W.M. Thomson. Oral health of older people admitted to hospital for needs assessment. *New Zealand Dental Journal* 110: 131-137 (2014).

Love R.M., Masi O.V. (2013) Shaping Ability of Twisted File, HERO Shaper and Profile .06 Ni-Ti Instruments in Simulated Curved Root Canals. *Dentistry* 3:171. doi:10.4172/2161-1122.1000171

Choi H., R. K. de Silva, D. C. Tong, H. De Silva, J. Garcia, R. M. Love. The thickness of parietal bones in a New Zealand sample of cadaveric skulls in relation to calvarial bone graft. *Craniofacial Trauma and Reconstruction* 6: 115-120 (2013)

Lin, Y. P., Love, R. M., Friedlander, L. T., Shang, H. F., & Pai, M. H. (2013). Expression of Toll-like receptor 2 and 4, and the OPG-RANKL-RANK system in inflammatory external root resorption and external cervical resorption. *International Endodontic Journal* 46: 971-81 (2013).



KARL LYONS

MDS (Otago) CertMaxillofacialPros (UCLA) FRACDS
Professor of Restorative Dentistry, Head of Department, Department of Oral Rehabilitation

Research Interests

Karl Lyons has carried out research in dental tooth whitening, dental implants, dental materials, particularly ceramics and CAD/CAM and has investigated microbial adhesion to dental obturator prostheses, particularly adhesion of *C. albicans* and *S. epidermidis*. Microbial adhesion, especially *C. albicans*, to these prostheses reduces the lifetime of the prosthesis and can affect the health of these patients. His research has included collaborative research involving undergraduate students and postgraduate students including DClintDent and PhD students.

Recent publications

Al-Amleh, Waddell, J.N., Lyons, K.M. and Swain, M.V. (2014). Influence of veneering porcelain thickness and cooling rates on residual stresses in zirconia molar crowns. *Dental Materials* 30: 271-280

Holmes, A.R., Rodrigues, E., van der Weilen, P., Lyons, K.M., Haigh, B., Wheeler, T., Dawes, P.J.D., and Cannon, R.D. (2014). Adherence of *Candida albicans* to silicone is promoted by the human salivary protein SPLUNC2/PSP/BPIFA2. *Molecular Oral Microbiology* 29: 90-98

Lee, A., Swain, M.V., He, L. and Lyons, K.M. (2014). Wear behaviour of human enamel against lithium disilicate glass ceramic and type III gold. *Journal of Prosthetic Dentistry* 112: 1399-1405

Polyzois, G. and Lyons, K.M. (2014). Monitoring Shore A hardness of silicone facial elastomers: the effect of natural aging and silicone type after one year. *Journal of Craniofacial Surgery* 25: 1217-1221



SUNYOUNG MA

BDS DClintDent (Otago)

Senior Lecturer, Department of Oral Rehabilitation

Research Interests

Dr Ma's research interest involves clinical trials using different materials or treatment modalities involving dental implants for patients especially in the older age group that need to replace their missing teeth. The main research outcome of interest includes biological success of the treatment as well as long-term clinical maintenance/complications issues for both clinicians and patients including any treatment impact on oral health related quality of life for these patients.

Research Achievements and Collaborations

With the ongoing national and international collaborations in addition to previous successful research grants and continuous external research funding support, Dr Ma continues to produce research outputs (8 articles in peer-reviewed journals and 8 conference abstracts/presentations in international research meetings) in the areas of oral implantology and gerodontology. Dr Ma has had multiple international invitations to present her research in these areas and has been involved in the preparation of a book chapter specifically in the area of implant overdentures. She has supervised a PhD candidate to completion and is actively involved as a reviewer for multiple international peer-reviewed journals.

Recent Publications

Thomson WM, Ma S (2014). An ageing population poses dental challenges. *Singapore Dental Journal* 35C:3-8.

Osman RB, Ma S (2014). Prosthodontic maintenance of overdentures on zirconia implants: 1-year results of a randomized controlled trial. *International Journal of Prosthodontics* 27:461-468.

Osman RB, Swain MV, Atieh M, Ma S, Duncan W (2014). Ceramic implants (Y-TZP): are they a viable alternative to titanium implants for the support of overdentures? A randomized clinical trial. *Clinical Oral Implants Research* 25:1366-1377.

Osman RB, Morgaine KC, Duncan W, Swain MV, Ma S (2014). Patients' perspectives on zirconia and titanium implants with a novel distribution supporting maxillary and mandibular overdentures: a qualitative study. *Clinical Oral Implants Research* 25:587-597.



LI (PETER) MEI

BDS MDS DDS (Sichuan) PhD (Groningen)

Senior Lecturer in Orthodontics, Department of Oral Sciences

Research Interests

Dr Mei's research expertise is in biofilms and biomaterials. His recent research activities are mainly focused on the mechanism and prevention of bacterial adhesion and biofilm formation in Dentistry.

His other interests include randomized controlled trials (RCT) and evidence-based dentistry. He has investigated the distribution of biofilm in patients with fixed appliances and clinical methods for enhancing oral hygiene in orthodontic patients. He has measured the adhesion forces between living bacteria and orthodontic materials using atomic force microscopy at a nano-level, and decoupled the bacterial adhesion forces into specific and non-specific forces. In addition, he has investigated measures for preventing biofilm formation using quaternary ammonium compounds. He developed a novel contact-killing surface by incorporating quaternary ammonium compounds into composite resin and studied its efficacy of killing the adhered bacteria and its bio-safety for human cells.

Research Achievements and Collaborations

He has been awarded an Oral Health Research Fund from the Ministry of Health, New Zealand for his study in efficacy of the oral probiotic *Streptococcus salivarius* in managing biofilm formation in patients wearing fixed orthodontic appliances. He has also been awarded a University of Otago Research Grant for his research in the influence of enamel surface roughness on bacterial adhesion.

He has ongoing biofilm research collaboration with an international team in Biomedical Engineering with the University Medical Center Groningen, University of Groningen, and State key Laboratory of Oral Diseases, West China School of Stomatology, Sichuan University. In addition, he has completed a study in detecting bacterial adhesion using microfluidic chip with the School of Dentistry, Capital Medical University, Beijing, and a study in enhancing enamel surface condition using resin infiltration and fluoride varnish with the School of Stomatology, Luzhou Medical University.

Recent Publications

Peng Y, Wu R, Qu W, Wu W, Chen J, Fang J, Chen Y, Farella M, Mei L. The effect of visual method vs. plaque disclosure in enhancing oral hygiene in adolescents and young adults: a single blind randomized controlled trial. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2014;145:280-286

Yuan H, Li J, Chen L, Cheng L, Cannon RD, Mei L. Esthetic comparison of white spot lesion treatment modalities using spectrometry and fluorescence. *The Angle Orthodontist*. 2014; 84:343-349.

Li J, Xie X, Wang Y, Yin W, Antoun JS, Farella M, Mei L. Long-term remineralizing effect of casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) on early caries lesions in vivo: A systematic review. *Journal of Dentistry*. 2014;(14) 00096-7. doi: 10.1016.

Pei Z, Wang B, Zhang F, Niu Z, Shi S, Cannon RD, Mei L. Response of human periodontal ligament cells to baicalin. *Journal of Periodontology*, 2014; 85(9):1283-1290.



ALISON MELDRUM

BDS MDS (Otago)

Senior Lecturer, Department of Oral Sciences

Research Interests

Research interests are around improving the oral health of pre-schoolers. This is focused on the quantitative and qualitative analysis of responses of clinicians and parent to delivery of preventive oral health messages and the evaluation of primary health care nurses delivering oral health messages.

Another research interest is the investigation of the delivery of oral health messages using specifically designed oral health brochures in community pharmacies

Research Achievements and Collaborations

Collaborations with Southland dental therapists in the delivery of a motivational message to prevent dental caries in preschoolers. A paper on this findings has been accepted for an oral presentation at the International Association of Paediatric Dentistry in Glasgow U.K. in July 2015.

Collaboration with Dunedin pharmacies to delivery oral health messages using specifically designed oral health brochures.

Recent Publications

Morgaine KC, Carter AS, Meldrum AM, Cullinan MP. (2015) Design of an oral health information brochure for at-risk individuals *Health Education Journal*, 74 (1): 60-73

Drummond BK, Meldrum AM, Boyd D. Influence of dental care on children's oral health and wellbeing. *Br Dent J*. 2013 Jun;214(11):E27. doi: 10.1038/sj.bdj.2013.533.



TRUDY MILNE

PhD (Qld UT) NZCS

Research Fellow, Department of Oral Diagnostic and Surgical Sciences

Research Interests

Dr Milne's interest in gene expression continues with collaborative projects looking at the proteins involved in the development of bone cells. In particular, furthering our understanding of the role growth factors and osteogenic genes play in the development of rat mandibular condyle and the development of an "off the shelf" bone replacement material. To this end a study is being undertaken to determine if human osteoblasts, synthesize a bone matrix capable of producing the remodelling dynamics of naturally occurring bone when cultured in vitro in a 3-dimensional, mechanically-active environment. In addition, the link between poor dental outcomes for smokers and DNA methylation continues to be studied with a goal to identifying the differential regulation of proteins in fibroblasts and epidermal cells. Research continues in the area of oral diseases.

Research Achievements and Collaborations

Current research projects Dr Milne is co-supervising include: two collaborations with the Discipline of Orthodontics; Growth factor expression in the rat Condyle: Implications for craniofacial development in collaboration with Mohamad Al-Dujaili (DClinDent candidate), Professor Mauro Farella, Professor Richard Cannon and Dr Li Mei and A new approach to engineering 3D constructs of human bone matrix in a mechanically-active environment in collaboration with Professor Murray Meikle, Yana Itskovich (DClinDent candidate), Professor Mauro Farella and Professor Richard Cannon. Research within the Department of Oral Diagnostic and Surgical Sciences with PhD candidates' Avadhoot Avadhani (Role of interleukin 17 in invasion of oral cancer) and Hina Narayan (In vitro effect of cigarette smoke on DNA methylation in human gingival fibroblasts) continues. Both these projects received funding, from the New Zealand Dental Association and the Ministry of Health, respectively.

The study of oral diseases continues in collaboration with Emeritus Professor Gregory Seymour and Professor Alison Rich, as part of the Molecular and Immunopathology Research Group. Oral squamous cell carcinoma and oral mucosal diseases are being investigated using gene expression and immunohistological techniques. In collaboration with Dr Allauddin Siddiqi, a member of the Biomechanics and Oral Implantology Research Group, Dr Milne has undertaken a study to determine the level of a number of periodontopathogens in the edentulous mouth.

Recent Publications

Siddiqi, A., Milne, T., Cullinan, M.P., Seymour, G.J. (2014) Analysis of *P. gingivalis*, *T. forsythia* and *S. aureus* levels in edentulous-mouths prior to and six months after placement of one-piece Zirconia and Titanium implants. *Clinical Oral Implants Research*. DOI: 10.1111/clr.12536

Zafar, S., Coates, D., Seymour, G.J., Drummond, B.K., Milne, T. and Cullinan, M.P. (2014) Zoledronic acid and geranylgeraniol regulate cellular behaviour and angiogenic gene expression in human gingival fibroblasts. *Journal of Oral Pathology and Medicine* 43(9) 711-721.

Parachuru VP, Coates DE, Milne TJ, Hussaini HM, Rich AM, Seymour GJ. (2014) Forkhead box P3-positive T-cells and interleukin 17-positive T-helper 17 cells in chronic inflammatory periodontal disease. *Journal of Periodontal Research* 49 (6) 817-826.



SUSAN MOFFAT

BA DPH (Otago) CertDentTherp (Well)
Lecturer, Department of Oral Sciences

Research Interests

Susan Moffat's field of research includes dental public health, dental therapy history, and the dental therapy/Oral Health workforce.

Dental therapy is an academic discipline which has not (until recently) had a research tradition of its own, having relied traditionally on work undertaken in the disciplines of paediatric dentistry and dental public health. In that respect, Susan is one of the pioneers in dental therapy research, with her work laying some of the groundwork for an ongoing research foundation for the discipline.

In 2007, the University of Otago introduced a Bachelor of Oral Health (BOH) degree. This has led to a new area of research into Oral Health education and workforce, and Susan also has a key role in that.

Research Achievements and Collaborations

Susan has collaborated with other Faculty staff on research projects where knowledge of the dental therapy/Oral Health profession or education is required, and has collaborated internationally with researchers in Australia, the United States and other countries.

Susan's PhD research centres on the establishment of the New Zealand School Dental Service (SDS). Her research places the development of the SDS within New Zealand's social, economic and political history, and emphasises the contribution of the early dental nurses to the founding of the Service.

Dental public health is also a research interest. Susan is principal investigator in a research project funded by a University of Otago Research Grant that looks at the acceptability of primary health care nurses giving oral health advice to the parents of preschool children.

Recent Publications

Nash, D. A., Friedman, J. W., Mathu-Muju, K. R., Robinson, P. G., Satur, J., Moffat, S., Kardos, R.,...Fernando, E. (2014). A review of the global literature on dental therapists. *Community Dentistry & Oral Epidemiology* 42(1): 1-10. doi: 10.1111/cdoe.12052.

Foster Page, L.A., Kang, I., Anderson, V., Thomson, W.M., Meldrum, A.M., & Moffat, S.M. (2013). The School of Dentistry educational environment: Bachelor of Oral Health students' perceptions from the start to end of their curriculum. *New Zealand Dental Journal* 108(3): 83-88.



BRIAN MONK

BSc(Hons) (Well) PhD(Monash)

Associate Professor (from 2015), Department of Oral Sciences

Director, Molecular Biosciences Laboratory

Research Interests

Novel drug discovery tools are used combat infectious disease, especially where drug resistance poses an important threat. Genetically manipulated yeast and bacteria are used to express drug targets for efficient screens and structural analysis. Many of the targets prototyped for antimicrobial discovery are membrane proteins – drug efflux pumps, essential fungal P-type ATPases and cytochrome P450 enzymes. Soluble targets include lumazine synthase and DNA gyrase. The challenge of obtaining monodisperse membrane proteins for X-ray crystallography is well advanced and high resolution X-ray crystal structures have been obtained for yeast lanosterol 14 α -demethylase with substrates or azole drugs. The yeast expression system his group has patented is used widely to express membrane proteins from sources including pathogenic fungi, plants, nematodes and humans. Research interests also include mitigating echinocandin (a new antifungal class) and antimalarial resistance, expressing human and phytopathogen drug targets for drug screening, combating dental pathologies, and equipping yeast biofactories with efflux pumps to protect against toxic metabolites and products.


Research Achievements and Collaborations

The first X-ray structures for a complete membrane spanning cytochrome P450 Dr Monk obtained are likely to have major impacts on antifungal discovery, and on drug discovery and development in general. The research on yeast lanosterol 14- α demethylase was the product of a Marsden fund grant and has led to support from the Health Research Council of New Zealand and a major agrochemical company that is focused on structure-based drug discovery. Dr Monk's group supports two post-doctoral fellows, two research fellows and a PhD student at Otago, partially supports two sub-contracted post-doctoral fellows at in the laboratory of Professor RM Stroud at UCSF, and includes research collaborations with Dr JDA Tyndall in the School of Pharmacy, a combinatorial chemistry provider in Germany and agrochemical researchers located in Germany and France. Other research highlights include structural resolution of lumazine synthase from the fungal pathogen *Candida glabrata*, the development of a yeast expression system for the drug target *Candida albicans* Pma1p and obtaining insights in the function of a *Candida albicans* drug efflux pump. Two PhD completions and two DClinDent completions were co-supervised in 2013-2014. Dr Monk received the Sir John Walsh Research Award in 2013.

Recent Publications

Monk, B.C, Tomasiak M.K., Keniya M.V., Huschmann, F.U., Tyndall J.D.A., O'Connell III, J.D, Cannon, R.D., McDonald, J.D., Rodriguez, A., Finer-Moore, J.S., and Stroud, R.M. (2014) Architecture of a single membrane spanning cytochrome P450 suggests constraints that orient the catalytic domain relative to a bilayer. *Proc. Nat. Acad. Sci. USA* 111: 3865-3870.

Shankar M., Wilbanks S.M., Nakatani Y., Monk B.C., Tyndall J.D.A. (2013) Catalysis product captured in lumazine synthase from the fungal pathogen *Candida glabrata*. *Acta Crystallogr D. Biol Crystallogr.* 69: 1580-1586.



Rawal M.K., Khan M.F., Kapoor K., Goyal N., Sen S., Saxena A.K., Lynn A.M., Tyndall J.D.A., Monk B.C., Cannon R.D., Komath S.S., Prasad R. (2013) Insight into PDR ABC pump drug transport through mutagenesis of Cdr1p transmembrane domains. *J. Biol Chem.* 288:24480-24493.

Keniya, M.V., Cannon, R.D., Nguyen, A., Tyndall, J.D.A. and Monk, B.C. (2013) Heterologous expression of *Candida albicans* Pma1p in *Saccharomyces cerevisiae*. *FEMS Yeast Research* 30: 302-311.



COLLEEN MURRAY

BEd(Massey) BDS(Otago) BChD(Hons)(Pret) PGDipClinDent(Otago)
Senior Lecturer, Department of Oral Rehabilitation

Research Interests

Colleen's interests lie in the areas of dental education, children and adolescent health and smoking cessation intervention with an emphasis on survey-based research. She has also been involved in a survey of vision involving all BDS students and clinical teachers.

Research Achievements and Collaborations

Colleen is currently involved with a large HRC-funded project "Identifying risk factors for rheumatic fever in New Zealand". Her involvement focuses on the possible association of poor oral health with rheumatic heart disease. The study is being carried out in the North Island. The team consists of researchers from the Wellington School of Medicine, University of Auckland, Environmental Science and Research and Auckland DHB.

Reflecting her qualification in education, most of her own research, as well as research projects which she has initiated and supervised, has its focus on how the curriculum and/or facilities can be adapted to meet the needs of the current student population. A study on dental students and their use of information and communication technology has been accepted for publication by an international dental education journal. She presented the results of a study on smoking cessation interventions used by New Zealand dental therapists and hygienists at the IADR General Session in Cape Town in 2014.

Recent Publications

Murray CM, Chandler NP (2014). Undergraduate endodontic teaching in New Zealand: Students' experience, perceptions and self-confidence level. *Australian Endodontic Journal* 40: 116-122.

Tilwala D, Murray C, Farah R, Broadbent JM (2014) New Zealand dental therapists' beliefs regarding child maltreatment. *Australian and New Zealand Journal of Public Health* 38: 480-484.

Murray CM, Knight ET, Russell AA, Tawse-Smith A, Leichter JW (2013). Peri-implant disease: Current understanding and future direction. *New Zealand Dental Journal* 109:55-62.



MASAKAZU NIIMI

DDS PhD

Honorary Fellow (2013), Senior Research Fellow (2014), Department of Oral Sciences

Research Interests

Dr Niimi has research interests in fungal and human ABC efflux pumps. Overexpression of ABC protein Cdr1p is a major contributor to azole antifungal drug resistance in clinical *Candida albicans* isolates yet little is known about its substrate specificity and pump function. Dr Niimi's interest is in the biochemical and structural analysis of Cdr1p using site-directed mutagenesis and identification of natural mutations to evaluate effects of individual amino acids on the function of Cdr1p.

Human ABC transporters are responsible for the drug resistance of some tumour cells. To study their drug efflux properties, Dr Niimi and colleagues from the Molecular Microbiology Programme have expressed them in the yeast *Saccharomyces cerevisiae*. Dr M Niimi is focused on achieving high-level functional expression of human ABCB1 and, potentially, other human efflux pumps involved in cancer, such as ABCG2 and ABCB5, in *S. cerevisiae* in order to screen for inhibitors of efflux pumps responsible for chemotherapy resistance.

Research Achievements and Collaborations

Dr Niimi has undertaken kinetic analysis of the inhibitor-induced amino acid changes in *C. albicans* ABC protein Cdr1p mutants and uncovered critical roles of particular amino acids for the pump function. Dr Niimi was awarded Marsden, NZDA and University of Otago Research grants as co-investigator for these projects.

He has undertaken a study in which a *S. cerevisiae* strain expressing ABCB1 was subjected to ultraviolet light in order to select variants with improved ABCB1 function. Cross-resistance to multiple cancer drugs, confocal microscopy of ABCB1-expressing cells tagged with GFP and Western blotting analysis showed that the UV-irradiated strain ADUV/ABCB1 improved functional and expression levels of ABCB1 significantly comparing the original ABCB1-expressing strain. Dr Niimi is pursuing this work with Dr Ariya Chindamporn, Chulalongkorn University, Bangkok, Thailand. He is also collaborating with Professor Susumu Kajiwara, Tokyo Institute of Technology, Japan on drug efflux pumps from pathogenic fungi such as *Penicillium marneffei*.

Recent Publications

Keniya, MV, Holmes AR, Niimi M, Lamping E, Jean-Pierre G, Gottesman M and Cannon RD. Drug resistance is conferred on the model yeast *Saccharomyces cerevisiae* by expression of full-length melanoma-associated human ABC transporter ABCB5. *Molecular Pharmaceutics* 11, 3452-62, 2014.

Lamping E, Niimi M, Cannon RD. Small, synthetic, GC-rich mRNA stem-loop modules 5' proximal to the AUG start-codon predictably tune gene expression in yeast. *Microbial Cell Factories*. 12, 1-19, 2013.

Ueno K, Okawara A, Yamagoe S, Naka T, Umeyama T, Utena-Abe Y, Tarumoto N, Niimi M, Ohno H, Doe M, Fujiwara N, Kinjo Y, Miyazaki Y. The mannan of *Candida albicans* lacking b-1,2-linked oligomannosides increases the production of inflammatory cytokines by dendritic cells. *Medical Mycology*. 51, 385-95, 2013.



PRAVEEN PARACHURU

BDS (M'lore) MDS (Ragas Dent Coll Chennai) PhD (Otago)
Senior Lecturer in Oral Biology, Department of Oral Sciences

Research Interests

Dr Parachuru's research interests relate to gaining a greater understanding of the role of immune response in the pathogenesis of chronic inflammatory diseases. His main research interest is in chronic inflammatory periodontal disease, particularly to predict the individuals susceptible to periodontal disease progression and, more recently, investigating the role of Regulatory T-cells and Th17 cells in the pathogenesis of periodontal disease using a variety of immunohistological and molecular techniques such as Immunohistochemistry, Immunofluorescence, qPCR and ELISA. Acquiring an in depth knowledge about immunological mechanisms and gaining essential research skills, especially in area of research project development and immunohistological and molecular techniques, has further led Dr Parachuru to instigate research into the immunopathological mechanisms underlying in the other oral chronic inflammatory diseases such as Oral Mucosal Lichen Planus and Squamous Cell Carcinoma. His current research interest focuses on the role of microRNA in chronic inflammatory periodontal tissues. The outcome of this study will help to identify the putative miRs biomarkers that play a role in periodontal disease process and also help to develop novel therapeutic strategies to improve patient management.

Research Achievements and Collaborations

Grants

2014: New Zealand Dental Research Foundation Grant

Title of Research: microRNA profile in chronic inflammatory periodontal disease

Investigators: Parachuru VPB, Rajesh K, Rich AM, Duncan WD and Seymour GJ

Amount Requested: \$15,000

2013: New Zealand Dental Research Foundation Grant

Title of Research: IL17 role in Oral Squamous Cell Carcinoma

Investigators: Avadhani AV, Parachuru VPB, Milne TJ, Rich AM and Seymour GJ

Funding: \$14934

Recent Publications

Goldsmith M, Seo LB, de-silva RK, Parachuru VPB, Rich AM and Seymour GJ (2014). Oral Mycosis Fungoides: Report with immune profile. *Oral Surg Oral Med Oral Pathol Oral Radiol*, 118(2), e48-e52. DOI: 10.1016/j.o000.2013.10.005.

Parachuru VPB, Coates DE, Milne TJ, Hussaini HM, Rich AM, Seymour GJ (2014).

Forkhead box P3-positive regulatory T-cells and interleukin 17-positive T-helper 17 cells in chronic inflammatory periodontal disease. *J Periodontol Res*. DOI: 10.1111/jre.12169.

Rich AM, Hussaini HM, Parachuru VPB, Seymour GJ (2014). Toll-like receptors and cancer, particularly oral squamous cell carcinoma. *Frontiers in Immunology*, 5, 464. DOI: 10.3389/fimmu.2014.00464

Rich AM, Hussaini H, Parachuru VPB, Seymour GJ (2014). The tumour microenvironment in oral squamous cell carcinoma. *Pathology*, 46(Suppl. 1), (pp. S9).



ALISON RICH

BDS (Otago) MSc PhD (Melb) FRACDS FFOP (RCPA)

Professor and Head of Department, Department of Oral Diagnostics and Surgical Sciences

Acting Dean (2013), Faculty of Dentistry

Programme Director, Oral Molecular and Immunopathology

Research Interests

Professor Rich's research interests relate to gaining a greater understanding of the pathogenesis of oral diseases to complement my clinical speciality of diagnostic oral pathology. Her main research interest is in oral cancer, particularly the influence of the microenvironment on local invasion and metastasis to lymph nodes. She has expertise in project design in these areas, in data analysis and in mentoring colleagues and post- and undergraduate students undertaking related projects. Specialist techniques in which she has expertise include light microscopic analysis, immunofluorescence microscopy, immunohistochemistry and histomorphometric analysis. More recently I have used polymerase chain reaction and array technology. She is a member of the Board of the New Zealand Dental Research Foundation. Since 2014 she has been the leader of the Oral Molecular and Immunopathology research programme, and prior to that was co-leader with Professor Gregory Seymour.

Her research also relates to her activities in student selection and teaching and learning (particularly student outplacements and inter-professional education). She has an ongoing collaboration with colleagues at the University of Adelaide evaluating undergraduate student selection.

Research Achievements and Collaborations

Research achievements in 2013-14 included the enrollment and progression of excellent PhD and DClinDent students under my supervision and our success in attracting significant grant funding from the New Zealand Dental Research Foundation and the Ministry of Health Oral Health Research Fund. Her research collaboration with Professor R Zain and colleagues, University of Malaya and the Oral Cancer Research and Co-ordinating Centre of Malaysia has resulted in one publication and a number of on-going projects.

Recent Publications

Rich AM, Hussani HM, Parachuru VPB, Seymour GJ. Toll-like receptors and cancer, particularly oral squamous cell carcinoma. *Front Immunol.* 2014 doi: 10.3389/fimmu.2014.00464.

Gavidi RO, Rich AM, Cox B, King T. Comparing the occurrence of oral squamous cell carcinoma in New Zealand and the Fiji Islands from 2000-2010. *Int J Cancer Research.* 2014 48 1212-1225.

Bakri MM, Cannon RD Holmes AR, Rich AM. Detection of *Candida albicans* ADH1 and ADH2 mRNAs in human archival oral biopsy samples *J Oral Pathol Med.* 43: 704-710. 2014. doi:10.1111/jop.12193.

Parachuru VP, Coates DE, Milne TJ, Hussaini HM, Rich AM, Seymour GJ. Forkhead box P3-positive regulatory T-cells and interleukin 17-positive T-helper 17 cells in chronic inflammatory periodontal disease. *J Periodontal Res.* 2014 49 817-826.



DONALD SCHWASS

BSc(Waik) BDS DClinDent(Otago) FPFA

Senior Lecturer in Prosthodontics and Head of Discipline (Preventive and Restorative Dentistry), Department of Oral Rehabilitation

Research Interests

Dr Schwass's research interests relate to the use of diagnostic tools for cariology, the management of dental caries, and the use of micro-CT (micro- computer tomography) and CBCT (cone beam computer tomography) for evaluation of mineralised tissues. In collaboration with Dr Carla Meledandri (Chemistry, University of Otago), his main focus involves the development of novel antimicrobial applications containing silver nanoparticles.

Dr Schwass is enrolled in a PhD (part-time) relating to his work with silver nanoparticles, and is an advisor for several other PhD students providing technical support on micro-CT and CBCT. He also contributes as a researcher in a randomised controlled clinical trial exploring the efficacy of resin infiltration as a means of inhibiting caries progression in children providing microscopy and technical support, collaborating with other department academic staff.

Research Achievements and Collaborations

Dr Schwass is involved in three separate projects developing applications for silver nanoparticles synthesised in different ways, engineered for optimal antimicrobial, physical and optical properties. The first of these applications is designed for treating teeth to prevent, control progression, or eliminate, dental caries. In January 2013 a provisional patent application was filed pertaining to the 'assembly of micelle aggregates of surfactant micelles and silver nanoparticles, and use as an antibacterial agent'. With support from Otago Innovation Ltd, Dr Schwass and Dr Meledandri have engaged dental manufacturers, with a view to securing a commercial partner for further development of this novel treatment into a marketable dental product. The second application involves developing an antimicrobial gel for treatment of periodontitis and peri-implantitis. In collaboration with Professor Warwick Duncan, funding was secured for an animal trial involving topical gel application in an artificially induced disease model, to be conducted commencing 2015. In a further application, incorporation of bioavailable silver nanoparticles in dental restorative materials is also being explored.

Other collaborations include:

Clinical trial exploring the efficacy of resin infiltration of non-cavitated proximal caries lesions in deciduous teeth, delivered in a community setting. Collaborators: Dr Lyndie Foster Page, Alison Meldrum, Professor Michael Swain, Professor W. Murray Thomson and DMG (Germany).

Evaluation of protocols used for the acquisition and reconstruction of micro-computer tomography (micro-CT) images to diagnose incipient caries lesions. Collaborators: Karla Rovaris da Silva (PhD student, Piracicaba Dental School, UNICAMP State University of Campina, Brazil), Dr. Francisco Haiter Neto (Brazil)

Recent Publications

Schwass DR, Meledandri CJ (2014). Enhanced penetration of silver nanocomposite assemblies into dentine using iontophoresis: Towards the treatment of dental caries. *Chem Plus Chem* 79(12):1671-1675 DOI:10.1002/cplu.201402132.

Garden AL, Scholz K, Schwass DR, Meledandri CJ (2014). Optimised colloidal chemistry for micelle-templated synthesis and assembly of silver nanocomposite materials. *Colloids and Surfaces A: Physicochemical and Engineering Aspects* 441:367-377.

Loch C, Schwass DR, Kieser JA, Fordyce RE (2013). Use of micro-computed tomography for dental studies in modern and fossil odontocetes: potential applications and limitations. *North Atlantic Marine Mammal Commission (NAMMCO) Scientific Publications* 10: DOI: [dx.doi.org/10.7557/3.2616](https://doi.org/10.7557/3.2616)

Schwass DR, Lyons KM, Purton DG (2013). How long will it last? The expected longevity of prosthodontics and restorative treatment. *New Zealand Dental Journal* 109(3):98-105.



BENEDICT SEO

BDS DClinDent (Otago)

Senior Lecturer in Oral Pathology, Department of Oral Diagnostics and Surgical Sciences

Research Interests

Dr Seo is a specialist oral pathologist and he investigates the pathogenesis of oral cancer, odontogenic lesions and immune-mediated oral diseases, with a particular focus on unfolded protein response (UPR) and endoplasmic reticulum (ER) stress. Techniques such as qRT2-PCR, IHC, tissue microarray (TMA), histochemistry, western blot, cell culture and in vitro assays (viability, caspase-based, TUNEL) are employed in his research.

Research Achievements and Collaborations

Dr Seo received the Oral Presentation Award from the International Association of Oral Pathologists (IAOP), Elman Poole Fellowship, International Association for Dental Research-Colgate Postgraduate Award and Sir Thomas Hunter Scholarship, amongst others. He also has an active research partnership with the University of Malaysia, Oral Cancer Research and Coordination Centre and the National University of Malaysia, as well as with Dunedin Public Hospital.

Recent Publications

Goldsmith, S. M., Seo, B. L., de Silva, R. K., Parachuru, P., Rich, A. M., & Seymour, G. J. (2014). Oral Mycosis Fungoides: Report with immune profile. *Oral Surgery, Oral Medicine, Oral Pathology & Oral Radiology*, 118(2), e48-e52. doi: 10.1016/j.oooo.2013.10.005



DARA SHEARER

BDS (Cork) MComDent (Otago)
Research Fellow, Department of Oral Sciences

Research Interests

Analysis of intergenerational, periodontal and glycaemic data from the Dunedin Study

- (1) The epidemiology of intergenerational associations in periodontal health and longitudinal observational research investigating the role of family history in periodontal health using age-26, age-32 and age-38 periodontal data from the Dunedin Study, and parental data from the Dunedin Family History Study. This research involves the use of group-based trajectory modelling to establish whether an unfavourable periodontal trajectory is linked to parental periodontal history and to clarify longitudinal associations between parental and cohort periodontal health.
- (2) Longitudinal associations between periodontal disease and glycaemic control. This comprises the analysis of Dunedin Study periodontal and glycated haemoglobin assays collected from Study members during the age-26, age-32 and age-38 assessments. The research makes use of both group-based trajectory modelling and linear mixed effects models to elucidate the natural history of, and associations between, periodontal disease and glycaemia as the cohort moves through their third and fourth decades towards middle age.

Research Achievements and Collaborations

Dara was the winner of the 2014 SJWRI Three-minute thesis competition for her presentation Trajectories of Glycated Haemoglobin and Periodontitis - a.k.a. "Gums and Glucose".

Dara won US\$2000 in the 2015 IADR Colgate Research in Prevention Travel Award for travel to the IADR/AADR/CADR General Session & Exhibition, March 11-14, 2015 in Boston.

Recent Publications

Zeng, J., Williams, S. M., Fletcher, D. J., Cameron, C. M., Broadbent, J. M., Shearer, D. M., & Thomson, W. M. (2014). Re-examining the association between smoking and periodontitis in the Dunedin Study with an enhanced analytical approach. *Journal of Periodontology*. Advance online publication. doi: 10.1902/jop.2014.130577

Thomson, W. M., Shearer, D. M., Broadbent, J. M., Foster Page, L. A., & Poulton, R. (2013). The natural history of periodontal attachment loss during the third and fourth decades of life. *Journal of Clinical Periodontology*, 40(7), 672-680. doi: 10.1111/jcpe.12108

Shearer, D. M., Thomson, W. M., Broadbent, J. M., & Poulton, R. (2013). Parental history as a risk factor for periodontitis trajectory group. Meeting of the International Association for Dental Research Asia-Pacific Region, Bangkok, 21-23 August 2013. Abstract from *Journal of Dental Research*, 92(Spec Iss B), 6. Retrieved from dentalresearch.org



ANDREW TAWSE-SMITH

DDS (Colombian Sch of Dent) CertPeriodontology (Göteborg)
Senior Lecturer and Student Affairs Officer, Office of the Dean, Dentistry

Research Interests

Dr Tawse-Smith's research interests are in the area of oral implantology, periodontics and dental education. His main research focus in oral implantology involves a long-term clinical evaluation of patients who have been rehabilitated with various implant prostheses. He is currently investigating the association of titanium particle leakage and its impact on peri-implant health. He has also developed novel in-vitro methodologies to complement his ongoing clinical studies to investigate the efficacy of different implant surface decontamination protocols.

Dr Tawse-Smith has also been the co-ordinator for the University of Otago – International Medical University (IMU) BDS partnership programme since its commencement in 2010. He has evaluated the transition of IMU students into the University of Otago dental curriculum and has been part of the dental education research team investigating Problem Based Learning in the undergraduate cariology curriculum between the two dental faculties.

Research Achievements and Collaborations

Dr Tawse-Smith has collaborations with research groups in South America and Europe. His research in the area of oral implantology has been recognised internationally with multiple invitations to present his ongoing clinical research. He has also maintained financial support from external bodies to continue with his in-vitro oral implantology studies as well as being successful with an internal grant in the area of dental education.

Recent Publications

Tawse-Smith A, Atieh M, Leichter JW, Girvan, L, Rich, AM (2014). Peri-implant bone loss and its uncommon causes: A case report. *Clinical Advances in Periodontics* DOI: 10.1902/cap.2014.140024

Tawse-Smith A, Khosa A, Kamel MS, Duncan WJ, Swain M, Tompkins G. (2014). Bacterial colonization of titanium discs: a pilot study for evaluating implant surface deterioration. *Brazilian Journal of Periodontology* 24:14 -23.

Russell AA, Tawse-Smith A, Broadbent J, Leichter JW. (2014). Peri-implantitis: A survey of diagnosis and treatment by New Zealand periodontists and oral maxillofacial surgeons. *New Zealand Dental Journal* 110:6-10.

Kamel MS, Khosa A, Tawse-Smith A, Leichter A. (2013). The use of laser therapy for dental implant surface decontamination: a narrative review of in vitro studies. *Lasers in Med Science* Nov;29(6):1977-85. doi: 10.1007/s10103-013-1396-0.



WILLIAM MURRAY THOMSON

BSc BDS MComDent (Otago) MA (Leeds) PhD (Adel)

Professor of Dental Epidemiology and Public Health, Head of Department,
Department of Oral Sciences
Programme Director, Dental Epidemiology and Public Health

Research Interests

Professor Murray Thomson is an experienced dental researcher and specialist in dental public health. His research falls into the 4 categories of (1) life-course epidemiology and longitudinal research, (2) periodontal epidemiology and risk factors, (3) gerodontology research, and (4) dental public health and health services research. To date, he has published 254 research papers and 5 book chapters in the scientific literature. His Scopus h index is 36. He is also Editor-in-Chief of Community Dentistry and Oral Epidemiology, and Associate Editor for the European Journal of Oral Sciences. He was the Editor of the New Zealand Dental Journal from 2007 to 2014, and Associate Editor for Gerodontology from January 2012 to December 2014.

Research Achievements and Collaborations

During the 2013-2014 period, Thomson published 42 papers in the peer-reviewed international literature, along with one book chapter and two technical reports (both for the NZ Ministry of Health), and made (or was a co-author on) 19 conference presentations. The latter included 6 keynote addresses. Notable achievements during that time were: the announcement of Thomson's appointment as Editor-in-Chief of Community Dentistry and Oral Epidemiology; the awarding of 3 research grants as co-investigator; and the supervision to completion of 6 Doctoral and 2 Masters students. He also retired as Editor of the New Zealand Dental Journal in July 2014 in order to take up another position.

Specific areas of research (with a range of NZ and international collaborators) included: ongoing work in the Dunedin Multidisciplinary Health and Development Study; continued health services research work in the development, testing and field use of OHRQoL measures; general dental epidemiology research and commentary; and dental educational research. In Cape Town in June 2014, Thomson received a second IADR Distinguished Scientist Award (the 2014 Geriatric Oral Research Award). This follows the H. Trendley Dean Memorial Award, presented to him in Barcelona in 2010, and makes him only the second New Zealander (after the late Basil Bibby) to have received two IADR Distinguished Scientist Awards.

Recent Publications

Thomson WM, Foster Page LA, Malden PM, Gaynor WN, Nordin N. Comparison of the ECOHIS and short-form P-CPQ and FIS scales. *Health and Quality of Life Outcomes* 12: 36 (2014). (doi: 10.1186/1477-7525-12-36)

Thomson WM, Foster Page LA, Gaynor WN, Malden PE. Short-form versions of the Parental-Caregivers Perceptions Questionnaire (P-CPQ) and the Family Impact Scale (FIS). *Community Dentistry and Oral Epidemiology* 41: 441-450 (2013).

Thomson WM, Shearer DM, Broadbent JM, Foster Page LA, Poulton R. The natural history of periodontal attachment loss during the third and fourth decades of life. *Journal of Clinical Periodontology* 40: 672-680 (2013).

Thomson WM, JM Broadbent, LA Foster Page, R Poulton. Antecedents and associations of root surface caries experience among 38-year-olds. *Caries Research* 47: 128-134 (2013).



GEOFFREY TOMPKINS

BSc PhD PGDipSc (Otago)

Senior Lecturer, Department of Oral Sciences
Programme Director, Molecular Microbiology

Research Interests

Dr Tompkins' principal research pursuit is in determining how the bacteria involved in periodontal disease acquire iron (and essential nutrient for all living cells). Recent developments in this area include the submission of a PhD thesis by Bikiran Pardesi, supervised by Dr Tompkins, titled *Creation and characterization of Porphyromonas gingivalis mutant strains and identification of specific heme-binding sites*. In addition, he collaborates with a number of other faculty members whose research involves microbiology – particularly the formation and removal of biofilms.

Research Achievements and Collaborations

Dr Tompkins collaborates with Dr. Andrew Tawse-Smith who is pursuing a PhD involving the destruction of microbial biofilms that form on titanium implants causing subgingival inflammation and deterioration of the implant. This work investigates the growth of *in vitro* biofilms and methods of assessing their viability following treatment with antimicrobials. Dr Tompkins also supports the research of Dr Don Schwass who is developing new antimicrobial delivery systems with which to treat dental caries. Drs Schwass and Tompkins co-supervised a summer student, Belinda Hsu who was placed first in the Australian Dental Association's award for undergraduate research (2013). In joint supervision with Dr Jo-Ann Stanton (Department of Anatomy), Juhi Muthuplackal submitted her MSc thesis titled *Amplification of bacterial DNA from ancient calculus*. In joint supervision with Assoc Prof Neil Waddell, Shuo Li was awarded MDentTech with Distinction for her thesis titled *The effect of surface roughness on biofilm formation on dental restorative materials*. Darnell Kennedy graduated with her PhD after submitting a thesis titled *Forensic analysis of bite marks by high-throughput sequencing of bacterial DNA*, co-supervised by Dr Tompkins, Dr Jo-Ann Stanton and the late Professor Jules Kieser.

Recent Publications

Colony polymerase chain reaction of heme-accumulating bacteria. Pardesi B. and Tompkins. G.R. Anaerobe 32C 49-50 (2014).

Wong S, Mundy L, Chandler N, Upritchard J, Purton D, Tompkins G. Antibacterial properties of root canal lubricants. Aust. Endodont. J. 40(3) 111-115 (2014)

Tawse-Smith, A., A. Khosa, M.S. Kamel, W.J. Duncan, M. Swain, G. Tompkins. Bacterial colonization of titanium discs: a pilot study for evaluating implant surface deterioration. Braz. J. Periodontol. 24 (1) 14 – 23 (2014).



DARRYL TONG

ED BDS MBChB PhD (Otago) MSD CertOMS (Wash) FFDRCSI FDSRCS FACS
Associate Professor in Oral and Maxillofacial Surgery, Department of Oral
Diagnostics and Surgical Sciences

Research Interests

Darryl's research interests include maxillofacial trauma, military history and military surgery with an emphasis on ballistic injuries. Darryl's current emphasis is on quantifying subconcussive impact forces utilizing a forensic head model and concussion in sports medicine.

Research Achievements and Collaborations

Darryl completed his PhD on war surgery of the face and jaws which combined a historical review, clinical case studies and systematic reviews based on literature and field experience in Afghanistan.

Darryl is involved with research with Veterans' health, military surgery, forensic biology and subconcussive head injuries. He is the co-director of the South-island Interdisciplinary Brain Injury Research Group (SIBIRG) which has brought together an interdisciplinary team of researchers and clinicians to look at various aspects of brain injury ranging from lab based subconcussive testing to sports medicine and concussion.

Recent Publications

Tong D.C., Al-Hassiny H.H., Ain A.B., Broadbent J.M. Post-operative complications following dental extractions at the School of Dentistry, University of Otago. *New Zealand Dental Journal* 110: 51-57 (2014).

McBride D.I., Cox B., Broughton J., Tong D.C. The mortality and cancer experience of New Zealand Vietnam war veterans. *bmjopen-2013-003379* (2013).

Adsett L., Thomson W.M., Kieser J.A., Tong D.C. Changes in the occurrence of serious facial fractures associated with lowering the legal alcohol purchasing age in New Zealand. *New Zealand Dental Journal* 109: 142 - 147 (2013).

Choi H.J., De Silva R.K., Tong D.C., De Silva H. L. The thickness of parietal bones in a New Zealand sample of cadaveric skulls in relation to calvarial bone grafting. *Journal of Craniomaxillofacial Trauma and Reconstruction* 6:115-120 (2013) (DOI: 10.1055/s-0033-1343788).



JOHN NEIL WADDELL

HDE(UN), PGDipCDTech(Otago), MDipTech(DentTech)(TN), PhD(Otago)
Associate Professor (from 2015) and Head of Discipline (Biomaterials), Department of Oral Rehabilitation
Programme Director, Biomechanics and Oral Implantology

Research Interests

Assoc Prof. Waddell conducts experimental and observational research in; Dental materials, toughening of advanced ceramics; Cranio-facial biomechanics, prosthodontic failure mechanisms and adhesion of dental restorations and materials; Sub-concussive brain injury research, in vitro modelling of the effects of blunt force trauma to the head and accumulative damage to the brain; Forensic biology, in vitro modelling of blunt force trauma, forensic odontology, wounding and ballistic blood splatter analysis and development of simulant materials for forensic modelling.

Research Achievements and Collaborations

Assoc Prof Waddell carries out his research as part of several multi-disciplinary research groups both within the Faculty of Dentistry, nationally and internationally. These are:- Cook R, Li KC, Swain MV, Prior D and Waddell JN, Collaborative group between School of Dentistry and national Centre for Advanced Tribology at Southampton (nCATS), Faculty of Engineering and the Environment, University of Southampton, investigating PFM failure in CoCr dental alloys; Carr DJ, Horsfall I, Swain MV, Kieser JA and Waddell JN, Collaborative group between School of Dentistry and Impact and Armour Group, Cranfield University / Defence Academy of the United Kingdom, Shrivenham, UK, investigating all aspects of ballistic wounding; Tong DC, Bennett A and Waddell JN, Collaborative group between School of Dentistry and University of Kansai, Osaka, Japan investigating sub-concussive head injury and quantification of impact forces; Johnson R, Franz L, Tong D and Waddell JN, South Island Brain Injury Research Group (SIBIRG). A multidisciplinary collaborative research group that brings together individuals and teams with an interest in brain injury research, management and prevention; Ma S, Swain MV, Duncan WJ, Kieser J and Waddell JN, Maxillary and Mandibular Implant Supported Overdenture Residual Ridge Resorption – Faculty of Dentistry Clinical Overdenture Research Project. Oral Implantology Area of Research Strength; Kieser J, Taylor M, Nicholson HD, Swain MV, Walsh K and Waddell JN (CI), Collaborative group between the School of Dentistry, the Forensic Science Department of Environmental Science and Research and the Department of Anatomy and Structural Biology investigating Sharp and Blunt Force Trauma, Skin/Skull/Brain Wound Ballistics and Blood Spatter.

Recent Publications

Kieser DC, Kanade S, Waddell JN, Kieser JA, Theis JC and Swain MV, 2014, The deer femur – a morphological and biomechanical animal model of the human femur. *Biomed Mater Eng*, 24(4):1693-703. doi: 10.3233/BME-140981.

Tiu J, Waddell JN, Al-Amleh B, Jansen van Vuuren WA and Swain MV. Coordinate geometry method for capturing and evaluating crown preparation geometry, 2014, *J Prosthet Dent*. Mar 24. pii: S0022-3913(14)00043-2. doi: 10.1016/j.prosdent.2013.11.012.

Ting S, Li KC, Waddell JN, Prior DJ, Jansen van Vuuren L and Swain MV, 2014, Influence of a tungsten metal conditioner on the adhesion and residual stress of porcelain bonded to cobalt-chromium alloy, *J Prosthet Dent*. Sep;112(3):584-90. doi: 10.1016/j.prosdent.2013.12.009.

Li, K. C., J. N. Waddell, D. J. Prior, S. Ting, L. Girvan, L. J. van Vuuren and M. V. Swain, 2013, "Effect of autoclave induced low-temperature degradation on the adhesion energy between yttria-stabilized zirconia veneered with porcelain." *Dent Mater* 29(11): e263-270.

MATTHEW WOODS

BSc (Well) PhD (Otago)

Research Fellow, Department of Oral Sciences

Research Interests

Matthew has been working in the field of Yeast genetics for since 2008 specializing in molecular microbiology and antifungal drug resistance. Matthew also has research interests in the ribosomal DNA repeats encoding the major ribosomal subunits, their genomic organization and evolution.

Research Achievements and Collaborations

Matthew is currently working on a drug discovery project with Brian Monk in the Molecular Biosciences Laboratory, whereby drug target proteins (Cyp51p) from human and plant fungal pathogens are cloned and expressed in a hypersensitive *Saccharomyces cerevisiae* (bakers yeast) laboratory strain. We are currently characterizing the effects of currently available antifungal drugs and screening new compounds for antifungal activity specific to the target protein.

This is a commercial research contract in collaboration with Joel Tyndall (School of Pharmacy) and the Stroud laboratory University College of San Francisco.

Recent Publications

Niimi K, Woods MA, Maki K, Nakayama H, Hatakenaka K, Chibana H, Ikeda F, Ueno K, Niimi M, Cannon RD, Monk BC (2013). Reconstitution of high-level micafungin resistance detected in a clinical isolate of *Candida glabrata* identifies functional homozygosity in glucan synthase gene expression. *J Antimicrob Chemother*; 67: 1666–1676

Postgraduate research students

A selection of research projects carried out by PhD and DClintDent students, 2013-14. Full listings of postgraduate student enrolments, projects and supervisors is provided in the 'Our Achievements' section of this Report.

OLIVE ALLSOBROOK

DClintDent candidate (Oral Pathology)

Supervisors: Professor Alison Rich, Mrs Lara Friedlander, Professor Gregory Seymour, Dr Praveen Parachuru, Dr Trudy Milne

Angiogenic factors in oral squamous cell carcinoma

Aim: To investigate the expression of vascular angiogenic markers in hyperplastic vascular oral lesions and oral squamous cell carcinoma (OSCC).

Methods: Archival formalin-fixed paraffin-embedded tissue from 10 gingival pyogenic granulomas (PGs), 10 cases of OSCC and 5 normal oral mucosal specimens were analyzed using immunohistochemistry for the angiogenic markers, vascular endothelial growth factor (VEGF), vasohibin-1 (VASH-1), VEGF receptor 2 (KDR), and CD34. Mean vessel density (MVD) was assessed using CD146. For the other antibodies, positive cells were counted and were analyzed using one-way ANOVA with a 5% level of significance.

Results: Positive staining for the angiogenic markers was seen in all groups. The MVD was significantly greater in PGs than in normal oral mucosa and in OSCC. Significantly more endothelial cells stained positively with VASH-1 in PGs. A qualitative analysis of the tissues showed a greater epithelial intensity of staining for VEGF in OSCC.

Conclusion: OSCC shows greater epithelial VEGF expression but less stromal VASH-1 expression compared with the control tissues suggesting angiogenesis self-regulating mechanisms may be altered in OSCC. Further research into this field will show the significance for treatment of OSCC with potential for regulation with angiogenesis inhibitors, and the prognostic significance of VASH-1 expression in tumours.

JOSEPH ANTOUN

PhD candidate

Supervisors: Prof Tony Merriman (Biochemistry), Prof W. Murray Thomson, Prof Mauro Farella

Clinical and psychosocial aspects of the long face morphology

The long face pattern is a relatively common clinical presentation, which is typically characterised by a large facial height. Although the orthodontic treatment of individuals with long faces can sometimes be challenging, little is actually known about the cause

of this facial pattern, or its clinical and psychosocial features.

The objectives of this study were to determine the radiographic features, oral behaviour patterns, oral health-related quality of life, and functional limitations of participants with different facial patterns. The study's sample consisted of eighty matched pairs of long and normal face participants. In general, the findings suggested that several subtypes of the long face pattern exist. In addition, long and normal face individuals have very similar oral behaviour patterns.

This suggested that environmental factors may play a limited role in vertical facial development. Finally, long face individuals have a small but significantly poorer oral health-related quality of life than their normal face counterparts. Further research is currently underway to characterise the subtypes of the long face pattern, and to investigate its genetic basis

MO'MEN ATIEH

DClintDent candidate (Periodontology)

Supervisor: Associate Professor Warwick Duncan

Immediate single implant restorations in mandibular molar extraction sockets: A four-year controlled clinical trial

Aim: The aim of this study was to report four-year quantitative and qualitative outcomes of a novel implant design when used for immediate restoration of single missing mandibular molar teeth.

Methods: In a controlled clinical trial, an 8 or 9 mm diameter implant was placed into either a fresh molar extraction socket or a healed site. All implants were immediately restored with provisional crowns within 48 hours. After eight weeks, the provisional crowns were replaced with full ceramic crowns. In-depth, audio-recorded, semi-structured interviews with 15 participants were also conducted, transcribed verbatim and analysed using inductive and content analysis.

Results: The overall implant success after one year of service was 75.0%, with no significant difference observed between the two groups ($P = 0.35$). None of the implants failed during the remaining observation period. The difference between the two placement groups remained insignificant at four years ($P = 0.16$). The qualitative study showed that the major decisive factor in selecting implant treatment option was the cost of treatment rather than the potential advantages that an implant-supported prosthesis could offer.

Conclusions: The rehabilitation of single missing mandibular molars by immediately-placed and restored wide-diameter implants was associated with a relatively high failure rate in the first eight weeks even though the successful implants showed favourable bone changes and improvements in implant stability values after four years of function.

VICTORIA BECK

DCLinDent (Orthodontics) candidate

Supervisors: Prof Mauro Farella, Prof W. Murray Thomson, Prof Jules Kieser, A/Prof Nick Chandler

Factors associated with orthodontic pain

Up to 95 percent of orthodontic patients report pain during orthodontic treatment. Pain is highly subjective, with some orthodontic patients feeling high levels of pain and others just mild discomfort. The reasons for this variability are largely unknown.

In order to investigate factors that may be associated with orthodontic pain experience, 107 participants were screened for pain response over 48 hours following placement of orthodontic elastomeric separators. The highest and lowest pain responders were identified and data collected on anxiety, mood, dental anxiety and fear, catastrophising, general sensitivity (cold) and tooth sensitivity.

Statistically significant differences between high and low pain responders were identified with the Pain Catastrophising Scale (PCS), Dental Anxiety Scale and Cold Pressor Tests. Multivariate analysis showed that 39.3 percent of pain response type (high or low) is explained by the magnification subcategory of the PCS.

Pain catastrophising, dental anxiety and cold sensitivity appear to modify orthodontic pain experience. A few simple screening questions may help to identify patients at risk prior to commencing orthodontic treatment, so that patient-specific management strategies can minimise orthodontic discomfort.

Conclusion: Pain catastrophising, dental anxiety, and cold sensitivity appear to modify orthodontic pain experience. A few simple screening questions may help to identify patients at risk prior to commencing orthodontic treatment, so that patient-specific management strategies can minimise the occurrence of orthodontic discomfort.

JON CAMPBELL

DCLinDent (Paediatric Dentistry) candidate

Supervisors: Prof Bernadette Drummond, Prof Mauro Farella

Pilot Study Monitoring Oral pH in Mouths Showing Signs of Dental Erosion

Aim: To develop a wireless pH telemetry device that can measure pH over the course of 24 hours, and to incorporate this device into an orthodontic appliance that can be worn in the mouths of children showing signs of dental erosion. Wireless pH telemetry would allow proper diagnosis of the source of acid causing dental erosion. This would enable preventive steps to be taken to stop the loss of tooth structure.

Methods: A wireless pH device was developed using a commercially available pH sensor and a battery powered electronic circuit to record the pH data. Preliminary testing was done to determine the ability of the device to record pH data and to confirm design of an intraoral appliance.

Results: Laboratory testing confirmed the ability of the wireless pH device to accurately measure pH in conditions similar to the mouth, and the feasibility of the oral appliance design.

Conclusion: It is possible to incorporate a wireless pH recording device into an appliance that may be worn in the mouth. Further studies will test the ability of the device to measure pH in the mouths of children showing signs of erosion.

JOANNE CHOI

Bachelor of Dental Technology with Honours/PhD candidate

Supervisors: Dr J. Neil Waddell, Prof Michael Swain

Pressed ceramics onto zirconia: Intrinsic properties and influence of cooling rate on residual stresses

Aim: The aim of this study was to evaluate the intrinsic properties and surface residual stresses present in various pressable ceramics to zirconia resulting from cooling induced temperature gradients.

Methods: The study compared the X-ray diffraction response and the mechanical properties of four different pressed ceramics (Noritake CZR Press, Vita PM9, Wieland PressXzr and IPS e.max ZirPress) to Vita In-Ceram YZ zirconia substrate. The adhesion was determined using the interfacial strain energy release rate fracture mechanics approach and biaxial flexural strength values of each material was determined. Indentation fracture toughness test was

used to evaluate the residual stress present in the ceramic system when subjected to different cooling regimen. The cooling responses were also evaluated by thermocouples embedded in the surface of the porcelains and at the porcelain–zirconia interface.

Results: X-ray diffraction analysis revealed that pressed ceramics compatible with zirconia tested were of two types; leucite containing and non-leucite containing essentially glass ceramics. The pressed ceramics with leucite have better adhesion and flexural strength than non-leucite ceramics to zirconia. The results from indentation test and the thermocouples confirmed the presence of surface residual compressive stress subjected to different cooling procedures. Slow cooling significantly reduced the formation of residual stress for all pressed ceramics compared to fast cooling.

Conclusion: Practitioners have choices of two types of ceramic materials when using pressing technique: Leucite containing and non-leucite glass ceramics. To reduce the development of residual stress within the ceramic system, practitioners are advised to slow cool the restoration on the last heat treatment cycle (e.g. glazing cycle).

SARAH DRAKE

DClinDent candidate (Oral Medicine)

Supervisors: Professor Alison Rich, Professor Jules Kieser, Associate Professor Warwick Duncan, Dr Trudy Milne

Just below the surface

Aim: To investigate how salt-water environments affect the retrieval of DNA from human teeth.

Methods: Forty caries- and periodontal infection-free extracted human third molars were collected. Twenty teeth were placed in the harbour as individual teeth with no protection from the environment (Group I) and a further 20 were surgically embedded into pig mandibles (Group II). In addition, to assess the difference between embedded teeth with and without attached periodontal ligament ten pig jaws with original teeth were used (Group III). Intertidal and fully submerged sea-water environments were compared. The teeth were recovered over 0-26 weeks. They were cleaned then pulverized using a SPEX 6770 freezer mill. gDNA was extracted *via* a silica-based extraction technique and the GAPDH gene amplified using a Taqman qPCR assay.

Results: Adequate amounts of high quality DNA were retrieved from time 0 teeth in Groups I and II respectively. Fragmentation of the DNA occurred to such an extent that within one week of exposure to

marine conditions only negligible amounts of DNA remained to provide a template for qPCR amplification. After two weeks in seawater the DNA had degraded to a level where it was no longer possible to detect the GAPDH gene with qPCR amplification. Results relating to tidal variation for all three groups are being analysed.

RATU OSEA GAVIDI

DClinDent (Oral Pathology) candidate

Supervisors: A/Prof Brian Cox (Preventive and Social Medicine); A/Prof Temalesi King (School of Dentistry and Oral Health, Fiji National University); Prof Alison Rich

Comparison on prevalence of oral squamous cell carcinoma in New Zealand and Fiji Islands (2000-2010)

Oral cancer is a seriously debilitating disease usually affecting individuals who smoke or chew tobacco, drink alcohol to excess and/or chew betel-nut quid. This research compared demographic characteristics and risk factors of oral cancer in New Zealand and the Fiji Islands between 2000-2010. It was the first detailed analysis of oral squamous cell carcinoma in Fiji.

Similar numbers of males and females developed oral cancer in Fiji and their mean age was 57 years. In New Zealand, more men suffered from this disease (mean age of 63 years). Tongue cancer was the most common site of involvement in both countries. The annual age standardised incidence rate for New Zealand and Fiji was 4.2 and 1.3 per 100,000 persons respectively. It is recommended that further research on risk factors be undertaken independently in Fiji and New Zealand as disparities were noted in the prevalence of risk factors and population estimates of exposure to potential carcinogens, suggesting bias if data were combined for both countries

SOPHIE GRAY

DClinDent candidate (Orthodontics)

Supervisors: Professor Mauro Farella, Professor Jules Kieser

Validity of the Cervical Vertebral Maturation method for predicting mandibular growth peak

Cervical Vertebral Maturation (CVM) is a commonly used method of determining accelerated growth periods in dentofacial orthopaedics. CVM has been criticised due to its subjective nature. Aims: (1) to analyse the morphometric changes in the outline of the second to fourth cervical vertebrae (C2-C4) with growth; and (2) to test the validity of the assumptions underlying the CVM method.

Methods: Lateral cephalograms of 25 participants from ages 10 to 16-years were acquired from the Toronto-Burlington Growth Study. Mandibular and cervical vertebral landmarks were digitized. Point distribution models were used to describe the morphometric templates of the vertebrae in relation to chronological age and timing of peak mandibular growth. Mixed model analysis was used to determine the relationship between mandibular length, sex, CVM stage and chronological age.

Results: Morphometric changes of C2-C4 during growth were consistent with the CVM descriptions. However, mandibular length changes were not significantly associated with CVM stages after adjusting for chronological age. Morphometric templates of vertebral shapes were similar before and during mandibular growth peak, with changes only detectable after the growth peak had passed. With chronological age, morphometric vertebral shape changes varied between sexes. Peak mandibular growth occurred at a mean age of 11.7 years in females (95% C.I =11.1-12.3 years) and 12.8 years in males (95% C.I =12.1-13.5 years).

Conclusions: Morphometric changes of the second to fourth cervical vertebrae are poorly related to mandibular growth rate. Chronological age represents a better predictor of mandibular growth peak than CVM stage.

GUANGZHAO (SIMON) GUAN

DClinDent candidate (Oral Medicine)

Supervisors: Mr Norman Firth and Professor Robert Love

Expression of cyclin D1 and its correlation with p27^{KIP1} in normal oral mucosa, oral dysplasia and oral squamous cell carcinoma

Aim: To determine cyclin D1 and P27^{KIP1} intensity of expression, location and pattern in oral epithelial dysplasia and oral squamous cell carcinoma by standard immunohistochemistry.

Methods: Specimens consisting of normal oral mucosa (n=10), oral epithelial dysplasia (n=12) and oral SCC (n=11) were prepared and stained using immunohistochemistry methods. Scanning software was used to determine cyclin D1 and p27^{KIP1} intensity of expression, location and pattern.

The information was entered into an Excel spreadsheet and statistical analysis was conducted with the statistical software package SPSS version 22 (IBM Company, NY, USA).

Results: In contrast to the pattern of protein expression in the normal epithelial controls where cyclin D1 positive cells were restricted to the basal and parabasal layers, in the cases of oral epithelial dysplasia positive cells extended into the prickle cell layer and in the cases of oral SCC positive cells were seen throughout the entire thickness of the epithelium. However, normal epithelial controls showed more p27^{KIP1} positive cells than oral epithelial dysplasia in the maturation compartment. There were no p27^{KIP1} positive cells in oral SCC.

Conclusion: These results suggest that the characteristic expression of both cyclin D1 and p27^{KIP1} correlate with the grade of oral epithelial dysplasia and degree of oral squamous cell carcinoma differentiation.

HAIZAL BIN MOHD HUSSAINI

PhD candidate

Supervisors: Professor Alison Rich, Professor Gregory Seymour, Mr Norman Firth

Immune responses in primary oral squamous cell carcinoma and lymph node metastasis

Using analysis of gene expression in oral cancer cells and in related immune cells the mechanisms by which cancer cells can escape from immune control in both primary oral cancer as well as in neck lymph nodes with metastatic cancer deposits has been investigated.

It was shown that oral cancer cells used different mechanisms to escape the immune system, depending on the extent of the disease. The immune system did not fail totally; surviving immune cells could be stimulated to fight back against the cancer cells. This understanding was essential for devising ways to overcome oral cancers using therapeutic interventions to assist the immune system.

HADEEL IBRAHIM

DClinDent candidate (Prosthodontics)

Supervisors: Professor W. Murray Thomson, Professor Karl Lyons, Dr Lyndie Foster Page, Ms Suzanne Hanlin

Personality and self-reported oral health

Aim: Recent work in health psychology clearly associates personality characteristics with health, most notably with the negative emotionality dimension of personality. The degree to which this personality trait mediates self-reported oral health has yet to be determined. This study investigated personality as a modifying factor in subjective oral health.

Methods: A cross-sectional study of a representative New Zealand adult population sample was undertaken. The questionnaire was mailed to 523 randomly-selected participants. Data were collected on: socio-demographic characteristics; oral and general health care; oral-health-related quality of life (OHRQoL); xerostomia; dental anxiety; and the personality characteristics of positive and negative affect (PA, NA). A total of 253 questionnaires were completed and returned, yielding a 51.8% response rate.

Results: Our study found that the prevalence of xerostomia was 7.8%. More than half of those with xerostomia reported one or more OHIP-14 impacts "often" or "very often". The prevalence rates for dental anxiety were 18.6% using DAS and 13.0% using IDAF-4C. After controlling for confounding factors, those scoring higher on Negative Emotionality were more likely to report 1+ OHIP-14 impacts. They also had a greater risk of reporting xerostomia and dental anxiety.

Conclusion: Responses to self-report measures can be influenced by particular personality traits. Therefore, it is important to consider this when using and interpreting such measures.

RAMYA JAWADI

DClinDent candidate (Oral Pathology)

Supervisors: Dr Praveen Parachuru, Dr Trudy Milne, Professor Gregory Seymour, Professor Alison Rich

Novel cytokines in the pathogenesis of oral lichen planus

Aim: Oral lichen planus (OLP) is a complex immunological disease of oral mucosa, mediated in part by the release of cytokines by activated T-cells. Recently novel cytokines like IL33, IL35 and IL17 were identified in other chronic diseases. Their role in OLP is yet to be investigated

Methods: Immunohistochemical staining was performed on 12 OLP and 7 non-specific inflammatory (NSI) formalin-fixed paraffin-embedded archival specimens using antibodies against IL33, IL35, IL17 and FoxP3. Quantitative and qualitative analysis was performed. Immunofluorescence double-labelling was performed to determine the presence of IL-33 and IL-35 in CD3+ T-cells.

Results: Both OLP and NSI tissues showed positive staining with FoxP3 and IL17 in the superficial connective tissue inflammatory infiltrate. Significantly more FoxP3+ cells were present in the OLP tissues, while IL17+ cells were significantly increased in the control tissues. IL33 and IL35 showed positive staining in both test and control groups although there were no significant differences between the groups. Neither

IL-33 nor IL-35 were localised within CD3+ T-cells in OLP or NSI tissues.

Conclusion: The present study demonstrated more FoxP3+ T regulatory cells (Tregs) than IL-17+ cells in OLP, suggesting that they may play an important role in the pathogenesis of OLP. Interestingly, IL-33 and IL-35 were not expressed on T-cells and further studies should be done to assess their functional role in OLP.

DARNELL KENNEDY

PhD candidate

Supervisors: Dr Jo-Ann Stanton, Professor Jules Kieser, Dr Geoffrey Tompkins

Microbial analysis of bite marks by sequence comparison of streptococcal DNA

Bite marks often feature in sexually motivated crimes and child abuse. The viscoelasticity of skin prevents accurate registration of the biter's dentition, and DNA from bite marks can be degraded by salivary enzymes. The concept of matching DNA patterns of oral bacteria (streptococci) derived from bite marks to those of the teeth responsible has previously been proposed. Individuals harbour distinctive populations of oral streptococci making feasible the identification of a biter by the streptococci deposited in a bite mark.

This study applied high throughput sequencing to obtain streptococcal DNA sequences from bite marks and teeth and compared these sequences to establish the probability of matching a bite mark to the teeth of the biter.

The results from this study strongly supported the tenet that bacterial DNA amplified from bite marks and teeth can provide corroborating information in the identification of assailants in situations where the perpetrator's DNA cannot be recovered.

SHAHRZAD KHAYAMI

DClinDent candidate (Orthodontics)

Supervisors: Professor Mauro Farella, Professor Jules Kieser, Dr Hannah Jack

Effect of occlusal vertical dimension on swallowing pattern

Aim: To determine the effect of an acute change in occlusal vertical dimension (OVD) on tongue and lip pressure during swallowing.

Methods: Five male and five female volunteers (27-32 years) participated in this research. Intra-oral transducers were used to assess tongue and lip pressure, whereas surface electromyographic (EMG) electrodes were used to assess perioral muscle

activity. The OVD was progressively increased using vacuum-formed trays of differing heights. Standardised swallowing tasks were performed repetitively with each tray in place. Individual swallowing waveforms were qualitatively and quantitatively analysed. Mean peak pressure, time to peak pressure, swallow duration and lip EMG peak activity were assessed for each swallow. Data were analysed using mixed-model analysis.

Results: Swallowing waveforms varied markedly between individuals, but within each individual, their shape was minimally affected by changes in OVD. When OVD was increased, swallow duration increased by 12.7% (160ms; $p = 0.01$). Upper lip peak pressure increased by 63.8% (2.1 kPa; $p \leq 0.001$) and intraoral peak pressure increased by 12.0% (1.3 kPa = 0.001) When OVD was increased, perioral muscle activity during swallows increased by 10.6% ($p \leq 0.01$) up to the OVD where resting lip seal was not attainable.

Conclusion: An acute increase of OVD produces swallowing episodes that are slightly stronger and longer than those recorded at the habitual OVD. The waveforms of the swallows, however, remain remarkably similar. The adaptive response and the waveform similarities associated with OVD variation supports the existence of both peripheral and central mechanisms to control swallowing.

ELLIE KNIGHT

DClinDent (Periodontology) candidate

Supervisors: Prof W. Murray Thomson, Dr Jonathan Leichter, Dr Andrew Tawse-Smith

Quantifying the association between self-reported diabetes/smoking and periodontitis in the NZ population

While diabetes and smoking are commonly accepted risk factors for chronic periodontitis, there are limited data from the New Zealand population. Furthermore, the presence and the strength of these associations have not been defined.

Data from two New Zealand national surveys were analysed to compare estimates of the strength of the association between diabetes/smoking status and periodontitis. Two epidemiological approaches (cohort and matched case-control studies) and six severe periodontitis case definitions were chosen. The prevalence of severe periodontitis ranged from 5 to 14 percent depending on the definition used. Diabetes was not associated with the majority of the periodontitis definitions. Chronic smokers (≥ 3 years) were 2 to 3 times at greater risk of having periodontitis than non-smokers.

This study affirmed that the strength of an alleged risk association is method-dependent. Readers must be aware of the methodological limitations, including case definitions and the analytical approaches used, when evaluating the literature.

NICK KNIGHT

DClinDent candidate (Prosthodontics)

Supervisors: Professor Richard Cannon, Professor Karl Lyons, Dr Vincent Bennani

Colonisation of acrylic denture fitting surfaces by *Candida* species

Aim: To investigate the patterns of oral mucosal and acrylic denture fitting surface colonisation by *Candida* species.

Methods: A convenience sample of edentulous patients attending the Faculty of Dentistry, University of Otago, for fabrication of new complete dentures was selected. Saliva and mucosal swab samples were collected from each participant and incubated on CHROMagar *Candida* plates. CHROMagar *Candida* impressions were captured from the fitting surfaces of boxed maxillary complete dentures. Growth of various coloured colonies indicated the presence of yeast species, the *Candida* species present and the number of colony forming units. Sampling was repeated following delivery and review of new dentures. Select colonies of *C. albicans* were characterised at the molecular level utilising multi-locus sequence typing to measure the genetic relatedness of the strains before and after denture fabrication.

Results: Preliminary results to date suggest that there may be a change in the relative numbers of species and a drop in the number of colony forming units of *Candida* species obtained from the fitting surfaces of new dentures for a period of at least three months. Molecular characterisation data on genetic relatedness and strain variation is still outstanding.

Conclusion: For a period of up to 3 months, fabrication of new complete dentures: reduces *Candida* colonisation of the denture fitting surface and saliva; reduces the colonisation by two or more *Candida* species; favours the relative growth of *Candida tropicalis* over *C. albicans* and *C. krusei*.

JENNIFER LEE

DClinDent (Orthodontics) candidate

Supervisors: Prof Mauro Farella, Prof Jules Kieser, Prof Bernadette Drummond

Development, validation and preliminary testing of a novel indwelling wireless intraoral pH telemeter

This research involved developing a miniature wireless device measuring mouth acidity continuously in the mouth where the data would be sent to a smart phone simultaneously. This was in an attempt to monitor changes in the mouth acidity as acidic drinks or substances were introduced in the mouth. The research also included coming up with an intraoral appliance that would adequately envelope the developed miniature wireless device.

Pilot tests were carried out to see how the wireless device worked in the mouth. Measurements in the mouth were taken during the day, sleep and after swallows of different types of acidic drinks, and were analysed. The recordings showed some interesting trends that would need observation with more participants. This device would have various applications in the future in the areas of erosive tooth wear and gastro-esophageal reflux disorders.

KAI CHUN LI

PhD candidate

Supervisors: Professor David Prior (Geology), Dr J. Neil Waddell, Professor Michael Swain (University of Sydney)

Microstructure and phase stability of cast, CAD/CAM and powder metallurgy manufactured Co-Cr dental alloy

Aim: The objective of the present study was to identify the different microstructures produced by CAD/CAM, powder metallurgy (PM) and cast techniques for Co-Cr alloys and its phase stability after conventional porcelain firings.

Methods: Three porcelain layered rectangular Co-Cr plates (20 × 8.0 × 1 mm) of each processing technique were fabricated. Microstructural evolution was observed after heating the specimens through conventional porcelain firing treatment of 0, 5 and 15 cycles. Specimens were removed of surface damage through sequential polishing to a <0.05 μm finish with colloidal silica in preparation for electron backscatter diffraction (EBSD) and energy dispersive spectrometry (EDS) analysis.

Results: EDS analysis at the metal-porcelain interface indicated subtle differences in compositional change. EBSD data revealed a substantially higher stability of the face-centered cubic (fcc) phase after porcelain firing treatment in the CAD/CAM and PM produced Co-Cr alloy compared to the cast Co-Cr alloy. CAD/CAM and PM Co-Cr alloys was also found to have much finer bulk grain sizes (~19-30 μm) compared to the cast alloy (>200 μm). Orientation relationships of $\{111\}_{fcc} // \{0001\}_{hcp}$ and $\{110\}_{fcc} // \{1120\}_{hcp}$ were identified in the bulk portion of the three alloys but was absent for the fcc/hcp phase at the metal-porcelain interfaces.

Conclusion: CAD/CAM and PM produced Co-Cr alloy exhibit superior fcc phase stability after porcelain firing treatment compared to cast Co-Cr alloy.

YEEN LIM

DClinDent (Prosthodontics) candidate

Supervisors: Prof Richard Cannon, Dr Ann Holmes, Prof Karl Lyons, A/Prof Patrick Dawes (Dunedin School of Medicine)

Analysis of salivary protein SPLUNC2 from head and neck cancer patients

The study investigated the role of salivary protein, Short Palate Lung Nasal Clone 2 (SPLUNC2), in particular whether there is an increased presence of the putative *Candida albicans* receptor SPLUNC2 that may explain the increase in *C. albicans* colonisation in patients who had received radiation therapy for head and neck cancer (HNC).

Patients were recruited from two clinics, Christchurch and Dunedin. Controls matched for age, sex and smoking history were also recruited. Saliva wash samples were collected. Polyacrylamide gel electrophoresis was performed and silver stain was used to visualise the proteins. Western blotting followed by immunodetection was used to detect and quantify salivary proteins SPLUNC2 and IgA.

IgA was detected in all samples but there was no significant difference between the relative amounts detected in patient and control samples. SPLUNC2 was detected in only 6 of 15 patient samples and was never present at higher levels than in control samples. The findings suggested that HNC, or its treatment, may reduce the production of SPLUNC2 in saliva and its presence is probably not linked to susceptibility to *C. albicans* colonisation

ANNE-CHRISTINE LINDSTRÖM

PhD candidate

Supervisors: Associate Professor Jurian Hoogewerff (Chemistry), Dr Zuzana Obertova (University of Auckland), Dr Josie Athens (Preventive and Social Medicine), Associate Professor Warwick Duncan, Dr J. Neil Waddell, Professor Jules Kieser¹

Gunshot residue preservation in seawater

Background: No full explanation has yet been given to the persistence of gunshot residue (GSR) in tissues during decomposition in marine environments. For a better understanding, qualitative and quantitative data on GSR retention was obtained by studying soft tissue and bony gunshot wounds.

Methods: Fleshed and defleshed bovine ribs were shot at contact range with .22 calibre hollow point ammunition using a Stirling .22 calibre long rifle. Triplicates were placed in three habitats: 1) submerged, 2) intertidal and 3) supralittoral zone. Decomposition was examined on day 3, 10, 24 and 38 and analysed with scanning electron microscopy, using energy dispersive X-ray spectrometry (SEM-EDX) and inductive coupled plasma mass spectrometry (ICP-MS).

Results: SEM-EDX recorded GSR-indicative particles surrounding the bullet entrance on all bone types (fleshed and defleshed) in all environments throughout the study. GSR-unique particles were only detected on the supralittoral bones. The most rapid loss of GSR was seen on specimens in the intertidal area followed by submerged and supralittoral specimens.

Conclusion: This study showed preservation of GSR in skeletal tissue up to at least 38 days, and highlights the usefulness of microscopic and analytical methods for examining suspected GSWs in highly decomposed bodies recovered from marine environments.

JINYI (JENNY) LIU

DClinDent (Periodontology) candidate

Supervisors: A/Prof Warwick Duncan, Dr Andrew Tawse-Smith, A/Prof Patrick Schmidlin

Alveolar bone healing using a novel bone substitute material in a sheep tooth extraction model

Bone substitute materials placed into tooth sockets after extraction may preserve alveolar bone. It is desirable that these materials be completely resorbed and replaced by a patient's own bone. Electrospun cottonwool-like nanocomposite (ECWN) is a novel synthetic bone substitute that incorporates tricalcium phosphate nanoparticles into a biodegradable synthetic copolymer poly(lactide-co-glycolide).

The objectives of this study were to establish a tooth extraction model in sheep and to compare bovine-derived xenograft (BX) and ECWN in this model. Eighteen female sheep were used. Bilateral mandibular premolars were extracted and grafted with BX, ECWN or left unfilled.

After 16 weeks of healing, the non-grafted extraction sockets were filled with thick bone trabeculae separated by large areas of fibrous stroma. At BX sites, new bone was formed to encapsulate the graft granules. Osseous healing followed a fine, finger-like trabecular pattern in ECWN grafted sites, suggesting that this material is osteoconductive. There was less residual graft material detected and greater hard tissue bridging formed at the socket entrance in ECWN treated sites than BX sites.

CAROLINA LOCH SANTOS DE SILVA

PhD candidate

Supervisors: Prof R. Ewan Fordyce (Geology), Prof Jules Kieser

Morphology, structure and evolution of teeth in fossil and modern odontocetes (Cetacea)

The research aimed to investigate the morphology, structure and biomechanics of teeth in dolphins, to explore the functional implications and the evolution of the cetacean feeding apparatus. The multidisciplinary approach used involved morphological description, morphometric measurements, scanning electron microscopy, nanoindentation testing, geochemical analyses and Micro-CT.

Results showed that the morphological adaptation to an aquatic lifestyle was reflected in the morphology of teeth and also in the ultrastructure and mechanical properties of dental tissues in dolphins. Chemical analyses of enamel and dentine revealed a conserved tooth chemistry as in many other mammals. While micro-computed tomography was useful as a non-destructive method for morphological analysis of extant teeth, it was less so in fossils due to diagenetic alteration. The multidisciplinary approach of this research allowed a broader characterization of the structure of teeth and feeding apparatus of dolphins, contributing to the understanding of their functional morphology, general biology and evolution.

ARUN NATARAJAN

DClinDent (Paediatric Dentistry) candidate

Supervisors: Prof Bernadette Drummond, Prof Michael Swain, Dr Chris He, Dr Rami Farah, A/Prof Warwick Duncan

Characterisation of enamel and effect of resin infiltration in molar-incisor hypomineralisation

Molar-incisor hypomineralisation (MIH) has been labelled as an ongoing problematic condition for both the affected children and dentists managing this condition. The objectives of this research were two fold, to investigate the biochemical properties of enamel affected with MIH using Raman spectroscopy and scanning electron microscopy equipped with energy dispersive X-ray spectroscopy (EDS-SEM), and also to investigate the penetrability of a commercially available low viscosity resin infiltrant into MIH enamel using these two spectroscopic techniques. The resin Icon caries infiltrant (DMG, Hamburg, Germany) was used in the study.

The findings from this study add further useful insight into the aetiology of MIH; resin infiltration into MIH enamel has shown that infiltrant resin material is capable of penetrating MIH enamel but the pattern and depth of penetration is variable and less compared to those reported in carious lesions. Raman spectral maps revealed increased concentrations of protein and carbonate in MIH-affected enamel compared to cervical normal enamel. In conclusion, Raman spectroscopy and EDS-SEM are useful tools for probing the chemical composition of MIH and normal enamel and can be used as additional tools to study changes in MIH enamel following treatment with different agents designed to further mineralise or to infiltrate enamel.

KATHRYN NEWSHAM-WEST

DClinDent (Prosthodontics) candidate

Supervisors: Dr Kyoko Niimi, Dr Donald Schwass, Professor Karl Lyons, Professor Richard Cannon

Overcoming the antifungal drug resistance of biofilms on dental acrylic

The fungus *Candida albicans* is commonly isolated from clinical oral-mucosal infections, in particular those related to microbial biofilms that form on acrylic dentures.

RC21v3 is an octapeptide derivative that has been shown to cause a dose-dependent enhancement of fluconazole activity that reduces the clinical symptoms of oral candidiasis in animal models. The research

showed that RC21v3 inhibited the planktonic growth of both fluconazole-susceptible and resistant strains of *C. albicans*, and made fluconazole fungicidal.

A novel dental acrylic biofilm model was developed that resulted in reproducible *C. albicans* biofilms. Using this model, checkerboard susceptibility assays showed that RC21v3 acted synergistically with fluconazole and reduced biofilm growth of *C. albicans*.

This is the first demonstration that RC21v3 can chemosensitize *C. albicans* biofilms to fluconazole, and so may be of use in the treatment of patients with fluconazole-resistant biofilms on denture surfaces.

JOANNA NGO

DClinDent candidate (Special Needs Dentistry)

Supervisors: Dr Anita Nolan, Dr Shelagh Ferguson, Professor W. Murray Thomson

Living with dry mouth – Sjogren’s patients’ perspectives

Aim: The aim of this qualitative study was to provide clinicians with insight into how dry mouth can impact on the daily lives of Sjogren’s Syndrome (SS) patients. SS is an autoimmune exocrinopathy characterised by lymphocytic infiltration of exocrine glands in multiple sites, with dry mouth as a primary presenting symptom. Although quantitative studies have shown the negative impact of both dry mouth and SS on patients’ quality of life, no qualitative diary and interview study has been undertaken to examine the specific impact of dry mouth on SS sufferers.

Methods: The revised international classification criteria (AECG) were used to identify participants from patients seen in the oral medicine clinic. After pilot study work to test the approach, the 10 main study participants were recruited. Diary entries and semi-structured interviews were used to explore how dry mouth affects the lives of SS sufferers. Owing to the exploratory nature of the research, thematic content analysis was applied, allowing the themes to arise naturalistically from the data without bias or elicitation.

Results: The main themes included the: (1) journey to diagnosis; (2) disease impact spectrum of dry mouth amid other symptoms; (3) interactions with healthcare professionals (HCPs); and (4) coping mechanisms utilised to manage dry mouth and SS.

Conclusion: The findings revealed patients’ perspectives on diagnosis, coping with dry mouth and SS, and interaction with HCPs. Dry mouth is not a trivial symptom for SS sufferers; it has considerable impact on their day-to-day lives. HCPs need this understanding in order to be part of the Sjogren’s journey.

REHAM OSMAN

PhD candidate

Supervisors: Professor Michael Swain, Dr Sunyoung Ma, Professor Warwick Duncan

Prosthodontic outcomes of Zirconia implants supporting overdentures

Titanium implants have been used since 1986 to anchor dentures (false teeth) and restore function for patients with complete tooth loss. Recently, there have been concerns expressed by some patients about using titanium in the body as this metal may induce allergic reactions. This research was designed to develop an attractive metal-free approach by using one-piece ceramic implants with components that anchor the dentures with plastic attachments. The outcomes of one-piece ceramic implants were evaluated and compared with those of one-piece titanium implants with metallic surfaces which have operated successfully for up to 10 years.

Implant treatment greatly improves the oral function and psychosocial aspects of patients with complete tooth loss. There is merit in the treatment concept with the proposed ceramic implants, however, further large scale clinical trials are still required before recommendations can be made for routine clinical use.

NOOR (YAYA) OTHMAN

DClinDent candidate (Orthodontics)

Supervisors: Professor Robert Love, Dr Brian Monk

Antimicrobial peptide BM2 shows dose-dependent inhibition on monospecies biofilms

Aim: To compare the effects of BM2 and endodontic disinfectants on monospecies biofilms of common endodontic pathogens grown on dentine.

Methods: Bacterial strains *Enterococcus faecalis* JH2-2, *Streptococcus gordonii* DL1, *Streptococcus mutans* NG8 and yeast strain *Candida albicans* ATCC10261 precultured for 24 h in Todd Hewitt Broth (THB) or Tryptone Soy Broth (TSB), respectively, were used to grow biofilms on sterile dentine surfaces for 72 h. The biofilm mass treated with BM2 (D-NH₂-RRRFWWFRRR-CONH₂, 10 µg/ml, 20 µg/ml and 40 µg/ml), NaOCl (0.25%, 0.5% and 1%) or saturated Ca(OH)₂ was stained using a LIVE/DEAD assay™ kits and visualized using confocal laser scanning microscopy.

Results: After 72h BM2 at 20 µg/ml for *C. albicans* and 40 µg/ml for *S. mutans* and *S. gordonii* reduced biofilm mass by ≥75%. The effectiveness of BM2 (40 µg/ml) on *S. gordonii* and *S. mutans* was similar with NaOCl

(1%, 10,000 µg/ml) and saturated Ca(OH)₂ (P < 0.05). *E. faecalis* was the least susceptible to BM2. At 72h BM2 (40 µg/ml) was effective as NaOCl (0.25%, 2,500 µg/ml) or saturated Ca(OH)₂ in causing biomass reduction. Of the cells remaining <50% were viable for *C. albicans*, *S. gordonii* and *S. mutans* and ≥65% for *E. faecalis*.

Conclusion: BM2 may have potential as an endodontic antimicrobial due to its efficacy in treating monospecies biofilms compared to existing endodontic disinfectants.

ANDREW PARTON

DClinDent candidate (Orthodontics)

Supervisors: Professor Mauro Farella, Associate Professor Warwick Duncan, Professor Jules Kieser

CBCT implant-based superimposition of the growing rabbit mandible

Aim: The aim of this project was to develop an animal model that could be used for the reliable assessment of the 3D morphological changes of the mandible during growth, by using implants as fiducial markers.

Methods: Titanium implants were placed in the body of the mandible of six growing New Zealand white rabbits. CBCT scans were taken 1-week following implant placement (T1) and after an additional 8-weeks of growth (T2). CBCT images of the mandibles and implants were segmented, implant centroids were identified, and implant stability during growth was determined. The segmented mandibles from the T1 and T2 CBCT scans were registered on the stable implant centroids using custom-made software. Semi-transparencies of 3D overlays of the registered mandibles were produced to enable visualisation of the morphological growth changes.

Results: All rabbits recovered well from implant placement surgery. The buccal cortical bone of the body of the mandible seemed stable during growth and was suitable for the placement of implants as fiducial markers. At least 3 stable implants were required for rigid registration. Qualitative descriptions of mandibular morphological growth changes were achieved from semi-transparencies of 3D overlays.

Conclusion: This animal model seems to be reliable for the assessment of the 3D morphological changes occurring during mandibular growth.

VENKATA PRAVEEN PARACHURU

PhD candidate

Professor Gregory Seymour, Dr Dawn Coates, Dr Trudy Milne, Professor Alison Rich, A/Professor Mary Cullinan, Dr Nick Heng

Characterisation of regulatory T-cells and Th17 cells in chronic inflammatory periodontal disease

Gum diseases result from interactions between dental plaque bacteria and the host response. The normal balance between the host and plaque bacteria is disturbed in gum diseases. Recently, two types of immune cells (Tregs and IL17⁺) have been shown to play a crucial role in the regulatory network that controls this balance, however their role in gum diseases has not been determined.

The aim of this study was to identify both types of immune cells within diseased gum tissues and to determine their role. The results demonstrated more Tregs than IL17⁺ cells. Overall there were very few IL17⁺ cells. Further identification of IL17⁺ cells showed that they were mast cells. IL17 protein and gene expression was not detected in any of the tissues. The results suggested that Tregs have a more prominent role in gum diseases when compared to IL17⁺ mast cells.

ELY RODRIGUES

PhD candidate

Supervisors: Professor Richard Cannon, Dr Jan Schmid, Dr Ann Holmes

Candida albicans: sex and survival in a rat model of colonisation

Unlike in most animal species, sex is not an obligatory mechanism for reproduction in fungi, and for some fungi the complex diversity of sexual and asexual reproductive mechanisms has yet to be unravelled.

Candida albicans, a commensal yeast that causes disease in an immunocompromised host, is one such ancient fungus that was believed to be reproducing only by asexual means. It was not until the discovery of "sex genes" in *Candida albicans* and subsequently, demonstration of mating *in vitro*, that the possibility of a cryptic sexual cycle came into focus.

In this study, a Rat model of oral colonisation demonstrating the commensal nature of *C. albicans* was designed. This model was then used to investigate if mating does occur *in vivo* and to investigate if the resultant offspring are fitter. It was shown that, although mating does occur *in vivo*, it is a rare event and that when mating did occur, the resultant offspring

were not as fit as the parents. This indicates that sex in *C. albicans* does not contribute to fitness of the microorganism.

ALLAUDDIN SIDDIQI

PhD candidate

Supervisors: Professor Warwick Duncan, Professor Jules Kieser, A/Professor Rohana de Silva

Surgical and peri-implant outcomes of zirconia implants supporting overdentures

Titanium implants have been used over the last four decades to replace missing teeth. Recently, concerns have been raised regarding the use of titanium in the body due to emerging reports that titanium and other metals may cause allergic reactions.

The study investigated a novel metal-free implant biomaterial Zirconia. One-piece Zirconia (Zr) and one-piece Titanium (Ti) implants were placed in thirty completely edentulous patients and outcome measures were compared after 12 months of use.

The research was based on five experiments involving human cadavers, sheep (animal model) and a randomised controlled clinical trial. The major implication of the research project was to acknowledge the relationship between implant design, surgical implant site and long-term implant function.

The study showed comparable success rates of Zr and Ti implants. This will have a profound effect on future treatment options for patients who require dental implants.

DARRYL TONG

PhD candidate

Supervisors: Professor Robert Love, Professor Tom Brooking

An evidence based and historical review of war surgery of the face and jaws

War surgery of the face and jaws is a fascinating and complex area of medicine and dentistry. This research provides the modern face and jaw surgeon with the necessary historical background and context from which current surgical principles have been developed. By way of historical review, case studies and evidence-based systematic reviews, the importance and relevance of war surgery of the face and jaws in current military medicine and surgery was highlighted for clinicians and military planners.

Current operations in Afghanistan and Iraq have seen a proportional increase in combat related head, face and neck injuries and emphasises the continued need to train military surgeons with specialist expertise in this field. Having a wider perspective gives the necessary background and deeper context to surgical developments and allows a better appreciation of lessons learnt from past conflicts.

SOBIA ZAFAR

PhD candidate

Supervisors: A/Professor Mary Cullinan, Dr Dawn Coates, Professor Bernadette Drummond, Professor Gregory Seymour

Effects of bisphosphonate on cells extracted from oral tissues

Bisphosphonates are commonly prescribed drugs for patients with bone diseases. In recent years, there have been reports that high doses of bisphosphonates cause death of the bone (necrosis) in the jaw and clinicians have named this condition bisphosphonate related osteonecrosis of the jaw (BRONJ). It is a painful condition that occurs at varying levels of severity but the underlying cause is still unknown.

This research aimed to investigate the effects of increasing doses of bisphosphonate on cells isolated from the jaw. Fibroblasts and osteoblast cell lines were generated and their growth characteristics identified. Genetic technology was used to measure the expression of up to 168 different genes simultaneously. The results demonstrated changes in the behaviour and expression of genes in the cells exposed to bisphosphonate. The results have improved our understanding of the pathogenesis of BRONJ and have provided a basis for the development of targeted therapies.

DIOGO GODOY ZANICOTTI

PhD candidate

Supervisors: A/Professor Warwick Duncan, Dr Dawn Coates, Professor Gregory Seymour

Human adipose-derived stem cells on titanium surfaces

Aim: (1) Examine the capacity of adipose-derived stem-cells (ADSCs) to multi-differentiate. (2) Determine the effects of turned and sandblasted titanium surfaces on the proliferation, mineralised matrix deposition, and gene expression of ADSCs, in serum-free and osteogenic differentiation conditions.

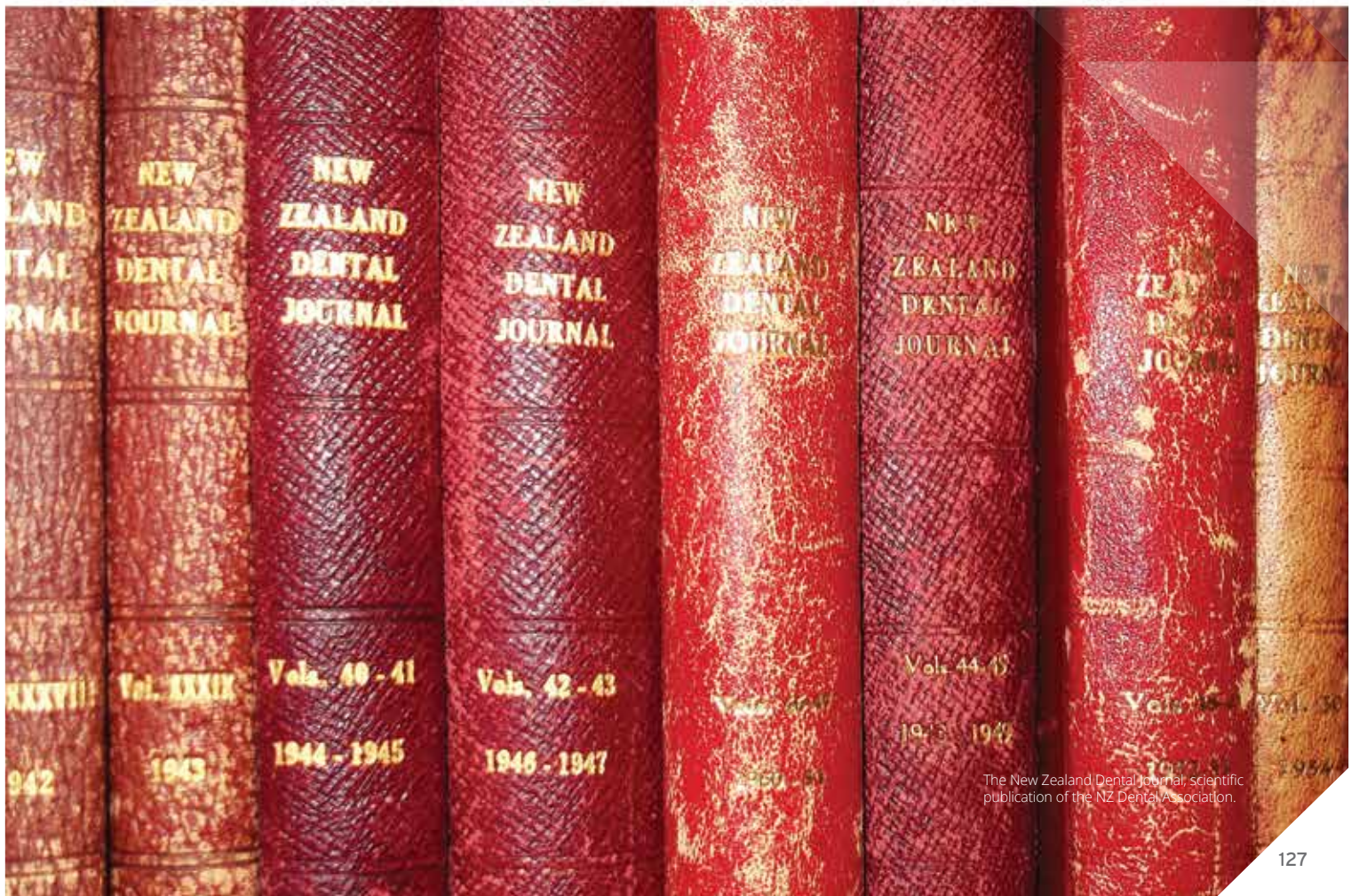
Methods: Confocal microscopy was used to measure the roughness of turned and sandblasted titanium discs (10mm diameter x 1.5mm thickness). Human ADSCs (Invitrogen) were tri-lineage differentiated. Osteogenic differentiation of ADSCs, on the titanium discs, was evaluated by immunofluorescence, anti-Runx-2 at 7 days and an anti-Osteocalcin antibody at 21 days. A proliferation assay on the discs was performed using AlamarBlue and the production of mineralised matrix was quantified by spectrophotometry after 21 days. Gene expression was performed with RT²-qPCR.

Results: ADSCs were successfully differentiated into osteoblasts, chondroblasts, and adipocytes. ADSCs cultured in serum-free and osteogenic media expressed Runx-2 on both types of titanium surfaces. Osteogenically-differentiated cells on both titanium surfaces expressed Osteocalcin. Cells in serum-free media proliferated more than in osteogenic media, regardless of the titanium surface type ($p < 0.01$). Osteogenically-induced ADSCs produced significantly more mineralised matrix at 21 days than cells in serum-free media, regardless of the titanium surface type ($p < 0.0001$). Gene expression assays showed that osteogenic associated genes were differentially regulated in ADSCs in response to the culture surface and conditions.

Conclusion: ADSCs were successfully differentiated into osteoblasts on titanium surfaces. Culture media had more effect on mineralised matrix production than the roughness of the titanium surfaces. Multipotent ADSCs showed potential for bone regeneration and repair adjacent to titanium devices.



Our Achievements



The New Zealand Dental Journal scientific publication of the NZ Dental Association.

Research funding, 2013-14

Competitive external research funding 2013-14

Note: This table does not include funding sourced from non-competitive commercial research contracts.

Name	Department/ Institution	Title of Application	Funding Body/ Round	Awarded	Duration
Allauddin Siddiqi Warwick Duncan	Oral Sciences Oral Sciences	91st General Session of the IADR	Maurice and Phyllis Paykel Trust Grant-in-Aid (Project/ Equipment, Travel & Conference)	\$1,500	Apr 2013 - Dec 2013
Dawn Coates Warwick Duncan Gregory Seymour Diogo Zanicotti	Oral Sciences Oral Sciences Oral Sciences Oral Sciences	Adipose-derived multipotent progenitor cells on titanium surfaces	New Zealand Lottery Grants Board Lottery Health - Research Project & Shared Equipment	\$37,300	Apr 2013 - Mar 2015
Bernadette Drummond Mauro Farella Jules Kieser Jonathan Campbell	Oral Sciences Oral Sciences Oral Sciences Oral Sciences	Oral pH monitoring in children with dental erosion	New Zealand Lottery Grants Board Lottery Health - Research Project & Shared Equipment	\$17,000	Apr 2013 - Mar 2014
Warwick Duncan Ajay Sharma Neil Waddell	Oral Sciences Oral Sciences Oral Rehabilitation	Does anodisation of titanium -zirconium alloy improve anchorage to bone for implanted prosthetic devices?	New Zealand Lottery Grants Board Lottery Health - Research Project & Shared Equipment	\$23,800	Apr 2013 - Mar 2015
Mauro Farella Michael Paulin Jules Kieser	Oral Sciences Zoology Oral Sciences	Wireless monitoring of oral pH and Bruxism	New Zealand Lottery Grants Board Lottery Health - Research Project & Shared Equipment	\$49,500	May 2013 - Apr 2015
Sobia Zafar Dawn Coates	Oral Sciences Oral Diagnostic and Surgical Sciences	2nd International Association of Dental Research (IADR)-Asia Pacific Region	Maurice and Phyllis Paykel Trust Grant-in-Aid	\$1,000	Jul 2013 - Dec 2013
Joseph Antoun Mauro Farella Tony Merriman Murray Thomson	Oral Sciences Oral Sciences Biochemistry (OSMS) Oral Sciences	The genetics of dentofacial dysplasia	Health Research Council of NZ (HRC) Emerging Researcher First Grant	\$149,462	Sep 2013 - Aug 2016
Brian Monk Richard Cannon Joel Tyndall Mikhail Keniya Edmond Fleischer Anette Klinger Robert Stroud	Oral Sciences Oral Sciences Pharmacy Oral Sciences MicroCombiChem MicroCombiChem University of California, San Francisco	Structure-directed antifungal discovery	Health Research Council of NZ (HRC) Project - Full Application	\$1,190,954	Oct 2013 - Sep 2016
Thomas Tomasiak	University of California, San Francisco				

Name	Department/ Institution	Title of Application	Funding Body/ Round	Awarded	Duration
Avadhoot Avadhani	Oral Diagnostics & Surgical Sciences	What is the balance of the immune cells in oral squamous cell carcinoma?	New Zealand Dental Association Research Foundation Research Grant	\$14,934	Oct 2013 - Sep 2014
Alison Rich	Oral Diagnostics & Surgical Sciences				
Gregory Seymour Praveen Parachuru	Oral Sciences Oral Diagnostics & Surgical Sciences				
Richard Cannon Masakazu Niimi	Oral Sciences Oral Diagnostics & Surgical Sciences	Overcoming the azole resistance of Candida albicans	New Zealand Dental Association Research Foundation Research Grant	\$12,300	Sep 2013 - Aug 2015
Alok Mitra	University of Auckland				
Dawn Coates	Oral Diagnostics & Surgical Sciences	BRONJ: The effects of zoledronic acid on the VEGF receptors and implications for osteoblast growth and maturation)	New Zealand Dental Association Research Foundation Research Grant	\$14,073	Sep 2013 - Aug 2014
Katy McLaughlin	Oral Sciences				
Mary Cullinan	Oral Sciences				
Gregory Seymour	Oral Sciences				
Bernadette Drummond Dawn Coates	Oral Sciences Oral Sciences	Primary teeth pulp as a source of progenitor cells for tooth regeneration	New Zealand Dental Association Research Foundation Research Grant	\$14,956	Oct 2013 - Sep 2014
Gregory Seymour	Oral Sciences				
Lara Friedlander	Oral Rehabilitation				
Diogo Zanicotti	Oral Sciences				
Mohammad Alansary	Oral Sciences				
Mauro Farella Jules Kieser	Oral Sciences Oral Diagnostics & Surgical Sciences	Wireless monitoring of intraoral pH and bruxism	New Zealand Dental Association Research Foundation Research Grant	\$15,000	Oct 2013 - Sep 2014
Sylvia Sander Coreen Loke	Chemistry Oral Sciences				
Jules Kieser Eithne MacFadyen	Oral Sciences Oral Diagnostics & Surgical Sciences				
Natalie Medicott Maggie-Lee Huckabee	Pharmacy University of Canterbury	Management of xerostomia following radiotherapy: a double blind, crossover trial of a novel emulsion for use as a saliva substitute	New Zealand Dental Association Research Foundation Research Grant	\$8,300	Oct 2013 - Sep 2014
Olivia Apperley	Oral Diagnostics & Surgical Sciences				
Robert Love Norman Firth	Oral Diagnostics & Surgical Sciences Oral Diagnostics & Surgical Sciences	Expression of Cyclin D1 in normal oral mucosa, oral dysplasia and oral squamous cell carcinoma	New Zealand Dental Association Research Foundation Research Grant	\$4,624	Oct 2013 - Sep 2014
Simon Guan	Oral Diagnostics & Surgical Sciences				
Trudy Milne Mauro Farella	Oral Sciences Oral Sciences				
Li Mei Richard Cannon Mohamad Al-Dujaili	Oral Sciences Oral Sciences Oral Sciences	Growth Factor Expression in the Rat Condyle: Implications for Craniofacial Development	New Zealand Dental Association Research Foundation Research Grant	\$14,042	Oct 2013 - Sep 2014

Name	Department/ Institution	Title of Application	Funding Body/ Round	Awarded	Duration
Benedict Seo	Oral Diagnostics & Surgical Sciences	Endoplasmic Reticulum Stress Proteins in the Development of Oral Squamous Cell Carcinoma	New Zealand Dental Association Research Foundation Research Grant	\$15,000	Oct 2013 - Sep 2014
Dawn Coates Alison Rich	Oral Sciences Oral Diagnostics & Surgical Sciences				
Gregory Seymour	Oral Sciences				
Jonathan Broadbent Lyndie Foster Page Don Schwass Colleen Murray	Oral Sciences Oral Rehabilitation Oral Sciences Oral Sciences	A novel technique for investigation of cavitation of proximal dental decay	University of Otago University of Otago Research Grants 2014	\$33,340	Jan 2014 - Dec 2014
Richard Cannon Masakazu Niimi	Oral Sciences Oral Diagnostics & Surgical Sciences	Discovery of fungal efflux pump inhibitors	University of Otago University of Otago Research Grants 2014	\$47,747	Jan 2014 - Dec 2014
Erwin Lamping	Oral Sciences				
Mauro Farella Michael Paulin Jules Kieser Sylvia Sander	Oral Sciences Zoology Oral Sciences Chemistry	Wireless Monitoring of Oral pH and Bruxism	University of Otago University of Otago Research Grants 2014	\$40,000	Jan 2014 - Dec 2014
Li Mei Richard Cannon Mauro Farella Jules Kieser Lydia Meredith	Oral Sciences Oral Sciences Oral Sciences Oral Sciences Oral Sciences	The influence of enamel surface roughness on bacterial adhesion	University of Otago University of Otago Research Grants 2014	\$10,660	Jan 2014 - Dec 2014
Richard Cannon Erwin Lamping Masakazu Niimi	Oral Sciences Oral Sciences Oral Diagnostics & Surgical Sciences	Fungal drug resistance - not as simple as A-B-C	Royal Society of New Zealand Marsden Fund: Standard - Full Proposal	\$773,913	Mar 2014 - Feb 2017
Alok Mitra Rajendra Prasad	University of Auckland Jawaharlal Nehru University, India				
Murray Thomson Warwick Duncan Dorothy Boyd Lyndie Foster Page Jonathan Broadbent	Oral Sciences Oral Sciences Oral Sciences Oral Rehabilitation Oral Sciences	Transform a tooth with a "transformer tooth". A novel approach for child oral health	Cure Kids Research Proposal - Full application	\$98,510	Feb 2014 - Jan 2017
Lyndie Foster Page Dorothy Boyd Jonathan Broadbent Murray Thomson	Oral Rehabilitation Oral Sciences Oral Sciences Oral Sciences	Transform a tooth with a "transformer tooth": A novel oral health approach for New Zealand children	New Zealand Lottery Grants Board Lottery Health - Translational Research Projects	\$64,675	Apr 2014 - Mar 2016
Joseph Antoun Mauro Farella Murray Thomson Tony Merriman	Oral Sciences Oral Sciences Oral Sciences Biochemistry (OSMS)	Identifying the genes that cause dentofacial growth anomalies	Maurice and Phyllis Paykel Trust Grant-in-Aid (Project/ Equipment, Travel & Conference)	\$3,000	Apr 2014 -Mar 2015

Name	Department/ Institution	Title of Application	Funding Body/ Round	Awarded	Duration
Warwick Duncan Dawn Coates Rohana De Silva	Oral Sciences Oral Sciences Oral Diagnostics & Surgical Sciences	The use of Periosteum-derived Mesenchymal Multipotent progenitor cells for bone regeneration on titanium surfaces	Maurice and Phyllis Paykel Trust Grant-in-Aid (Project/ Equipment, Travel & Conference)	\$10,000	Apr 2014 - Mar 2015
Gregory Seymour Ye Naung	Oral Sciences Sir John Walsh Research Institute				
Diogo Zanicotti	Oral Sciences				
Kai Chun Li Neil Waddell	Oral Rehabilitation Oral Rehabilitation	92nd General Session & Exhibition of the International Association for Dental Research, Capetown	Maurice and Phyllis Paykel Trust Grant-in-Aid (Project/ Equipment, Travel & Conference)	\$1,000	Apr 2014 - Mar 2015
Ajay Sharma	Oral Sciences	92nd General Session & Exhibition of the IADR (International Academy of Dental Research)	Maurice and Phyllis Paykel Trust Grant-in-Aid (Project/ Equipment, Travel & Conference)	\$1,000	Apr 2014 - Mar 2015
Richard Cannon	Oral Sciences	Frontiers of Biology: From protein structure and function to drugs	Maurice and Phyllis Paykel Trust Grant-in-Aid (Travel & Conference)	\$3,000	Jul 2014 - Jun 2015
Joanne Choi Jules Kieser	Oral Sciences Oral Sciences	Intraoral pH and temperature during sleep with and without mouth breathing	DENTSPLY Australia Pty Ltd Research Fund	\$543	Jul 2014 - Jun 2015
Joseph Antoun Mauro Farella Julia Horsfield Catherine Carleton	Oral Sciences Oral Sciences Pathology (DSM) Oral Sciences	A novel model for exploring causes and treatment of craniofacial birth defects in children	New Zealand Dental Association Research Foundation Research Grant	\$10,400	Sep 2014 - Aug 2016
Kullasit Chutipongpisit Alison Rich Praveen Parachuru	Oral Diagnostics & Surgical Sciences Oral Diagnostics & Surgical Sciences Oral Diagnostics & Surgical Sciences	Lymphangiogenesis in the oral squamous cell carcinoma microenvironment	New Zealand Dental Association Research Foundation Research Grant	\$8,074	Sep 2014 - Aug 2016
Dawn Coates Mohammad Alansary Lara Friedlander Gregory Seymour Bernadette Drummond	Oral Sciences Oral Sciences Oral Rehabilitation Oral Sciences Oral Sciences	Primary tooth pulp as a source of progenitor stem cells for permanent tooth pulp-dentine regeneration	New Zealand Dental Association Research Foundation Research Grant	\$13,221	Sep 2014 - Aug 2015
Lara Friedlander	Oral Rehabilitation	Direct pulp capping in New Zealand general dental practice – A Practice Based Research Network (PBRN) study	New Zealand Dental Association Research Foundation Research Grant	\$14,970	Oct 2014 - Sep 2015
Mikhail Keniya Richard Cannon	Oral Sciences Oral Sciences	NanoPhotometer for dental research and drug discovery	New Zealand Dental Association Research Foundation Research Grant	\$15,000	Sep 2014 - Aug 2015

Name	Department/ Institution	Title of Application	Funding Body/ Round	Awarded	Duration
Murray Meikle Yana Itskovich Mauro Farella Trudy Milne Richard Cannon	Oral Sciences Oral Sciences Oral Sciences Oral Sciences Oral Sciences	A new approach to engineering 3-dimensional constructs of human bone matrix in a mechanically-active environment	New Zealand Dental Association Research Foundation Research Grant	\$11,862	Sep 2014 - Aug 2016
Praveen Parachuru Alison Rich Warwick Duncan Gregory Seymour Rajesh Katare	Oral Diagnostics & Surgical Sciences Oral Diagnostics & Surgical Sciences Oral Sciences Oral Sciences Physiology	MicroRNA expression profile in healthy and diseased gingival tissues	New Zealand Dental Association Research Foundation Research Grant	\$15,000	Sep 2014 - Aug 2015
Alison Rich Avadhoot Avadhani Trudy Milne Gregory Seymour	Oral Diagnostics & Surgical Sciences Oral Diagnostics & Surgical Sciences Oral Sciences Oral Sciences	Role of interleukin 17 in invasion of oral cancer	New Zealand Dental Association Research Foundation Research Grant	\$14,698	Sep 2014 - Aug 2016
Mauro Farella Ghassan Idris Christopher Robertson Barbara Galland	Oral Sciences Oral Sciences Oral Sciences Womens & Child Health (DSM)	Efficacy of a mandibular advancement appliance on sleep disordered breathing in children	New Zealand Dental Association Research Foundation Ministry of Health Oral Research Fund	\$24,374	Sep 2014 - Aug 2016
Lyndie Foster Page Murray Thomson Ellen Clark Shareen Ali	Oral Rehabilitation Oral Sciences Northland District Health Board Northland District Health Board	Supervised tooth brushing trial in Northland Intermediate schools	New Zealand Dental Association Research Foundation Ministry of Health Oral Research Fund	\$40,766	Jan 2015 - Dec 2016
Li Mei Gareth Benic Nicholas Heng Mauro Farella	Oral Sciences Oral Sciences Oral Sciences Oral Sciences	Efficacy of the oral probiotic Streptococcus salivarius in managing biofilm formation in patients wearing fixed orthodontic appliances: A double-blind randomized placebo-controlled trial	New Zealand Dental Association Research Foundation Ministry of Health Oral Research Fund	\$11,410	Aug 2014 - Jul 2016
Alison Rich Hina Narayan Trudy Milne Gregory Seymour	Oral Diagnostics & Surgical Sciences Oral Diagnostics & Surgical Sciences Oral Sciences Oral Sciences	In vitro effect of cigarette smoke on DNA methylation in human gingival fibroblasts	New Zealand Dental Association Research Foundation Ministry of Health Oral Research Fund	\$14,179	Oct 2014 - Sep 2016
Warwick Duncan Ye Naung Dawn Coates Diogo Zanicotti Harsha De Silva	Oral Sciences Sir John Walsh Research Institute Oral Sciences Oral Sciences Oral Diagnostics & Surgical Sciences	The Use of Periosteum-Derived Mesenchymal Multipotent Progenitor Cells for Bone Regeneration on Titanium Surfaces	Wishbone Trust Research Grant	\$13,913	Sep 2014 - Aug 2015

Name	Department/ Institution	Title of Application	Funding Body/ Round	Awarded	Duration
Warwick Duncan Ye Naung	Oral Sciences Sir John Walsh Research Institute	Periosteum-Derived Mesenchymal Multipotent Progenitor Cells for Bone Growth on Titanium Surfaces	Arthritis New Zealand National Research Fund - Project or Programme Grant	\$20,000	Oct 2014 - Sep 2015
Dawn Coates Diogo Zanicotti Harsha De Silva	Oral Sciences Oral Sciences Oral Diagnostics & Surgical Sciences				
Gregory Seymour	Oral Sciences				
Julia Horsfield Joseph Antoun Mark Hampton	Pathology (DSM) Oral Sciences Pathology (UOC)	A novel model for exploring the causes and treatment of craniofacial birth defects in children.	Otago Medical Research Foundation Research Grant	\$30,000	Oct 2014 - Sep 2015
Therese de Castro Warwick Duncan	Oral Sciences Oral Sciences	European International Association of Bloodstain Pattern Analysis Conference	Maurice and Phyllis Paykel Trust Grant-in-Aid (Project/ Equipment, Travel & Conference)	\$1,500	Dec 2014 - Nov 2015
Neil Waddell Joanne Choi Mauro Farella Karl Lyons	Oral Rehabilitation Oral Sciences Oral Sciences Oral Rehabilitation	Continuous measurement of intraoral pH and temperature of individuals with and without xerostomia	Maurice and Phyllis Paykel Trust Grant-in-Aid (Project/ Equipment, Travel & Conference)	\$5,000	Jan 2015 - Dec 2016
Warwick Duncan Nicholas Chandler Neil Waddell Paul Harris	Oral Sciences Oral Rehabilitation Oral Rehabilitation Callaghan Innovation Research Limited	Ultrasonic diagnostic devices for Dentistry	University of Otago University of Otago Research Grants 2015	\$40,000	Jan 2015 - Dec 2015
Dawei Wu	Callaghan Innovation Research Limited				
Russell Petherick	Callaghan Innovation Research Limited				
Julia Horsfield Mark Hampton Joseph Antoun Mauro Farella Catherine Carleton	Pathology (DSM) Pathology (UOC) Oral Sciences Oral Sciences Oral Sciences	A novel model for exploring the causes and treatment of craniofacial birth defects in children.	University of Otago University of Otago Research Grants 2015	\$40,000	Jan 2015 - Dec 2015
Darryl Tong	Oral Diagnostics & Surgical Sciences	Quantification of impact forces in the prevention of sub- concussive head injury using a forensic head model	University of Otago University of Otago Research Grants 2015	\$35,591	Jan 2015 - Dec 2015
Neil Waddell Alex Bennett	Oral Rehabilitation Kansai University				
Mauro Farella Ghassan Idris Barbara Galland	Oral Sciences Oral Sciences Womens & Child Health (DSM)	Efficacy of a Mandibular Advancement Appliance on Sleep Disordered Breathing in Children	Cure Kids Research Proposal	\$31,782	Jan 2015 - Dec 2017
Christopher Robertson	Oral Sciences				
Darryl Tong	Oral Diagnostics & Surgical Sciences	The Establishment of a University of Otago Archive Collection of War Surgery of the Face and Jaws	New Zealand Lottery Grants Board Lottery World War One Commemorations, Environment and Heritage	\$36,600	Jul 2015 - Jun 2016

Commercial research funding awarded to SJWRI researchers, 2013-14

Principal Investigator	Project title	Contracting body	Awarded	Duration
Don Schwass	Advanced silver nanoparticle formulation	Otago Innovation Ltd	\$16,118	Jun 2013 – Jun 2015
Richard Cannon	Mother and Baby Study	Massey University	\$3,000	Oct 2013 – Dec 2014
Richard Cannon	Expression of membrane proteins	Syngenta Limited	\$41,618	Dec 2013 – Jul 2014
Brian Monk	Fungicidal inhibitors of cyp51 proteins	International agrichemical company (identity confidential)	Over \$1.4M	Mar 2014 – Mar 2016
Nick Heng	Genome Sequencing Streptococcus salivarius	Universiti Malaya	\$9,000	Mar 2014 – Feb 2015
Nick Heng	Metagenomic study of oral microbiota	Estacio de Sa University	\$5,000	Jun 2014 – May 2015
Warwick Duncan	Testing a novel abutment -interface seal	Biomet 3i LLC	\$112,000	Jul 2014 – Sep 2015
Jonathan Leichter	Dental Implant use in NZ	Various implant companies	\$15,000	Oct 2014 – Sep 2015
Warwick Duncan	Evaluation of novel bone replacement grafts	Resorba Medical GmbH	\$53,430	Jan 2015 – Nov 2016

Fuller Scholarships

The Fuller Scholarships in Dentistry are externally-funded research awards made to Doctorate of Clinical Dentistry students to fund their research projects. The primary source of funding is from a trust held by Downie Stewart Lawyers, however from 2013 a new award was made available from the NZ Dental Association Central Districts branch to support an annual postgraduate research scholarship.

* NZDA Central Districts Postgraduate Scholarship recipients

2013 awardees

Student name	Discipline	Title of project	Supervisors	Amount
Mo'men Atieh	Periodontology	Interventions for replacing missing teeth: oral implants in molar extraction sockets (delayed, early and immediate placement) restored with single implant crowns	Prof Warwick Duncan Assoc Prof Mary Cullinan Dr Clovis Faggion	\$784
David Ko	Periodontology	How well does cone-beam computerized tomography (CBCT) determine the amount of bone healing grafted maxillary sinuses prior to implant placement?	Prof Warwick Duncan Assoc Prof Jonathan Leichter Dr Donald Schwass Prof Patrick Schmidlin	\$3,000
Lydia Meredith	Orthodontics	The influence of enamel surface roughness on bacterial adhesion	Dr Li Mei Prof Richard Cannon Prof Mauro Farella Prof Jules Kieser	\$3,000
Patrick Wong*	Prosthodontics	Interventions for replacing missing teeth: oral implants in molar extraction sockets (delayed, early and immediate placement) restored with single implant crowns	Assoc Prof Neil Waddell Prof Karl Lyons	\$3,000

2014 awardees

Name	Discipline	Title of Study	Supervisors	Awarded
Shreya Aggarwala	Endodontics	The antimicrobial efficacy of the antimicrobial peptide, BM2 in an <i>ex vivo</i> model	Prof Robert Love	\$3,000
Azza Al-Ani	Orthodontics	Finding the missing link for hypodontia	Dr Joseph Antoun Prof Mauro Farella Assoc Prof Tony Merriman Prof W Murray Thomson	\$3,000
Angel Babu	Paediatric Dentistry	Comparison of the orofacial characteristics in children who are habitual snorers and children with no history of snoring – A descriptive study	Prof Bernadette Drummond	\$1,950
James Dawson	Periodontology	Effect of diode laser irradiation on viability of bacteria in an <i>in vivo</i> biofilm, formed on titanium implant surfaces	Dr Jonathan Leichter Dr Andrew Tawse-Smith Dr Geoffrey Tompkins	\$3,000
Arpana Devi	Endodontics	Enhancing the efficacy of antimicrobial peptide, BM2	Prof Robert Love	\$3,000
Dhrupad Siddhanta	Prosthodontics	Mechanical properties and antibacterial effects of a silver nanoparticle modified glass ionomer restorative material	Dr Donald Schwass Dr Basil Al-Amleh Dr Carla J Meledandri Prof Karl Lyons	\$3,000
Muhammed Yakin	Oral Pathology	The relationship between endoplasmic reticulum stress and STAT3 pathways in oral squamous cell carcinoma	Dr Benedict Seo Prof Alison Rich	\$3,000
Sobia Zafar*	Paediatric Dentistry	Bisphosphonate related osteonecrosis of the jaw (BRONJ) and the role of osteoclasts	Dr Dawn Coates Prof Bernadette Drummond	\$2,966

Research publications, 2013-14

Publications and outputs are listed by academic department.

Clinical Services

Conference Contribution - Verbal presentation and other Conference outputs

Meldrum, A., Noble, D., & Aitken-Ferguson, D. (2014, November). *Dentistry @ Otago*. Verbal presentation at the New Zealand National Liaison Officers' Conference, Dunedin, New Zealand.

Total publications (2013 to 2014) for Clinical Services: 1

Office of the Dean (Dentistry)

Authored Book - Research

Kieser, J., Taylor, M., & Carr, D. (2013). *Forensic Biomechanics*. Oxford, UK: John Wiley & Sons, 164p. doi: 10.1002/9781118404249

Journal - Research Article

Anthony, M. T., & Farella, M. (2014). Body dysmorphic disorder and orthodontics: An overview for clinicians. *Australian Orthodontic Journal*, 30(2), 208-213.

Antoun, J. S., Lawrence, C., Leow, A., Rongo, R., Dias, G., & Farella, M. (2014). A three-dimensional evaluation of Māori and New Zealand European faces. *Australian Orthodontic Journal*, 30(2), 169-175.

Carr, D., Kieser, J., Mabbott, A., Mott, C., Champion, S., & Girvan, E. (2014). Damage to apparel layers and underlying tissue due to hand-gun bullets. *International Journal of Legal Medicine*, 128(1), 83-93. doi: 10.1007/s00414-013-0856-1

Carr, D., Lindstrom, A.-C., Jareborg, A., Champion, S., Waddell, N., Miller, D., Kieser, J. (2014). Development of a skull/brain model for military wound ballistics studies. *International Journal of Legal Medicine*. Advance online publication. doi: 10.1007/s00414-014-1073-2

Faggion, Jr., C. M., Cullinan, M. P., Atieh, M., & Wasiak, J. (2014). An overview of systematic reviews of the use of systemic antimicrobials for the treatment of periodontitis. *British Dental Journal*, 217(8), 443-451. doi: 10.1038/sj.bdj.2014.909

Faggion, Jr., C. M., Liu, J., Huda, F., & Atieh, M. (2014). Assessment of the quality of reporting in abstracts of systematic reviews with meta-analyses in periodontology and implant dentistry. *Journal of Periodontal Research*, 49(2), 137-142. doi: 10.1111/jre.12092

Golding, C., & Adam, L. (2014). Evaluate to improve: Useful approaches to student evaluation. *Assessment & Evaluation in Higher Education*. Advance online publication. doi: 10.1080/02602938.2014.976810

Goldsmith, S. M., Seo, B. L., de Silva, R. K., Parachuru, P., Rich, A. M., & Seymour, G. J. (2014). Oral Mycosis Fungoides: Report with immune profile. *Oral Surgery, Oral Medicine, Oral Pathology & Oral Radiology*, 118(2), e48-e52. doi: 10.1016/j.oooo.2013.10.005

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Conference Contribution - Verbal presentation and other Conference outputs

Lawrence, M., & Broughton, J. (2014, October). *Tangata Whaiora Me Oranga Niho (Māori mental health consumers and oral health)*. Verbal presentation at the Royal Australian and New Zealand College of Psychiatrists (RANZCP) New Zealand Conference: Deep South Psychiatry, Dunedin, New Zealand.

Antoun, J. S., Gray, S., Cameron, C., Sew Hoy, W., & Farella, M. (2013, June). *Secular trends in craniofacial growth: Are historical controls valid*. Verbal presentation at the 89th Congress of the European Orthodontic Society (EOS), Reykjavik, Iceland.

Apperley, O., Kieser, J., Huckabee, M.-L., Medicott, N., & MacFadyen, E. (2013, October). *Management of xerostomia following radiotherapy: A randomised, double blind, cross-over study of novel emulsion for use as a saliva substitute*. Verbal presentation at the 9th Biomouth Conference, Dunedin, New Zealand.

Broughton, J. R., Downs, R., Laing, B., Lawrence, M. G., McGibbon, M., Steinmann, M., Anderson, V. (2013, April). *Oranga Niho me Ngā Tangata Whaiora: A kaupapa Māori oral health research project in Tauranga Moana*. Invited address at the Te Ao Marama (The New Zealand Māori Dental Association) Hui a Tau, Tauranga, New Zealand.

Tong, D. (2013, November). *Airway considerations for ballistic and blast injury patients*. Verbal presentation at the New Zealand Anaesthesia (NZA) Annual Scientific Meeting, Dunedin, New Zealand.

Film/Video/CD Rom

Broughton, J. (2013). *Te Whakapapa* (lyrics) in *Waiata, Wairua, Waiora*, performed by Rim D. Paul. Puoro Productions.

Broughton, J. (2013). *Te Kupu Tapu* (lyrics) in *Waiata, Wairua, Waiora*, performed by Rim D. Paul. Puoro Productions.

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Other Research Output

Inaugural Professorial Lecture

Broughton, J. (2013, April). *A bro-fessor in the whale*. University of Otago, Dunedin, New Zealand. [Inaugural Professorial Lecture].

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Conference Contribution - Poster Presentation (not in published proceedings)

Al-Hassiny, A., Rich, A. M., Parachuru, V. P. B., Friedlander, L. T., & Seymour, G. J. (2014, May). *The role of angiogenesis in the pathogenesis of oral lichen planus*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Allsobrook, O. F. L., Parachuru, V. P. B., Milne, T. J., Friedlander, L. T., Seymour, G. J., & Rich, A. M. (2014, May). *Angiogenic factors in oral squamous cell carcinoma*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Choi, J. E., Waddell, J. N., Farella, M., & Kieser, J. A. (2014, May). *Continuous measurement of intraoral pH and temperature: Development and validation of an appliance*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Choi, J., Waddell, N., Lyons, K., Kieser, J., & Farella, M. (2014, September). *Continuous and simultaneous measurement of intraoral pH and temperature*. Poster session presented at the Division of Health Sciences Research Forum: Learning Different Research Languages, Dunedin, New Zealand.

Edwards, C., Bennani, V., Chandler, N., & Lowe, B. (2014, September). *Effectiveness of single-use tips for dental air-water syringes*. Poster session presented at the Division of Health Sciences Research Forum: Learning Different Research Languages, Dunedin, New Zealand.

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Jansen van Vuuren, L., Loch, C., Kieser, J. A., Gordon, K. C., & Fraser, S. J. (2014, June). *Structure and mechanical properties of normal and anomalous teeth in the sand tiger shark *Carharias taurus**. Poster session presented at the Sharks International, Durban, South Africa.

Kieser, D., Kanade, S., Waddell, N., Kieser, J., Theis, J.-C., & Swain, M. (2014, October). *The deer femur: A morphological and biomechanical animal model of the human femur*. Poster session presented at the New Zealand Orthopaedic Association (NZOA) Annual Scientific Meeting, Tauranga, New Zealand.

Ma, S., Lau, A., Lee, J., Lee, L., & Painuthara, L. (2014, September). *Single- vs two-implant overdentures: Is one treatment option more beneficial for our elderly edentulous patients?* Poster session presented at the New Zealand Association of Gerontology Conference: The Age of Ageing, Dunedin, New Zealand.

McElroy, K., Hanlin, S., Daniel, B., Cullinan, M., & Friedlander, L. (2014, May). *Evaluation of direct pulp capping of permanent teeth in general dental practice: A PBRN study*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Shearer, D. M., Thomson, W. M., Mann, J. I., Broadbent, J. M., & Poulton, R. (2014, May). *Influence of periodontitis on glycosylated haemoglobin trajectory*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Tiu, J., Al-Amleh, B., Waddell, N., & Duncan, W. (2014, September). *Evaluating clinical molar preparations: Using the coordinate geometry method*. Poster session presented at the Division of Health Sciences Research Forum: Learning Different Research Languages, Dunedin, New Zealand.

Fraser, S. J., van Vuuren, L. J., Kieser, J. A., & Gordon, K. C. (2013, August). *Probing the chemical composition of snake fangs via Raman spectroscopy*. Poster session presented at the Seventh International Conference of Advanced Vibrational Spectroscopy (ICAVS-7), Kobe, Japan.

Knight, E., Thomson, M., Leichter, J., & Tawse-Smith, A. (2013, September). *Quantifying the diabetes-periodontitis association*. Poster session presented at the Division of Health Sciences Research Forum: Foundations for Health: Otago Health Research, Christchurch, New Zealand.

Nordin, N., Thomson, M., & Foster Page, L. (2013, September). *Cross-cultural evaluation and interpretation of parental perceptions of the impact of early childhood caries (ECC) in New Zealand and Malaysia: A pilot study*. Poster session presented at the Division of Health Sciences Research Forum: Foundations for Health: Otago Health Research, Christchurch, New Zealand.

Shkrum, S. A., Tayles, N., Halcrow, S. E., & Foster Page, L. (2013, September). *A comparison of visual and radiographic methods for detecting oral pathology in an archaeological skeletal sample from Thailand*. Poster session presented at the Division of Health Sciences Research Forum: Foundations for Health: Otago Health Research, Christchurch, New Zealand.

Conference Contribution - Verbal presentation and other Conference outputs

Lyons, K. (2014, September). *Microbial adhesion to maxillary obturator prostheses*. Invited Speaker at the Xi'an Conference of the International Society for Maxillofacial Rehabilitation (ISMR), Xi'an, China.

Chandler, N. P. (2013, May). *Endodontic surgery: Some mysteries of resection, root-end fillings and cavities*. Verbal presentation at the International Federation of Endodontic Associations (IFEA) 9th World Endodontic Congress, Tokyo, Japan.

Law, C., Bennani, V., Lyons, K., & Swain, M. (2013, October). *The influence of implant fixed substructures on mandibular flexure*. Verbal presentation at the 9th Biomouth Conference, Dunedin, New Zealand.

Loch, C., Swain, M., Fraser, S., Gordon, K., Kieser, J., & Fordyce, E. (2013, October). *Elemental and chemical characterization of the enamel and dentine of dolphins*. Verbal presentation at the 9th Biomouth Conference, Dunedin, New Zealand.

Other Research Output

Public Lecture

Broadbent, J. (2013, August). *Teeth and the rest of you!* University of Otago Winter Lecture Series. Wellington, New Zealand. [Public Lecture].

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Total publications (2013 to 2014) for Oral Rehabilitation: 195

Oral Sciences

Journal - Research Article

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Al-Harathi, L. S., Cullinan, M. P., Leichter, J. W., & Thomson, W. M. (2014). Periodontal diseases in an Omani adult population: A preliminary study. *Journal of Periodontology*, 85(5), e104-e110. doi: 10.1902/jop.2013.130266

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Aung, H. L., Samaranyaka, C. U. K., Enright, R., Beggs, K. T., & Monk, B. C. (2014). Characterisation of the DNA gyrase from the thermophilic eubacterium *Thermus thermophilus*. *Protein Expression & Purification*. Advance online publication. doi: 10.1016/j.pep.2014.11.009

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Benn, A. M. L., Broadbent, J. M., & Thomson, W. M. (2014). Occurrence and impact of xerostomia among dentate adult New Zealanders: Findings from a national survey. *Australian Dental Journal*. Advance online publication. doi: 10.1111/adj.12238

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Conference Contribution - Poster Presentation (not in published proceedings)

Al-Hassiny, A., Rich, A. M., Parachuru, V. P. B., Friedlander, L. T., & Seymour, G. J. (2014, May). *The role of angiogenesis in the pathogenesis of oral lichen planus*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Allsobrook, O. F. L., Parachuru, V. P. B., Milne, T. J., Friedlander, L. T., Seymour, G. J., & Rich, A. M. (2014, May). *Angiogenic factors in oral squamous cell carcinoma*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Avadhani, A., Rich, A., Parachuru, P., Milne, T., & Seymour, G. (2014, September). *Multiple cell types express interleukin 17 in oral squamous cell carcinoma*. Poster session presented at the Division of Health Sciences Research Forum: Learning Different Research Languages, Dunedin, New Zealand.

Avadhani, A. V., Rich, A. M., Parachuru, V. P. B., Milne, T., & Seymour, G. J. (2014, May). *Multiple cell types express interleukin 17 in oral squamous cell carcinoma*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Choi, J. E., Waddell, J. N., Farella, M., & Kieser, J. A. (2014, May). *Continuous measurement of intraoral pH and temperature: Development and validation of an appliance*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Choi, J., Waddell, N., Lyons, K., Kieser, J., & Farella, M. (2014, September). *Continuous and simultaneous measurement of intraoral pH and temperature*. Poster session presented at the Division of Health Sciences Research Forum: Learning Different Research Languages, Dunedin, New Zealand.

Hwang, L., Bennani, V., Tawse-Smith, A., Cannon, R., Tompkins, G., & Dias, G. (2014, May). *Effect of air-polishing treatment on titanium surfaces: An in vitro study*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Hwang, L., Bennani, V., Tawse-Smith, A., Cannon, R., Tompkins, G., & Dias, G. (2014, July). *Effect of air-polishing treatment on titanium surfaces: An in vitro study*. Poster session presented at the Sir John Walsh Research Institute Research Day, Dunedin, New Zealand.

Jansen van Vuuren, L., Loch, C., Kieser, J. A., Gordon, K. C., & Fraser, S. J. (2014, June). *Structure and mechanical properties of normal and anomalous teeth in the sand tiger shark *Carharias taurus**. Poster session presented at the Sharks International, Durban, South Africa.

Jawadi, R., Parachuru, V. P. B., Seymour, G. J., & Rich, A. M. (2014, May). *Expression of IL33 and IL35 in oral lichen planus*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

McElroy, K., Hanlin, S., Daniel, B., Cullinan, M., & Friedlander, L. (2014, May). *Evaluation of direct pulp capping of permanent teeth in general dental practice: A PBRN study*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Nordin, N., Thomson, M., Foster Page, L., & Morgaine, K. (2014, September). *Parents' ratings of the impact on their families of early childhood caries (ECC) and its treatment*. Poster session presented at the Division of Health Sciences Research Forum: Learning Different Research Languages, Dunedin, New Zealand.

Ong, J., Keniya, M., & Monk, B. C. (2014, May). *Genetic regulation of drug resistance in yeast*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Sagatova, A., Keniya, M., Huschmann, F., Wilbanks, S., Cannon, R., Tyndall, J., & Monk, B. (2014, September). *Egr11p structure in a triazole resistant yeast strain*. Poster session presented at the Division of Health Sciences Research Forum: Learning Different Research Languages, Dunedin, New Zealand.

Sagatova, A., Keniya, M. V., Huschmann, F. U., Wilbanks, S. M., Cannon, R. D., Tyndall, J. D. A., & Monk, B. C. (2014, May). *Egr11p structure in triazole resistant and susceptible strains of yeast*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Shearer, D. M., Thomson, W. M., Mann, J. I., Broadbent, J. M., & Poulton, R. (2014, May). *Influence of periodontitis on glycated haemoglobin trajectory*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Tiu, J., Al-Amleh, B., Waddell, N., & Duncan, W. (2014, September). *Evaluating clinical molar preparations: Using the coordinate geometry method*. Poster session presented at the Division of Health Sciences Research Forum: Learning Different Research Languages, Dunedin, New Zealand.

Yeh, C.-W., Kamalendran, N., Cullinan, M. P., Drummond, B. K., & Heng, N. (2014, May). *Microbiological analysis of plaque samples from children with dental caries*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Keniya, M. V., Fleischer, E., Klinger, A., Cannon, R. D., & Monk, B. C. (2013, September). *Expression of MDR proteins in yeast for structure-function studies and drug discovery*. Poster session presented at the Role of Multidrug Resistance Proteins in Pharmacokinetics and Toxicology Conference, Ryn, Poland.

Knight, E., Thomson, M., Leichter, J., & Tawse-Smith, A. (2013, September). *Quantifying the diabetes-periodontitis association*. Poster session presented at the Division of Health Sciences Research Forum: Foundations for Health: Otago Health Research, Christchurch, New Zealand.

Monk, B. C., Tomasiak, T. M., Keniya, M. V., Cannon, R. D., Huschmann, F. U., Tyndall, J. D. A., Stroud, R. M. (2013, August). *Crystal structures of full-length Saccharomyces cerevisiae Erg11p give insight into triazole and substrate binding*. Poster session presented at the Queenstown Molecular Biology (QMB) Meetings, Queenstown, New Zealand.

Nordin, N., Thomson, M., & Foster Page, L. (2013, September). *Cross-cultural evaluation and interpretation of parental perceptions of the impact of early childhood caries (ECC) in New Zealand and Malaysia: A pilot study*. Poster session presented at the Division of Health Sciences Research Forum: Foundations for Health: Otago Health Research, Christchurch, New Zealand.

Zanicotti, D. G., Coates, D., Seymour, G., & Duncan, W. (2013, September). *Human adipose-derived stem cells on titanium surfaces*. Poster session presented at the Division of Health Sciences Research Forum: Foundations for Health: Otago Health Research, Christchurch, New Zealand.

Conference Contribution - Verbal presentation and other Conference outputs

Ahmadi, B. (2014, February). *From School Dental Service to Community Oral Health Service: Recent changes within SDHB*. Verbal presentation at the Department of Preventive and Social Medicine In-House Convention, Dunedin, New Zealand.

Foster Page, L. A. (2014, June). *What do child oral health-related quality of life measures tell us about treatment outcomes for children?* Verbal presentation at the International Association for Dental Research (IADR) General Session and Exhibition, Cape Town, South Africa.

Shearer, D. (2014, February). *Periodontitis and glycated haemoglobin*. Verbal presentation at the Department of Preventive and Social Medicine In-House Convention, Dunedin, New Zealand.

Thomson, W. M., Smith, M. B., & Ling, G. Y. (2014, September). *Oral health in old age: Flying below the radar*. Verbal presentation at the New Zealand Association of Gerontology Conference: The Age of Ageing, Dunedin, New Zealand.

Antoun, J. S., Gray, S., Cameron, C., Sew Hoy, W., & Farella, M. (2013, June). *Secular trends in craniofacial growth: Are historical controls valid*. Verbal presentation at the 89th Congress of the European Orthodontic Society (EOS), Reykjavik, Iceland.

Cannon, R. (2013, July). *Overcoming antifungal drug resistance*. Keynote speaker at the Sir John Walsh Research Institute Research Day, Dunedin, New Zealand.

Davies, S., Huckabee, M.-L., Fink, J., & Tompkins, G. (2013, October). *Examining factors which may reduce the incidence of aspiration pneumonia in patients with acute stroke and dysphagia*. Verbal presentation at the 9th Biomouth Conference, Dunedin, New Zealand.

Farella, M. (2013, September). *Looking around braces and misaligned teeth*. Verbal presentation at the Division of Health Sciences Research Forum: Foundations for Health: Otago Health Research, Christchurch, New Zealand.

Farella, M. (2013, September). *Measuring muscle activity in natural environments*. Verbal presentation at the Linking Businesses with Academia Forum: Smart Materials and Devices, Dunedin, New Zealand.

Total publications (2013 to 2014) for Oral Sciences: 249

Sir John Walsh Research Institute

Journal - Research Article

Atieh, M. A., Faggion, Jr., C. M., & Seymour, G. J. (2014). Cytokines in people with type 2 diabetes and chronic periodontitis: A systematic review and meta-analysis. *Diabetes Research & Clinical Practice*. Advance online publication. doi: 10.1016/j.diabres.2014.02.002

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Keniya, M. V., Holmes, A. R., Niimi, M., Lamping, E., Gillet, J.-P., Gottesman, M. M., & Cannon, R. D. (2014). Drug resistance is conferred on the model yeast *Saccharomyces cerevisiae* by expression of full-length melanoma-associated human ATP-binding cassette transporter ABCB5. *Molecular Pharmaceutics*, 11(10), 3452-3462. doi: 10.1021/mp500230b

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Parachuru, V. P. B., Coates, D. E., Milne, T. J., Hussaini, H. M., Rich, A. M., & Seymour, G. J. (2014). Forkhead box P3-positive regulatory T-cells and interleukin 17-positive T-helper 17 cells in chronic inflammatory periodontal disease. *Journal of Periodontal Research*. Advance online publication. doi: 10.1111/jre.12169

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Rich, A. M., Hussaini, H. M., Parachuru, V. P. B., & Seymour, G. J. (2014). Toll-like receptors and cancer, particularly oral squamous cell carcinoma. *Frontiers in Immunology*, 5, 464. doi: 10.3389/fimmu.2014.00464

Siddiqi, A., Milne, T., Cullinan, M. P., & Seymour, G. J. (2014). Analysis of *P. gingivalis*, *T. forsythia* and *S. aureus* levels in edentulous mouths prior to and 6 months after placement of one-piece zirconia and titanium implants. *Clinical Oral Implants Research*. Advance online publication. doi: 10.1111/clr.12536

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Conference Contribution - Published proceedings: Abstract

Choi, J., Waddell, J. N., Farella, M., & Kieser, J. A. (2014). Continuous and simultaneous measurement of intraoral pH and temperature. *Journal of Dental Research*, 93(Spec Iss C). Retrieved from iadr.org.

Cullinan, M. P., Faddy, M. J., Palmer, J. E., Westerman, B., West, M. J., & Seymour, G. J. (2014). Triclosan slows the progression of periodontal disease in cardiovascular patients. *Journal of Dental Research*, 93(Spec Iss B), 1057. Retrieved from iadr.org.

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Hwang, L., Bennani, V., Tawse-Smith, A., Cannon, R. D., & Tompkins, G. R. (2014). Effect of air-polishing on titanium surfaces, biofilm removal and biocompatibility. *Journal of Dental Research*, 93(Spec Iss C). Retrieved from iadr.org.

Kamalendran, N., Yeh, C., Drummond, B., Heng, N., Cullinan, M. P., & Stanton, J. (2014). Oral microbiota of children undergoing comprehensive treatment for severe ECC. *Journal of Dental Research*, 93(Spec Iss C). Retrieved from iadr.org.

Loch, C., Swain, M., Fraser, S., Gordon, K., Kieser, J., & Fordyce, E. (2014). Elemental and chemical characterization of the enamel and dentine of dolphins. *New Zealand Dental Journal*, 110(1), (pp. 28).

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Mohamed Thani, W. S., MacFadyen, E., Rich, A. M., & Cannon, R. D. (2014). Fluconazole resistance against oral candida in patients taking antipsychotic drugs. *Journal of Dental Research*, 93(Spec Iss C). Retrieved from iadr.org.

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Seymour, G. J., Faddy, M. J., Palmer, J. E., Westerman, B., West, M. J., & Cullinan, M. P. (2014). Progression of periodontal disease in cardiovascular patients. *Journal of Dental Research*, 93(Spec Iss B), 1055. Retrieved from iadr.org.

Seymour, G. J., Milne, T., & Cullinan, M. P. (2014). Genetics/epigenetics and periodontal disease. *Journal of Dental Research*, 93(Spec Iss C). Retrieved from iadr.org.

Sharma, A., Waddell, J. N., McQuillan, J., Sharma, L., & Duncan, W. J. (2014). Surface characteristics and biocompatibility of anodized titanium-zirconium (aTiZr) discs. *Journal of Dental Research*, 93(Spec Iss B), 1253. Retrieved from iadr.org.

Huschmann, F. U., Tomasiak, T. M., Keniya, M. V., O'Connell, III, J. D., Luckner, S. R., Krause, K., Cannon, R. D., Tyndall, J. D. A., Monk, B. C. (2013). Antifungal drug discovery: Crystallization of the cytochrome P450 triazole target. *Proceedings of the Australasian Pharmaceutical Science Association (APSA) Conference*. Retrieved from apsa-online.org/home.html.

Conference Contribution - Poster Presentation (not in published proceedings)

Al-Hassiny, A., Rich, A. M., Parachuru, V. P. B., Friedlander, L. T., & Seymour, G. J. (2014, May). *The role of angiogenesis in the pathogenesis of oral lichen planus*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Allsobrook, O. F. L., Parachuru, V. P. B., Milne, T. J., Friedlander, L. T., Seymour, G. J., & Rich, A. M. (2014, May). *Angiogenic factors in oral squamous cell carcinoma*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Avadhani, A., Rich, A., Parachuru, P., Milne, T., & Seymour, G. (2014, September). *Multiple cell types express interleukin 17 in oral squamous cell carcinoma*. Poster session presented at the Division of Health Sciences Research Forum: Learning Different Research Languages, Dunedin, New Zealand.

Avadhani, A. V., Rich, A. M., Parachuru, V. P. B., Milne, T., & Seymour, G. J. (2014, May). *Multiple cell types express interleukin 17 in oral squamous cell carcinoma*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Choi, J. E., Waddell, J. N., Farella, M., & Kieser, J. A. (2014, May). *Continuous measurement of intraoral pH and temperature: Development and validation of an appliance*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Edwards, C., Bennani, V., Chandler, N., & Lowe, B. (2014, May). *Effectiveness of single-use tips for dental air-water syringes*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Edwards, C., Bennani, V., Chandler, N., & Lowe, B. (2014, July). *Effectiveness of single-use tips for dental air-water syringes*. Poster session presented at the Sir John Walsh Research Institute Research Day, Dunedin, New Zealand.

Jawadi, R., Parachuru, V. P. B., Seymour, G. J., & Rich, A. M. (2014, May). *Expression of IL33 and IL35 in oral lichen planus*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

McElroy, K., Hanlin, S., Daniel, B., Cullinan, M., & Friedlander, L. (2014, May). *Evaluation of direct pulp capping of permanent teeth in general dental practice: A PBRN study*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Ong, J., Keniya, M., & Monk, B. C. (2014, May). *Genetic regulation of drug resistance in yeast*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Sagatova, A., Keniya, M., Huschmann, F., Wilbanks, S., Cannon, R., Tyndall, J., & Monk, B. (2014, September). *Egr11p structure in a triazole resistant yeast strain*. Poster session presented at the Division of Health Sciences Research Forum: Learning Different Research Languages, Dunedin, New Zealand.

Sagatova, A., Keniya, M. V., Huschmann, F. U., Wilbanks, S. M., Cannon, R. D., Tyndall, J. D. A., & Monk, B. C. (2014, May). *Egr11p structure in triazole resistant and susceptible strains of yeast*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Yeh, C.-W., Kamalendran, N., Cullinan, M. P., Drummond, B. K., & Heng, N. (2014, May). *Microbiological analysis of plaque samples from children with dental caries*. Poster session presented at the International Association for Dental Research (IADR) New Zealand Section Student Poster Competition, Dunedin, New Zealand.

Total publications (2013 to 2014) for Sir John Walsh Research Institute: 43

Research degree completions

PhD students 2013-14

Students whose degrees have been conferred (i.e those who have been awarded their degree and have graduated) are listed in **bold**

Family Name	Preferred Name	Primary Department	Primary Supervisor	Other Supervisors	Thesis Title	Status (end 2014)
NAlansary	Mohammad	SJWRI	Professor Bernadette Drummond	A/Prof Mary Cullinan, Dr Dawn Coates, Dr Lara Friedlander, Prof Gregory Seymour	Primary tooth pulp as a source of progenitor cells for tooth regeneration	Confirmed
Avadhani	Avadhoot	SJWRI	Professor Alison Rich	Prof Gregory Seymour, Dr Trudy Milne	Role of IL 17 in the development of oral squamous cell carcinoma	Confirmed
Choi	Joanne	SJWRI	Professor Jules Kieser	A/Prof Neil Waddell, Prof Mauro Farella	Development of intra-oral system to measure pH using wireless microelectronic sensors	Confirmed
Coldea	Andrea	SJWRI	Professor Michael Swain	Dr Norbert Thiel, Prof Jules Kieser	Suitability of polymer-infiltrated-ceramic-networks for CAD/CAM based dental restorative materials	Conferred
de Castro	Therese	SJWRI	Professor Jules Kieser	Dr Michael Taylor, Dr Debra Carr	Statistical analysis of bloodstain formation and investigation of the interaction of blood and apparel fabrics	Confirmed
Friedlander	Lara	SJWRI	Professor Alison Rich	A/Prof Mary Cullinan, Prof Gregory Seymour	Angiogenesis and healing in immature permanent teeth	Conferred
George	Amanda	Anthropology and Archaeology	Professor Richard Walter	Prof Jules Kieser	Dental pathology profile of pre-European Māori and Mori	Conferred
Gowda	Sujan	SJWRI	Associate Professor Brian Monk	Prof Richard Cannon, Dr Kyoko Niimi	Heterologous expression of membrane proteins in <i>Saccharomyces cerevisiae</i>	Conferred
Hanning	Sara	Pharmacy	Associate Professor Natalie Medicott	Prof Jules Kieser	An investigation of oily formulations for the management of Xerostomia	Conferred
Healey	David	SJWRI/DSM	Professor Murray Thomson	Prof Robin Gauld	Orthodontic treatment efficacy determined by normative and psychosocial measures	Conferred
Huschmann	Franziska	Pharmacy	Associate Professor Joel Tyndall	Prof Richard Cannon, Prof Kurt Krause	Investigating resistance in infectious diseases: Functional and structural characterization of the HIV-1 protease and the fungal lanosterol 14 α -demethylase(Erg11p)	Conferred

Family Name	Preferred Name	Primary Department	Primary Supervisor	Other Supervisors	Thesis Title	Status (end 2014)
Nldris	Ghassan	SJWRI	Professor Mauro Farella	Ms Winifred Harding, Mr Chris Robertson	Efficacy of a mandibular advancement appliance on sleep disordered breathing in children	Confirmed
Jalaludin	Anil	Chemistry	Emeritus Professor Jim McQuillan	A/Prof Brian Monk, Prof Phil Bremer	Biofouling	Conferred
Kennedy	Darnell	SJWRI	Dr Jo-Ann Stanton	Prof Jules Kieser, Dr Geoff Tompkins	Microbial analysis of bite marks by sequence comparison of streptococcal DNA	Conferred
Kieser	David	DSM	Professor Jean-Claude Theis	Prof Michael Swain	Ballistic skeletal injuries: An experimental study of the orthopaedic, biomechanic and forensic characteristics	Conferred
Li	KC	SJWRI/Geology	Professor David Prior	AVProf Neil Waddell	Microstructure and phase stability of three dental cobalt chromium alloys used for metal-ceramic restorations during thermal processing.	Confirmed
Lindstrom	Anki	SJWRI	Professor Jules Kieser	AVProf Jurian Hoogerwerff, Prof Warwick Duncan, AVProf Neil Waddell	Postmortem alterations on skeletonised material recovered from marine environments	Confirmed
Loch	Carolina	Geology	Professor Ewan Fordyce	Prof Jules Kieser	Morphology, structure and evolution of teeth in fossil and modern odontocetes (Cetacea)	Conferred
Ma	Sunyoung	SJWRI	Professor Michael Swain	Prof Warwick Duncan	Alveolar ridge resorption and implant prostheses	Confirmed
McDowell	Jennifer	SJWRI	Professor Jules Kieser	Prof Abby Smith, Prof Sue Black	Taphonomic effects on juvenile skeletal remains in a marine environment	Confirmed
Mohd Hussaini	Haizal	SJWRI	Professor Alison Rich	Prof Gregory Seymour, Mr Norman Firth	Immune responses in primary oral squamous cell carcinoma and lymph node metastasis	Conferred
Narayan	Hina	SJWRI	Professor Alison Rich	Dr Trudy Milne, Prof Gregory Seymour	In vivo effects of cigarette smoke on DNA methylation in oval cells	Provisional

Family Name	Preferred Name	Primary Department	Primary Supervisor	Other Supervisors	Thesis Title	Status (end 2014)
Nordin	Norhasnida (Anis)	SJWRI	Professor Murray Thomson	Dr Lyndie Foster Page	Oral health-related quality of life (OHRQoL) in young children and their families	Confirmed
Osman	Reham	SJWRI	Professor Michael Swain	Dr Sunyoung Ma, Prof Warwick Duncan	Prosthodontic outcomes of Zirconia implants supporting overdentures	Conferred
Parachuru	Praveen	SJWRI	Professor Gregory Seymour	Dr Dawn Coates, Dr Trudy Milne, A/Prof Alison Rich, A/Prof Mary Cullinan, Dr Nick Heng	Characterisation of regulatory T-cells and Th17 cells in chronic inflammatory periodontal disease	Conferred
Pardesi	Bikiran	SJWRI	Dr Geoffrey Tompkins	Dr Nick Heng, Prof Iain Lamont	Identification and characterization of the high-affinity heme-binding site expressed by Porphyromonas gingivalis	Under examination
Quick	Andrew	SJWRI/ Physiotherapy	Professor Jules Kieser	A/Prof Gillian Johnson	The influence of orthodontic and orthognathic therapy on mandibular motion	Confirmed
Ramawarrier	Arun	SJWRI	Professor Robert Love	A/Prof George Dias	Biocomposite scaffolds for regeneration of pulp and periapical tissues	Confirmed
Rodrigues	Ely	SJWRI	Professor Richard Cannon	Dr Jan Schmid, Dr Ann Holmes	Candida albicans: sex and survival in a rat model of colonisation	Conferred
Safi	Syarida	SJWRI	Professor Warwick Duncan		Subgingivally delivered manuka honey as an adjunct to scaling and root planing in the treatment of chronic periodontitis	Confirmed
Sagatova	Alia	SJWRI	Associate Professor Brian Monk	A/Prof Joel Tyndall, Dr Mikhail Keniya	Discovery and development of multifunctional triazole drugs	Confirmed
Schwass	Donald	SJWRI	Professor Jules Kieser	Dr Carla Meledandri, Dr Geoff Tompkins	Novel application of silver nanoparticles for prevention and management of dental caries	Confirmed
Seo	Benedict	SJWRI	Professor Alison Rich	Prof Gregory Seymour, Dr Dawn Coates	Unfolded protein response in the tumorigenesis of oral squamous cell carcinoma	Confirmed

Family Name	Preferred Name	Primary Department	Primary Supervisor	Other Supervisors	Thesis Title	Status (end 2014)
Shankar	Madhu	Pharmacy	Associate Professor Joel Tyndall	A/Prof Brian Monk	Validating essential enzymes as targets for new broad spectrum antifungal compounds	Conferred
Sharma	Ajay	SJWRI	Professor Warwick Duncan	A/Prof Neil Waddell	Effect of electrochemically modified titanium-Zirconium alloy implant surface on osseointegration: an in vitro and in vivo study	Confirmed
Shearer	Dara	SJWRI	Professor Murray Thomson	Prof Richie Poulton, A/Prof Jim Mann	Longitudinal associations between periodontal disease and glycaemic control	Confirmed
Siddiqi	Allauddin	SJWRI	Professor Warwick Duncan	Prof Jules Kieser, A/Prof Rohana De Silva	Surgical and peri-implant outcomes of zirconia implants supporting overdentures	Conferred
Symon	Vanda	Pharmacy	Associate Professor Natalie Medicott	Dr Susan Heydon, Prof Jules Kieser	Fact and fiction: Communicating science through the crime fiction of Ngaio Marsh	Confirmed
Tawse-Smith	Andrew	SJWRI	Professor Warwick Duncan	Prof Michael Swain, Dr Geoff Tompkins	A critical evaluation of titanium particle formation about implants and their role on implant longevity	Confirmed
Tiu	Janine	SJWRI	Professor Warwick Duncan	A/Prof Neil Waddell, Dr Basil Al-Amleh	Preparation geometry and its effect on the survivability of full crowns	Confirmed
Tong	Darryl	SJWRI	Professor Robert Love	Prof Tom Brooking	An evidence-based and historical review of war surgery of the face and jaws	Conferred
Ye Naung	Noel	SJWRI	Professor Warwick Duncan	Prof Gregory Seymour, A/Prof Rohana De Silva, Dr Dawn Coates	The effect of periosteum derived osteoprogenitor cells on the healing of peri-implant defects around titanium dental implants	Confirmed
Zafar	Sobia	SJWRI	Associate Professor Mary Cullinan	Dr Dawn Coates, Prof Bernadette Drummond, Prof Gregory Seymour	Effects of bisphosphonate on cells extracted from oral tissues	Conferred
Zanicotti	DJ	SJWRI	Professor Warwick Duncan	Dr Dawn Coates, Prof Gregory Seymour	Adipose-derived stem cells for bone regeneration around titanium implants	Under examination

DClinDent graduations 2013-14

Given Name	Family Name	Department	Discipline	Enrolled	Graduated	Research supervisors (primary supervisor listed first)	Research project title
Olive	ALLSOBROOK	Oral Diagnostic & Surgical Sciences	Oral Pathology	2012	2014	Prof A Rich Dr L Friedlander, Prof G Seymour	Angiogenic factors in oral squamous cell carcinoma
Joseph	ANTOUN	Oral Sciences	Orthodontics	2011	2013	Prof M Farella A/Prof T Merriman, Prof WM Thomson	The role of genetics in vertical craniofacial form
Mömen Ahmad Hasan	ATIEH	Oral Sciences	Periodontics	2012	2014	Prof W Duncan	Immediate single implant restorations in mandibular molar extraction sockets: a four-year controlled clinical trial
Victoria	BECK	Oral Sciences	Orthodontics	2011	2013	Prof M Farella Prof J Kieser, A/Prof N Chandler, Prof WM Thomson	Predictive factors for orthodontic pain
Jonathan	CAMPBELL	Oral Sciences	Paediatric Dentistry	2011	2013	Prof B Drummond Prof M Farella, Prof J Kieser	Monitoring oral pH levels in paediatric patients showing signs of dental erosion
Sarah	DRAKE	Oral Diagnostic & Surgical Sciences	Oral Medicine	2012	2014	Prof J Kieser Prof A Rich, Prof W Duncan	How does submersion in a seawater environment affect the retrieval of useful DNA from teeth?
Ratu Osea	GAVIDI	Oral Diagnostic & Surgical Sciences	Oral Pathology	2011	2013	Prof Alison Rich Brian Cox, Temalesi King (Fiji)	Oral Squamous Cell Carcinoma: Comparing this disease in New Zealand and Fiji Islands
Sophie	GRAY	Oral Sciences	Orthodontics	2012	2014	Prof M Farella & Prof J Kieser Prof P Herbison	Morphometric Changes in the Cervical Vertebrae with time
Guangzhao (Simon)	GUAN	Oral Diagnostic & Surgical Sciences	Oral Medicine	2012	2014	Prof R Love N Firth	Expression of Cyclin D1 in normal oral mucosa, oral dysplasia and oral squamous cell carcinoma

Given Name	Family Name	Department	Discipline	Enrolled	Graduated	Research supervisors (primary supervisor listed first)	Research project title
Hadeel	IBRAHIM	Oral Rehabilitation	Prosthodontics	2012	2014	Prof WM Thomson Prof K Lyons, Dr L Foster Page, S Hanlin	Personality and self-reported oral health
Lakshmi (Ramya)	JAVADI	Oral Diagnostic & Surgical Sciences	Oral Pathology	2012	2014	Prof A Rich Prof G Seymour	Characterisation of Th17 cells in oral mucous lichen planus
Niveathanan	KAMALENDRAN	Oral Sciences	Paediatric Dentistry	2012	2014	Prof B Drummond Dr N Heng, A/Prof M Cullinan	Oral bacterial profiling of children before and after comprehensive restorative treatment of severe early childhood caries
Shahzad	KHAYAMI	Oral Sciences	Orthodontics	2012	2014	Prof M Farella Prof M Swain, Prof J Kieser	Intraoral pressure profiles across changes in vertical dimension
Ellie	KNIGHT	Oral Sciences	Periodontics	2011	2013	Prof WM Thomson A/Prof J Leichter, Dr A Tawse-Smith	Investigating the association between diabetes mellitus and periodontal disease in the NZ adult population
Nicholas	KNIGHT	Oral Rehabilitation	Prosthodontics	2012	2014	Prof R Cannon Prof K Lyons, Dr V Bennani	Colonisation of acrylic denture fitting surfaces by <i>Candida</i> species
Jennifer (Jae Won)	LEE	Oral Sciences	Orthodontics	2011	2013	Prof M Farella Prof J Kieser, Prof B Drummond	Continuous measurement of salivary pH using a novel indwelling wireless intraoral telemetry
Yeen	LIM	Oral Rehabilitation	Prosthodontics	2011	2013	Prof R Cannon Dr A Holmes, Prof K Lyons, A/Prof P Dawes (DSM)	Analysis of salivary protein SPLUNC2 from head and neck cancer patients
Jinyi	LIU	Oral Sciences	Periodontics	2011	2013	Prof W Duncan Dr A Tawse-Smith, Prof P Schmidlin	Electrospun cotton wool-like nanocomposites for alveolar ridge preservation – an experimental study in sheep
Muhamad Sharifuddin	MAT DAUD	Oral Rehabilitation	Endodontics	2012	2014	A/Prof N Chandler Dr L Friedlander	Working lengths and root canal fillings in immature permanent teeth: a radiographic study

Given Name	Family Name	Department	Discipline	Enrolled	Graduated	Research supervisors (primary supervisor listed first)	Research project title
Hamish	MILMINE	Oral Rehabilitation	Prosthodontics	2012	2014	A/Prof JN Waddell Dr B Al-Amleh, Prof K Lyons, Prof M Swain	Effects of multiple firing on the physical properties of CAD/CAM produced lithium disilicate for dental restorations
Wan	MOHAMED THANI	Oral Diagnostic & Surgical Sciences	Special Needs Dentistry	2012	2014	E MacFadyen Prof A Rich, Prof R Cannon	Are patients on antipsychotic drugs at risk of developing azole-resistant oral candidal infection?
Arun	NATARAJAN	Oral Sciences	Paediatric Dentistry	2011	2013	Prof B Drummond Prof M Swain, Dr C He	A laboratory investigation of the infiltration of resins of different molecular weights into hypomineralised enamel in teeth with molar-incisor hypomineralisation
Kathryn	NEWSHAM-WEST	Oral Sciences	Prosthodontics	2011	2013	Dr K Niimi Dr D Schwass, Prof K Lyons, Prof R Cannon	Overcoming the antifungal drug resistance of biofilms on dental acrylic
Di Ying (Joanna)	NGO	Oral Diagnostic & Surgical Sciences	Special Needs Dentistry	2012	2014	E MacFadyen Prof A Rich, Prof R Cannon	Are patients on antipsychotic drugs at risk of developing azole-resistant oral candidal infection?
Noor Ilyani (Yaya)	OTHMAN	Oral Rehabilitation	Endodontics	2011	2014	Prof R Love Dr B Monk	Antimicrobial peptide BM2 shows dose-dependent inhibition on monospecies biofilms
Andrew	PARTON	Oral Sciences	Orthodontics	2012	2014	Prof M Farella Prof M Swain, Prof J Kieser	Mandibular growth in 3D, using CBCT in a rabbit model
Jeeson	SAJEEV	Oral Rehabilitation	Endodontics	2012	2014	Prof R Love A/Prof G Dias (Anatomy)	Influence of keratin preparations on cementoblast OCCM-30 and fibroblast L929 cells
Ting-Hui (Jolin)	YANG	Oral Sciences	Paediatric Dentistry	2011	2013	Prof B Drummond Dr D Schwass, Dr R Farah, Prof M Swain	Does silver diamine fluoride increase the acid resistance of primary tooth dentine to erosion?

Enrolled DClinDent students 2013-14 (yet to graduate at time of press)

Given Name	Family Name	Department	Discipline	Enrolled	Research supervisors <small>(primary supervisor listed first)</small>	Research project title <small>(where available)</small>
Shreya	AGGARWALA	Oral Rehabilitation	Endodontics	2014	Prof R Love A/Prof B Monk	The antimicrobial efficacy of the antimicrobial peptide, BM2 in an <i>ex vivo</i> model
Azza	AL-ANI	Oral Sciences	Orthodontics	2014	Dr J Antoun Prof M Farella, A/Prof Tony Merriman, Prof WM Thomson	Finding the missing link for hypodontia
Mohamad	AL-DUJAILI	Oral Sciences	Orthodontics	2013	Prof M Farella Dr T Milne, Prof R Cannon	Growth factor expression in the rat condyle: implications for craniofacial development
Olivia	APPERLEY	Oral Diagnostic & Surgical Sciences	Special Needs Dentistry	2013	Prof J Kieser & A/Prof M-L Huckabee E MacFadyen, Prof N Medicott, Prof A Rich	Management of xerostomia following radiotherapy: a randomised, double blind, crossover trial of a novel emulsion for use as a saliva substitute
Angel	BABU	Oral Sciences	Paediatric Dentistry	2013	Prof B Drummond	Comparison of the orofacial characteristics in children who are habitual snorers and children with no history of snoring – A descriptive study
Gareth	BENIC	Oral Sciences	Orthodontics	2014	Dr L Mei Dr N Heng, Prof M Farella	Efficacy of the oral probiotic <i>Streptococcus salivarius</i> in managing biofilm formation in patients wearing fixed orthodontic appliances: A double-blind randomized placebo-controlled trial
Catherine	CARLETON	Oral Sciences	Orthodontics	2014	Dr J Antoun A/Prof J Horsfield (DSM), Prof M Farella	A novel model for exploring the causes and treatment of craniofacial birth defects in children
Kullasit	CHUTIPONGPISIT	Oral Diagnostics & Surgical Sciences	Oral Pathology	2014	Prof A Rich Dr VP Parachuru, Dr H Hussaini, Dr L Friedlander	Lymphangiogenesis in oral squamous cell carcinoma

Given Name	Family Name	Department	Discipline	Enrolled	Research supervisors (primary supervisor listed first)	Research project title (where available)
Haritha	COIMBATORE	Oral Sciences	Paediatric Dentistry	2013	Prof B Drummond	Not available
James	DAWSON	Oral Sciences	Periodontics	2014	A/Prof J Leichter A Tawse-Smith, Dr G Tompkins	Effect of diode laser irradiation on viability of bacteria in a non-periodontal-biofilm whilst on various titanium implants surface
Arpana	DEVI	Oral Rehabilitation	Endodontics	2014	Prof R Love A/Prof B Monk	Enhancing the efficacy of antimicrobial peptide, BM2
Yana	ITSKOVICH	Oral Sciences	Orthodontics	2014	Prof M Farella Murray Meikle, Dr T Miline, Prof R Cannon	A new approach to engineering 3-dimensional constructs of human bone matrix in a mechanically-active environment
Leonid	KHIMOVICH	Periodontics	Periodontics	2014	Prof W Duncan A/Prof J Leichter, Prof P Schmidlin	Evaluation of novel bone replacement grafting products for tooth socket preservation in a sheep animal model
Seung Young (David)	KO	Oral Sciences	Periodontics	2013	Prof W Duncan A/Prof J Leichter, Dr D Schwass, A McNaughton	The accuracy of CBCT to determine tissue development within grafted maxillary sinus, using sheep model
Coreen	LOKE	Oral Sciences	Orthodontics	2013	Prof M Farella A/Prof S Sander	Wireless monitoring of intra-oral pH
Katy	MCLAUGHLIN	Oral Sciences	Periodontics	2013	Dr D Coates A/Prof M Cullinan, Prof G Seymour	BRONJ: The effects of zoledronic acid on the VEGF receptors and implications for osteoblast growth and maturation)
Lydia	MEREDITH	Oral Sciences	Orthodontics	2013	Dr Li Mei Prof M Farella, Prof R Cannon	The influence of enamel surface roughness on bacterial adhesion
Dhrupad	SIDDHANTA	Oral Rehabilitation	Prosthodontics	2014	Dr D Schwass Dr B Al-Amlah, Dr C Meledandri (Chemistry), Prof K Lyons	Mechanical properties and antibacterial effects of a silver nanoparticle modified glass ionomer restorative material

Given Name	Family Name	Department	Discipline	Enrolled	Research supervisors (primary supervisor listed first)	Research project title (where available)	Graduated
Peng Sim (Patrick)	WONG	Oral Rehabilitation	Prosthodontics	2013	A/Prof JN Waddell Prof K Lyons	Interventions for replacing missing teeth: oral implants in molar extraction sockets (delayed, early and immediate placement) restored with single implant crowns	2014
Muhammed	YAKIN	Oral Diagnostic & Surgical Sciences	Oral Pathology	2014	Prof A Rich Dr B Seo, Dr H Hussaini	The differential expression of STAT3 pathway genes under ER stress in OSCC	2014
Sobia	ZAFAR	Oral Sciences	Paediatric Dentistry	2014	Prof B Drummond Dr D Coates, A/Prof M Cullinan, Prof G Seymour	The role of osteoclasts in Bisphosphonate Related Osteonecrosis of the jaw	2014

Masters degree graduates 2013-14

Given Name	Last Name	Degree	Department	Supervisors	Title	Graduated
Mohammed	ALRASHED	MDentTech	Oral Rehabilitation	A/Prof JN Waddell	The influence of single and double implants on the strain distribution of mandibular metal-reinforced overdentures	2014
Yong Joon (Antonio)	KIM	MHealSci	Faculty of Dentistry	A/Prof JN Waddell, L Jansen van Vuuren, J Upritchard	The effect of surface roughness on biofilm adhesion to clear heat-cured poly(methyl methacrylate) used for ocular prostheses	2014
Saeed Salem	ALAMERI	MDentTech	Oral Rehabilitation	Mr J Aarts, A/Prof JN Waddell	Dental Technology Services and Industry Trends in New Zealand	2013
Kathryn	FUGE	MComDent	Oral Sciences	Prof WM Thomson, Dr L Foster Page	Oral-Health related Quality of Life in New Zealand Adults	2013
Sināpioa	IOAPO	MDS (General Practice)	Oral Rehabilitation	Not available	The effect of Biodentine™ and ProRoot MTA® on cementoblasts, fibroblasts and dental pulp stem cells.	2013
Shuo	LI	MDentTech	Oral Rehabilitation	A/Prof JN Waddell, Dr G Tompkins	The effect of surface roughness, produced by ultrasonic scaling, on biofilm formation and integrity on selected restorative materials	2013

Enrolled Masters students 2013-14 (yet to graduate at time of press)

Given Name	Last Name	Degree	Department
Ahmed	AL WABARI	MDentTech	Oral Rehabilitation
Lisa	FALLAND	MDentTech	Oral Rehabilitation
Sunitha	GOWDA	MComDent	Oral Sciences
Noorhaizad	ITHNIN	MDentTech	Oral Rehabilitation
Ellen	JOHNSON	MComDent	Oral Sciences
Rudi	JOHNSON	MComDent	Oral Sciences



The SJWRI PhD cohort of 2013, pictured with Prof Greg Seymour and the late Prof Jules Kieser

Summer Studentship students hosted in the Faculty of Dentistry

2012-13

KELSI ANDER

A literature review on the oral health of adolescents

Supervisors: Dr Rami Farah, Alison Meldrum, Dorothy Boyd, Dentistry

Funder: Australian and New Zealand Society of Paediatric Dentistry

It is the belief among dental professionals that adolescence is the time when we are the most at risk of oral disease. Adolescence is typically when boundaries are stretched and during the change from child to adult the individual must decide the value to which they give their oral health. This value is reflected in the current dental research we have on adolescence. The aim of this study was to better understand the level of oral health amongst adolescents within New Zealand. We discerned the most reliable and viable findings of the current literature in adolescent oral health and related these findings to how we currently view and deliver oral healthcare. The main areas of investigation included caries prevalence, periodontal disease and malocclusion, with a possible insight to dental anxiety, nutrition and oral health related quality of life. This review was confined to New Zealand literature and only where required incorporated findings from other countries. Thus, this review is of significant relevance to New Zealand adolescents.

AUSTIN CHAN

Wear at titanium-zirconia implant-abutment interfaces: Surface characterisation

Supervisors: Dr Sunyoung Ma, Professor Mike Swain, Dentistry

Funder: Division of Health Sciences

The introduction of CAD/CAM zirconia abutments in implant dentistry has placed the biomaterial under much investigation. Its superior aesthetics and improved mechanical properties have made it a popular alternative to titanium abutments. However, there are clinical issues regarding the use of zirconia that warrant further investigation. Studies have shown that wear is significantly higher at the titanium-zirconia interface compared to the titanium-titanium implant-abutment interface. This study aimed to investigate the feasibility of using impression materials to analyse the surface characterisation at the titanium-zirconia implant-abutment interface in patients rehabilitated with single implant crowns after five years in function.

TRINIT GEORGE

Forensic analysis of dog bites

Supervisor: Dr Nicholas Heng, Dentistry

Funder: Division of Health Sciences

In New Zealand, nearly 12,000 people sustained injuries from dog bites in 2011 at a cost of \$2.4 million. In this study, microbial culture and Arbitrarily Primed PCR (AP-PCR) analyses of the canine oral microbiota were evaluated as tools capable of providing definitive, forensically- accurate evidence linking a dog bite to one particular animal. The results from this study suggest that the AP-PCR may not be a good method to profile dog DNA for forensic purposes. The absence of AP-PCR profile similarity between sample times indicates that the microbiota in dogs' mouths may be transient.

TALHA GUL

A clinical audit of dental implant treatment at the University of Otago School of Dentistry for the years 2006 – 2010

Supervisors: Associate Professor Warwick Duncan, Dr Basil Al-Amleh, Dr Jonathan Broadbent, Dentistry

Funder: New Zealand Society of Periodontology

The primary aim of the study was to evaluate the outcome of dental implants placed at the School of Dentistry between 2006 and 2010. A total of 538 implants were placed in a population of 245 patients over the 5 year period with a high survival rate of 98.6%. The current study provides a wide range of information concerning the utilisation, placement and outcomes of dental implants placed at the School. This is the first step in a quality improvement process that seeks to improve patient care and outcomes. Further analysis of the data will continue over the next year as an elective project.

MELISSA INGER

Comparison of currently available cordless gingival displacement materials

Supervisors: Dr Vincent Bennani, John Aarts, Dentistry

Funder: Pierre-Roland, Acteon, France

Cordless gingival displacement methods offer a less traumatic alternative to cord based methods. The ability of these cordless materials to exert substantial pressure is not well understood. A pressure gauge was embedded into the wall of a chamber made of stone and silicone, and four cordless materials were injected. The maximum loading pressures and the post loading pressures generated were recorded. There was no

significant difference in both the maximum loading pressures and the post loading pressures created between Expasyl and Expasyl new. The post loading pressures and maximum loading pressures generated by Expasyl and Expasyl new were significantly greater than the pressures generated by 3M ESPE ARP and Magic FoamCord. No materials produced pressures as great as those generated by the physical action of packing a displacement cord system (as indicated by previous studies). Cordless gingival retraction materials can be considered a safe alternative to displacement cord systems, however further clinical investigation is required.

IRIN KANG

BDS students' perceptions of their educational environment: Phase four of a longitudinal study

Supervisor: Dr Lyndie Foster Page, Dentistry; Dr Vivienne Anderson, College of Education

Funder: Faculty of Dentistry

The Dundee Ready Educational Environment Measure was used to examine how a cohort of Bachelor of Dental Surgery (BDS) students at the Faculty of Dentistry expected and perceived their educational environment. Five surveys were conducted over the programme - a modified version at the beginning of their first year asked students what they expected, while questionnaires at the end of each professional year addressed students on their actual perception of their educational environment. The response rate was 93%. Overall, students' perceptions of their educational environment were more positive than negative and both strengths and weaknesses in the BDS programme were identified.

MELISSA KIM

Interaction of *Candida albicans* ABC transporter Cdr1p with its inhibitors

Supervisors: Dr Masakazu Niimi, Dr Kyoko Niimi, Professor Richard Cannon, Dentistry

Funder: Division of Health Sciences

The fungal pathogen *Candida albicans* often develops resistance to the widely used azoles, which hampers treatment of patients with systemic infections. Overexpression of efflux pump Cdr1p is the major resistance mechanism, and one way to combat resistance would be to combine Cdr1p inhibitors with azoles. We have evidence that Cdr1p amino acid Ala713 interacts with Cdr1p inhibitors. The aim of this project was to construct baker's yeast strains

expressing GFP-tagged Cdr1p with Ala713 changed to proline. Mutant Cdr1p-Ala713Pro-GFP was successfully constructed. This strain will be a useful tool to investigate how inhibitors bind to Cdr1p and inhibit the pump function.

ADELYN LAU

Effect on dentinal surface and bond strength: A comparison between disposable risk control syringes and non-disposable triplex syringe

Supervisors: Dr Vincent Bennani, Associate Professor Nick Chandler, Ms Suzanne Hanlin, Dentistry; Dr Bronwyn Lowe, Applied Sciences

Funder: Pierre-Roland, Acteon, France

The aim of this study was to compare the effectiveness of disposable and non-disposable dental air/water syringe tips for drying the dentine of teeth, and to determine any effect on tensile bond strengths to composite (tooth-coloured) filling material. Extracted teeth were ground to produce flat dentine surfaces. Twenty teeth were dried using the disposable syringe and 20 with the non-disposable device. Specimens were then bonded to composite and subjected to a micro-tensile test. The results suggest no statistical difference in bond strengths. Use of disposable syringes does not affect bonding to composite.

CLIFFORD LEE

Strain distribution within mandibular implant overdentures: An *in-vitro* study

Supervisors: Dr Neil Waddell, Dr Sunyoung Ma, Professor Michael Swain, Dentistry

Funder: Sir John Walsh Research Institute

Implants are employed to provide additional anchorage to the edentulous arch for improved function and retention, especially in the mandible. However, according to clinical observation, the levels of maintenance for implant supported overdentures are particularly high, being significantly more susceptible to failure or fracture in comparison to conventional dentures. Although many computed strain-distribution simulations of such situations exist, rarely have they been applied in order to understand the deformations within the denture itself. This project aimed to identify these intra-prosthesis strains, allowing further understanding such that excessive time and money spent on maintenance can be eliminated.

KATE MCELROY

Why do students decline the offer of a place in the BDS programme in favour of medicine?

Supervisors: Dr Janet Rountree, Professor Alison Rich, Dentistry

Funder: Division of Health Sciences

It is a generally held belief that the majority of students who are offered places in both medicine and dentistry choose to study medicine. However, the extent to which this is the case, and the reasons behind this choice are unclear. The objectives of this study were to investigate, using an online survey, why successful applicants to both dentistry and medicine at Otago (2006-2012), choose to accept medicine. 400 students who were accepted into both programmes decided to study medicine. Two of the reasons given for this decision were that dentistry was seen as having a limited scope of practice—being perceived as solely confined to teeth, and that medicine was what they had always wanted to study. It will be interesting to compare these results with the comments from the 73 students who accepted dentistry over medicine.

DEEPA MISTRY

Functional analysis of *Candida albicans* drug efflux pump Cdr1p

Supervisors: Dr Kyoko Niimi, Dr Masakazu Niimi, Professor Richard Cannon, Dentistry

Funder: Division of Health Sciences

The fungal pathogen *Candida albicans* causes serious infections in the immunocompromised, and often develops resistance to the widely used drug fluconazole. Overexpression of efflux pump Cdr1p is the major mechanism for fluconazole resistance, however, Cdr1p structure and function are poorly understood. Previous studies showed that amino acid Glu704 was critically important for Cdr1p function. This project investigated the hypothesis that the conserved Arg546 amino acid creates a salt-bridge with Glu704 that is required for Cdr1p function. The hypothesis was, however, disproved as mutants with Arg546 changed to Glu546 showed no change in pump function, hence Arg546 doesn't interact with Glu704.

KATHERINE JUHEE MOON

The use of microdissection prior to retrieval of RNA from frozen fresh tissues for downstream gene expression analysis

Supervisors: Professor Alison Rich, Mr Venkata Parachuru, Professor Greg Seymour, Dentistry

Funder: Sir John Walsh Research Institute

Laser Capture Microdissection (LCM) allows sampling of RNA from specific regions of tissue or cell populations in tissue sections without appreciable degradation. The aim of this study was to develop a protocol to prepare tissue specimens for LCM prior to RNA extraction and B2M gene analysis using fresh tonsil tissue. Quantification cycle values for B2M gene expression were consistent in all samples. The results showed that an appropriate protocol for preparing tissue samples for LCM and subsequent retrieval of adequate quality RNA for gene analysis has been established.

ANTONIA NAGELS

Detection of Icon and dental decay in primary molar teeth: How useful is DIAGNOcam?

Supervisors: Dr Lyndie Foster Page, Dr Don Schwass, Dentistry

Funder: Dental Materials Gesellschaft

DIAGNOcam is a new camera that utilises fibre-optic light to capture gray-scale images of teeth. This study focused on investigating whether DIAGNOcam could be used to detect resin infiltrants (product Icon) and dental decay on the contacting surfaces of primary molars (baby teeth). Images of ten extracted primary molar teeth were taken before and after resin infiltration, and it was found that DIAGNOcam could not visualise the resin infiltrant. DIAGNOcam was able to clinically visualise dental decay, and differentiate depths of lesions in children aged 7-9 years.

NICHOLAS PITTAR

The quantification of impacts to the head in sport

Supervisor: Associate Professor Darryl Tong, Dentistry

Funder: Division of Health Sciences

The broad aim of this research was to assess the prospect of sub-concussive head injury in Kendo; specifically injury caused by repetitive impact with a bamboo sword. Phase one of this research involved validating a specially designed quartz sensor system for measuring force impacts. The quartz sensor system

was repetitively stuck using a bamboo kendo sword and the force and velocity data recorded and analysed. Long term, the findings of this study could lead to changes in modes of practice and use of protective equipment in kendo to reduce the chance in head trauma in the sport.

NIGEL TAN

Developing a baker's yeast strain that expresses high levels of human membrane-protein for drug discovery

Supervisors: Dr Masakazu Niimi, Dr Kyoko Niimi, Professor Richard Cannon, Dentistry

Funder: Faculty of Dentistry

The human drug efflux pump ABCB1 confers drug resistance on cancer cells. Baker's yeast provides a robust and cost-effective host for the heterologous expression and study of ABCB1. ABCB1 has been cloned in our previously validated yeast strain but expression levels obtained were low. In this project high-level ABCB1 expression was achieved after modifying the yeast strain by UV irradiation, back-crossing with un-irradiated cells, and selection for desired phenotypes. The improved strain can now be used to screen for ABCB1 inhibitors, and for high-level expression of other membrane proteins that play critical roles in human diseases.

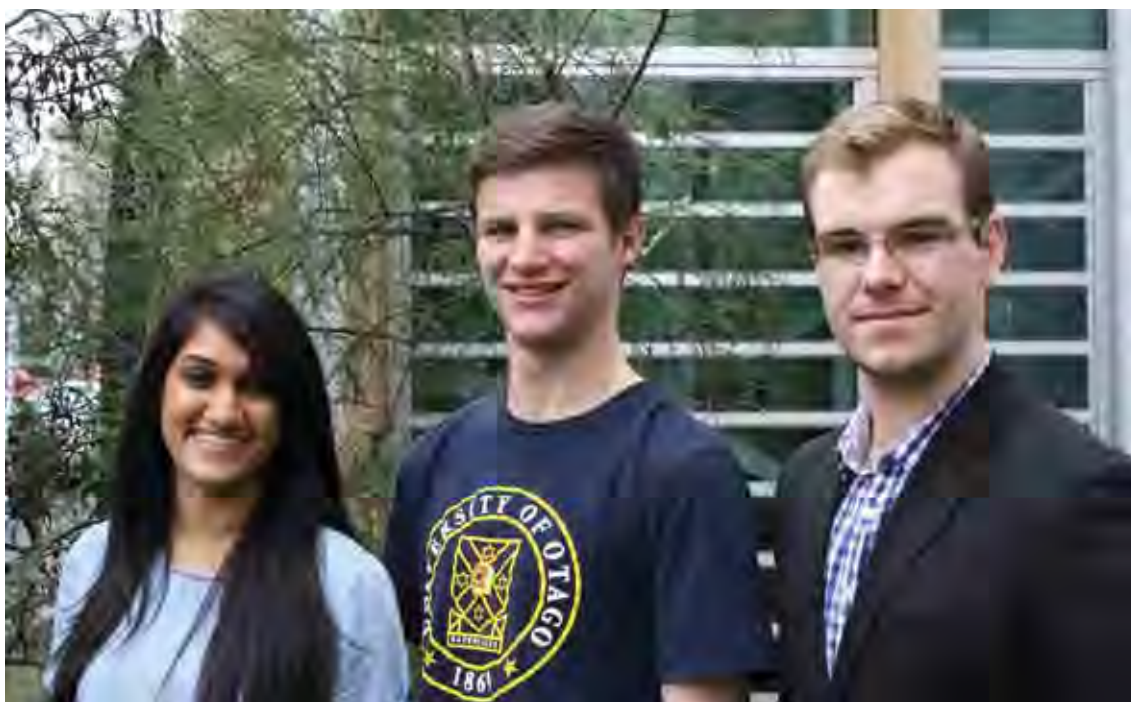
DHARA TILVAWLA

New Zealand dental therapists' knowledge and beliefs regarding child maltreatment

Supervisors: Dr Jonathan Broadbent, Colleen Murray, Dentistry

Funder: Child Injury Prevention Foundation

In 2003, UNICEF found child abuse and neglect rates to be six times higher in New Zealand than many developed countries. New Zealand dental therapists are in a unique position to detect cases because they work with children daily. This research investigates their perceptions and past training experiences, number of cases suspected and reported, and any barriers that prevent reporting. A questionnaire was sent to 693 New Zealand dental therapists with current annual practising certificates. To date, the participation rate is 35%. Most participants felt a responsibility to report cases, however, only 20% recalled learning about child protection as undergraduates. Around half of all cases suspected were not reported, mainly because of a fear of reporting a non-abuse case. Clear advice to therapists on national guidelines on reporting may be of benefit.



Deepa Mistry (photographed with fellow Summer research scholarship prize winners Timothy McLennan (centre) of the Dept of Physiology and Ben Drinkwater (right) of the Dunedin School of Medicine) won the IADR Australia/New Zealand divisional student poster competition (junior category) at the IADR ANZ Division Annual Scientific Meeting in Bangkok in August 2013, presenting a poster based on her 2012-13 Summer Studentship project research. She went on to present her work at the international meeting of the IADR in Cape Town, South Africa in 2014. Deepa undertook a second Summer Studentship project in 2013-14, also in the Molecular Microbiology programme.

2013-14

SHARIFA AL BALUSHI

Dental age assessment of Omani children using Demirjian's method

Supervisor: Prof Jules Kieser, Faculty of Dentistry

Funder: School of Dentistry

Dental age plays a significant role in forensic dentistry, orthodontics, paediatric dentistry and for general diagnosis and treatment planning. Different methods have been developed to determine dental age. One of the most common is Demirjian's method which was developed in 1973 on a large number of French-Canadian children. It is based on degree of tooth mineralisation by examining the radiological appearance of the lower mandibular left quadrant. The clinical interpretation of age assessment indicates if the child is dentally advanced, average or delayed compared to the reference obtained in Demirjian's study. The purpose of this study was to assess the dental age of Omani children using Demirjian's method and evaluate the its applicability for dental age estimation of Omani children. The sample consisted of 485 (264 males, 221 females) digital panoramic radiographs of children aged between 4.6 and 16.5 years from the records of the Military Dental Centre in Oman. Data was analysed using the quantile regression method. A single examiner scored the radiographs and intra-observer reliability was evaluated using Bland-Altman's method on data from re-scoring one out of every 20 radiographs. The results are currently being analysed and the prediction of age from maturity status will be done using the regression models in consultation with a biostatistician.

AHMAD AL-HASSINY

The role of angiogenesis in the pathogenesis of oral lichen planus

Supervisors: Prof Alison Rich, Mrs Lara Friedlander, Dr Praveen Parachu, Prof Gregory Seymour, Faculty of Dentistry

Funder: Division of Health Sciences

Oral mucosal lichen planus (OMLP) is a chronic mucocutaneous disease of uncertain cause that affects mucous membranes within the oral cavity. Although the aetiology of OMLP is unknown, it is well documented that the disease represents a cell-mediated autoimmune response. Angiogenesis is central to the pathogenesis of chronic inflammatory disorders and so the purpose of this study was to evaluate the role of angiogenesis in the pathogenesis of OMLP when compared with non-specific

inflammation using immunohistochemistry with antibody markers CD34 and VEGF. VEGF expression was shown to be similar in both groups across all fields examined, while CD34 expression was greater in the deep connective tissue of OMLP samples. This indicates that OMLP may be more vascular than control tissues, which is possibly due to the action of proangiogenic factors other than VEGF.

YINDI JIANG

Is New Zealand water fluoridation justified?

Supervisors: Dr Lyndie Foster Page, Prof Karl Lyons, Dr Jonathan Broadbent, Dr Kate Morgaine, Faculty of Dentistry; Prof John McMillan, Bioethics Centre

Funder: Faculty of Dentistry

The ethical principles that are relevant to public health are distinct from those that have been developed for other issues within health care. Public health programmes extend beyond the clinical context and focus on measures that affect the lives of large subgroups or the population as a whole. An example of this is community water fluoridation (CWF), the altering of fluoride levels in the water supply with the aim of preventing the initiation and slowing the progression of dental caries for the benefit of entire populations. Despite the unfeasibility of randomised controlled trials of CWF, a large volume of evidence is available on the topic. However, CWF remains a polarising and keenly contested issue. CWF is also an intervention where it is difficult to provide everyone affected with a choice. The Nuffield Council on Bioethics is an independent body that examines and reports on ethical questions, and they have provided a useful ethical framework for considering CWF via the 'stewardship' model. This project discusses each of the public health aims and how they can be applied and weighed to reach a justified position about CWF.

LINDA HWANG

Effect of air-polishing treatment on a titanium surface: An *in vitro* study

Supervisors: Dr Vincent Bennani, Dr Andrew Tawse-Smith, Prof Richard Cannon, Dr Geoffrey Tompkins, Faculty of Dentistry; Dr George Dias, Anatomy

Funder: Satelec, Acteon Group, France

This study aimed to evaluate the effect of air-polishing treatment on titanium disks using an air-polishing device with a periodontal nozzle. A total of 48 titanium disks were used in this study. *In vitro* bacterial adhesion to the disks was achieved by incubation with *Streptococcus mutans* for 3 days. Disks were treated

with glycine powder using an air-polishing device with a specialised periodontal nozzle for 5 seconds. The tip of the nozzle was kept 5mm from the disk and at a fixed angle of 90° to the disk surface. Changes in surface morphology were determined from images captured using a scanning electron microscope before and after the treatment. Changes in surface roughness were determined by images captured using a confocal laser scanning microscope before and after the treatment. A crystal violet assay was performed before and after the treatment to quantify the reduction in bacterial biofilm. A statistically significant amount of biofilm was removed by the air-polishing treatment. This change was also visible to the naked eye, and under the scanning electron microscope. However, treated disk surfaces became rougher than control disks after the treatment. In conclusion, the air-polishing device with a specialised periodontal nozzle and glycine powder reduces the amount of biofilm attached on titanium surface significantly. However, this 'polishing' is accompanied by increase in surface roughness of the titanium disk.

KATE MCELROY

Evaluation of direct pulp capping of permanent teeth in general practice – a PBRN study

Supervisors: Lara Friedlander, Suzanne Hanlin, Dr Ben Motidyang, A/P Mary Cullinan, Faculty of Dentistry; Dr Claire Cameron, Preventive and Social Medicine DSM

Funder: Southern Trust – Otago Medical Research Foundation

ARCH (Applied Research through Clinicians Hands) was recently established as Practice Based Research Network (PBRN) in New Zealand (NZ) with the objective of engaging academics and clinicians in collaborative research. This inaugural PBRN study investigated the use of direct pulp capping (DPC) as a treatment procedure in NZ dental practices. A literature review informed the project prior to distribution of an online survey to NZ dentists. Quantitative and qualitative data analysis was undertaken. Respondents indicated that DPC is part of routine practice for NZ dentists. Most had updated their knowledge, understanding and practices around the management of an exposed pulp and DPC was seen to be a viable treatment option for patients.

DEEPA MISTRY

Candida albicans Cdr1p pump function

Supervisors: Prof Richard Cannon, Dr Masakazu Niimi, Dr Kyoko Niimi, Faculty of Dentistry

Funder: Deloitte – Otago Medical Research Foundation

Candida albicans, an opportunistic fungal pathogen affecting the immunocompromised, can become resistant to currently used azole drugs. A drug efflux pump, Cdr1p, in the plasma membrane is responsible for this azole resistance. Amino acids, G521 and A713 have been found to be important for Cdr1p function. We hypothesised that G521 affects the inhibitor binding and the entry of substrates into the pump. DNA sequencing and phenotypic characterisation of G521- derived resistant strains revealed that G521 acts like a gate and controls Cdr1p substrate and inhibitor access and binding. This discovery will facilitate future development of drugs that inhibit Cdr1p-mediated efflux.

JEFFREY ONG

Genetic regulation of drug resistance in yeast

Supervisors: Dr Mikhail Keniya, Dr Brian Monk, Faculty of Dentistry

Funder: Allan Wilkinson Scholarship – Otago Medical Research Foundation

This project aimed to identify the component(s) in Bacto™ Peptone that activate Pdr1p-mediated multidrug resistance in *Saccharomyces cerevisiae*. Fractions soluble in 80% acetone or in chloroform methanol that were eluted with ~40% acetonitrile in 0.1% trifluoroacetic acid from a C-18 column by reverse-phase chromatography contained species making a major contribution to the activation of Pdr1p. It is proposed that those species might be sterols and liquid chromatography mass spectrometry could be used to test this idea. By identifying the molecules activating to Pdr1p, antagonists may be developed to block the xenobiotic binding site of Pdr1p and prevent the activation of multidrug resistance.

SANIKA RANGNEKAR

Outcomes of direct pulp capping of permanent teeth in general practice – A pilot PBRN study

Supervisors: Lara Friedlander, Suzanne Hanlin, A/P Mary Cullinan, Faculty of Dentistry

Funder: Sir John Walsh Research Institute

Records of patients aged between 6-25 years who received direct pulp caps (DPC) on permanent dentition, between 01/01/08 and 31/12/10, were reviewed in two dental practices to investigate outcomes of DPC. Qualitative data was collected in reflective journals to compare ease of data collection between Practice1's paper based records (PBRs) and Practice2's electronic health records (EHRs). Twenty-five teeth at Practice1 and five teeth at Practice2 had DPCs. EHRs eased cohort identification. In PBRs, deciphering handwriting and accessing multiple data sources was time consuming. DPCs were uncommon at both practices. Initial assessment indicates EHRs may provide faster and easier data collection.

JOYCE TANG

Understanding the electrochemistry of the fungal ABC transporter Cdr1p

Supervisor: Dr Brian Monk, Faculty of Dentistry

Funder: Crowe Horwath – Otago Medical Research Foundation

ATP binding cassette transporters play a pivotal role in the development of xenobiotic resistance. Two highly conserved features, the pairs of nucleotide binding domains and the pairs of transmembrane domains, suggest ABC transporters may be electrogenic primary pumps because ATP hydrolysis generates protons and transported substrates are partially positively charged. This study aimed to confirm the concept that overexpression of the *Candida albicans* Cdr1p drug efflux pump confers on yeast the ability to produce an enhanced electrochemical gradient at the plasma membrane and to test whether this applies more broadly to efflux pumps of the ABC transporter superfamily.

DOROTHY TEO

Effects of abrasive grinding and subsequent polishing and overglazing on dental ceramics

Supervisors: Dr Basil Al-Amleh, Dr Neil Waddell, Faculty of Dentistry

Funder: Division of Health Sciences

The aim of this study was to evaluate overglazing and polishing as surface treatments on the flexural strength of dental ceramics (IPS emax Ceram, IPS Empress and IPS e.max Press). Ceramic discs were fabricated into a size of 10mm in diameter and 2mm thick and were randomly categorised into polished group (P), polished and overglazed group (PO) and overglazed group (O). They were then subjected to fracture testing using the piston-on-three ball method and fracture origin was determined under SEM. Both overglazing and polishing were shown to be effective although to differing extents. Overglazing was also found to be more homogeneously smoother than polishing.

CHIA-WEN YEH

Characterisation of non mutans *Streptococci* from plaque samples of children undergoing comprehensive restorative treatment for severe early childhood caries

Supervisor: Dr Nicholas Heng, Faculty of Dentistry

Funder: EK Crow Scholarship fund

Previous microbial diversity studies involving next-generation DNA sequencing technology suggest that mutans group streptococci may not be the only culprits and that certain pioneer species such as *Streptococcus sanguinis* may also have a cariogenic role. Moreover, strains of *S. sanguinis* can be isolated on agar specifically formulated to cultivate mutans streptococci. This project aimed to characterise, using microbiological and molecular techniques, the streptococcal species isolated from young children undergoing comprehensive restorative treatment for severe early childhood caries. Mutans Selective Agar (MSA) was used as the isolation medium and no less than eight streptococcal species (including *S. sanguinis*) were cultured. Surprisingly, lactobacilli and a strain of *Staphylococcus aureus* were also isolated from MSA.

BDS (Honours) research students 2013-14

BDS (Honours) 2013

Name	Project title	Primary supervisor	Other supervisor(s)
Howard Chao	Does the presence of an inadequate coronal restoration or periapical lesions on radiographs influence assessment of the quality of root canal fillings?	Assoc Prof Nick Chandler	Dr Jonathan Broadbent
Peter Coghlan	Temporomandibular Disorder and Bruxism: Childhood and Adolescent Aetiologies?	Dr Jonathan Broadbent	Prof Murray Thomson, Dr Lyndie Foster Page
Krystal Fernandes	Smoking Cessation Interventions Among Dental Hygienists and Therapists in New Zealand	Ms Colleen Murray, Dr Jonathan Leichter	Dr Jonathan Broadbent
Sarah Twine	Overcoming Human Tumour Chemotherapy Resistance	Dr Masakazu Niimi	Dr Kyoko Niimi, Prof Richard Cannon
Amy White	The Relationship Between Adults' Chewing Behaviours and Being Overweight	Prof Mauro Farella	N/A

BDS Honours research students 2014

Name	Project title	Primary Supervisor	Other supervisor(s)
Omer Al-Sabiry	The bacterial effects of light-activated disinfection (LAD) with FotoSan and ultrasonic instrumentation on titanium discs: an in-vitro study	Andrew Tawse-Smith	Dr Geoffrey Tompkins
Vivian Chen	Pay it forward: Measuring social accountability following dental education	Dr Lyndie Foster Page	Prof Karl Lyons, Dr Jonathan Broadbent, Prof John McMillan
Catherine Edwards	Comparative study of the effectiveness of different single-use tips for air-water syringes	Dr Vincent Bennani	Assoc Prof Nick Chandler, Dr Bronwyn Lowe
Stephanie Lee	Optimal gingival retraction with minimal soft tissue trauma – a literature review on recommended materials and techniques	Dr Donald Schwass	Dr Geoffrey Tompkins
Ernie Park	A retrospective longitudinal morphometric analysis of the dimensional changes in the nasopharynx and adenoids	Prof Mauro Farella	Sophie Gray
Jennifer Tirtawijaya	Dunedin water fluoridation	Dr Jonathan Broadbent	Prof Murray Thomson, Assoc Prof Barrie Peake

Visiting seminars, 2013-14

Date	Name	Institution	Title of Seminar
28 Jan 2013	Stefan Prost	Department of Anatomy University of Otago	Forensic anthropology training in the US: From the Bodyfarm in Tennessee to a quarry in Pennsylvania
20 Feb 2013	Professor WM Tilakaratne	Faculty of Dental Sciences University of Peradeniya	Mechanisms of pathogenesis and malignant transformation of OPMD
27 Feb 2013	Professor WM Tilakaratne	Faculty of Dental Sciences University of Peradeniya	Prognostic markers of Oral Squamous cell carcinoma
6 Mar 2013	Professor Sandro Palla	University of Zurich (retired 2012)	Orofacial pain: Principles of management
13 Mar 2013	Professor Sandro Palla	University of Zurich (retired 2012)	Bruxism revisited
20 Mar 2013	Professor Sandro Palla	University of Zurich (retired 2012)	Must a partial denture be unaesthetic
25 Mar 2013	Professor Sandro Palla	University of Zurich (retired 2012)	A different perspective of dental occlusion: neurocognitive aspects
3 Apr 2013	Professor Luigi Gallo	University of Zurich (retired 2012)	Biomechanical effects of occlusal splints: new insights
2 Aug 2013	Mr Matthew Gibson	Simplant	Treatment planning for implants in Three Dimensions
30 Sep 2013	Dr Nick Cole	Periodontist, Auckland	Clinical update on the 3i Implant System
2 Oct 2013	Dr Mark Jermy	Department of Mechanical Engineering University of Canterbury	Viscoelastic simulants for brain material in studies of ballistic wounding
10 Oct 2013	Professor Sonia Williams	School of Dentistry University of Leeds	Oral health – Nutritional implications
26 Nov 2013	Dr Barry Gibson	School of Clinical Dentistry The University of Sheffield	The changing meaning of dentine hypersensitivity
26 Nov 2013	Dr Sarah Baker	School of Clinical Dentistry The University of Sheffield	What psychosocial factors influence children's oral health
27 Nov 2013	Dr Barry Gibson & Dr Sarah Baker	School of Clinical Dentistry The University of Sheffield	The development and evaluation of person-reported outcome measures in dentistry
29 Nov 2013	Dana Teusner & Emmanuel Gnanamanickam	Australian Research Centre for Population Oral Health (ARCPOH) University of Adelaide	Methodological issues in oral health research: Addressing the complexity in analysing oral health data
6 Dec 2013	Professor Al Brown	School of Medical Sciences University of Aberdeen	How a fungal pathogen adapts to its human host
1 Apr 2014	Professor Paul Brunton	School of Dentistry University of Leeds	Oral and dental research: a personal view
17 Apr 2014	Stefan Prost	Department of Anatomy University of Otago	Forgotten atrocities: Forensic investigations of war crimes and crimes against humanity in Somaliland (Somalia).

Date	Name	Institution	Title of Seminar
5 May 2014	Professor Qing Li	School of Aerospace, Mechanical and Mechatronic Engineering University of Sydney	Modelling of clinical issues related to dental biomaterials and biomechanics
16 May 2014	Dr Denise Bailey	Melbourne Dental School University of Melbourne	Using ICDAS – and just how reliable is it in practice?
1 Aug 2014	Mr Matthew Gibson	Simplant	Simplant: Treatment planning for implants in Three Dimensions
13 Aug 2014	Dr Ben Daniels	HEDC University of Otago	HEDC and support for clinical research in the Faculty of Dentistry: Mixed method research design
12 Sep 2014	Associate Professor Dew Agustina	Faculty of Dentistry Gadjah Mada University	Oral health of Indonesian elderly
17 Sep 2014	Kishore Rajendran	Centre for Bioengineering University of Otago	MARS Spectral Imaging for orthopaedic applications

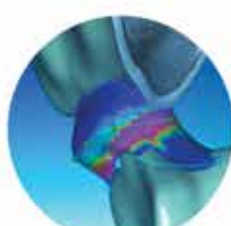
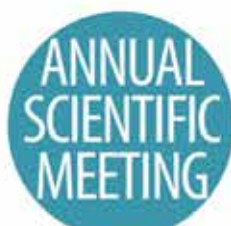
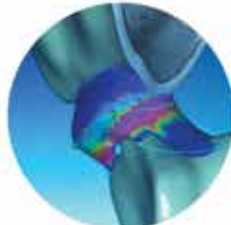
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