

Sir John Walsh Research Institute Research Report 2015-16

The Sir John Walsh Research Institute (SJWRI), a Research Centre of the University of Otago from 2012 through 2016, 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 20 internationally in 2015-16, 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 comprehensive record of our research activities and achievements for 2015-16. Further details on our research programmes, activities and achievements, and profiles of researchers are available from our website otago.ac.nz/sjwri.

Dr James Smith

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Compiled by James Smith

This *Research Report of the Sir John Walsh Research Institute 2015-16* was compiled by James Smith, with thanks to Prof Richard Cannon, Nicole Summerfield, Fiona McDonald and the staff and students of the Sir John Walsh Research Institute.

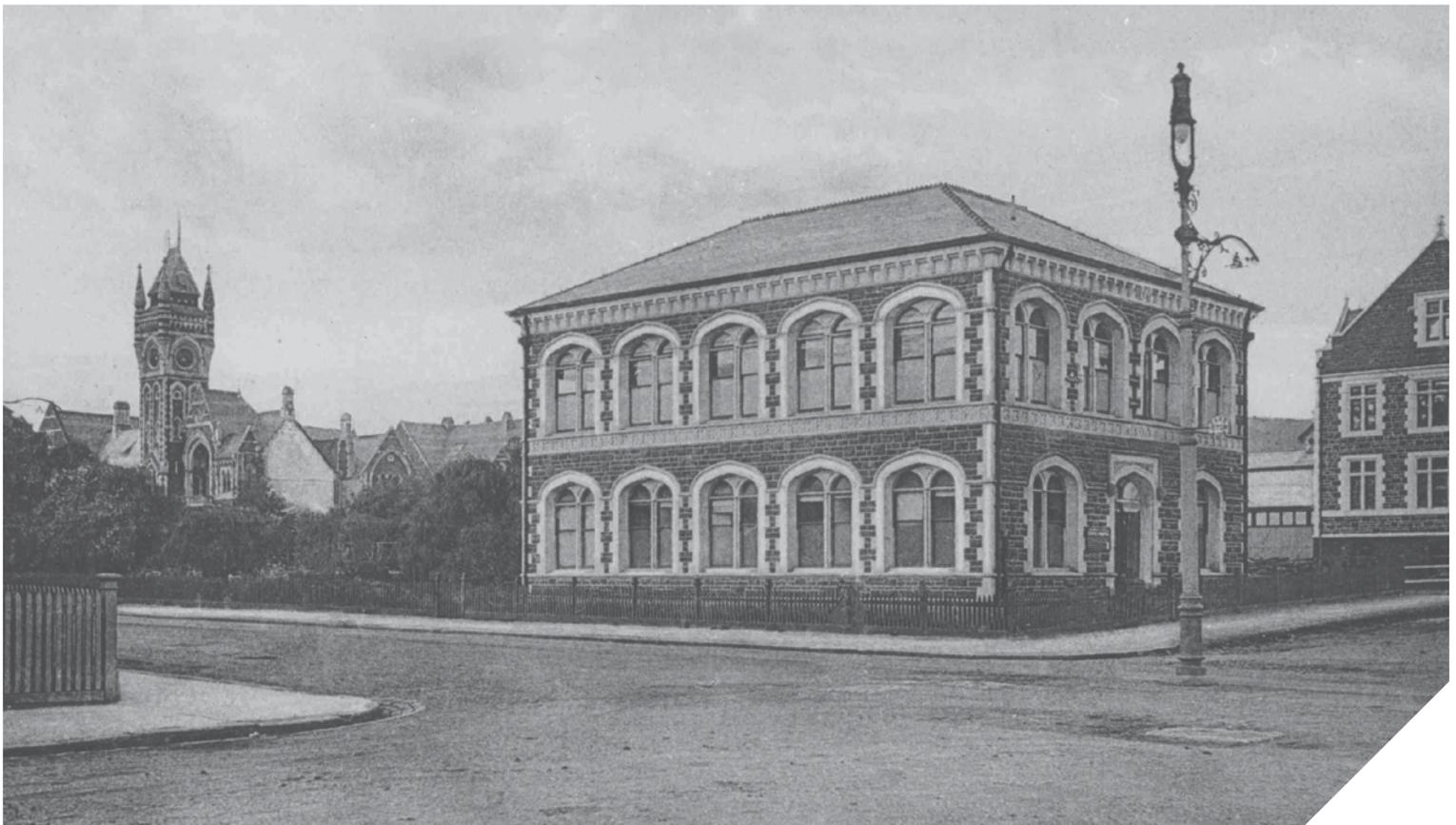
Follow us on Twitter: twitter.com/SJWRI

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1907

University of Otago School of Dentistry founded

The original School of Dentistry was housed at 80 Union Street, a category 1 registered heritage building now used as the University Staff Club.



Introduction from the Dean



The University of Otago's Faculty of Dentistry is, as we all know, very highly regarded within New Zealand and internationally for its excellence both in research and dental education. The Faculty's very diverse, research portfolio covers a wide variety of fields and research in the Faculty is quite simply outstanding. This I am sure will be reflected in the next PBRF round, for which we are currently preparing, where I am sure we will see the excellence of our research acknowledged. The quality of our research and the reputation of the Faculty of Dentistry has recently been further recognised by the QS rankings which have placed the School in the top 20 of all Dental Schools internationally.

Our centre of excellence in dentistry was also this year the most highly ranked (QS rankings) University department across all New Zealand. This tells me that this success is all about the people who work in the Faculty, given the state of the various buildings the Faculty currently occupies. We are, of course, getting a brand new school and facilities and we plan to develop the dental school and extend its footprint into the North Island as many of you will be aware. This is an exciting time for the Dental School because we can build on our, as I say, excellent reputation in the new facilities when we plan to excel even further. This is crystallised in our vision for the future to be a Top 10 Dental School by 2025. We plan in 2017 and beyond to grow our clinical and translational research which will further complement our existing research themes.

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

Professor Paul Brunton
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Report from the Director



The Sir John Walsh Research Institute (SJWRI) was established in 2007, and so it is approaching its 10th anniversary. This is, therefore, an appropriate time to look back at our achievements and plan for the next decade. University of Otago Faculty of Dentistry oral health, dental, and biomedical research is carried out within SJWRI research programmes. Since their inception, these areas of research strength have gradually evolved. This year, for example, the Clinical Research programme has become the Clinical and Translational Research programme. This highlights the desire of the SJWRI to 'translate' research results into clinical, social, educational, and economic benefits with the aim of increasing the effect, or impact, of the research. There are, indeed, translational components to all of the other research programmes that include: the development of new materials; devices or technologies; new teaching modalities; or new ways of treating patients and delivering services.

Over the last two years the SJWRI has continued to develop a Practice-Based Research Network called ARCH (Applied Research through Clinicians' Hands). This network is a collaboration between researchers in the SJWRI and community practitioners in which they undertake, primarily, clinical research of mutual interest to enhance patient care and delivery, systems assessment, quality assurance, and other factors affecting health care policy. Importantly, the topics to be investigated come from the practitioners, and so it is highly likely that research outcomes will be 'translated' or implemented in clinical practice.

Research that remains unread, unused or unimplemented is of limited value. Traditionally, the outputs of research are articles published in books or scientific journals; however, if the target audience does not read the journal, the potential impact of the research is reduced. As you will see from the information presented in this report, the SJWRI produces a broad spectrum of research outputs from the theoretical to the applied, and while we have great success publishing our research in high impact journals, in the last two years we have sought to expand the impact of our work by communicating our research through specialist journals, magazines, electronic, social and other media, including a regular slot on oral health by Professor Murray Thomson on National Radio. Conferences remain a good way of disseminating research findings through the scientific community and this year, for the first time, the SJWRI had an exhibition booth at the General Session of the International Association for Dental Research, in Seoul, Republic of Korea. The SJWRI also disseminates its research results through its own mini-conferences, and accounts of the successful 2015 Research Day and the 2016 Research Symposium are included in this research report.

A recent initiative by the SJWRI has been to increase community engagement by explaining the science behind dentistry and dental procedures. This has involved providing hands-on activities at the Otago Museum for World Oral Health Day and taking these activities to schools. With support from the government's Unlocking Curious Minds fund, Dr Carolina Loch has run an activity called Making a good impression: from fossils to false teeth in several primary and intermediate schools. This activity explains the science behind dental impressions, helps the children make impressions and models of animal teeth and, at the same time, delivers messages on healthy diets and the importance of looking after your teeth. The project has generated several short videos on fossils, teeth and dental impressions, aimed at children, that have been uploaded to YouTube and can be accessed through the SJWRI website (otago.ac.nz/sjwri/resources).

Another way SJWRI research has impact is through informing the teaching of undergraduate and postgraduate students. The involvement of Faculty of Dentistry teachers in cutting edge oral health research ensures that graduating students leave with the most up-to-date and effective training possible and an appreciation of the value of research in the continuing improvement of clinical practice. The quality of our research-informed teaching has helped maintain the School of Dentistry in the top 12 Dental Schools in the world in the QS World University rankings in 2015 and 2016.

Looking to the future, the SJWRI wants to continue to find new and more effective ways of communicating, disseminating and implementing research outcomes. These may include the development of novel dental materials, dental devices or clinical procedures, or implementing new paradigms of oral health care policy and delivery systems. Engagement with the users of the research will be through traditional written media and oral presentations at conferences and the popular press and electronic media. We look forward to partnering with other researchers, institutions, organisations and community groups to ensure our research improves oral health in New Zealand and worldwide.

Professor Richard Cannon

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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 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 houses the Faculty of Dentistry and bears his name. The Walsh Building will be retained and renovated as the centrepiece of the redeveloped University of Otago Faculty of Dentistry complex, to be opened in 2019.



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

Our highlights

1926

Marples Building

To accommodate growth, the School of Dentistry relocates to a new purpose-built building at 360 Great King Street (now known as the Marples Building – Department of Zoology).



Publications and Research Funding summary 2015-16

Publications Summary, 2015-16

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. Data courtesy Dr Donna Hendry, Publications/Outputs Office.

Category	2015	2016
Edited Book - Research	1	1
Chapter in Book - Research	10	3
Chapter in Book - Other	1	0
Journal - Research Article	75.09	85.6
Journal - Research Other	6.47	4.42
Journal - Professional & Other Non-Research Articles	25	15
Conference Contribution - Published proceedings: Abstract	76.85	59.25
Conference Contribution - Poster Presentation (not in published proceedings)	2.5	0
Conference Contribution - Verbal presentation and other Conference outputs	9.5	10
Other Research Output	1	2
Awarded Doctoral Degree (Staff member only)	2	0
Total Unique Publication Counts for SJWRI/Dentistry	210.41	180.27

Research Funding Summary 2015-16

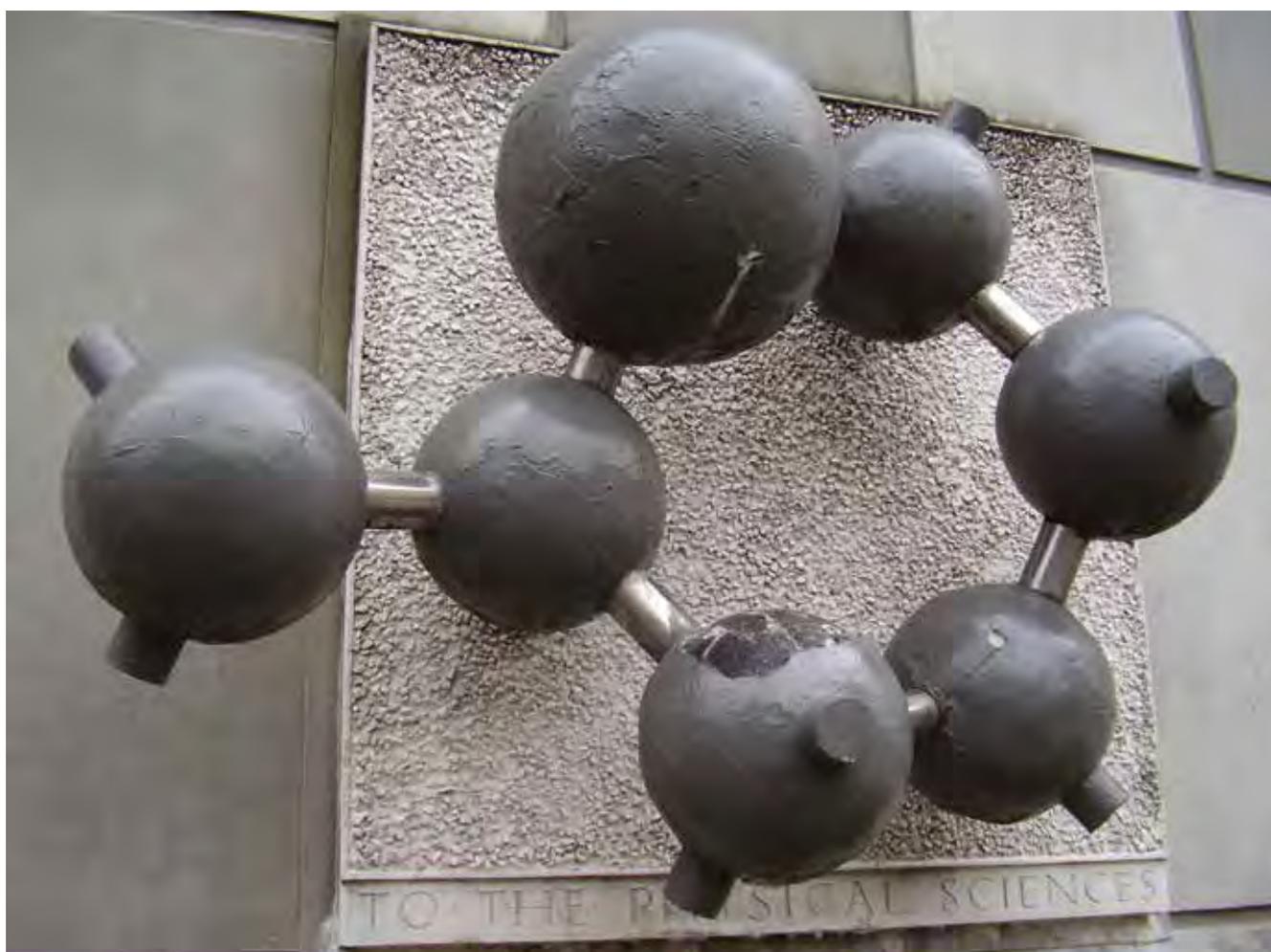
Figures below are for all research funding contracts beginning between 1 Jan 2015 and 31 Dec 2016, led by Sir John Walsh Research Institute/Faculty of Dentistry Principal Investigators. This does not reflect contracts beginning in earlier years which ran through the 2015-16 period. Research funding data courtesy Dr John Milnes, Research and Enterprise.

Contracting Body	Total
Cure Kids	\$31,782
DMG Dental Materials Gesellschaft mbh	\$32,068
Downie Stewart	\$34,916
Foundation for Orthodontic Research & Education, NZAO (FORENZAO) Charitable Trust	\$9,668
Health Promotion Agency	\$10,000
Health Research Council of NZ (HRC)	\$2,391,489
Manuka Health New Zealand Ltd	\$56,428
Maurice and Phyllis Paykel Trust	\$45,500
Ministry of Business, Innovation and Employment	\$2,225,778
Neurological Foundation of New Zealand	\$12,000
New Zealand Dental Association Research Foundation and Ministry of Health Oral Health Research Fund (administered by NZDARF)	\$368,582
New Zealand Lottery Grants Board	\$251,150
New Zealand Society of Gastroenterology Inc	\$5,000
New Zealand Society of Periodontology	\$8,000
Otago Innovation Limited	\$30,000
Resorba Medical GmbH	\$53,430
University of Otago	\$220,617
Wiley Periodicals Inc	\$144,800
Grand Total	\$5,931,208

Postgraduate Degree Completions 2015-16

Figures below are for all postgraduate degree completions between 1 Jan 2015 and 31 Dec 2016, for which the SJWRI or other Dentistry departments were listed as host department.

Degree	2015	2016
Doctor of Philosophy (PhD)	3	6
Doctor of Clinical Dentistry (DClinDent)	8	12
Master of Dental Technology (MDentTech)	0	2
Master of Dental Surgery (MDentSurg)	1	0
Postgraduate Diploma in Clinical Dentistry (PGDipClinDent)	2	3
Postgraduate Diploma in Clinical Dental Technology (PGDipCDTech)	24	8



World ranking successes



The 2015 and 2016 QS World University Subject Rankings identified the University of Otago's Faculty of Dentistry as among the top 10 best in the world. Dentistry was included as a subject for the first time in 2015, with Dentistry at Otago ranked 8th in 2015 and 12th in 2016.

Dentistry is the highest-ranked subject from any New Zealand university, and the first subject taught at a New Zealand University to ever feature in the world's top ten. Dentistry was joined by Psychology (ranked 31st) as one of two Otago subjects to feature in the world's top 50 in 2015; a feat repeated in 2016.

The QS subject rankings are derived on the basis of a combination of factors including Academic Reputation (how academics from other universities rate a university in a particular subject area), Employer Reputation (how employers rate a university in a particular subject area), and citations (the extent to which the work of an academic in a subject area is quoted or referenced in the work of others). Research performance, led by the achievements of the Sir John Walsh Research Institute, are critical to the Faculty's high ranking.

University of Otago Vice-Chancellor Professor Harlene Hayne said she is delighted that the School of Dentistry's international reputation for excellence has been formally recognised through the QS rankings.

"I would like to pay tribute to the School's staff for their commitment to providing high quality undergraduate and postgraduate education while also undertaking internationally leading research," Professor Hayne said.

The University had already identified the School as a top performer and made a strategic decision to invest in a major re-development of its facilities, she said.

Deputy Vice-Chancellor (Academic) Professor Vernon Squire said that Otago's pleasing showing in the QS subject rankings reflect Otago's broad and deep capabilities across a range of academic disciplines.

"Our solid performance in these rankings follows the University last month [February 2016] being awarded the highest possible international quality rating of five stars plus from QS Stars rating system," Professor Squire noted. QS Stars is a quality evaluation system in which universities are assigned a stars rating based upon their performance in an institution-wide review.

The five star plus rating is a mark of quality and excellence that is awarded to universities described by QS as "an institution (that) is not just world-class, but an elite destination to which the very best students and faculty worldwide will aspire. Its brand name will transform the résumé of anyone connected with it".

Building programme

The University of Otago Council has agreed to spend in excess of \$125 million on a state-of-the-art new Dental School.

"The University Council and executive are delighted to now be in a position to announce the plans to the wider University and the Dunedin community," said University Chancellor John Ward and Vice-Chancellor Professor Harlene Hayne in a joint statement issued in April 2015. "These substantial developments will give the University a significant boost nationally and internationally, and will reinforce our stellar reputation for teaching and research. Quality environments and technology of the highest possible standards are vitally important as we go forward as a leading New Zealand research and educational institution."

These buildings will be tasteful, modern and energy efficient, deploying the latest construction methods, and they have been designed with great care to ensure they reflect our already world-class campus setting.

"We are investing in the quality of our educational environment at a time of intense competition in the tertiary sector both nationally and internationally. Both projects will also give Dunedin and Otago citizens a major injection of confidence that the city is in good heart. The level of construction on campus will be on a scale that has not been seen for many years and will provide a significant boost to the regional economy. We believe that these projects, on completion, will provide substantial benefits for our staff, students and patients."

The University appointed Jasmax, an Auckland-based architectural firm that has experience in providing hospital-type facilities for the design work for the new Dental School. In keeping with values in the 2010 Campus Master Plan, the research and teaching facility, which undertakes all the dental training for New Zealand, will reflect excellence in architecture.

The heritage-listed glass-curtain facade will be replaced with a replica facade that meets current standards of weather-proofing and technology. The mosaic north-facing wall will also be strengthened and renovated, with both aspects to be undertaken with the assistance of Salmond-Reed Heritage specialists. There will also be ongoing consultation at each stage of this adaptive re-use project with Heritage New Zealand, which lists the modernist building as a Category 1 historic place.

The Dental School's original Walsh Building was constructed in Great King Street in 1961, with the West Wing extension completed in 1981, behind the original building and next to the Dental School car park.

To make way for the new Clinical Services Building, the non-listed west wing extension and the remainder of the University's Barningham building behind the

existing Walsh building were removed. The new 8000 square metre clinical building, as well as an 1800 square metre atrium and "social space" linking it to the Walsh building, is being constructed on this footprint.

The 8000 square metres of space in the Walsh building will be refurbished to house laboratories for research, academic offices, student support and teaching spaces.



The future ... An artist's impression of the atrium which will link the Faculty of Dentistry's new School of Dentistry Building and the refurbished Walsh Building.



An artist's impression of the interior of the new School of Dentistry.



An artist's impression of the exterior of the new School of Dentistry.



“The new building will have its own look, but in size and scale it will link back to the heritage and existing architecture of the 1960s Walsh building,” said Property Services Director Barry MacKay.

This clinical building will house clinical services including radiology, oral surgery, paediatric dentistry, undergraduate clinics and orthodontics that are currently housed in the Walsh building. In total there will be 211 new dental chairs, 61 more than the existing dental school.

Large multi-national company Sirona Dental has been confirmed as the supplier for all the School’s dental and radiography equipment, so several partnering initiatives are being set up with the firm; including further education, research, product testing, and forums with other universities.

“This is seen as an exciting and strategic relationship for the University, now and for the years ahead,” said Mr MacKay.

Dean of the Faculty of Dentistry Professor Paul Brunton said staff at the Dental School are excited that the plans have advanced to this stage.

“The physical environment is really important not only for staff and students, but also for the patients who access our clinical services.

“The Faculty already has an excellent reputation, but a new facility will allow us to grow, develop and innovate such that I anticipate we will, in due course, be the best of the best in Australasia and beyond.”

Learn more about the new University of Otago Faculty of Dentistry building project, featuring interviews with staff, students and neighbouring business owners: youtube.com/watch?v=0hz7Eq3znCU

Contractor appointment

In August 2016, the University’s Project Working Party approved the appointment of the contractor on Wednesday 3 August, and Leighs Cockram JV, a joint venture company made up of Christchurch-based Leigh’s Construction, and Australian-based Cockram’s Construction, was subsequently notified.

The appointment came after a two-stage open tender process run via the Government tendering website over 12 weeks. At the conclusion of the process, which evaluated price and non-price attributes of tenders such as construction methodology, quality management, experience with similar projects and managing the links between the existing operations, services, and the new build, Leighs Cockram JV scored the highest and were recommended as contractor. The total value of the project, which includes

demolition, the construction tender just announced, and then fit-out with all equipment and furnishings, has been estimated at around \$125 million.

University Chief Operating Officer Stephen Willis says the joint venture of Leighs and Cockram brings a unique level of experience and appreciation for health-related facilities, and they are “among a few in New Zealand that we believe are capable of successfully delivering a project of this size and complexity.”

“Leighs Cockram JV brings with them recent relevant experience with a number of the team having just completed the Burwood Hospital project in Christchurch. We also know there will be significant engagement locally from the sub-contract and labour market, which is fantastic for Dunedin, and the local economy.

“It’s great to see all the hard work paying off to get to this stage. All the stakeholders, including the Faculty of Dentistry, the Division of Health Sciences, University Property Services and our students, are incredibly excited to finally be starting construction,” he says.

The project managers, Aurecon, who were appointed in late 2015 have, in conjunction with the Faculty of Dental and University, re-thought the staging and decanting methodology, resulting in a single-stage redevelopment of the Walsh Building. Originally this was going to be done in two stages, with half the building occupied during construction. A revised decant strategy will see research, dental technology, histology and some teaching temporarily relocated predominately to the northern end of the campus. The project team has focused on utilising existing space, as opposed to building new temporary space. It is likely the temporary facilities will be in use for 18 months to two years.

“This (strategy) will result in a shorter programme, as well as making it safer and more comfortable for students, staff and patients during the works. The new clinical school building will be constructed first and is anticipated to be complete mid-2018, at which point the existing Walsh building will be vacated and refurbished with completion expected in mid-2019.”

The process of appointing a main contractor for the construction of Otago’s new Faculty of Dentistry included evaluating the company’s “innovation and consideration” for the Faculty’s existing activities throughout the project. The Faculty provides the only dental training in New Zealand, and treats patients from the community as part of that training.

Associate Dean, Capital Build, Don Schwass says minimising disruption is a very high priority, “but the practicality of expensive multi-million dollar building contracts – with performance penalties – prevents all disruption being avoided.”

Archaeological finds on Faculty of Dentistry site

Artefacts painting a picture of some of Dunedin's early residents were unearthed by staff of Otago's Department of Anthropology and Archaeology as site preparation for the University's Faculty of Dentistry redevelopment got underway in early 2015.

Early preparation work for the much anticipated redevelopment identified the site as part of a once-bustling domestic and light-industrial centre of the still young, but rapidly growing city of Dunedin.

Research Fellow, Emma Brooks says early photos and plans show that from at least the 1860s the land behind the current Faculty of Dentistry contained shacks, workshops and houses as well as a set of buildings associated with the Victoria Foundry run by Barningham and Co in the late 19th century.

The University was required under the Heritage New Zealand Pouhere Taonga Act to commission an archaeological investigation of the site in order to identify, record and provide an interpretation of all earlier structures and work zones on the site and has been able to harness in-house expertise. The archaeological work is being carried out by a team from Southern Pacific Archaeological Research (SPAR), a research and consulting unit within the Department of Anthropology and Archaeology. The work is led by SPAR Director Professor Richard Walter, with other SPAR staff and graduate students. Ms Brooks is SPAR's Research Manager.

"Careful planning between Property Services and the SPAR team has resulted in the commencement of the

archaeological investigation of the site well ahead of the construction schedule to ensure that any possible delays as a consequence of archaeological finds can be avoided," Ms Brooks said.

"The archaeologists have started work underneath the Barningham Building (one of the former foundry buildings) which has recently been demolished and which until recently housed the Multi-Disciplinary Health Research Unit, and Property Services itself, prior to that," she said.

The team exposed several features associated with 19th century structures on the site, including a cobblestone floor, rows of well-preserved timber posts, and timber-lined drains. Many artefacts have been recovered, including many pairs of leather boots and shoes, clay pipes, bottles and ceramics, and these have the potential to reveal information about the nature of activities that took place on the site.

"This was not a wealthy part of Dunedin and on this city block houses were crammed in with commercial and industrial activities," said Professor Walter.

Professor Walter said these archaeological finds contribute to our understanding of Dunedin's past and help build up a picture of how early residents lived and worked.

"It is not often that you get to carry out an archaeological excavation right on your back doorstep. This has provided a valuable training opportunity for many of our students who are planning careers as professional archaeologists."



Archaeology staff examine the site of the former Barningham Building for relics of early Dunedin as part of the Dental School redevelopment.

Time-lapse camera

A time-lapse camera is recording the largest capital redevelopment the University has ever undertaken.

From its spot on top of Zoology's Marples Building in Great King Street, the camera has been snapping the site of the \$125 million project since February 2016, taking a photo every minute.

Those images can already be seen refreshing every 10 seconds at otago.ac.nz/dentistry/about/new-building-project

Camera footage of the activity lets people get an instant visual update on the rebuild from wherever they are, including alumni, dental and academic colleagues, and students off campus.

The final footage will also interest people involved in planning, development and construction, along with the public and project stakeholders.



Expected timeframes

Early 2017	Continuing detailed excavation, piling and in-ground concrete works, services diversions and installation.
Mid-Late 2017	Decant of Walsh Building laboratory spaces.
Late 2017-early 2018	Decant of Walsh Building Dental Technology and office spaces.
Mid-2018 -	Expected opening of Clinical Services Building and subsequent handover of the Walsh Building for refurbishment.
Mid-to-late 2019	Completion of Walsh Building

Staff awards and achievements

Professor John Broughton awarded Companion of the New Zealand Order of Merit



Professor John Broughton

Professor John Broughton was awarded the Companion of the New Zealand Order of Merit (CNZM) in the Queen's 90th Birthday Honours in June 2016 for his services to Māori health, theatre, and the community.

Professor Broughton said he was not only very proud to be an academic staff member but the University is also "the best employer in the world".

The Professor in Māori Health says he is proud of being an Otago graduate as well.

That is especially because his late father graduated in medicine from the University during World War II, his sister Jane and brother Philip are Otago alumni, and a third generation of nieces and nephews has graduated from the University as well; in Commerce, Law, Physical Education, Physiotherapy and Marketing.

Professor Broughton says the honour should mean a lot for the University because "it is really a reflection of the incredibly wonderful colleagues I have had the privilege of working with" at the Faculty of Dentistry, Preventive and Social Medicine, Te Poutama Māori (which supports the development of Māori academic staff), and the Māori academic staff caucus, along with the students he has had the privilege of encountering.

Professor Broughton feels humbled by the honour, which has made his family very proud, especially the whānau whanui at both Kohupatiki Marae (Hastings on his Ngāti Kahungunu side) and at Puketeraki (Karitane on his Ngāi Tahu side).

The CNZM is also recognition for causes he is passionate about, including being the foundation Chairman of the New Zealand Institute for Cancer Research Trust, a role he has filled for about 30 years.

The Trust helped create the University's Chair in Cancer Pathology by donating a million dollars to the Dunedin School of Medicine, which was matched by a million dollars from the Government, through the Leading Thinkers programme.

Professor Broughton was also founding Director of the Ngāi Tahu Māori Health Research Unit. He is responsible for the cultural competency and Māori oral health component of the dental undergraduate course, and established the whānau dental clinic Te Whare Kaitiaki in the Faculty of Dentistry in 1990. He is Director of the clinic.

As a New Zealand Māori playwright, he has written and co-produced more than 22 theatre productions that have been performed nationally and internationally, and he has received the Bruce Mason Playwright Award. Professor Broughton's plays include Michael James Manaia, Te Hokinga Mai (The Return Home); Nga Puke (The Hills), and ANZAC and The Private War of Corporal Cooper.

He also wrote the libretto for the musical ShowBand Aotearoa, with music by Rim D Paul, and is a Life Member of the Araiteuru Marae Council.

Professor Broughton is also the 2016 recipient of the Maarire Goodall Award, awarded by Te Ohu Rata o Aotearoa—the Māori Medical Practitioners' Association—at the September Hui-ā-Tau Awards Dinner at Papakura Marae, Auckland.

The Award acknowledges and honours long service and unrecognised commitment to Māori health by a Māori health worker, and was established in 1998 by University of Otago alumnus Dr Maarire Goodall.

This award acknowledges and honours John's long service to patients, students, and community, and his commitment to Māori health. John has had a long-term role in supporting students in Health Sciences at Otago, and has made a huge contribution to Māori health in New Zealand through his research and work in the wider community.

Dr Goodall graduated from Otago in the early 1960s. He worked in Thailand for a number of years, and later moved to the United States where he was part of the 'Freedom Riders'—a group of idealists from the north who rode buses into the heart of the southern states in support of the African American struggle for equality.

Dr Goodall worked for nearly four years in Chicago Medical School's Institute for Medical Research, before being called home to lead a cancer research programme at Otago (1966–1985). He then agreed to take up a position at the National Cancer Institute (USA), but was asked to assist with research for the Waitangi Tribunal. He did this for the next five years until ill health intervened. After he retired, Dr Goodall founded Aoraki Press and also founded two charitable cancer research institutes. Dr Goodall passed away in June 2015.

Professor Alison Rich admitted to Royal College of Pathologists



Professor Alison Rich (left) at the Royal College of Pathologists admissions ceremony for new fellows.

The world-class standard of oral pathologist **Professor Alison Rich's** endeavours has been recognised by the London-based Royal College of Pathologists, which in June 2016 added her to their roll of Fellows after assessing her published works.

Professor Rich said "It's an honour and an achievement to have that international recognition. To be judged by your peers for the quality of your research work is satisfying. I'm a diagnostic oral pathologist, which

essentially means I diagnose lumps and bumps from the oral region, mostly via biopsies sent from dentists and dental specialists from around New Zealand."

As Faculty of Dentistry Deputy Dean, Head of the Department of Oral Diagnostic and Surgical Sciences, and leader of the Oral Pathology training programme, Professor Rich said her Fellowship is useful for staff and postgraduate students.

"It's good that they can be exposed to a different qualification, to see different international options you have for earning further qualifications in oral pathology.

"As a Fellow, I also have access to all the Royal College of Pathologists' databases, expert groups and publications, which is helpful to me and our team and, through that, the Dental School and University as a whole."

Faculty of Dentistry Dean, Professor Paul Brunton said he is "delighted to see that Professor Rich's significant and sustained contribution to Oral Pathology has been recognised with such a prestigious award."

Professor Rich was informed that her Fellowship application had been successful late in 2015 and attended the admission ceremony in March 2016.

"It was held in Middle Temple, an amazing old London building [which had been the Knights Templar headquarters until 1312]. I was one of three people accepted as Fellows in the published works category."

The event may have reminded Professor Rich of how far she'd come since graduating with her undergraduate degree from Otago in 1976. She spent two years in her first job at Christchurch Hospital, then went on to enrol at the University of Melbourne, Australia, for her master's. She was subsequently offered a staff position, but after many years the attraction of family ties drew her back to Dunedin in 1998. She began at the Dental School as a Senior Lecturer in Oral Pathology, working her way up to her current position.

Professorial promotions

SJWRI Clinical and Translational Research Programme Director **Warwick Duncan** was among a select group of fifteen leading University of Otago academics promoted to full professorships in January 2015, on the basis of their world-class research, teaching and service to the University and community.



Warwick Duncan

Professor Duncan, who also served as Associate Dean (Facilities and Clinical Services) for 2014-15, is 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 has developed research interests in forensic biology and victim identification.

A further 39 University of Otago academics were promoted to Associate Professor in 2015, including Oral Sciences researchers Jonathan Leichter and Brian Monk (Molecular Microbiology) and Neil Waddell (Oral Rehabilitation, Director of our Biomechanics and Oral Implantology research programme).

At Otago, full professorships are conferred only after a rigorous selection process that thoroughly evaluates academic quality and involves input from international experts. Candidates must have demonstrated records of sustained excellence and outstanding leadership in research, teaching, and service to the University and their external communities.

Announcing the new professorships, Vice-Chancellor Professor Harlene Hayne warmly congratulated the new Otago professors on their success.

"These well-earned promotions are going to leading academics from across our Dunedin, Christchurch, and Wellington campuses and clearly reflect the range and depth of world-class scholarship at this university."

Darryl Tong was one of 17 University of Otago academics who were promoted to full Professor, effective 1 February 2016.

A specialist in oral and maxillofacial surgery in the Department of Oral Diagnostics and Surgical Sciences and a Lieutenant Colonel in the New Zealand Army Reserves, Tong



Professor Lieutenant Colonel Dr Darryl Tong

has a wide range of research interests including clinical (trauma and military surgery), biomechanical (forensic biology and subconcussion in sports), historical (development of maxillofacial surgery) and development of surgical instruments for commercialisation. His current research includes the quantification of subconcussive forces to the head and how it relates to potential long-term brain injury especially in sports and the martial arts; the development of an anatomical head model (which incorporates a simulant skin, skull and brain) for forensic blunt and ballistic trauma research and war surgery of the head, face and neck relating to operational deployment in areas of conflict, personal protective equipment and lessons learned from military medical history. He is the co-director of the South Island Interdisciplinary Brain Injury Research Group (SIBIRG) and part of the management committee for the Veterans' Health Research Group (University of Otago Research Theme).

His recently-completed PhD consisted of a historical review of the development and evolution of face-and-jaw surgery in warfare; a surgical audit; and a systematic review.

"We know what has been developed and how things evolved since World War I. Certain things work and have done so for almost 100 years, but since medicine has gone to evidence-based practice, the surgical principles so far are anecdotal."

The influence of face and jaw pioneers such as Harold Gillies (the "father of modern plastic surgery") and Henry Percival Pickerill, founding Dean of Otago's Dental School, is still felt today, says Tong. "Most of their surgical principles still apply."

For his surgical audit, Tong compared case studies from World War I with similar cases he worked on in Afghanistan, where he was deployed in 2009. Inspired by his time in Afghanistan, Tong has invented a device to help with the treatment of facial trauma in

hostile environments. His Temporary Inter Maxillary Stabilisation (TIMS) device, developed in collaboration with Associate Professor Neil Waddell, has already received commercial interest in the US.

A further 28 University of Otago academics were promoted to Associate Professor in 2016, including Vincent Bennani (of the Department of Oral Rehabilitation), Lyndie Foster Page and Geoff Tompkins (both of the Department of Oral Sciences).

Professor Richard Cannon elected President of the NZ Microbiological Society

SJWRI Director Professor Richard Cannon was elected President of the New Zealand Microbiological Society (NZMS) at its Annual Conference in Rotorua, November 2015.

Richard is Professor of Molecular Microbiology in the Department of Oral Sciences, and former director of the SJWRI Molecular Microbiology research programme before taking up his current position of SJWRI Director and Associate Dean (Research) of the Faculty of Dentistry. He undertook his biochemistry and microbiology training at the University of Cambridge, UK. His main research interest is in oral yeast: how they colonise the oral cavity; how they cause disease; and ways of preventing them causing disease.



Professor Cannon's first duty as new NZMS president was to present the highest honour of the society, the 2016 NZMS Orator Award, to Associate Professor Mary Nulsen of Massey University (pictured left with Prof Cannon).

His particular research interests focus on the human pathogen *Candida albicans*, which causes both oral candidosis and life-threatening disseminated disease. He uses molecular approaches to determine how *C. albicans* adheres in the mouth; what makes it pathogenic; how it becomes resistant to antifungal drugs; and how its drug resistance can be overcome. Richard also uses baker's yeast, *Saccharomyces cerevisiae*, as a tool to investigate fungal membrane protein structure and function.

The aim of the NZMS is to foster the generation and dissemination of knowledge of microbiology in New Zealand through networking, student support, special interest groups, a newsletter, and awards. The aims of the Society are further met by representation on national and international committees, and organisation of an annual scientific meeting and smaller workshops organised around specific themes. In addition, the society makes submissions on issues relevant to practicing microbiologists or to education policies in New Zealand.

UNESCO honours Hocken's Pickerill Papers

The UNESCO Memory of the World New Zealand Trust announced the inscription of the Hocken Library's Pickerill Papers on Plastic Surgery onto the New Zealand documentary heritage register for 2015.

UNESCO recognition draws attention to the significance of documentary heritage and the institutions that are its custodians. Inscription on the register raises awareness of the custodian's institutions and promotes the importance of caring for our documentary heritage.

The Hocken Collections Curator Anna Blackman (pictured with the Inscription and William Randall, Chair Auckland Museum Trust Board), says the Hocken Library was "absolutely delighted" to have been successful in its application for the inscription of the Pickerill Papers on Plastic Surgery.



Photo courtesy Memory of the World initiative

"The inscription is especially timely as one of the University's World War I projects this year has been to digitise a portion of the collection relating to Dr Henry Percival Pickerill's World War I work on the treatment of wounded NZ soldiers," she says.

Doctors Henry Percival Pickerill (1879-1956) and Cecily Pickerill (1903-1988) pioneered significant developments in facial plastic surgery especially for soldiers wounded in warfare, and for children with cleft palate and hare lip deformities. Henry Pickerill was the founding Dean of the Dental School at the University of Otago.

This important medical archive charts the history of the modern specialty of plastic surgery and the pioneering work of the surgeons involved. It is the only collection documenting the history of plastic surgery in a public collection in New Zealand and has been used also by international researchers.

It contains many case files, illustrated with watercolours and photographs that were used both as a medical record and for teaching purposes and now have significance for the families of patients. There is additional aesthetic value in the watercolours of the New Zealand artist Herbert R. Cole recording the progress of the treatment of World War I patients.

"These new inscriptions onto the New Zealand register and the inscription of the Sir Edmund Hillary Archive onto the UNESCO Memory of the World International register make 2015 a significant year for the recognition of the importance of documentary heritage in New Zealand," says Memory of the World New Zealand Trust Chairperson, Dianne Macaskill.

Conferences and events

SJWRI hosts highly successful 55th Annual Scientific Meeting of the IADR ANZ Division

The Sir John Walsh Research Institute and the Local Organising Committee of IADR ANZ 2015 would like to thank all those who attended the 55th Annual Scientific Meeting of the International Association for Dental Research Australia and New Zealand Division this August in Dunedin, New Zealand. The meeting was a great success, with 184 delegates attending from more than a dozen countries. More than half of the registrants were students, which is very encouraging for the future of dental research in Australasia and the Pacific.

The scientific programme contained 133 abstracts, with local and international speakers scheduled in a series of plenary and open oral sessions, in addition to poster presentations. The theme for this year's meeting was *Translational Dentistry – from the laboratory to the clinic*, recognising the importance of our research having impact in the clinic and in the community.

Professor Ben Wu was welcomed to IADR ANZ 2015 as the meeting's Colgate Eminent Speaker. Professor Wu is a practicing clinician and biomaterial scientist who is Professor and Chair of the Division of Advanced Prosthodontics at the UCLA School of Dentistry, and also chairs the Department of Bioengineering at the UCLA School of Engineering. His address was on Biomimetic Strategies for Tissue Regeneration.

Other invited speakers included Adjunct Professor Antonio Barone (School of Dental Medicine, University of Pisa, and Co-Director, Division of Oral Surgery, Versilia Hospital, Italy), Professor Paul Brunton (Faculty of Dentistry, University of Otago, New Zealand), Associate Professor Konstantinos Michalakis, (Department of Prosthodontics, Aristotle University of Thessaloniki School of Dentistry, Greece), and Professor Svante Twetman (Department of Dentistry, University of Copenhagen, Denmark), who delivered keynote presentations as part of the plenary sessions.

An IADR ANZ council meeting and an ACODS (Australasian Council of Dental Schools) meeting was held on Sunday, 23 August, preceding the Annual Scientific Meeting, which opened at the Dunedin Public Art Gallery on the morning of Monday, 24 August and ran through to the afternoon of Wednesday, 26 August. The Colgate Welcome Reception was held on the opening evening of the conference at the Dunedin Public Art Gallery, with the Conference Dinner held at the recently restored Toitū Otago Settlers Museum on the Tuesday evening.

Our highly successful hosting of IADR ANZ 2015 would not have been possible without the generous support of our sole sponsor Colgate Palmolive Australia and New Zealand. Special thanks to Dr Susan Cartwright and Dr Rebecca Schipper for the ongoing support and assistance of Colgate.

Professor Mauro Farella and Dr Jonathan Broadbent win prestigious research awards at IADR ANZ 2015

SJWRI researchers were among the recipients of highly prestigious IADR ANZ Divisional awards presented at the Conference Dinner of the 55th Annual Scientific Meeting, at Toitū Otago Settlers Museum in Dunedin on the night of 25 August.

Professor Mauro Farella, Director of our Craniofacial Biology and Clinical Oral Physiology research programme, was presented with the Division's top prize, the Alan Docking Award, by outgoing IADR ANZ President, Professor Camile Farah of the University of Western Australia.

Dr Jonathan Broadbent of our Dental Epidemiology and Public Health programme won the IADR ANZ Division Investigator Award in Preventive and Community Dentistry. His award was accepted by Dean of the Faculty of Dentistry, Professor Paul Brunton.

Dr Stephen Hamlet of Griffith University on Queensland's Gold Coast was awarded the IADR ANZ Division Oral Biology Award.

Otago students were also successful in the Colgate Poster Competition, with BDS student Danyon Graham winning the Junior competition for his poster presentation 'The molecular basis of triazole inhibition of an antifungal target'. He is pictured below with Prof Camile Farah and Rebecca Schipper of competition and meeting sponsor, Colgate-Palmolive NZ. As the winner of the Colgate Junior Competition, Danyon was supported to attend the IADR General Session meeting in Seoul in June 2016, and entered his research poster into the Hatton Competition at that meeting.

The winner of the Colgate Senior Poster Competition was Jessica Cecil of the University of Melbourne, who competed in the Basic Research category. Runner-up was Chakrabhavi Gundurao Dileep Sharma of Griffith University, who competed in the Clinical/Preclinical category. Runner-up in the Junior competition was Victor Butnejski of the University of Adelaide.



Prof John Broughton (left) and Prof Paul Brunton (right) of the University of Otago's Faculty of Dentistry officially open IADR ANZ 2015.

Colgate Eminent Lecturer, Prof Benjamin Wu of UCLA. Prof Wu's keynote presentation was on using biomimetic strategies as novel methods of tissue regeneration.



Colgate Welcome Reception, Monday evening, in the Donaghy Foyer of DPAG.

Monday poster session.

Keynote presenter Prof Svante Twetman, University of Copenhagen.



Prof Mauro Farella, winner of the Alan Docking Award, presented by outgoing IADR ANZ President Prof Camile Farah.

IADR ANZ 2015 Conference Dinner, held at Toitū Otago Settlers Museum.

Prof Karl Lyons, Chair of the Local Organising Committee, at the closing ceremony for IADR ANZ 2015.



SJWRI and Faculty of Dentistry host exhibitor booth at IADR General Session in Korea

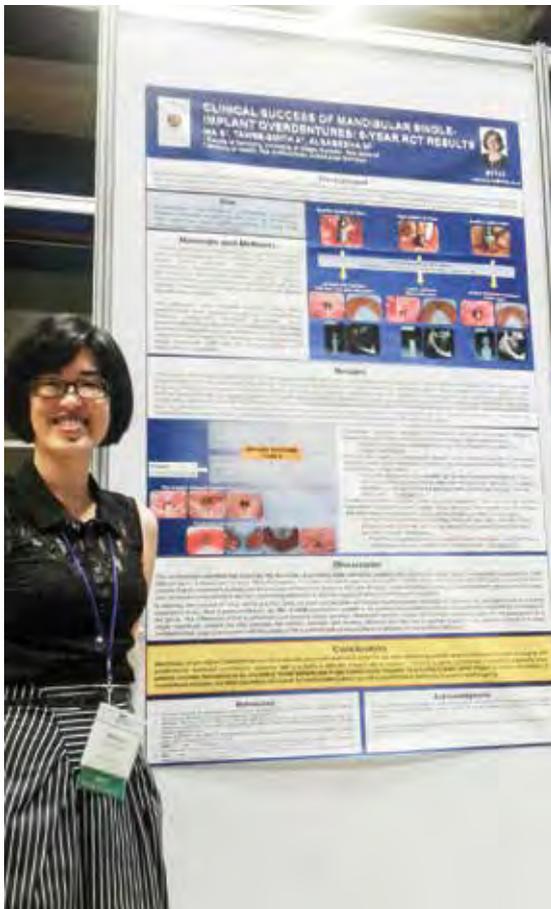
The International Association for Dental Research held their annual General Session in Seoul, Republic of Korea from 21-25 June 2016. This was a joint meeting of the IADR General Session, IADR Asia Pacific Region and our local Australia-New Zealand Division. Some 3,600 delegates were part of the meeting, held in the COEX conference centre in the Gangnam district of Seoul. The SJWRI and Faculty of Dentistry were well represented with 16 staff, two postgraduate and three undergraduate students attending.

As a President's Circle member of the IADR, the Faculty of Dentistry hosted a booth at the Exhibition, coordinated and run by the SJWRI, to promote the activities and achievements of the Institute and the Faculty. The booth proved to be very popular amongst attendees and also offered a focal point for the NZ attendees. Thanks go to Dr James Smith from the SJWRI for all his efforts organising and staffing the

booth. An Otago alumni event was held on the opening night of the meeting.

The achievements of several SJWRI researchers were recognised through a number of awards presented at the meeting. Associate Professor Nick Chandler was awarded the ANZ Division Alan Docking Science Award (the highest award made by the Division); Dr Sunyoung Ma was awarded the J. Morita Junior Investigator Award for Geriatric Oral Research Second Prize in Post-doctoral category for Best Presentation in Geriatric Oral Research; and Chuen Lin Hong, 5th-year BDS student was runner up in the ANZ Division Colgate poster competition and will get to present her work at the IADR General Session in San Francisco in March 2017.

Congratulations to all.



Dr Sunyoung Ma presenting her poster at IADR 2016 in Seoul.



The Faculty's booth at IADR 2016

SJWRI Research Day 2015

Our 2015 SJWRI Research Day was held on Thursday 9 July at the Dunedin Public Art Gallery in the Octagon. Research Day is our annual celebration of the research achievements of the SJWRI and Faculty of Dentistry, featuring presentations from academic researchers and postgraduate students, a research poster competition, and the presentation of the SJWRI Awards for 2015. Research Day also saw the launch of our 2013-14 SJWRI Research Highlights, our two-yearly snapshot of research achievements, news and events within the Institute and the Faculty.

Following a mihi whatakau delivered by Professor John Broughton on the theme of 'Special Operations in Dentistry', the meeting was opened by Deputy Vice-Chancellor (Research & Enterprise) Professor Richard Blaikie, whose address touched on the recent success of Dentistry at Otago being ranked in the top ten worldwide.

Professor Paul Brunton, on his inaugural Research Day as Dean of the Faculty, gave a keynote presentation outlining his vision for the future of oral health and dental research in the Faculty, at Otago and nationwide. Following this, Director of the SJWRI, Professor Richard Cannon, presented the SJWRI Awards for 2015 (see separate story).

In addition to the Dean, our keynote staff research presentations were given by Research Fellow Dr Dawn Coates, on her work in bisphosphonate-induced necrosis of the jaw, and by Professor Mauro Farella, who outlined the Institute's research aims and achievements in Craniofacial Biology and Clinical Oral Physiology, an emerging research programme of the SJWRI. Professor Farella was later awarded the Institute's premier research prize, the Sir John Walsh Award for Research Excellence.

As in previous years, a selection of our doctoral research students (PhD and DClinDent candidates) presented their research to the meeting, with prizes awarded for the best postgraduate oral presentation. The research poster competition, introduced last year for staff, undergraduate and postgraduate students, was also held again this year.

Student Oral Presentation Award

Olivia Apperley and Sobia Zafar (joint award)

Staff Research Poster Competition

Dr Li Mei

Postgraduate Research Poster Competition

Allauddin Siddiqi

Undergraduate Poster Competition

Tony Lin and Joyce Yu (joint award)

For the first time, Research Day met social media, with the meeting being live-tweeted on the Institute's Twitter account @SJWRI. If you missed the event, we've gathered all the #SJWRIResearchDay tweets together in this Storify link:

storify.com/SJWRI/2015-sjwri-research-day

Thanks to all staff and students of the SJWRI and Faculty of Dentistry who helped make our 2015 Research Day such a success.



Our 2013-14 SJWRI Research Highlights was launched at Research Day 2015, with all attendees furnished with a copy.



Pictured with SJWRI Director Richard Cannon, joint winners of the Research Day student oral presentation award, DClinDent students Olivia Apperley (left) and Sobia Zafar (right).



Professor Paul Brunton, on his inaugural Research Day as Dean of the Faculty of Dentistry, outlines his vision for the future of oral health research at Otago and across New Zealand.

SJWRI Research Symposium 2016

The 2016 SJWRI Research Symposium, highlighting the research achievements of the University of Otago's Sir John Walsh Research Institute and Faculty of Dentistry, was held on 1-2 September at the Dunedin Public Art Gallery.

Bigger and better

Now in its tenth year, our Institute's annual celebration of research excellence was moved to a new date and an expanded two-day format, inspired by the success of the IADR ANZ 2015 meeting hosted by the SJWRI this time last year. The new format allowed the introduction of specialised sessions focusing on each of our SJWRI research programmes, meaning more of our staff and students could present their work to peers, fellow researchers from across the University, industry professionals and dental practitioners. The meeting was a success, with over 140 registrants across the two days of the meeting.

Programme highlights

The meeting opened with a session on clinical and translational research, chaired by Professor Warwick Duncan. Guest speakers included Professor Ian Tucker, Associate Dean (Research Commercialisation) for the University of Otago Division of Health Sciences, and Del Carlini of Dunedin-based biotechnology company Blis Technologies, offering perspectives on the translation and commercialisation of research.

This was followed by concurrent sessions in the areas of epidemiology and public health, and molecular microbiology, before a poster session on Thursday afternoon. Friday began with a keynote presentation from Professor Alison Rich on oral cancer, and a presentation from sponsor representative Janice Pitt of 3M Oral Care. SJWRI collaborators from across campus were featured in the session on craniofacial biology and clinical oral physiology, with Associate Professor Julia Horsfield of the Department of Pathology and Associate Professor George Dias of Anatomy both presenting their research. Concurrent sessions followed on dental education, oral molecular and immunopathology, and biomechanics and oral implantology, before an awards session closed the meeting.

Symposium awards

Awards were presented to the best presenter in each of the seven programme sessions, as well as the best undergraduate, postgraduate and staff poster competition entries. Congratulations to the following award winners:

Oral presentation awards

Biomechanics and oral implantology

Frances Ruddiman, DCLinDent candidate
Bacterial colonisation around implants restored with aftermarket or original abutments – how does this affect implant osseointegration?

Clinical and translational research

Dr Carolina Loch Santos da Silva, Research Fellow
From the laboratory to clinical practice and back: ultrastructure and properties of carious deciduous teeth treated using the Hall Technique

Craniofacial biology and clinical oral physiology

Gareth Benic, DCLinDent candidate
Efficacy of oral probiotics in managing biofilm formation in patients wearing fixed orthodontic appliances

Dental education research

Calum Fisher, BDS (Honours) student
Development of a social accountability measure for the dental environment

Dental epidemiology and public health

Deanna Beckett, Master of Public Health candidate
Concordance between the CPQ11-14 ISF:16 and the CHU9D among participants in a clinical trial

Molecular microbiology

Gemma Cotton, PhD candidate
Silver nanoparticle-based hydrogel for treatment of periodontal disease

Oral molecular and immunopathology

Muhammed Yakin, DCLinDent candidate
Endoplasmic reticulum stress modulates the pathogenesis of oral cancer through STAT3-pathway-dependent immune responses



Dunedin Public Art Gallery, site of the 2016 Research Symposium, 2015 Research Day, and IADR ANZ 2015.

Poster presentation awards

Undergraduate student

David Chew, BDS (Honours) student

Tooth preparation with ultrasonic instrments: effects on enamel and dentine surface bonding

Postgraduate student

Lisa Falland, PhD candidate

Use of agar/glycerol and agar/glycerol water as a translucent brain simulant for ballistic testing

Staff

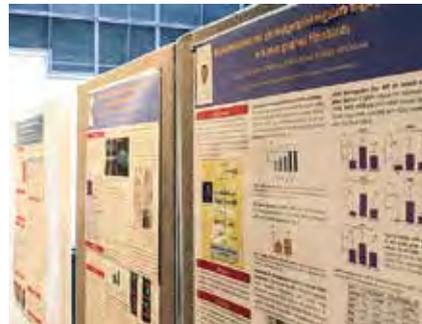
Dr Li (Peter) Mei, Senior Lecturer

Tongue brushing and oral probiotics for the treatment of halitosis

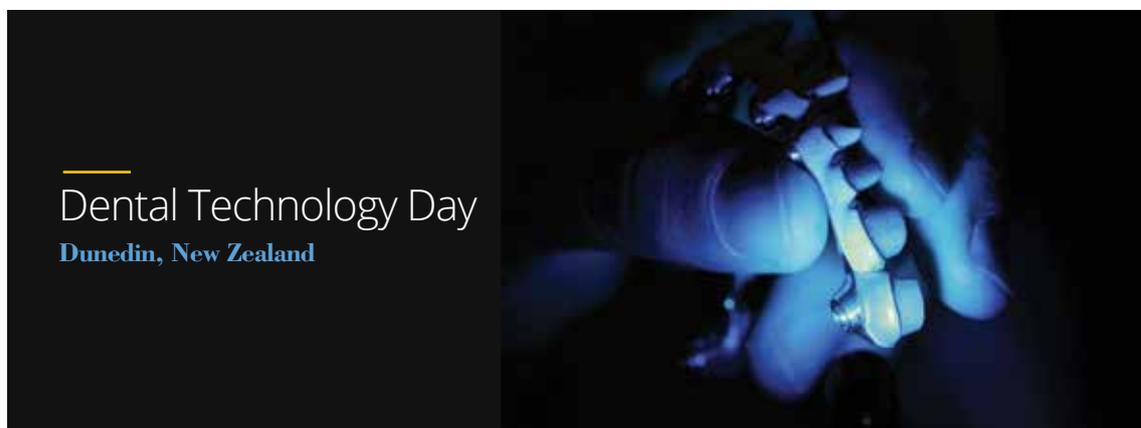
The 2016 Sir John Walsh Research Institute Awards were also presented as part of the closing session.

SJWRI Research Day 2015 and Research Symposium 2016 were made possible by the support of 3M Oral Care.

Programme and abstract books for both events are available for download from otago.ac.nz/sjwri



Research Posters



Dental Technology Day

For many years the Discipline of Dental Technology has set a day aside in second semester to present the results of research carried out by third-year Bachelor of Dental Technology (BDentTech) and Bachelor of Dental Technology with Honours (BDentTech(Hons)) students. Beginning in 2013, it was decided to invite members of the dental community, in particularly the commercial dental technology sector. The response of the sector was very positive, with 25 qualified dental technicians attending the 2013 meeting from as far afield as Whangarei and Auckland.

In 2014, the event was held at the University of Otago College of Education Auditorium on Saturday 6 September. The attendance increased from 25 to 47, and 7 hours of CPD was allocated for the event. The event was promoted through the newly created Dental Technology Day webpage (otago.ac.nz/dental-technology). Delegates were able to visit the website, register and pay online. To help offset the costs, funding was provided through the generous sponsorship of 3M ESPE and Healthcare Essentials Ltd. A University of Otago Continuing Education Fund grant was also obtained to support the meeting.

After numerous requests from industry delegates to make this an annual event, it was decided to continue to invite the wider dental sector and formalise the day as part of the SJWRI and Faculty of Dentistry Continuing Professional Development (CPD) events calendar. Over the years the event has expanded to include research and clinical case reports by Postgraduate Diploma in Dental Technology, Master of Dental Technology and PhD students, Dental Technology teaching staff, and academic and research staff from the wider Faculty and SJWRI.

Dental Technology Day 2015

Dental Technology Day 2015 was organised on the same framework as the 2014 event, but with two major changes. Additional slots were offered resulting in four sponsors for the event: Sirona, 3M ESPE, Ivoclar, and Oraltec. The sponsors was offered a four-hour session to run a CPD course of their choice on Thursday 17 September in the Dental Technology teaching laboratories in the Dental School. All of the sessions were fully booked.

The research presentations took place on Friday 18 September at the University of Otago College of Education Auditorium. The attendance increased from 47 (2014) to 74 qualified dental technicians and seven hours of CPD was allocated for the event. Every year the best undergraduate research presenter is nominated to present their research at the annual New Zealand Institute of Dental Technologists conference. Tay Yoon (BDentTech Student) was nominated to his group's research titled 'The effect if surface treatment on bonding of reline poly(methyl-methacrylate) to denture base resin' at the NZIDT conference in Auckland on Saturday 17 October 2015.

Dental Technology Day 2016

The Faculty of Dentistry's Discipline of Dental Technology held their fourth annual Dental Technology Day at the University of Otago College of Education Auditorium on 9 September, showcasing research and clinical case reports from Dental Technology staff and students to industry professionals.

This year, Dental Technology Day took place on Friday 9 September at the University of Otago College of Education Auditorium. External attendance increased to 78 registered dental professionals, including dentists and oral hygienists. Feedback from attendees indicated that Dental Technology Day 2016 was a very successful event, with the high quality of Dental Technology research commented on by many delegates. The opportunity to showcase our research to industry is extremely valuable, and also helps students make links with potential employers.

Every year, the best undergraduate research presenter is nominated to present their research at the annual New Zealand Institute of Dental Technologists (NZIDT) conference. Chloe Leong presented her group's research, 'Bond strength of relined soft-liner to poly(methyl methacrylate) denture base material', at the NZIDT conference in Wellington on 14 October.

Next year's Dental Technology Day will be held on 21 September 2017, in collaboration with the NZIDT annual conference which is to be held from 22-23 September 2017 in the Dunedin Town Hall.

Dental Technology Day 2017

Thursday, 21 September

All members of the dental profession are invited to attend Dental Technology Day on Thursday, 21 September 2017 in the Dunedin Public Art Gallery.

Dental Technology students will present:

- Technical case studies
- Clinical case studies
- New research by final-year Dental Technology students
- Research by Master of Dental Technology and PhD students

This is a great opportunity to visit Dunedin and share in some cutting-edge knowledge, while also qualifying for up to **seven hours of CPD**.

otago.ac.nz/dental-technology/index.html

Sir John Walsh Research Institute Awards for 2015 and 2016

Congratulations to the recipients of Sir John Walsh Research Institute Awards for 2015 and 2016. Our Institute Awards celebrate the research achievements of academic staff and postgraduate students, as well as commending the contribution of general staff to the research successes of the SJWRI and Faculty of Dentistry.

Sir John Walsh Award for Research Excellence

This award acknowledges excellence in research over an extended period of time by a member of staff of the Faculty of Dentistry. The recipient receives \$5,000 towards professional development.

2015 winner: Professor Mauro Farella

Professor Farella was appointed Professor of Orthodontics at the University of Otago in 2009. An internationally recognized expert in orofacial muscles and temporomandibular joint research, he is the founding director of the SJWRI's research programme in Craniofacial Biology and Clinical Oral Physiology. Professor Farella's research interests include craniofacial growth, craniomandibular function, craniofacial genetics, three-dimensional craniofacial imaging, and sleep bruxism. His current activities are mainly focused on the physiology and pathology of the masticatory muscles and on their relationship to orthodontics, craniofacial growth, and temporomandibular disorders. He is currently also involved in a number of randomised control clinical trials in orthodontics and in clinical gnathology.



2015 Sir John Walsh Award recipient Professor Mauro Farella presenting his research at Research Day.

2016 winner: Dr Dawn Coates

Following a post-doctoral research position at the University of Cambridge, and after leading the Bioactive Discovery research group at AgResearch Invermay for a number of years, Dr Coates joined the Faculty of Dentistry as a Senior Research Fellow in 2006. Dr Coates' research interests are in stem cell biology and angiogenesis (blood vessel formation) in oral health and disease, with a particular interest in finding treatments for medication-related osteonecrosis of the jaw (MRONJ). A highly productive researcher and very well regarded supervisor of postgraduate students, Dr Coates is a very deserving recipient of our premier research award for 2016.

Research Supervisor Award

A new award for 2016, this award is to celebrate outstanding research supervisors of postgraduate and undergraduate students within the Faculty of Dentistry. Nominations were made via a survey process, whereby students were asked to anonymously nominate outstanding supervisors, with reasons for their nominations. Attributes such as being supportive, available, interested and enthusiastic, knowledgeable and an expert in their field, a good communicator, and taking prompt, decisive action to resolve issues were listed as being important for excellent supervision. The winner receives \$2,000 towards professional development.

2016 winner: Professor Alison Rich

Professor Rich is the leader of the Oral Molecular and Immunopathology research programme within the SJWRI, as well as serving as the Head of the Department of Oral Diagnostics and Surgical Sciences and the Medlab Dental Oral Pathology Diagnostic Service. An Otago BDS graduate, Professor Rich undertook her MDSc and PhD at the University of Melbourne before returning to Otago in 1998. Her research interests are focused on diagnostic oral pathology, particularly oral cancer, on which topic she gave the keynote address to open the second day of SJWRI Research Symposium 2016. As well as being a highly productive researcher in terms of publications, awards and commendations, she has supervised numerous postgraduate and undergraduate research projects since rejoining the Faculty of Dentistry. This award indicates the appreciation, respect and regard in which Professor Rich is held by her students.



Professor Richard Cannon and Sir John Research Award recipient Dr Dawn Coates at Research Symposium 2016

Basic and Clinical Research Awards

These awards are to acknowledge and promote basic and clinical research by a member of staff or postgraduate student in the Faculty of Dentistry by supporting research development initiatives that could make a contribution to the strategic direction of research within the Institute. The recipients of each award will receive \$5,000 towards their proposed research.

2015 Basic Research Award: Dr Jonathan Broadbent

Dr Broadbent is a Senior Lecturer in the Department of Oral Rehabilitation. His research interests include the epidemiology of dental caries, tooth loss, and periodontal disease. He has special interests in dental longitudinal research and inequalities in dental health. Dr Broadbent is Principal Investigator for the dental component of the Dunedin Multidisciplinary Health and Development Study. As part of that project, Jonathan has been working on research relating to blood pressure, lead exposure, fluoride, dental caries, periodontal disease, and ageing. His Basic Research Award proposal involved conducting a clinical audit of human and comparative anatomy specimens held in the Faculty of Dentistry collection, contributing to research capacity within the Institute by enhancing the ability of SJWRI researchers to conduct work pertaining to human oral biology and comparative dental anatomy, enabling staff to more easily identify specimens from the collection that are likely to be of interest/relevance to research, and strengthening and re-establishing links with the Department of Anatomy by using the same electronic template for cataloguing human remains as the Anatomy Museum.

2015 Clinical Research Award: Dr Li (Peter) Mei

Dr Mei is a Senior Lecturer in the Department of Oral Sciences. His 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 on dental materials. His other interests include randomised controlled trials (RCT) and evidence-based dentistry. He has investigated clinical methods for enhancing oral hygiene in patients wearing fixed orthodontic appliances. Dr Mei's Clinical Research Award proposal was titled 'Tongue brushing and oral probiotics for the treatment of halitosis: a randomized controlled trial' and involved conducting a single-blind RCT to investigate the clinical efficacy and synergistic effect of tongue brushing and use of oral probiotic *Streptococcus*

salivarius for treating halitosis. Dr Mei went on to present the findings of this research at SJWRI Research Symposium 2016, where he won the Staff Poster Prize.

Strategic Research Prize

This award is to acknowledge and promote new research within the Faculty of Dentistry, by supporting a research development initiative by a member of staff or postgraduate student that could make a contribution to the strategic direction of research within the Institute. This award replaces the Basic and Clinical Research Awards presented in previous years. The recipient receives \$5,000 towards his proposed research.

2016 winner: Dr Li (Peter) Mei

The aim of Dr Mei's proposal is to investigate the effectiveness of Air-Flow, a dental procedure which uses a pressurized jet of air, water and abrasive powder, for managing the formation of biofilm in patients with fixed orthodontic appliances.

Biofilm formation causes side effects such as enamel demineralisation, halitosis and tooth decay. Conventional oral hygiene methods are not effective in removing biofilms that form around the brackets and archwires of fixed orthodontic appliances. Air-Flow may be effective at removing biofilms from areas that are difficult to reach, but this needs to be examined clinically. Dr Mei and his collaborators will examine clinical measures of oral hygiene to investigate the efficacy of this approach, as well as biomaterials analysis of the surface topography and roughness of the tooth enamel, brackets and archwires following treatment.



Left: 2015 SJWRI Clinical Research Award winner Dr Li Mei, accepting his award for winning the 2015 Research Day Staff Poster Competition (staff). Right: Allauddin Siddiqi, winner of both the 2015 Research Day Postgraduate Poster Competition and the SJWRI Postgraduate Research Publication Award.

Research Publication Award

This award is to recognise excellence in research by acknowledging the research calibre and effort required to publish in high impact journals in science and dentistry. To be eligible, the manuscript must have been accepted for publication in the previous calendar year. The recipient receives \$1,000 towards professional development.

2015 winner: Associate Professor Brian Monk

Associate Professor Monk is the Director of the SJWRI's Molecular Biosciences Laboratory and a leading figure within the Molecular Microbiology research programme. His research is focused on discovering new ways to combat infectious disease, especially where clinically significant drug resistance has emerged. A key element to this work is identifying new molecular targets for antifungal diseases and characterising their molecular structure, followed by using molecular genetic manipulation of yeast and bacterial systems to express drug targets for screening of compound libraries to find compounds which act against these targets. Many of the antifungal targets he has developed are membrane proteins, including essential P-type ATPases, fungal glucan synthase, cytochrome P450 enzymes and drug efflux pumps. In 2014, Associate Professor Monk published the first structure for a fungal cytochrome p450, the target of widely-used antifungal drugs, and the only full-length structure of a eukaryotic membrane-associated cytochrome p450. The work, a major result of a Marsden Fund grant awarded to Associate Professor Monk in 2011, was published in high-impact journal *Proceedings of the National Academy of Sciences USA*, which has an impact factor of 9.41 and is regarded as one of the leading scientific journals internationally.

Monk, B. C., Tomasiak, T. M., Keniya, M. V., Huschmann, F. U., Tyndall, J. D. A., O'Connell, J. D., III, Cannon, R. D., ... Stroud, R. M. (2014). Architecture of a single membrane spanning cytochrome P450 suggests constraints that orient the catalytic domain relative to a bilayer. *PNAS*, 111(10), 3865-3870. doi: [10.1073/pnas.1324245111](https://doi.org/10.1073/pnas.1324245111)

2016 winner: Dr Sunyoung Ma

Dr Ma is a Senior Lecturer in Prosthodontics in the Department of Oral Rehabilitation, with research interests in oral implantology. Her paper, titled 'Maxillary three-implant overdentures opposing mandibular two-implant overdentures: 10-year surgical outcomes of a randomised controlled trial' and published in the June 2016 edition of *Clinical Implant*

Dentistry and Related Research, followed long-term surgical outcomes and implant success of implant treatments on edentulous patients over ten years. Dr Ma was the lead investigator of the study and collected the clinical data, along with being primary author of the paper. *Clinical Implant Dentistry and Related Research* has an impact factor of 4.152 and is ranked 4th of 89 journals in the field of Dentistry Oral Surgery and Medicine. This work contributes significantly to further understanding in the area of selecting implant treatment modalities when rehabilitating older edentulous patients.

Ma, S., Tawse-Smith, A., De Silva, R. K., Atieh, M. A., Alsabeeha, N. H. M., & Payne, A. G. T. (2016). Maxillary three-implant overdentures opposing mandibular two-implant overdentures: 10-year surgical outcomes of a randomised controlled trial. *Clinical Implant Dentistry & Related Research*, 18(3), 527-544. doi: [10.1111/cid.12325](https://doi.org/10.1111/cid.12325)

Postgraduate Research Publication Award

This award is to recognise excellence in postgraduate student research by acknowledging the research calibre and effort required to publish in high impact journals in science and dentistry. The publication must have been accepted in the previous calendar year, and have been written by a Masters or Doctoral research student. The recipient receives \$500.

2015 winner: Allauddin Siddiqi (PhD student)

Allauddin Siddiqi commenced his PhD in 2009 and graduated in 2014. Allauddin's major research interests are in maxillofacial trauma and implantology. His PhD, titled 'Surgical and peri-implant outcomes of ceramic implants supporting overdentures', was centered around the rehabilitation of edentulous elderly persons, comprising a human clinical trial, an *in vivo* sheep study and *in vitro* human cadaver study. His award-winning paper, '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' was accepted for publication in the journal *Clinical Oral Implants Research* (Impact factor 3.123) in November 2014. This journal is ranked 4th of 83 journals in the field of Dentistry Oral Surgery & Medicine. Dr Siddiqi's analyses determined whether the periodontopathic bacteria *Porphyromonas gingivalis* and *Tannerella forsythia*, as well as the non-periodontopathic bacterium *Staphylococcus aureus*, emerged in edentulous patients six months after placement of one-piece zirconia and titanium implants. The results indicated that they did not.

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*, 27, 288-294. doi: [10.1111/clr.12536](https://doi.org/10.1111/clr.12536)

2016 winner: Alia Sagatova (PhD student)

Alia completed her PhD in the Molecular Microbiology research programme of the SJWRI in 2016, under the primary supervision of Associate Professor Brian Monk. Her thesis research was on the discovery and development of multifunctional triazole drugs. Her award-winning paper, titled 'Structural insights into the binding of the antifungal drug fluconazole to *Saccharomyces cerevisiae* lanosterol 14 α -demethylase' was published in *Antimicrobial Agents & Chemotherapy*, one of the most widely read journals in the field of antifungal research with an impact factor of 4.476 in 2014. Infections by fungal pathogens such as *Candida albicans* and *Aspergillus fumigatus*, and their resistance to triazole drugs, are major concerns. Lanosterol 14 α -demethylase is a fungal enzyme involved in ergosterol biosynthesis, and is the primary target of azole antifungal drugs, including fluconazole. The lack of high-resolution structural information for this enzyme has inhibited the design of modified triazole drugs that could overcome resistance. This paper, one of a series of publications based on Alia's PhD research, reported the X-ray structure of full-length *Saccharomyces cerevisiae* lanosterol 14 α -demethylase in complex with fluconazole at a resolution of 2.05 Å, showing the key interactions involved in fluconazole binding and providing insight into resistance mechanisms. Alia was the lead author on this paper and performed most of the research within it.

Sagatova, A., Keniya, M. V., Wilson, R. K., Monk, B. C., & Tyndall, J. D. A. (2015). Structural insights into the binding of the antifungal drug fluconazole to *Saccharomyces cerevisiae* lanosterol 14 α -demethylase. *Antimicrobial Agents & Chemotherapy* 59:4982-4989. doi: [10.1128/aac.00925-15](https://doi.org/10.1128/aac.00925-15)

Research Support Award

This award is to recognise the excellent support provided by general staff to research groups, units and/or departments within the SJWRI and Faculty of Dentistry. The recipient receives \$2,000 for professional development.

2016 recipient: Sharla Kennedy, Medlab Dental Oral Pathology and Diagnostic Service

Sharla has over 20 years' experience in histology and, for the last eight years since being employed with the Faculty of Dentistry, has taken on the position of research coordinator in the Oral Pathology laboratory. She has responsibility for the histology aspects of the research projects of the Oral Molecular and Immunopathology Programme, and also assists researchers from other research programmes within the Faculty and from outside the Faculty. This involves planning and assisting in research projects that use various techniques including histology, immunohistochemistry and immunofluorescence. As part of the laboratory team, Sharla also offers technical advice to staff and PhD, DClindent and undergraduate dental students. In addition to her technical support, she has an encouraging and supportive manner, which has been very important to many postgraduate students coming to grips with the complexities of research. Without Sharla's technical and emotional support, many of these research projects would not have come to fruition.



2016 Research Supervisor Award winner Professor Alison Rich, with Lynda Horne of the Oral Pathology Centre (formerly Medlab Dental Oral Pathology and Diagnostic Service).

Student awards and achievements

SJWRI PhD student Jenny McDowell wins University Three Minute Thesis Competition, represents Otago at the Trans-Tasman 3MT Competition

On the evening of Wednesday 26 August, SJWRI PhD student Jenny McDowell won the 2015 University of Otago Three Minute Thesis (3MT) Competition, competing against PhD candidates from across all divisions of the University. Jenny's 3MT presentation 'Identifying missing persons: getting answers from our bones' explored her PhD thesis research, which looks 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.

Jenny's prize for winning the Otago 3MT was a research grant of \$1,000 and a trip to the Trans-Tasman 3MT Competition, held at the University of Queensland on Friday 2 October, where Jenny represented Otago against PhD winners from universities across Australia, New Zealand, Oceania and south-east Asia. Fifty competitors were entered into the competition, divided into five semi-final heats. Two semi-finalists were selected from each heat to compete in the final.

Jenny won through from her semi-final heat to compete in the ten-person final. While she was not successful in winning the competition, making the final (and thus the top ten in Australasia) was a magnificent achievement given the exceedingly high quality of the competitors and presentations.

Jenny's interest in forensic anthropology came from a teenage interest in human anatomy triggered by surviving a shark attack, 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. In December 2014, Jenny was awarded a AMP National Scholarship worth \$10,000 to support her ambition of becoming an internationally accredited forensic anthropologist.

The overall winner of the Trans-Tasman 3MT Competition was Eamonn Fahy of the University of Melbourne's Centre for Eye Research Australia, with his presentation 'Catching the silent thief of sight.' The People's Choice Award was presented to Jaysuman Bin Pusppanathan of the Faculty of Electrical Engineering, Universiti Teknologi Malaysia, who presented on 'Tomography for liquid gas imaging.'



Three Minute Thesis judge Professor Rachel Spronken-Smith (left) and PhD section winner Jenny McDowell at the competition finals.

Colgate IADR New Zealand Section Student Poster Competition

Each year, the SJWRI in conjunction with the IADR New Zealand Section holds the Colgate IADR NZ Section Student Poster Competition for undergraduate and postgraduate research students, with award winners supported to attend that year's IADR Australia and New Zealand Division Annual Scientific Meeting and present their research.

2015 winners

This year, with the Annual Scientific Meeting to be held in Dunedin in August, four prizes of \$1,000 were kindly made available by Colgate New Zealand, with two further IADR ANZ Division Travel Grants also awarded to help towards meeting expenses such as conference registration and poster printing. Thank you to all this year's competitors and their supervisors.

Colgate Award Winners

Colgate Award, Undergraduate

Danyon Graham

The molecular basis of triazole inhibition of an antifungal target

Runner-up

Joanne Lee

Extracellular cysteines of Candida albicans Cdr1p affect its efflux-pump function

Colgate Award, Postgraduate

Avadhoot Avadhani

Interleukin 17 stimulates invasion in oral squamous cell carcinoma

Runner-up

Mohammed Alansary

Primary tooth pulp as a source of progenitor cells for permanent pulp tissue regeneration

IADR Division Winners

IADR ANZ Division Travel Grant, Undergraduate

Joyce Yu

Effectiveness of dental students' crown preparations using preparation assessment software

IADR ANZ Division Travel Grant, Postgraduate

Sobia Zafar

Role of osteoclasts in bisphosphonate-related osteonecrosis of the jaw

Many thanks to judges, Dr Colleen Murray and Dr Geoffrey Tompkins, and competition convenor Associate Professor Nicholas Chandler.

2016 Colgate IADR New Zealand Section Student Poster Competition

With the IADR ANZ Annual Scientific Meeting being held in conjunction with the 94th General Session of the IADR in Seoul, South Korea on 22-25 June 2016, two prizes of \$2,000 were made available by Colgate New Zealand and the IADR NZ Section. The following students were selected as having the best poster in their category and were supported to represent New Zealand at the Seoul meeting:

Colgate Award, Postgraduate

Abdullah Barazanchi

Comparative study of the physical properties of 3D printing versus powder-metallurgy cobalt chromium

Colgate Award, Undergraduate

Chuen Lin Hong

Growth inhibition of non-streptococcal pathogens by Streptococcus salivarius

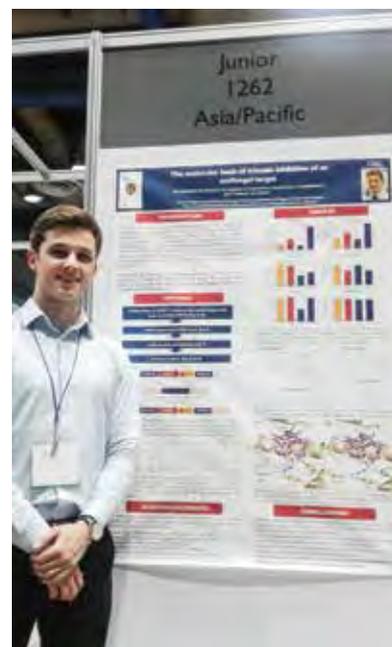
Dentistry summer students excel at 2016 OMSRS Scientific Meeting

Congratulations to 4th-year BDS student Danyon Graham on winning the summer student presentation prize at the 226th Scientific Meeting of the Otago Medical School Research Society, held on 11 May at the Dunedin Public Hospital.

At this meeting, 2015-16 Division of Health Sciences summer students presented results from their summer studentship projects. Twenty five students submitted abstracts, of which ten were selected for the oral competition.

Two of the students selected for the oral competition were dental students; Danyon (supervised by Associate Professor Brian Monk and his team) and third-year BDS student Annie van Wichen (supervised by Dr Erwin Lamping and Dr Hee Ji Lee).

Congratulations to Danyon and supervisors, and to Annie for the admirable achievement of advancing to the oral presentation round from a strong field.



BDS student Danyon Graham presenting his poster at IADR 2016 in Seoul. Danyon was invited to present his research at the IADR General Session having won the 2015 Colgate IADR NZ poster competition, followed by the Junior Division of the Colgate Poster Competition at IADR ANZ 2015.

Research funding successes

Health Research Council

Tracing oral health from childhood to mid-life: 2015 HRC funding success for Dr Jonathan Broadbent

Dr Jonathan Broadbent of the SJWRI's Dental Epidemiology and Public Health research programme was announced in June 2015 as the recipient of a \$1.2 million, five-year research grant in the Health Research Council of New Zealand's annual funding round. Dr Broadbent, a Senior Lecturer in the Department of Oral Rehabilitation, is Principal Investigator on the project, titled 'Oral health from childhood to mid-life'.

The study is centred around the age-45 oral health assessments of the Dunedin Multidisciplinary Health and Development Study, popularly known as the Dunedin Study, one of the longest-running and most successful longitudinal health studies in the world. The Dunedin Study follows the health life course of a cohort of people born in Dunedin in 1973-74. One of the most remarkable features of the Dunedin Study is its very high subject retention rate (95% in the most recent age-38 assessment, 2010-2012).

The 'Life-course research in oral health' component of the Dunedin Study looks into the natural history of oral health and disease in the Dunedin Study cohort. Through its many years of operation, this study has provided unprecedented information on the natural history of oral health and disease. Poor oral health is a global health problem, which disproportionately affects disadvantaged people. However, there is a lack of high quality information about oral health during the mid-part of the life course, particularly about how experiences and disadvantage during childhood shape the oral health of adults.

This study will inform investigations into the rate of dental health decline into the fifth decade of life, and the mediators, moderators and comorbidities that are associated with good or poor oral health into the fifth decade. Dr Broadbent's co-investigators on this project include Professor Murray Thomson, Director of the Dental Epidemiology and Public Health research programme, and Professor Richie Poulton, Director of the Dunedin Study.

Dr Broadbent's broader 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. 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).

In the 2015 HRC round, University of Otago researchers were awarded nearly \$32 million in new funding to support world-class research aimed at improving the health and well-being of New Zealanders. Otago researchers gained 18 contracts, including three major multi-million, five-year programmes and 15 projects.



Dr Jonathan Broadbent presenting at Research Day 2014.

Overcoming antifungal drug resistance: 2016 HRC success for A/ Prof Brian Monk

Congratulations to Associate Professor Brian Monk of the SJWRI's Molecular Microbiology research programme on being awarded a three-year Project grant worth \$1,197,552 in the 2016 Health Research Council of New Zealand Funding Round for his project 'Structure-directed discovery of next-generation antifungals'. Other named investigators from the SJWRI involved in this project are Dr Mikhail Keniya and Dr Rajni Wilson, along with Associate Professor Joel Tyndall of the School of Pharmacy.

The aim of this research is to identify and develop next-generation antifungals to augment existing triazole drug treatments that are prone to drug resistance by infectious fungal microbes. This project follows on from an earlier study funded in the 2013 HRC round, which investigated the structure of a key fungal metabolic enzyme lanosterol 14 α -demethylase (CYP51).

CYP51 catalyses the key step in the ergosterol biosynthetic pathway targeted by triazole antifungal drugs. Through this work, the team have obtained high-resolution X-ray crystal structures of wild type and triazole resistant CYP51s, complexed with substrates and triazole inhibitors.

This project will apply these structural discoveries to improve drug specificity, by modifying several features of existing antifungals to develop broad-spectrum drugs that can target fungal CYP51 and not its human homologue or other key metabolic enzymes. The identification of new antifungals will provide a model for drug discovery and development that circumvents the ubiquitous activities of cytochrome P450 enzymes.

Associate Professor Monk's project was one of 17 Otago projects funded in the 2016 HRC round, in addition to five major, multi-million dollar, five-year programmes including renewal of the Dunedin Study for its age-45 assessments. Funding for the dental component of the age-45 Dunedin Study assessments, led by the SJWRI's Dr Jonathan Broadbent, was secured in the 2015 HRC Funding Round. In total, University of Otago researchers were awarded around \$43.8M in new health research funding to support world-class studies aimed at improving New Zealanders' health and well-being.

Ministry of Business, Innovation and Employment funding

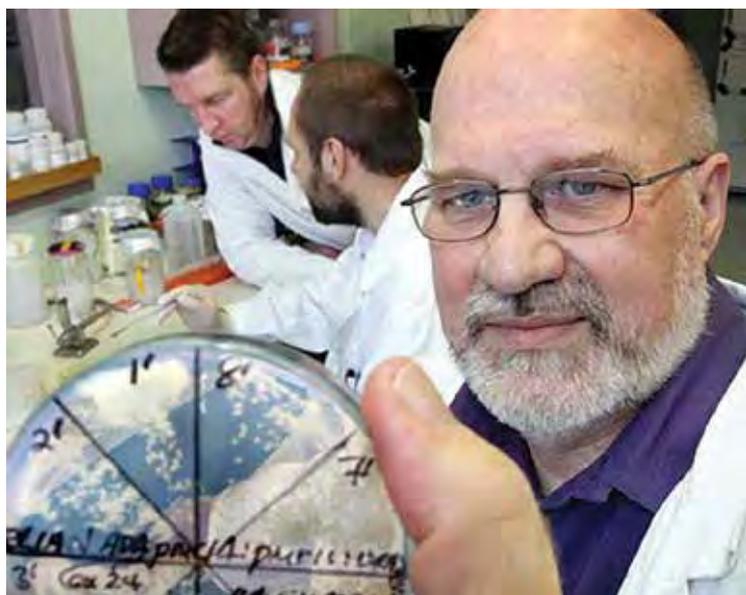
UltraD3 team awarded \$1.2M in 2015 MBIE funding to develop new dental diagnostics

Professor Warwick Duncan of the SJWRI and collaborator Paul Harris of Callaghan Innovation were today awarded \$1.2 million in MBIE Targeted Research funding over three years for a project called UltraD3, the aim of which is to develop new dental diagnostic devices which can detect disease using ultrasound.

The UltraD3 project aims to develop a miniaturised ultrasonic device for the early diagnosis of periodontal (gum) disease around teeth and dental implants. Periodontal disease is a common condition; severe periodontitis is the sixth most prevalent condition in the world, and one in three New Zealand adults have evidence of periodontal pockets. There is a strong link between periodontal infection and other diseases with high mortality and morbidity, including cardiovascular disease, stroke, diabetes, and adverse pregnancy outcomes. Examination techniques for periodontal disease have not changed in a century, involving painful manual probing of the gums around teeth to determine whether the gum tissue is inflamed or diseased.

The UltraD3 concept employs miniaturised high frequency transducers and imaging systems and applies these to the clinical problem of diagnosing early inflammation around teeth and dental implants. By using ultrasonics to examine changes in the elasticity of the gum tissue (gingiva) and ligaments that connect the tooth to the surrounding tissues, the team aims to provide an early diagnosis of periodontal disease. Earlier intervention for gum problems will reduce both the discomfort and the cost of late-stage surgical treatment for these conditions. Between the SJWRI and Callaghan Innovation, the UltraD3 team has world-leading capabilities in dental research, ultrasonics, electronics and materials science.

The SJWRI congratulates Professor Duncan and the UltraD3 team on this tremendous news.



Associate Professor Brian Monk (foreground), Associate Professor Joel Tyndall and Dr Mikhail Keniya (background).

SJWRI collaborator wins national award

Dr Carla Meledandri won the 2016 Emerging Innovator Award at the KiwiNet Research Commercialisation Awards for her work harnessing silver nanoparticles to treat and prevent dental disease, carried out in collaboration with Dr Don Schwass.

Dr Meledandri was announced as joint winner of the Norman F. B. Barry Foundation Emerging Innovator Award with the University of Canterbury's Dr Daniel Holland, whose work focuses on mathematics plus measurements equals economic benefit.

"In my case, working toward this goal has required a great team effort over the last several years."

Dr Meledandri feels proud to have been able to contribute to a celebration of Kiwi innovation, saying: "The process involved in the translation of academic research into commercial outcomes is not always an easy one, and in my case, working toward this goal has required a great team effort over the last several years."

"I am delighted to have received recognition for our success so far."

The Department of Chemistry's Professor Lyall Hanton says Dr Meledandri's success is testament to the innovative multidisciplinary work she has done with her group and colleagues in the SJWRI.

The awards are designed to celebrate commercialisation success in New Zealand's universities and Crown Research Institutes, and were announced at a reception in Auckland.

The Kiwi Innovation Network (KiwiNet) kiwinet.org.nz is a consortium of 16 universities, Crown Research Institutes and a Crown Entity established to boost commercial outcomes from publicly funded research. Principal support is also provided by the Ministry of Business, Innovation & Employment.

SJWRI-led 'Silverbone' innovation supported by 2016 MBIE Endeavour Fund

An innovative new approach to developing bone grafting material with anti-bacterial qualities has been supported by the New Zealand Ministry of Business, Innovation and Employment (MBIE) in their 2016 Endeavour Round. The 'Silverbone' approach, led by SJWRI Clinical and Translational Research programme leader Professor Warwick Duncan, combines the university's unique 'nano-silver' technology with New Zealand-developed bone grafting materials to produce artificial bone grafting materials that are resistant to bacterial infection. Professor Duncan and colleagues were awarded \$999,804 over three years, with the eventual aim of developing Silverbone products that will encourage bone growth and repair in patients undergoing orthopaedic or oral surgical treatment.

"The project combines clever nanoscience, a detailed understanding of biomaterials, a great local company that has been producing world-class bone grafting products for many years, and specialist dental practitioners who want better products for their patients," says Professor Duncan, who in addition to working as an academic and researcher also runs a private specialist practice. "I routinely use bone grafting products to reconstruct people's jawbones following gum disease, after tooth extraction or when placing dental implants. Unfortunately our mouths are quite dirty places, and sometimes these grafts get infected, which can be both painful, disfiguring and expensive for my patients. Our plan is to develop a locally-produced grafting product that is resistant to infection and hopefully cheaper than equivalent products bought from overseas."

Professor Duncan leads a collaborative team involving Dr Carla Meledandri from the University of Otago Department of Chemistry, Associate Professor Neil Waddell and Dr Mike Smith from the SJWRI and Faculty of Dentistry, and Dr Nina Molteno from Molteno Ophthalmic Ltd, a specialist Dunedin company who are leaders in the development and manufacture of ophthalmic implants for treating glaucoma and other eye conditions.

"We are grateful to MBIE for supporting this initiative, which we think is good for science, good for Kiwis needing dental treatment, and good for New Zealand business," says Professor Duncan.

The purpose of MBIE's Endeavour Fund is to invest in excellent research that is designed to have a positive impact for New Zealand economically, environmentally and socially. The Endeavour Fund supports both Smart Ideas initiatives and larger Research Programmes. Smart Ideas initiatives, such as the SJWRI's Silverbone proposal, catalyse and rapidly test promising, innovative research ideas.

SJWRI-Chemistry collaboration leads to dental caries prevention breakthrough

A collaboration between researchers in the University of Otago's Department of Chemistry and the SJWRI has led to a new way to preserve caries-infected teeth and prolong the life of dental fillings being developed and commercialized through Otago Innovation Ltd.

The technology uses specially-formulated, non-staining silver nanoparticles to arrest caries and make teeth more resistant to decay. The dentist applies the product after removing decay but before filling, and it diffuses into the tooth where it can kill any remaining bacteria that may cause further decay.

The Otago invention is unique because it does not discolour the teeth. All other available products that use silver to arrest caries turn teeth black, and therefore, they have not been widely accepted by patients or dental practitioners.

"We believe that our non-staining formula will be an important step forward for oral care and public health," says Dr Don Schwass of the Department of Oral Rehabilitation. "The result will be that recurrent caries will be significantly reduced and dental fillings will last longer, providing both economic and health benefits."

"Our contribution has been to create stabilised nanoparticles of a certain size, using a unique method of production so that the end result is a clear, stain-free product," says Dr Carla Meledandri of the Department of Chemistry and the MacDiarmid Institute.

Otago Innovation Ltd has recently licensed the rights to this invention to a global dental materials manufacturer for further product development.

SJWRI makes a good impression with Unlocking Curious Minds outreach project

A new SJWRI-led outreach project, supported by the government's Unlocking Curious Minds initiative, is using a hands-on activity - making impressions of animal teeth - to introduce children to the science of everyday life. The project, titled 'Making a good impression: from fossils to false teeth' was one of 44 projects supported for funding in the 2016 Unlocking Curious Minds investment round, announced by the Minister of Science and Innovation last week.

Led by research fellow Dr Carolina Loch and SJWRI Director Professor Richard Cannon, Making a good impression: from fossils to false teeth aims to engage with students from lower-decile primary schools in Dunedin in order to unlock their curiosity about the science behind fossils, animal teeth and tooth function, and also raise their awareness of oral health. Children from lower decile schools tend to have fewer opportunities for hands-on science activities than pupils from high decile schools, as well as experiencing poorer oral health.

The activity will involve the students taking impressions of teeth from various marine and terrestrial animals, including taonga species, to make replicas that they can keep. Accompanying videos, which are available on the SJWRI website, explain the science behind fossil formation, dental impression taking, tooth shape and function, and the importance of looking after your teeth for good oral and general health.

The hands-on part of the 'Making a good impression project' was first trialled as part of the highly successful UCM-supported 'Family Science and Technology Experience' sessions organised by the Otago Museum between October 2015 and February 2016, at schools around Dunedin, and further developed it as part of the Otago Museum's Oral Health Open Day in March of this year. In each case, Carolina and Richard were very encouraged by the strong interest and engagement they saw with children and their parents in the activity and the educational messages associated with it.

Funding from the Unlocking Curious Minds initiative will support further development of the hands-on activity and the associated videos, and taking the activities to schools around the Dunedin area.

If successful, the team hopes to extend the pilot outreach regionally, potentially in partnership with the University of Otago's Lab In A Box project, also supported by Unlocking Curious Minds.



Dr Carolina Loch and children from Carisbrook School at a 'Family Science and Technology Experience' event in October 2015.

Further evidence found against ancient “killer walrus” theory

An Otago-led team of scientists using techniques from the field of dentistry is shedding new light on the evolution of walruses, fur seals and sea lions. The researchers have cast further doubt on previous claims that an ancient “killer walrus” was a marine mammal eater.

In a newly published article in the international journal, *The Science of Nature*, the multidisciplinary team of researchers report their analysis of the internal structure of tooth enamel in a fossil walrus from California, *Pelagiarctos thomasi*, and in teeth of modern pinnipeds the New Zealand fur seal and sea lion.

Study co-author Dr Carolina Loch of the SJWRI says this was the first time the enamel ultrastructure of fur seals and sea lions, as well as the extinct walrus *Pelagiarctos*, was studied using scanning electron microscopy.

“*Pelagiarctos* was originally thought to have been a “killer walrus” that fed on large prey such as other marine mammals, but we found it has an enamel layer reasonably similar to that of modern New Zealand fur seals and sea lions, which are fish and squid eaters,” Dr Loch says.

“The enamel structure the researchers identified in *Pelagiarctos* meant the walrus was unlikely to be up to crunching through large bones without cracking its teeth – suggesting that it was a dietary generalist like the modern New Zealand pinnipeds studied,” she says.

Dr Loch says the study showed how using techniques and methods commonly employed in dentistry can answer questions with broader implications in the biology and evolution of animal species.

“Features and structures of the enamel layer have long been associated with differences in diet and tooth usage among animals, and can also help in the understanding the relationships among fossil and living species.

“Teeth are not only the focus of modern dentistry, but also valuable tools for biologists, archaeologists and palaeontologists,” Dr Loch says.

The study was conducted by Dr Loch, research fellow at the SJWRI (and Otago alumna – Department of Geology and Faculty of Dentistry); Dr Robert Boessenecker, College of Charleston USA (and Otago alumni – Department of Geology); Dr Morgan Churchill (New York Institute of Technology College of Osteopathic Medicine, USA) and the late Professor Jules Kieser (Otago Faculty of Dentistry) – who is always remembered for his prolific multidisciplinary dental research.

A 2013 paper by Drs Boessenecker and Churchill was the first to cast doubt on the “killer walrus” claims and the latest findings bolster their case, Dr Loch says.

New Zealand Dental Association Research Foundation and Ministry of Health Oral Health Research Fund strong supporters of SJWRI research in 2015 and 2016 grant rounds

SJWRI research staff and students have been highly successful in the NZ Dental Association Research Foundation and Ministry of Health Oral Health Research funding rounds in 2015 and 2016. In total, some \$420,103 was awarded to SJWRI-led projects in the 2015-16 period across both of these NZDA-administered research funds.

Established in 1964, the NZ Dental Association Research Foundation awards grants for research projects related to dentistry. Its overall purpose is to “promote, foster and extend the study and practice of the art and science of dentistry in New Zealand”. Since its inception, the Foundation has provided financial support for decades of dental and oral health research projects within the Dental School and the SJWRI, to help extend the boundaries of dental knowledge and to promote the fostering and extension of the study and practice of the art and science of dentistry in

New Zealand. The Research Foundation is funded by donations from dental practitioners, the dental supply industry and other businesses, as well as profits from the annual NZDA Conference and other fundraising activities. The SJWRI and the Faculty are hugely grateful for the role and contribution of the NZDA Research Foundation in supporting our research over the past five decades, in the process helping many of our Masters, PhD and specialising dental postgraduate students complete their studies.

In 2015, our researchers were primary investigators or co-investigators on ten research proposals awarded \$122,712 in funding from the NZDA Research Foundation. In 2016, our researchers were primary investigators on eleven research proposals awarded \$107,600 in funding from the NZDA RF. Many of these awards supported the research of postgraduate students and the training of specialist dentists.

New Zealand Dental Association Research Foundation

Our funding recipients in the 2015 round were:

Principal applicant	Other applicants (SJWRI unless noted)	Project title	Awarded
Dr Joseph Antoun	Prof Mauro Farella, <i>Azza Al-Ani</i> , Prof Tony Merriman (Biochemistry), Prof Murray Thomson	Finding the missing link for hypodontia	\$10,243
<i>Joanne Choi</i>	Prof Mauro Farella, Prof Karl Lyons, Assoc Prof Neil Waddell	Continuous measurement of intraoral pH and temperature of individuals with and without xerostomia	\$5,500
Dr Dawn Coates	Prof Richard Cannon, Dr Trudy Milne, Prof Alison Rich	An ABI qPCR machine for oral health research	\$15,000
<i>Fiona Firth</i>	Dr Benedict Seo, Dr Trudy Milne, Prof Mauro Farella	The effect of mechanical strain on the unfolded protein response of periodontal ligament cells in a three-dimensional culture	\$15,000
Dr Lara Friedlander	<i>Hitesh Navani</i> , Prof Alison Rich, Dr Trudy Milne, Peter Cathro	Angiogenesis in the apical papilla of immature permanent teeth associated with healthy and inflamed dental pulps	\$14,990
Suzanne Hanlin	Dr Sunyoung Ma, Dr Lara Friedlander	A 5-year retrospective assay (audit) of the outcomes of implant therapy in New Zealand private dental practice	\$13,000*
Dr Haizal Hussaini	Alison Rich, <i>Adil Alkharusi</i>	Expression of STAT 3 and cytokines (IL22, IL23, TH17) within metastatic lymph nodes of oral squamous cell carcinoma (OSCC)	\$12,134
Assoc Prof Neil Waddell	Prof David Prior (Geology), Kai Chun Li, Dr Carla Meledandri (Chemistry), Dr Karl Lyons	Gold nanoparticle reinforcement of biomedical dental ceramics	\$12,000
Dr Matthew Woods		Precision balance and pH meter for dental research including drug discovery	\$9,845
<i>Muhammed Yakin</i>	Dr Benedict Seo, Prof Alison Rich	Oral cancer cells under stress: The intertwined roles of cell stress and the dynamic signalling pathways	\$15,000

Names italicised above are SJWRI postgraduate students (either PhD or DClintDent). * Grant-in aid.

Our funding recipients in the 2016 round were:

Principal applicant	Other applicants (SJWRI unless noted)	Project title	Awarded
<i>Nawal Radhiah Abdul Rahman</i>	Dr Benedict Seo, Dr Haizal Hussaini, Prof Alison Rich	Expression of the lysyl oxidase family in benign odontogenic tumours	\$9,442
Dr Jonathan Broadbent	Prof Murray Thomson	A life course study on chronic dental conditions and ageing of the teeth and dentition: equipment grant	\$13,500
<i>Sy Yin (Adeline) Chai</i>	Assoc Prof Vincent Bennani, John Aarts, Prof Karl Lyons, Dr Bronwyn Lowe, Andrew Gray	The effect of preparation design on stress distribution and fracture strength of porcelain laminate veneers	\$6,500
Prof Mauro Farella	Dr Joseph Antoun, Assoc Prof Nicholas Chandler, Prof Tony Merriman (Biochemistry), <i>Will Sew Hoy</i>	Genetic and psychological factors associated with orthodontic pain in children and adolescents	\$8,441
Prof Mauro Farella	<i>Divya Ramanan</i> , Dr Ajith Polonowita, Dr John Hamilton, Prof Sandro Palla (U Zurich)	Jaw muscle overload as a possible cause of orofacial pain and headache	\$12,350
<i>Nurul Ruziantee Ibrahim</i>	Dr Haizal Hussaini, Dr Benedict Seo, Prof Alison Rich	Lymphangiogenesis in metastatic lymph nodes of oral squamous cell carcinoma	\$10,800
<i>Ludwig Jansen van Vuuren</i>	Prof Warwick Duncan, Assoc Prof Neil Waddell	Development of a simulant model for clinically relevant testing of implant-and natural tooth-supported all-ceramic restorations	\$8,000*
Jae-Kwang Jung	Dr Haizal Hussaini, Dr Benedict Seo, Prof Alison Rich	Investigation of the role of lymphangiogenesis in oral lichen planus	\$12,144
Dr Venkata Praveen Parachuru	Prof Warwick Duncan, Dr Ellie Knight	IL33 and IL35 expression in healthy and diseased gingival tissues	\$14,988
<i>Elizabeth Williams</i>	Dr Benedict Seo, Dr Haizal Hussaini, Dr Dawn Coates, Prof Alison Rich	Investigation of the presence of human papillomavirus in verrucal-papillary lesions of the oral cavity and comparison of viral detection methods	\$8,962
<i>Muhammed Yakin</i>	Dr Benedict Seo, Prof Alison Rich	The expression of STAT3 signalling pathway proteins in Oral Squamous Cell Carcinoma tissue	\$2,503

Names italicised above are SJWRI postgraduate students (either PhD or DClinDent).

**Grant-in aid of \$3,000 from the NZDARF and \$5,000 from the International College of Dentists*

Ministry of Health Oral Health Research Grants

In 2007, the New Zealand Ministry of Health established a funding programme for oral health research, managed by the NZDA and its Research Foundation, to fund research targeted towards the oral health priorities of the Ministry. Priority is given to oral health research that targets children and adolescents; people of all ages with physical, intellectual, behavioural, or cognitive disabilities, or who are medically compromised; people experiencing inequalities of outcome (e.g., Māori, Pacific and low-income populations); maternal oral health; older adults; and research focusing on promoting oral health, building links with primary care and building the oral health workforce.

Four SJWRI-led projects totalling \$62,247 were funded from the Ministry's targeted Oral Health Research fund in 2015, with another five projects totalling \$119,544 supported from the OHR fund in 2016.

Our successful applicants in the 2015 round were:

Principal applicant	Other applicants	Project title	Awarded
<i>Leonard Chia</i>	Prof Darryl Tong, Assoc Prof Lyndie Foster Page, Prof Murray Thomson	Clinicians' perspectives on Special Needs Dentistry in New Zealand	\$2,000*
Dr Haizal Hussaini	<i>Hina Narayan</i> , Dr Trudy Milne, Prof Alison Rich	Effect of cigarette smoking on TGF- β expression in oral tissues and cells	\$10,517
Haizal Hussaini	<i>Hina Narayan</i> , Dr Trudy Milne, Prof Alison Rich	<i>In vitro</i> effect of cigarette smoke on DNA methylation in oral epithelial cells	\$15,489
Dr Moira Smith (Public Health, UO Wellington)	Prof Murray Thomson	Exploring oral health care planning and service delivery models for dependent older adults in aged residential care facilities: feasibility and acceptability in the aged-care sector	\$34,241

*Names italicised above are SJWRI postgraduate students (either PhD or DClintDent). * Grant-in aid.*

Our successful applicants in the 2016 round were:

Principal applicant	Other applicants	Project title	Awarded
Assoc Prof Lyndie Foster Page	Dr Joseph Antoun, Dr Hannah Jack	Reading between the lines: how do young New Zealanders from low socio- economic backgrounds feel about not getting their teeth straightened?	\$29,168
Dr Lara Friedlander	<i>Shaikra Al Samahi</i> , Prof Alison Rich, Dr Haizal Hussaini, Dr Trudy Milne	Type 2 Diabetes and inflammatory markers in dental pulp	\$14,891
Prof Alison Rich	<i>Dema Waleed</i> , Prof Murray Thomson	Teeth for all for life: time to rethink? Comparing retaining natural teeth versus dentures among New Zealand's older population	\$1,620
Dr Lee Smith	Assoc Prof Lyndie Foster Page, Dr Rosalina Richards (Preventive& Social Medicine)	Pasifika adolescents' understandings and experiences of oral health care	\$36,076
Prof Murray Thomson	Dr Moira Smith (UO Wellington), Prof Ngaire Kerse (U Auckland), Dr Anna Ferguson	Cognitive function, dependency and oral health among frail older New Zealanders: a national survey	\$37,789

Names italicised above are SJWRI postgraduate students (either PhD or DClintDent).

The SJWRI and the Faculty are hugely grateful for the role and contribution of the NZDA Research Foundation and the Ministry of Health Oral Health Research Fund in supporting our research over the past five decades, in the process helping many of our Masters, PhD and specialising dental postgraduate students complete their studies.

SJWRI researchers supported by Lottery Health Research equipment grants

SJWRI researchers gained over \$209,000 in funding in 2015-16 from the Lottery Grants Board for equipment to support research aimed at improving the health of New Zealanders.

In 2015, Professor Mauro Farella and colleagues from the Craniofacial Biology and Clinical Oral Physiology research programme were awarded \$90,000 towards the purchase of a 3dMDtrio Imaging System and software, while Wendy-Ann Jansen van Vuuren of Biomechanics and Oral Implantology was awarded \$15,417 towards a Proto-Tech Thermocycler Unit.

The 3dMDtrio system is a portable, ultra-fast, high-precision surface imaging device consisting of nine medical grade cameras and a synchronised flash system, which is designed to capture detailed 3D images of the face at very high resolution. Prof Farella and his colleagues plan to use the 3dMDtrio imaging system to investigate facial deformities such as cleft lip and palate, evaluate treatment outcomes following orthodontics or corrective jaw surgery, and assess new and innovative treatments such as 3D printing of facial prosthetics in head and neck cancer patients. As well as clinical applications, this technology is well suited for investigating the genetic basis of face and jaw abnormalities.

The Proto-Tech Thermocycler Unit will be used in Biomaterials research to simulate temperature changes to which dental restorations are subjected in the oral cavity. The breakdown of dental restorations in the mouth can be aggravated by thermal changes, induced by routine eating, drinking and breathing. By subjecting prototype restorations and other biomaterials to temperature fluctuations, accelerated aging experiments can be conducted to reveal possible weaknesses. This will aid in the development of improved dental materials with higher fracture toughness and wear resistance.

In 2016, Associate Professor Brian Monk, Director of the Molecular Bioscience Laboratory (MBL) of the SJWRI led a successful equipment grant application to Lottery Health Research for the purchase of an AKTA™ PURE 25 FPLC system (\$109,133).

The AKTA™ PURE 25 FPLC system is an advanced chromatography system for protein fractionation and purification which is used on a daily basis by numerous ongoing and future research projects in the MBL. Modern research in the fields of oral health, dentistry and medicine often requires detailed information

about particular proteins in order to translate the basic biology into health benefits. The ability to isolate and determine the structure and function of individual proteins is fundamental to molecular and microbiological research. The AKTA™ PURE 25 FPLC system enables more sophisticated and efficient study of proteins by integrating with the MBL's expertise in molecular biology, its facilities for cell, microbial culture, centrifugation plus a library of centrifuge heads. It is used in a wide range of analytical studies related to dentistry, provide understanding basic biological phenomena at the molecular level, and aids in the determination of drug target structures needed to facilitate structure-directed drug discovery designed to circumvent drug resistance. The FPLC system will also be made available to other researchers in the Dunedin campus of the University of Otago.

Popular Forensic Biology summer school course continues as Prof Jules Kieser's legacy

Increasingly, forensic investigations have come to rest on the techniques of forensic biology to provide vital evidence in homicides, violent crimes, disaster identification and even minor crimes. These techniques are also commonly used in a wide range of professional areas such as the investigation of crimes against humanity, forensic archaeology and wildlife protection.

For many years, the SJWRI has leveraged its established strengths in forensic research to run an introductory course in forensic biology, FORB201, at the University's Summer School. FORB 201 was established by the late Professor Jules Kieser (1950-2014), founding Director of the Sir John Walsh Research Institute, who developed the course as an introduction for the student who is interested in analysing biological evidence as it relates to legal and other investigations, or collecting and processing evidence at a crime scene or in a laboratory.

Jules, who passed suddenly in June 2014, 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. Several students were inspired by FORB201 course to pursue postgraduate forensic biology research under Jules' supervision. 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.

The SJWRI has been proud to carry on a small part of Jules' legacy by continuing to run FORB201. The course is coordinated by Dr Angela Clark and Professor Richard Cannon, and taught by Dr Clark in concert with guest lectures from New Zealand and overseas. FORB201 has for many years been one of the most popular summer school courses run by the University, and this has continued under Dr Clark and Professor Cannon's stewardship. A feature of the course is that students have an unequalled opportunity to interact with a range of National and International forensic experts. The multidisciplinary nature of forensics depends on the integration of scientific skills within a forensic context, and hence the course includes a wide spectrum of topics, including trace and contact evidence, DNA, body fluids, traumatology, forensic entomology, toxicology and fibre analysis.

Mouth breathing while sleeping may increase tooth decay risk

Mouth breathing during sleep is linked to a more acidic oral environment that may promote tooth enamel erosion and caries, new University of Otago research suggests.

Dentistry researchers from the University's Sir John Walsh Research Institute studied the oral pH levels of 10 healthy volunteers who alternated between sleeping with and without a nose clip that forced them to breathe through their mouths.

Their study's findings, published in the *Journal of Oral Rehabilitation* in 2015, showed that the average pH during sleep with forced mouth breathing was a mildly acidic 6.6 compared to a neutral 7 when nose breathing.

Study lead author and PhD student Joanne Choi says the research team found a noticeable difference in the pattern of variation of pH and temperature between day and night.

"Intraoral pH decreased slowly over the hours of sleep in all participants, but showed greater falls over a longer period of time when participants were forced to mouth breathe," Ms Choi says.

At times the pH levels fell as low as 3.6 during forced mouth breathing during sleep, well below the critical threshold of 5.5 when enamel starts to demineralise, she says.

"This study is the first to continuously monitor intraoral pH changes in healthy individuals over several days. Our findings support the idea that mouth breathing may indeed be a causal factor for dental diseases such as enamel erosion and caries."

The study, which was funded by the Dentsply Research Foundation and Maurice and Phyllis Paykel Trust project grants, was picked up by media in New Zealand and around the world.

Our programmes

1957

Construction of the Walsh Building

Construction of the existing Faculty of Dentistry (the Walsh Building) begins. The building is designed in the 'Modernist' style and includes an early example of glass curtain walling.



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.
- Communication of forensic concepts to the general public

Within the area of oral implantology our research focuses on:

- Bone replacement grafting
- Stem-cell regenerative therapies.
- Early diagnosis and treatment of peri-implant immune-inflammatory disease
- Fit of aftermarket versus original equipment manufacturer (OEM) implant components
- Modifications to dental implant materials and surfaces to enhance osseointegration.
- The effects of implant fixture corrosion products on periodontal structures.
- *In vitro* modelling of masticatory forces on implant overdentures, their supporting sub-structures and surrounding bone.
- The short-term and long-term clinical outcomes of modified surgical and prosthodontic loading protocols during implant treatment.

Key personnel and collaborations

Staff

Professor WJ Duncan
Professor KM Lyons
Professor P Brunton
Associate Professor JN Waddell
Professor DC Tong
Dr P Cathro
Dr DR Schwass
Associate Professor A Tawse-Smith
Dr S Ma
Ms S Hanlin
Dr C Loch Santos Da Silva
Dr KC Li
Mr L Jansen van Vuuren
Mrs. W Jansen van Vuuren
Ms J Choi

Postgraduate students

Andrew Tawse-Smith	Vanda Symon
Donald Schwass	Seung David Ko
Joanne Choi	Leonid Khimovich
Mohammed Alrashed	James Dawson
Sunyoung Ma	Yevgeny Sheftel
Therese De Castro	Frances Ruddiman
Ludwig Jansen van Vuuren	Allauddin Siddiqi
Veivakatorocaketaki Masi Ovini	Gemma Cotton
Abdullah Barazanchi	Anne-Christine (Anki)
Lisa Falland	Lindstrom

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 (University of Adelaide School of Dentistry, Impact and Armour Group, Cranfield University/Defence Academy of the United Kingdom, Shrivenham, University of the Witwatersrand, Johannesburg, South African Nuclear Energy Corporation in Palindaba, Tokyo University of Agriculture and Technology, Tokyo).

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: Neurological Foundation Research Grant, Maurice and Phyllis Paykel Trust, ANZAOMS Research and Education Trust, 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 this data is 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: Neurological Foundation Research Grant, Maurice and Phyllis Paykel Trust, University of Otago Research Grant. University of Otago Health Sciences Division Sandpit Funding Grant. ANZAOMS Research and Education Trust.

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.



Nanosilver gel treatment of ligature-induced peri-implantitis in a sheep model (W Duncan, A Siddiqi, D Schwass, C Meledandri, G Cotton, C da Silva).



Biomet 3i Implant in sheep femur model with Endobon bone replacement graft & Osseoguard collagen membrane

Biomet 3i implant in sheep femur model with Endobon bone replacement xenograft and Osseoguard resorbable collagen membrane (W Duncan, P Schmidlin, J Liu).

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 into supporting biological and regenerative products. Our research encompasses immediate placement and/or loading of single implants and implant-supported overdentures, fit of zirconia prostheses, implant analysis using micro-CT, *in vitro* modelling of strain distribution within implant overdentures and their supporting substructures and bone, and *ex vivo* analysis of implant fixture corrosion. Commercially-sponsored research ranges from comparisons of different implant systems, to different bone replacement grafts and resorbable membranes in sheep animal models including mandibular tooth extraction sockets, femur epicondyle and maxillary sinus. We have also recently established a new animal model of peri-implantitis for investigating novel therapeutic agents.

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. Diagnosis and treatment of peri-implant immunoinflammatory disease.

Source(s) of funding: New Zealand Dental Association Research Foundation; JF Fuller Foundation; International Team for Oral Implantology ITI Switzerland; Straumann AG, Switzerland; Nobel Biocare Australia; Southern Implants, South Africa; Otago Innovation Ltd; Zimmer Biomet 3i Ltd, United States of America; Resorba GmbH, Germany; Geistlich Pharma Ltd, Switzerland; Ministry of Business, Innovation and Employment, New Zealand; Maurice and Phyllis Paykel Trust; University of Otago Research Grants.

Research funding (over \$5000)

\$12,000 Waddell JN, Falland L, Tong D & Brunton P. Neurological Foundation Research Grant 1624-SPG, Development of skin/skull/brain model to measure impact forces to the head and brain-injury mechanisms.

\$999,804 Duncan WJ, CI – Smith M, Meledandri C and Waddell JN. MBIE's 2016 Endeavour Round – Smart Ideas. "Silverbone" - Otago's nano-silver technology plus NZ-manufactured bone graft produces unique antibacterial biomaterial.

\$8,000 Jansen van Vuuren L, CI – Duncan WJ & Waddell JN. New Zealand Dental Association Research Fund. Development of a simulant model for clinically relevant testing of implant and natural tooth supported all-ceramic restorations.

\$30,026 Loch C & Cannon R, CI – Waddell JN & Brunton P. MBIE, 2016 Unlocking Curious Minds Fund – Local.

\$1,200,000 Duncan WJ and Harris P, CI – Chandler NP and Waddell JN. UltraD3: Ultrasonic Dental Diagnostic Device, MBIE Targeted Research Grant.

\$5,000 Choi J, Waddell JN & Lyons K. New Zealand Dental Association Research Fund. Continuous measurement of intraoral pH and temperature of individuals with and without xerostomia.

\$7000 Waddell JN, Falland L, Tong D & Brunton P. Maurice and Phyllis Paykel Trust, Development of a skin/skull/brain model to measure impact forces to the head and brain injury mechanisms.

\$12,000 Waddell JN, Li KC, Meledandri C, Prior D & Lyons K. New Zealand Dental Association Research Fund. Gold nanoparticle reinforcement of biomedical dental ceramics.

\$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.

\$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.

\$40,000: Duncan W – CI, Chandler NP and Waddell JN: A large animal gum-disease model of peri-implantitis and periodontitis in sheep for testing novel treatment strategies. University of Otago Research Grant (UORG).

\$18,000: Duncan W: The Machined Surface Coronal implant in a sheep model of peri-implantitis. Southern Implants Ltd SA.

\$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.

\$66,340 Duncan WJ and Schmidlin P, Evaluation of novel bone replacement grafts in a sheep animal model. Resorba Medical GmbH, Germany.

\$156,000. Duncan WJ and Schmidlin P, Evaluation of novel bone replacement grafting products for tooth socket preservation and maxillary sinus elevation in a sheep animal model. Zimmer Biomet 3i, United States of America.

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

Clinical and Translational Research

Programme Director: Professor Warwick Duncan

Te Kaupeka Pūniho, New Zealand's National Centre for Dentistry, is the centre of excellence in New Zealand for clinical and translational research in dentistry and oral health. During 2015-16, the Clinical and Translational Research Programme was refreshed and relaunched, with an expanded focus to include Translational Research. The Research Programme groups together researchers and projects whose objective is to enhance care and achieve better outcomes for our patients. There is considerable overlap with other research programmes, particularly with respect to the translation from benchtop, *in vitro* and preclinical animal research into development of commercially-viable products or improvements in clinical practice.

Current projects range from clinical trials conducted within the school and out in the community of new products or modified treatment protocols, to development of new therapeutic agents and devices from benchtop through initial *in vitro* and preclinical animal trials with the objective of phase 1 clinical trials, to surveys conducted within the school or in the community regarding the techniques employed in clinical dental practice and their outcomes. Funding for this work ranges across contestable research grants, commercial sponsorship and contract research, and includes both researcher-initiated investigations and research driven by manufacturers of dental products.

The major part of Clinical and Translational research involves diverse projects undertaken by the staff, postgraduate and undergraduate students of the Faculty. Additionally, work has continued on the development of our dental practice-based research network, Applied Research through Clinicians' Hands (ARCH), with a view towards fostering research conducted outside the Faculty by and for New Zealand dental practitioners, with the support of Faculty of Dentistry staff.

Key personnel

Professor W Duncan
Professor P Brunton
Professor B Drummond
Professor D Tong
Associate Professor N Chandler
Associate Professor J Leichter
Associate Professor N Waddell
Associate Professor V Bennani
Associate Professor Tawse-Smith
Associate Professor L Foster-Page
Dr M Brosnan
Dr S Ma

Dr D Schwass
Dr D Coates
Dr T Milne
Dr C Loch Santos Da Silva
Dr B Al-Amieh
Dr J Choie
Ms D Boyd
Ms C Murray

ARCH

Dr L Friedlander
Ms S Hanlin

Postgraduate students

Seung David Ko	Noel Ye Naung
Leonid Khimovich	Janine Tiu
James Dawson	Syarida Safii
Yevgeny Sheftel	Joanne Choie
Frances Ruddiman	Soo-Wee Ong
Allauddin Siddiqi	Dr Andrew Tawse-Smith
Ajay Sharma	Dr Sunyoung Ma

Research projects and themes established

Novel therapeutic agents

Manuka honey antibacterial action against caries – clinical trial

Manuka honey and Manuka oil antibacterial action against periodontitis – *in vitro* and clinical trial

Geranylgeraniol treatment for Bisphosphonate-Related Osteonecrosis of the Jaw (BRONJ) – *in vitro* and preclinical animal model

Novel grafting products for alveolar ridge preservation – clinical trial

Mucograft for gingival and mucosal regeneration – clinical trial

Novel bone grafting products and resorbable membranes for alveolar ridge preservation – preclinical animal model

Silver nanoparticles as antibacterial agents – *in vitro*

Silver nanoparticles in dental materials – *in vitro*

Silver nanoparticle topical gel for treating peri-implantitis and periodontitis – *in vitro* & preclinical animal model

Silver nanoparticle-doped bone xenografts for maxillofacial grafting – *in vitro* & preclinical animal model

Novel therapeutic approaches

HALL technique for childhood caries – clinical trial
Tooth preparation with ultrasonics – benchtop
Tooth preparation and restoration with ceramic materials- benchtop
Gingival retraction for dental impressions – clinical trial
Ultrasonic instrumentation of titanium – benchtop
Diode laser irradiation of titanium surfaces – benchtop
Novel bone-grafting surgical instruments – benchtop and cadaveric study

Implant therapy

Anodic modification of titanium and titanium-zirconia alloy – *in vitro* & preclinical animal model
Zirconia versus titanium one-piece implants – preclinical animal model & randomised clinical trial
Modified hydrophilic surfaces on dental implants – preclinical animal model

Stem cell therapy

Adipose-derived stem cell therapy around titanium implants – *in vitro* & preclinical animal model
Stem cells in dental pulp from deciduous teeth – *in vitro*
Oral periosteum-derived stem cells – *in vitro*

Outcomes of treatment

Outcomes of implant therapy in New Zealand private practice – clinical audit
Maxillary implant-supported overdentures – follow-up of randomised clinical trial
Mandibular implant-supported overdentures – follow-up of randomised clinical trial
Periodontal treatment: instrumentation of root surfaces – benchtop
Clinical success of zirconia implant abutments – follow-up of randomised clinical trial
Aftermarket versus original implant abutments – preclinical animal model
Perceptions of implant treatment – qualitative survey
Piezoelectric surgery vs rotary instruments for lateral maxillary sinus floor elevation – systematic review

Clinical audit

Referrals for Paediatric treatment – clinical audit
Dental files used for forensic identification – clinical audit
Dental treatment in New Zealand soldiers – clinical audit
Third molar extractions – clinical audit

Diagnostics

Oral pH and temperature – clinical trial
Ultrasonic devices for early diagnosis of periodontal diseases – benchtop, preclinical animal trial, clinical trial

Epidemiology of disease

Children and snoring – clinical survey
Caries in Māori – clinical survey
Use of Miswak by New Zealand Muslim immigrants – clinical survey
Titanium particles and peri-implantitis – clinical and histological survey
Quality assessment of systematic reviews on oral implants – systematic review

New Animal models

A sheep model of bilateral artificially-induced periodontal disease and periodontitis
A sheep model for testing bone grafting products in alveolar ridge preservation
A sheep model for testing bone grafting products in maxillary sinus elevation
A sheep model for testing modified titanium discs in the femoral epicondyle

Awards

- Associate Professor Nicholas Chandler received the Alan Docking International Association for Dental Research Science Award, 2016
- Dr Joanne Choi received 25 national and international media reports on her intra-oral pH and temperature device.
- Dr Sunyoung Ma won the SJWRI Publication Award (2015), was awarded 1st place for the Carl E Misch Award for Excellence in Implant Dentistry (2015) and was awarded the J. Morita Junior Investigator Award for Geriatric Oral Research (IADR, 2016).
- Associate Professor Vincent Bennani won the Faculty of Dentistry Research Day Poster Competition (2016).
- Dr Dawn Coates was awarded Faculty of Dentistry's, Sir John Walsh Research Institute, Research Excellence Award in 2016.

Major grants

Professor W Duncan and co-investigators were awarded \$1,199,869 by the Ministry of Business Innovation and Employment (High Value Manufacturing and Services- Targeted Research) for "UltraD3: Ultrasonic Dental Diagnostic Device" in 2015.

Professor W Duncan and co-investigators were awarded \$999,804 by the Ministry of Business Innovation and Employment (Contestable Research Fund – Smart Ideas) for "Silverbone" – unique antibacterial biomaterial" in 2016.

Contestable Funding

New Zealand Dental Research Foundation
Faculty of Dentistry Fuller Grant
New Zealand Dental Association/Ministry of Health Oral Health Research Grant.
New Zealand Dental Association Research Foundation Project Grant
Lottery Health Research
International College of Dentists Research Fund
Otago Innovation Ltd (OIL)
University of Otago Research Grant
Cure Kids, HRC
DMG Germany
Health Research Council of New Zealand
Manuka Health New Zealand
Maurice and Phyllis Paykel Trust
New Zealand Society of Periodontology
Division of Health Sciences Sandpit fund
Wishbone Trust

In-kind support

Ivoclar International Co.
Southern Implants
Nobel Biocare
Neoss
Geistlich Pharma
Zimmer Biomet 3i
Resorba

Patent applications

D Schwass, C Meledandri, G Cotton (Antimicrobial alginate gel) 2015
D Schwass, C Meledandri, G Cotton, W Duncan, G Tompkins (Silvergel) 2016

Collaborations

Other Departments at Otago University:

Applied Sciences Department, Clothing & Textile Sciences
Geology Department
Preventive & Social Medicine Department

Physics Department
Chemistry Department

Other Universities

Department of Mechanical Engineering, University of Auckland
eveDENT (Australian PBRN)
University of Western Australia
University of Geneva, Switzerland
Chonbuk University, Korea
University of Zürich, Switzerland
Swiss Federal Institute of Technology at Zürich, Switzerland

Companies and other entities

Callaghan Innovation (New Zealand)
Southern Implants Ltd (South Africa)
Zimmer Biomet 3i (United States of America)
Resorba Medical GmbH (Germany)
Ivoclar International (Liechtenstein)
Geistlich Pharma (Switzerland)
Molteno Ophthalmic Ltd (New Zealand)

Undergraduate clinical research in 2015

Ong, J.Z.T. Practices and philosophies towards vital pulp therapy: A PBRN Study

Twaddle, N.J. Vital Pulp therapy practices in regional New Zealand

Phang, J.; Sim, S.Y. Adolescents and young adults' knowledge and understanding of dental trauma

Tong, A.A.L.H. An audit of children and adolescents with medical problems including genetic anomalies and syndromes receiving care in the Paediatric Dentistry Clinic

Jeganath, J.; Wong, A. New Zealand general dentists' usage and views on caries detection methods

Chow, M.; Costain, S. Knowledge, opinions and practices regarding sugar in oral paediatric medications: A survey of Dunedin pharmacies

Eggleston, A.R.J.; Baker, L.C. Treatment needs and potential funding available for children referred for restorative dental care under general anaesthesia at the University of Otago School of Dentistry

Lim, M.; Lin, R. Prescription of systemic antibiotics by dental specialists in New Zealand

Avau, P.S.; Jahnke, D.J. Oral health perceptions, awareness and preferences in a Dunedin Pacific population, New Zealand

Gatland, C.L.; Geoghegan, G.E. Strategies for the provision of oral health care for institutionalised older adults in New Zealand

Foo, M.; Kim, A.; Lee, D. Comparison of survival rates between single implant crowns (SIC) and short-span tooth-supported fixed bridges: 6-year retrospective study

Lin, T. Convergence angles and margin widths of tooth preparations prepared by New Zealand dental students

Campbell, H., Wilson, J. New Zealand dentist's perspectives on whether recent NZ dental graduates are well equipped for the workforce

Singh, J.K.; Masri, N. Oral health status of New Zealand First World War service personnel

Nichols, G. Bicycle-related facial fractures over a 33-year period: have safety helmets made a difference?

Tan, A.P. Orthodontic screening and referral practices among dental therapists in New Zealand: A qualitative study

Kota, A.; Jayaweera, Y. The effect of standardised implantoplasty protocol on titanium surface roughness: an *in-vitro* study

Ee, S.J.; Tan, J.Y. Dimensional analysis of prosthetic screws supporting single implant crowns after 5 years *in vivo*

Undergraduate clinical research in 2016

Goh, K., Arrif, A. Current dental practice in New Zealand: anaesthesia, direct restorations, endodontics and bleaching

Hong, C.L. And Lamb, A. Medical emergencies and cross-infection control practices in New Zealand dental practices.

Looi, S., Chua, K.R. New Zealand general dental practitioners' preferred methods and views regarding restoration of root canal treated teeth

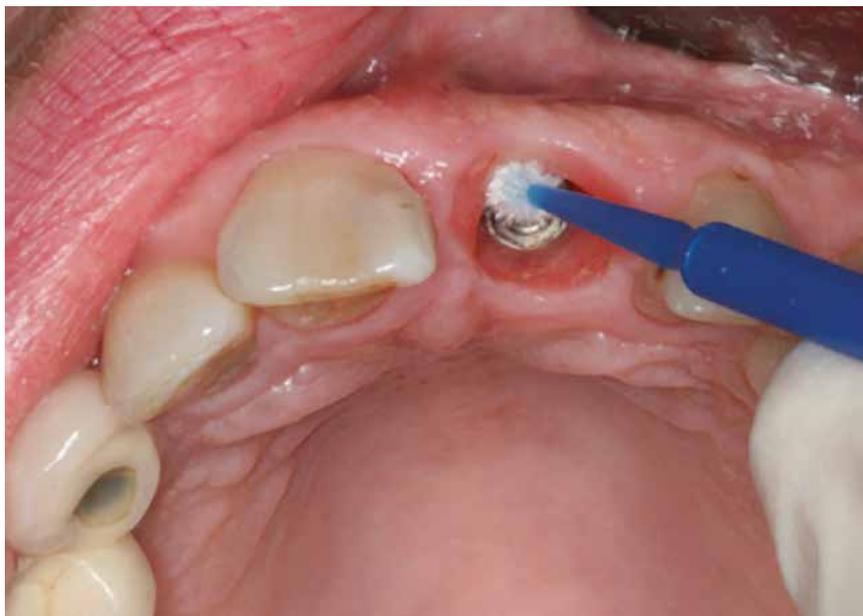
Chew, D.W.S Tooth preparation with ultrasonic instruments. Effects on enamel and dentine surface bonding

Alayan, H., Fernandes, R. The use of miswak among Muslim immigrants living in New Zealand

France, A.J, Laqekoro Z. Pacific adolescents' attitudes to and beliefs about oral health and oral health care

Radu A, Barber H. Presence of titanium particles in the oral mucosa of implants with peri-implantitis

Chuah, W.C. Quality evaluation of dental records in Forensic Odontology



Are Titanium wear particles associated with peri-implantitis? Images from Andrew Tawse-Smith's PhD research showing micro brush sampling of the peri-implant mucosa

Featured publications

Book chapters

Drummond, B. K., & Harding, W. (2015). Examination and treatment planning for hypomineralized and/or hypoplastic teeth. In B. K. Drummond & N. Kilpatrick (Eds.), *Planning and care for children and adolescents with dental enamel defects: Etiology, research and contemporary management*. (pp. 99-112). Berlin, Germany: Springer. doi: 10.1007/978-3-662-44800-7

Duncan, WJ (2016). Peri-Implant Bone: Preservation or Reconstruction? In: *Current Issues in Periodontics*, PM Bartold, Kemal Y, eds., Asian Pacific Society of Periodontology: Adelaide, ISBN 978-0-646-95464-6.

Friedlander, L., McElroy, K., Daniel, B., Cullinan, M., & Hanlin, S. (2015). Direct pulp capping of permanent teeth in New Zealand general dental practice: A practice based research study. *New Zealand Dental Journal*, 111(2), 58-64.

Chandler, N. P. (2017). Root canal filling. In B. S. Chong (Ed.), *Harty's endodontics in clinical practice*. (7th ed.) (pp. 151-173). Edinburgh, UK: Elsevier. ISBN 9780702058356

Journal publications

Tong, D. C., & Breeze, J. (2016). Damage control surgery and combat-related maxillofacial and cervical injuries: A systematic review. *British Journal of Oral & Maxillofacial Surgery*, 54, 8-12.

Choi JE, Loke C, Waddell JN, Lyons KM, Kieser JA, Farella M (2015). Continuous measurement of intraoral pH and temperature: Development, validation of an appliance and a pilot study. *Journal of Oral Rehabilitation* 42:563-570.

Duncan, W. J., Gay, J. H. A., Lee, M.-H., Bae, T.-S., Lee, S.-J., & Loch, C. (2016). The effect of hydrothermal spark discharge anodization in the early integration of implants in sheep sinuses. *Clinical Oral Implants Research*, 27(8), 975-980.

Chow, M., Costain, S., Brosnan, M., & Murray, C. (2016). Knowledge, opinions and factors influencing practices regarding sugar in oral paediatric medications: A survey of Dunedin pharmacy staff. *New Zealand Dental Journal*, 112(2), 33-38.

Bennani V, Aarts J, Schumayer M (2016). Correlation of pressure and displacement during gingival displacement: An *in vitro* study. *J Prosthet Dent*; 115, 3:296-300

Tawse-Smith A, Ma S, Duncan WJ, Gray A, Reid MT, Rich AM (2016). Implications of wear at the titanium-zirconia implant-abutment interface on the health of peri-implant tissues. *International Journal of Oral & Maxillofacial Implants - JOMI-2015-562/R1* - (5014),

Ma, S., Tawse-Smith, A., De Silva, R. K., Atieh, M. A., Alsabeeha, N. H. M., & Payne, A. G. T. (2016). Maxillary three-implant overdentures opposing mandibular two-implant overdentures: 10-year surgical outcomes of a randomized controlled trial. *Clinical Implant Dentistry & Related Research*, 18(3), 527-544.

Zafar, S., Coates, D. E., Cullinan, M. P., Drummond, B. K., Milne, T., & Seymour, G. J. (2016). Effects of zoledronic acid and geranylgeraniol on the cellular behaviour and gene expression of primary human alveolar osteoblasts. *Clinical Oral Investigations*, 20, 2023-2035.

Zanicotti, D. G., Coates, D. E., & Duncan, W. J. (2016). In vivo bone regeneration on titanium devices using serum-free grown adipose-derived stem cells, in a sheep femur model. *Clinical Oral Implants Research*. Feb 8. [Epub ahead of print]

Sharma, A., McQuillan, A. J., Shibata, Y., Sharma, L. A., Waddell, J. N., & Duncan, W. J. (2016). Histomorphometric and histologic evaluation of titanium-zirconium (αTiZr) implants with anodized surfaces. *Journal of Materials Science: Materials in Medicine*, 27(5), 86.

Liu, J., Schmidlin, P. R., Philipp, A., Hild, N., Tawse-Smith, A., & Duncan, W. (2015). Novel bone substitute material in alveolar bone healing following tooth extraction: An experimental study in sheep. *Clinical Oral Implants Research*. Advance online publication. doi: 10.1111/clr.12673

Siddiqi, A., Kieser, J. A., De Silva, R. K., Thomson, W. M., & Duncan, W. J. (2015). 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*, 17(3), 483-496. doi: 10.1111/cid.12159

Tiu, J., Al-Amleh, B., Waddell, J. N., & Duncan, W. J. (2015). Reporting numeric values of complete crowns: Part 1: Clinical preparation parameters. *Journal of Prosthetic Dentistry*, 114(1), 67-74. doi: 10.1016/j.prosdent.2015.01.006

Craniofacial biology and clinical oral physiology

Programme leader: Professor Mauro Farella

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 oral health, jaw function, and psychological wellbeing, and the understanding of the peripheral and central mechanisms of orofacial pain and jaw dysfunction 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, dysphagia, tooth wear, eating behaviour, and novel food products. We are currently using wired and wireless sensors to monitor intraoral pH, temperature, and jaw activity for the purpose of identifying and evaluating ways of overcoming orofacial pain, dental wear, jaw dysfunction, jaw clicking sounds, snoring, and obstructive sleep apnea. We also use monitoring equipment to improve the quality of sleep in New Zealand children and adults.

Highlights 2015-2016

In total 33 articles were published in the peer-reviewed scientific literature. For details, please refer to the Publications data in the 'Our Achievements' section of the 2015-16 SJWRI Research Report. The total number of conference presentations made was 32 (including 8 keynote addresses).

Total research funding (external) obtained in 2015-2016 amounted to \$492,271.

Prof Farella was the recipient of the Alan Docking Award from the International Association for Dental Research (2015), and of the Sir John Walsh Award (2015), to acknowledge the excellence achieved in dental research.

Li Mei won the SJWRI Clinical Research Award 2015

Gareth Benic won the prize for the best research presentation within the Research Programme in Craniofacial Biology and Clinical Oral Physiology at the 2016 Research Day.

PhD (Theses submitted): Andrew Quick, Ghassan Idris, Erin Hutchinson.

Doctor of Clinical Dentistry (completed): Andrew Parton, Sophie Gray, Shahrzad MacAvoy, Coreen Loke, Mohamad Al-Dujaili, Lydia Meredith, Yana Itskovich, Azza Al-Ani, Catherine Carleton, Gareth Benic.

Master of Health: Austin Kang

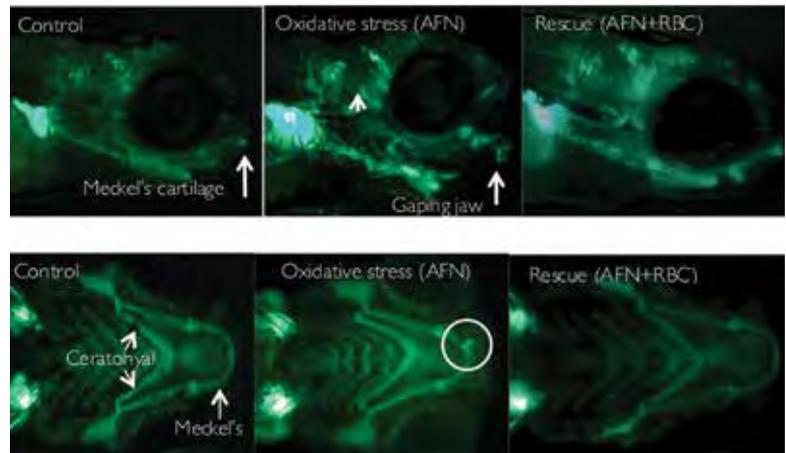
Honours Students: Erni Park, Sharifa Al Balushi, Sherry Lee.

Research projects

A novel model for exploring the causes and treatments of craniofacial birth defects

Research Team: Catherine Carleton, Julia Horsefield, Joseph Antoun, and Mauro Farella

The aim of this research was to determine how environmental causes of craniofacial birth defects affect the growth and survival of cells contributing to the craniofacial skeleton during embryonic development. A second objective was to determine whether factors that enhance cell survival, such as antioxidant molecules, could rescue craniofacial defects. Our findings indicate that oxidative stress in a zebrafish model results in craniofacial cartilage defects that can be rescued by the antioxidant RiboCeine. These findings may have translational significance, as treatment with antioxidants may help to prevent craniofacial defects in children, especially in families where there is an identified genetic or environmental risk.

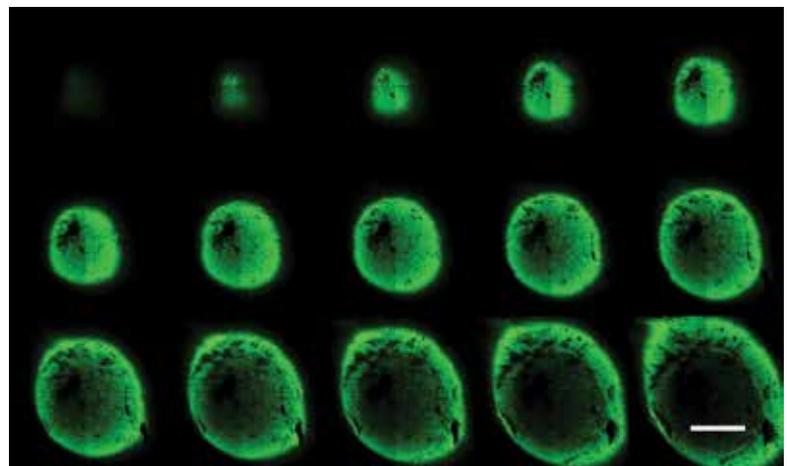


Zebrafish embryos exposed to oxidative stress (Auranofin) developed a gap jaw defect. Treatment with the antioxidant RiboCeine™ rescued the jaw defect so that the embryos had the appearance of untreated controls fish.

A new approach to engineering 3-dimensional constructs of human bone matrix in a mechanically-active environment

Research Team: Yana Itskovich, Murray Meikle, Trudy Milne, Richard Cannon, and Mauro Farella

The development of suitable alternatives to autogenous and allogeneic bone has been a goal of bone and biomaterials research for many years. An autograft is the biologic gold standard against which biocompatibility of all new materials are compared. Numerous materials have been tested, but with limited success. The present research uses a semi-synthetic hydrogel, which provides a close resemblance of the extracellular matrix, and the opportunity to modify the gel cross-linking ratios. The aim of the present study was to develop a 3-dimensional cell culture model and to validate assays that could be used to aid the engineering of an artificial mineralized bone matrix *in vitro*. We have examined the proliferation and hydroxyapatite deposition of human femoral and calvarial osteoblasts cultured in two modifications of a thiol-modified hyaluronan-gelatin-PEGDA cross-linked hydrogel. A hydrogel construct has also been cultured under intermittent compressive mechanical strain and preliminary gene expression analysis undertaken.



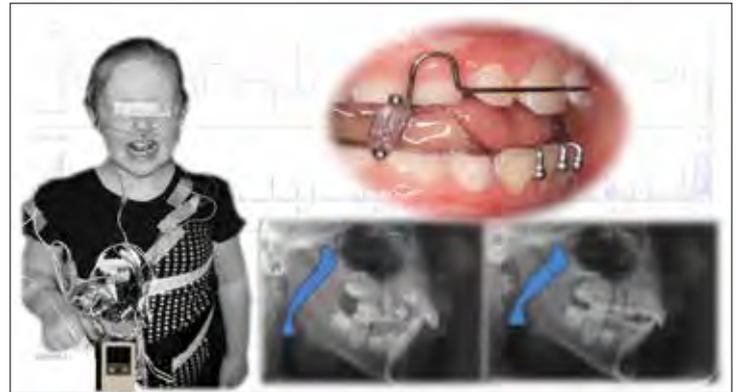
Fluorescently labelled viable human osteoblasts grown in a 3-D gel. Serial sections of gel were photographed using a confocal microscope.

Efficacy of a mandibular advancement appliance on Sleep Disordered Breathing in Children

Research Team: Ghassan Idris, Barbara Galland, Chris Robertson, and Mauro Farella

Sleep-Disordered Breathing (SDB) varies from habitual snoring to partial or complete obstruction of the upper airway, and can be found in up to 10% of children. SDB can significantly affect children's wellbeing, as it can cause growth disorders, educational and behavioural problems, and even life-threatening conditions, such as cardiorespiratory failure. In patients with craniofacial anomalies, for whom adenotonsillectomy or other treatment modalities have failed, or surgery is contraindicated, mandibular advancement splints (MAS) may represent a viable treatment option. We designed a crossover randomised controlled trial to determine the efficacy of mandibular advancement appliances (MAS) for the management of Sleep-Disordered Breathing (SDB) and related health conditions in children.

The Apnoea Hypopnoea Index (AHI) represented the main outcome variable and was assessed via home-based polysomnography. Compared to a Sham MAS, wearing an Active MAS resulted in a significant reduction in AHI and snoring time.



A patient with sleep disordered breathing wearing an oral appliance to increase oropharyngeal airway. Polysomnography is used for a home-based sleep study.

Our preliminary findings indicate that the short-term use of mandibular advancement splints significantly reduced AHI, supine AHI, and snoring time in children with SDB, and improved subjectively assessed SDB symptoms and quality of life, in addition to significant changes in children's behaviour.

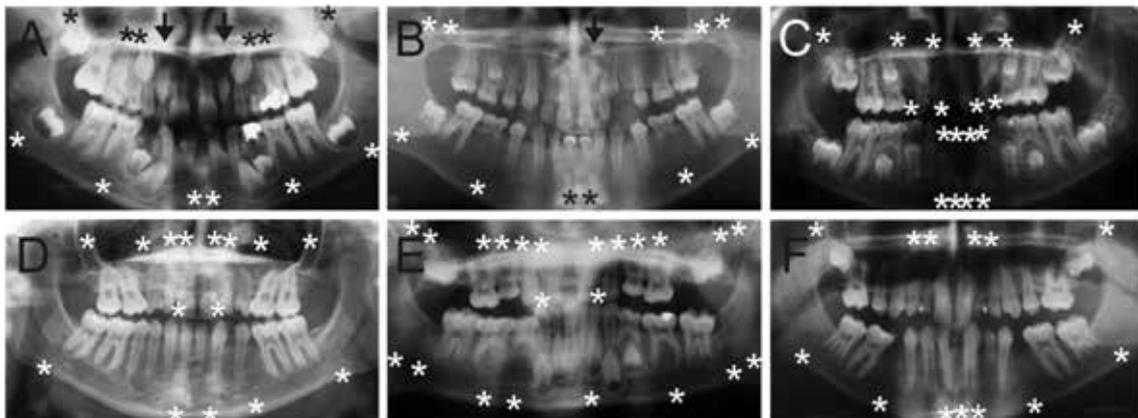
Environmental and genetic factors associated with hypodontia

Research Team: Azza Al-Ani, Joseph Antoun, Mauro Farella, Murray Thomson, and Tony Merriman

Hypodontia, or tooth agenesis, is the most prevalent craniofacial malformation in humans. Both environmental and genetic factors are involved in the aetiology of hypodontia, with the latter playing a more significant role. The objectives of this study were two-fold: (1) to investigate the association between non-syndromic hypodontia and single nucleotide polymorphisms (SNPs) of candidate genes paired box 9 (*PAX9*), *msh* homeobox 1 (*MSX1*), axis inhibition

protein 2 (*AXIN2*), and ectodysplasin A (*EDA*); and (2) to examine its association with environmental factors, such as exposure to smoking and alcohol during pregnancy.

Our preliminary findings reveal some evidence that polymorphisms of the *EDA* and *PAX9* genes are associated with specific phenotypes of non-syndromic hypodontia. Furthermore, this research is the first to date to test the association between maternal cigarette smoking during pregnancy and having a child with hypodontia.



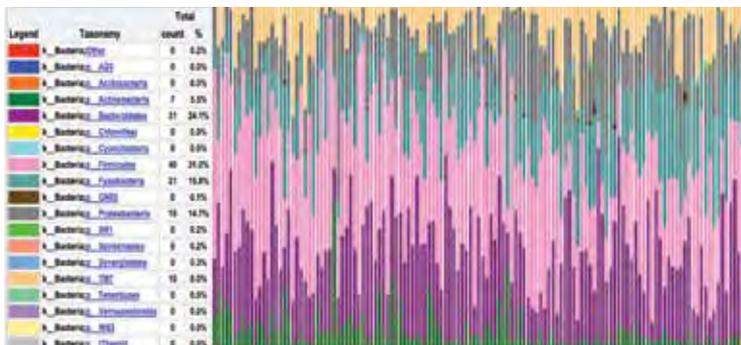
Orthopantomographs showing different patterns (see asterisks) of hypodontia and oligodontia.

Efficacy of oral probiotics in managing biofilm formation in patients wearing fixed orthodontic appliances

Research team: Gareth Benic, Mauro Farella, Patrick Biggs, Nicholas Heng, Richard Cannon, and Li Mei

This research aims to investigate the efficacy of the oral probiotic *Streptococcus salivarius* M18 on managing biofilm formation in patients wearing fixed orthodontic appliances. We have designed a prospective, randomized, triple-blind, two-arm parallel-group, placebo-controlled trial in patients undergoing fixed orthodontic treatment. The outcome measures were plaque index (PI), gingival index (GI) and halitosis-causing volatile sulphur compound (VSC) levels. Oral microflora was analysed utilising next-generation sequencing of the bacterial 16S rRNA gene.

Our preliminary findings indicate that the oral probiotic *S. salivarius* M18 reduced the VSC levels in patients with fixed appliances but did not decrease their plaque or gingival indices. The influence of probiotic *S. salivarius* M18 on oral microflora seems to be minimal. A longer intervention and follow-up period are needed.

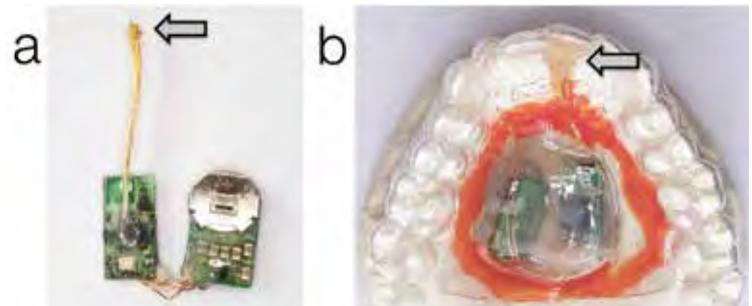


Distribution of phyla (Y-axis) from samples of oral plaque (X-axis) sequenced, in orthodontic patients.

Wireless Monitoring of Intra-oral pH

Research Team: Coreen Loke, Mauro Farella, Sylvia Sander, and Richard Cannon.

Intra-oral pH plays a significant role in the pathogenesis of tooth wear as well as white spot lesions in patients with fixed or removable orthodontic appliances. However, there is currently very little information about intra-oral pH variation over time, and in real life settings. The aims of this research were 1) to develop a wireless monitoring intra-oral pH device, which can be used to record real-time pH and temperature data in a natural environment, in which participants carry out their normal daily activities; and 2) to collect preliminary data in a sample of healthy volunteers, in a manner that is as non-invasive as possible, for over 24 hours.



Example of wireless device for measuring intraoral pH. a) Tip of antimony electrode (see arrow). b) wireless unit embedded in a vacuum-formed splint.

The wireless device consisted of a miniature pH telemeter, which included a temperature sensor and is capable of transmitting data wirelessly to a smartphone. A monitoring and calibration software application was also developed and was used to aid data input from the participants. *In vitro* tests were conducted to calibrate and validate the measurements of the device, and the measurements were tested against a gold standard reference electrode. The wireless device was then embedded into an in-mouth appliance and worn by a number of participants for at least 24 hours, while conducting regular daily activities.

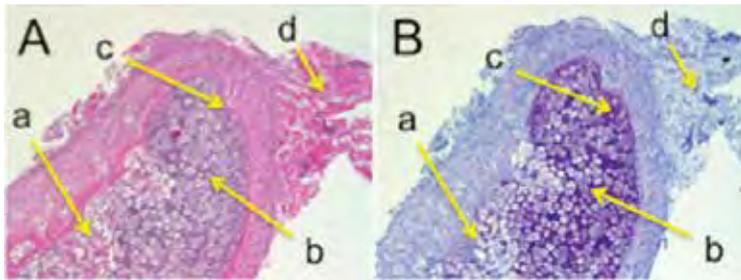
Preliminary results suggest that real-time variations in intra-oral pH and temperature can be successfully collected in participants. This wireless device is therefore capable of providing new insights into the variations of intra-oral pH over time, and its relationship with dental wear, white spot and caries.

Growth factor expression in the condylar cartilage of rats

Research Team: Mohamad Al-Dujaili, Trudy Milne, Richard Cannon, and Mauro Farella

The mandibular condylar cartilage has attracted significant interest in orthodontic research, as it is a key site of growth and development of the mandible. The aim of this research was to assess the expression of an array of growth factors and to identify changes in their regulation during early stages of growth. Condyles were extracted from rats aged 4, 10, 21 or 90 days, processed through a validated RNA extraction protocol, and subjected to histological analysis. Quantitative polymerase chain reaction (qPCR) was used to compare the relative gene expression of 28 growth factor-related genes. There were detectable changes in the regulation of genes involved in chondrogenesis and osteogenesis for each age group. However, none of the growth factor genes showed a change greater than two-fold. The present study showed that the cryogenic grinding protocol was a

valid technique for extracting RNA from rat condyles and that all the growth factors analysed were present. However, only weak evidence is provided for the regulation of the growth factors investigated at any of the selected time points.



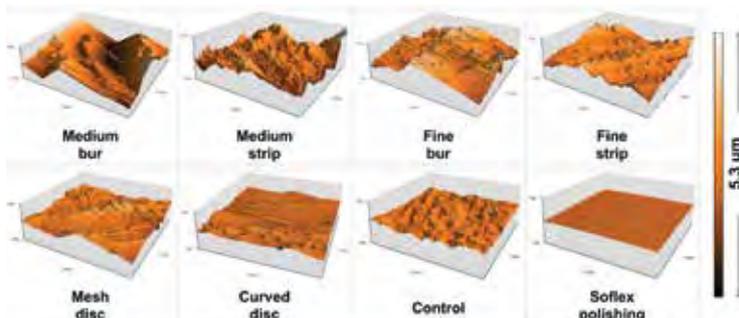
Coronal sections of the condyle of a 4-day old rat. Sections stained with H&E (A) and TB (B). 100X magnification a) erosive cell layer b) hypertrophic cell layer c) resting cell layer d) muscle tissue.

The influence of orthodontic interproximal reduction on enamel roughness and bacterial adhesion

Research Team: Lydia Meredith, Li Mei, Richard Cannon, and Mauro Farella

Interproximal reduction (IPR), also known as enamel stripping, is becoming more and more popular in orthodontics, but it leaves many grooves and furrows on the enamel surface, which may increase the risk of caries. We investigated the influence of IPR on the morphology and roughness (Ra) of enamel surfaces and the bacterial adhesion to these surfaces. The specific aims of this research were to assess the roughness of enamel surfaces (both qualitatively and quantitatively) produced by the most commonly used IPR instruments, to investigate the adhesion of bacteria to these surfaces, and to evaluate the effect of polishing after IPR on the amount of bacterial adhesion.

Extracted human premolar teeth were used to prepare enamel blocks, which were subjected to interproximal reduction. The morphology and roughness of the enamel surfaces were investigated qualitatively and



Examples of atomic force microscopy 3D images of enamel surfaces after using different IPR instruments.

quantitatively using atomic force microscopy. From the seven IPR-treated groups, the samples from the three instruments that yielded significantly different roughnesses, as well as the control group, were used for the adhesion experiments. Adhesion of *Streptococcus sanguinis* ATCC10556 to the enamel surfaces was assessed by counting the colony forming units that adhered to the roughened surfaces after 30 min exposure.

The findings suggest that diamond burs created the roughest enamel surfaces, followed by diamond strips, followed by diamond discs. The Soflex polishing discs created the smoothest surfaces, even smoother than that of the untreated enamel. There was a positive relationship between enamel surface roughness and the number of bacteria that adhered.

Other research projects

- Relationship between sugar sweetened drinks, tooth wear and dental caries in Māori
- Jaw muscle overload as a possible cause of orofacial pain
- Assessing three-dimensional tooth movements during orthodontic activations using an E-typodont
- The effect of mechanical strain on the unfolded protein response of periodontal ligament cells in a three dimensional culture
- Predictive factors of orthodontic pain
- The influence of orthodontic therapy on mandibular motion
- Genetic aspects of the long face
- Growth factor expression in the rat condyle: implications for craniofacial development
- 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.
- Morphometric analysis of cervical vertebrae in relation to mandibular growth

Research funding

University of Otago Research Grant I just want my teeth straightened. (LF Page, JS Antoun, PW Fowler, HC Jack) \$36,000

Ministry of Oral Health Reading between the lines: how do young New Zealanders from lower socio-economic backgrounds feel about not getting their teeth straightened? (LF Page, JS Antoun, HC Jack) \$29,000

New Zealand Dental Research Foundation Genetic and psychological factors associated with orthodontic pain in children and adolescents (Farella M, Antoun J, Chandler N, Merriman T, Sew Hoy W) \$8,441

New Zealand Dental Research Foundation Jaw muscle overload as a possible cause of orofacial pain and headache (Farella M, Ramanan D, Polonowita A, Hamilton J, Palla S). \$12,350.

Lottery Health Grant "3dMD Trio Imaging System and Software for 3D imaging of the face". Supported by Lottery Health Grant (Mauro Farella, Joseph Antoun) \$90,000

ERDG/FORENZAO Charitable Trust "Efficacy of a Mandibular Advancement Appliance on Sleep Disordered Breathing in Children (Ghassan Idris, Mauro Farella, Barbara Galland, Jules Kieser) \$10,100.

CureKids Charitable Trust "Efficacy of a Mandibular Advancement Appliance on Sleep Disordered Breathing in Children (Mauro Farella, Ghassan Idris, Barbara Galland, Jules Kieser) \$31,782

Ministry of Oral Health "Efficacy of a Mandibular Advancement Appliance on Sleep Disordered Breathing in Children (Mauro Farella, Ghassan Idris, Barbara Galland, Jules Kieser) \$24,734

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

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

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

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

Key personnel

The programme is led by Professor Mauro Farella, and includes the following SJWRI researchers:

Dr Joseph Antoun
Florence Bennani
Prof Richard Cannon
A/Prof Rohana De Silva
Professor Mauro Farella
Dr Winifred Harding
A/Prof Nick Heng
Dr Hannah Jack
Dr Carolina Loch Santos da Silva
Dr Li Mei
Dr Trudy Milne
Dr Christopher Robertson
Dr Benedict Seo
Suzan Stacknik
Prof Murray Thomson

A/Prof Geoffrey Tompkins
Dr Mike Brosnan
A/Prof Nick Chandler
Dr Harsha De Silva
Prof Warwick Duncan
A/Prof Lyndie Foster Page
Prof Karl Lyons
Dr Ajith Polonowita
A/Prof Neil Waddell

Postgraduate students

Sabarinath Prasad (2016) (PhD)
Joseph Antoun (PhD)
Erin Hutchinson (PhD)
Ghassan Idris (PhD)
Andrew Quick (PhD)
Joanne Choi (2015) (PhD)
Ana Low (DClinDent)
Caleb Lawrence (DClinDent)
Divya Ramanan (DClinDent)
Fiona Firth (DClinDent)
Will Sew Hoy (ODClinDent)
Austin Kang (DClinDent)
Azza Al-Ani (DClinDent)
Gareth Benic (DClinDent)
Catherine Carleton (DClinDent)
Yana Itskovich (DClinDent)
Mohamad Al-Dujaili (DClinDent)
Coreen Loke (DClinDent)
Lydia Meredith (DClinDent)
Austin Kang (MHealSc)

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 Physics

Department of Computer Science

Department of Human Nutrition

Department of Physics

Department of Zoology

D4 Network

Genetics Otago

Neuroscience Programme

Otago Zebrafish Facility

Pain@Otago

The programme also collaborates with the MedTech Centre of Research Excellence (CoRE), the Consortium for Medical Device Technologies (CMDT), 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).

University of Otago collaborators

Dr Azam Ali (Department of Applied Sciences)

Mr Hamza Bennani (Department of Computer Science)

Dr Claire Cameron (Department of Preventive & Social Medicine)

A/Prof George Dias (Department of Anatomy)

A/Prof Julia Horsfield (Department of Pathology)

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

Dr Louise Mainvil (Department of Human Nutrition)

Prof Tony Merriman (Department of Biochemistry)

A/Prof Michael Paulin (Department of Zoology)

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)

Dr Louise Mainvil (Department of Human Nutrition)

Overseas collaborators

Prof Alan Brook (University of Adelaide)

Dr Iacopo Cioffi (University of Toronto)

Jie Fang (Sichuan University)

Prof Luigi Gallo (University of Zurich)

A/Prof David Healey (University of Brisbane)

Prof Beverley Kramer (University of Johannesburg)

Jialing Li (Nanjing Medical University, China)

Prof Ambra Michelotti (University of Naples, Federico II)

Em Prof Sandro Palla (University of Zurich)

Visiting scientists and students

Em Prof Sandro Palla (University of Zurich)

Prof Philip Benson (University of Sheffield)

Dr Annemarie Renkema (University of Nijmegen)

Mr Aurelio Songini (University of Cagliari)

Dr Francesca Fabiano (University of Messina)

Key publications

Hutchinson EF, Farella M, Kramer B. Variations in bone density across the body of the immature human mandible. *Journal of Anatomy*, 2016. Accepted for publication.

Meredith L, Mei L, Cannon RD, Farella M. Atomic force microscopy analysis of enamel nanotopography following interproximal reduction. *Am J Orthod*, 2016. Accepted for publication.

Antoun JS, Thomson M, Merriman T, Farella M. Impact of Facial Divergence on Oral Health-Related Quality of Life and Self-Report Jaw Function. *Korean J Orthod*, 2016. Accepted for Publication.

Antoun JS, Mei L, Gibbs K, Farella M Effect of Orthodontic Treatment on the periodontal tissues. *Periodontology 2000*. Accepted for publication, 2016.

Tan A, Bennani F, Thomson WM, Farella M, Mei L. A qualitative study of orthodontic screening and referral practices among dental therapists in New Zealand. *Aust Orthod J* 2016; 32: In press.

Healey D, Gauld R, Thomson WT. Treatment-associated changes in malocclusion and oral health-related quality of life: A 4-year cohort study. *Am J Orthod*, 2016. In press.

Gray, S., Stacknik, S., & Farella, M. (2016). Space maintenance: An overview for clinicians. *New Zealand Dental Journal*, 112(3), 76-80.

Fang J, Li YF, Zhang K, Zhao Z, Mei L. Escaping the adverse impacts of NSAIDs on tooth movement during orthodontics: current evidence based on a meta-analysis. *Medicine* 2016;95:e3256.

Fang J, Wang C, Li YF, Zhao Z, Mei L. Comparison of bacterial adhesion to dental materials of polyethylene terephthalate (PET) and polymethyl methacrylate (PMMA) using atomic force microscopy and scanning electron microscopy. *Scanning*. 2016. Mar 15.

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- Ong DC, Itskovich Y, Dance G. Autotransplantation: A Viable Treatment Option for Adolescent Patients with Significantly Compromised Teeth. *Aust Dent J.* 2016 Mar 30.
- Idris G, Galland B, Robertson CJ, Farella M. Efficacy of a Mandibular Advancement Appliance on Sleep Disordered Breathing in Children: A Study Protocol of a Crossover Randomized Controlled Trial. *Front Physiol.* 2016 Aug 19;7:353.
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- Michelotti A, Iodice G, Piergentili M, Farella M, Martina R. Incidence of temporomandibular joint clicking in adolescents with and without unilateral posterior cross-bite: a 10-year follow-up study. *J Oral Rehabil.* 2016;43:16-22.
- Wang Y, Mei L, Gong L, He S, Ji Y, Sun W. Remineralization of early enamel caries lesions using different bioactive elements containing toothpastes: an *in vitro* study. *Technology and Health Care* 2016;24(5):701-11.
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- Antoun JS, Cameron C, Sew Hoy W, Herbison P, Farella M. Evidence of secular trends in a collection of historical craniofacial growth studies. *Eur J Orthod.* 2015 Feb;37(1):60-6.
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Dental Education Research

Programme leader: Dr Lee Adam

Research in dental education focuses on enhancing theoretical and evidence-based policies and practices in teaching and learning. Researchers in the Dental Education Research Programme typically examine educational experiences in the Faculty and other dental education environments in order to foster a positive impact on education in both the clinical and traditional teaching and learning environments. We seek to use research to identify strategies and practices that can improve experiences and support for students and educators, both within the University of Otago Faculty of Dentistry, and in other education environments.

Research Projects

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

Investigators: Professor. A. Rich, Dr J. Rountree, Professor. G. Seymour (University of Otago), Dr D. Lekkas, Associate Professor T. Winning & Professor G. Townsend (University of Adelaide). Funded by the UMAT Consortium (\$100,000)

The overall aim of this study is to investigate the relationship between the various components of multifaceted admission processes and academic and clinical performance of dental students (2005 – 2012) in two Australasian dental programmes. In addition, the study aims to identify what combination of admission components best predicts success of dental students. The long-term objective is to ensure that admission of dental students at the Universities of Otago and Adelaide continues to be undertaken using reliable, valid and efficient methods, that the skills of successful applicants are matched with our respective curricula requirements, and that the process is socially accountable.

Stress and mood states of New Zealand dental students

Investigators: Professor P. Brunton, Dr J. Broadbent, Dr L. Adam, Professor A. Rich, Mrs A. Meldrum (University of Otago) & Dr L. Jones (Massey University).

The aim of this study is to identify the stress, mood states and resilience of University of Otago Faculty of Dentistry undergraduate dental students. Information is being collected twice yearly using the Perceived Stress Scale Questionnaire (PSS), the Profile of Mood States Questionnaire (POMS-Bi), and a brief resilience scale. The research results will provide important information that can be used, where appropriate, to create a healthier learning environment for students, and to help inform appropriate support interventions, if necessary.

Feedback processes in the clinical dental learning environment

Investigators: Dr L. Adam, Ms S. Ebbeling, Mrs A. Meldrum, Professor A. Rich & Dr A. McLean.

The aim of this project is to identify characteristics of effective feedback in the clinical dental education setting and to develop a set of resources for supporting and improving the approach to feedback by clinical teaching staff in the Bachelor of Oral Health (BOH) and Bachelor of Dental Surgery (BDS) programmes.

Professionalism for the undergraduate oral health professional

Investigators: Mrs R. Ahmadi, Dr L. Smith, Dr L. Adam, Mrs A. Meldrum & Dr S. Moffat.

This project is an investigation of Bachelor of Oral health (BOH) students' development of professionalism through their degree course. Data for the study comprises a review of the first year BOH curriculum in which the fundamentals of professionalism are taught, alongside interviews with staff and students from all years of the BOH programme. The results of the research will help inform the development of the BOH curriculum in regards to teaching professionalism.

Perceptions of stressors of undergraduate students

Investigators: Mrs H Olson, Dr L. Adam, Dr A. Tawse-Smith & Dr S. Moffat.

The aim of this study is to identify University of Otago Faculty of Dentistry undergraduate students' perceived stressors. Data collection is via the Dental Environment Stress Survey (DES). The research results will provide important information that can be used, where appropriate, to create a healthier learning environment for students, and assist students to develop strategies for managing stress in the future.



Hanna Olson presenting her research at the 2016 College of Oral Health Academics (COHA) conference in Adelaide.

Measuring the attitudes of dental students towards social accountability

Investigators: Associate Professor L. Foster Page, Professor J. McMilian, Professor K. Lyons, Professor B. Gibson, V. Chen & C. Fisher

The aim of this project is to develop a social accountability measure for the dental environment. Data was gathered using a modified version of the Medical Students' Attitudes Towards Underserved (MSATU) questionnaire. The instrument's validity was assessed by an expert panel of eight academics and face validity was conducted with six students prior to a pilot study of BDS students. The instrument was consequently revised and further testing is required to ensure its robustness for measuring the concept of social accountability in New Zealand dental students.



BDS Honours student Calum Fisher was awarded Best Oral Presentation in the Dental Education session at the 2016 SJWRI Research Symposium.

Grants and funding

Mrs R. Ahmadi, Dr L. Adam, Dr L. Smith, Mrs A. Meldrum. *Professionalism for the Undergraduate Professional*. University of Otago Teaching Development Grant \$19,087

Dr L. Adam, Ms A. Meldrum, Prof. A. Rich, Dr A. McLean. *Guidelines for providing feedback in the clinical dental setting*. University of Otago Teaching Development Grant, \$10,075

Key personnel

Lee Adam
Jonathan Broadbent
Paul Brunton
Peter Cathro
Nick Chandler
Lyndie Foster-Page
Suzanne Hanlin
Wendy-Ann Jansen van Vuuren
Karl Lyons
Alison Meldrum
Colleen Murray
Kate Newsham-West
Hanna Olsen
Alison Rich
Janet Rountree
Lee Smith
Andrew Tawse-Smith
Murray Thomson



Lee Smith presents her research in the Dental Education session of 2016 SJWRI Research Symposium, chaired by Lee Adam.

Key Publications

Adam, L. (2015). Student perspectives on plagiarism. In T. Bretag (Ed.), *Springer handbook of academic integrity*. Singapore: Springer. doi: 10.1007/978-981-287-079-7_67-1.

Adam, L. Anderson, V. & Spronken-Smith, R. (2016). "It's not fair": Policy discourses and students' understandings of plagiarism in a New Zealand university. *Higher Education* DOI: 10.1007/s10734-016-0025-9.

Chen, V., Foster Page L.A., McMillan J., Lyons K.M. & Gibson B.J. (2015). Measuring the attitudes of dental students towards social accountability following dental education – Qualitative findings. *Medical Teacher* DOI:10.3109/0142159X.2015.1060303.

Cox, S., Pollock, D., Rountree, J., & Murray, C.M. (2016). Use of information and communication technology amongst New Zealand dental students. *European Journal of Dental Education* 20: 135-141.

Ding, C., Foster Page, L.A. & Rangnekar, S.. (2015). Interprofessional Education, Dentistry, and the NZ Experience: A Commentary. *New Zealand Dental Journal*, 111(3):109-12.

Foster Page, L.A., Chen, V., Gibson B. & McMillan, J. (2016). Overcoming structural inequalities in oral health: The role of dental curricula. *Community Dental Health* 33:1-5.

Foster Page, L.A., Gray, L., Gallagher, P., McKinlay, E., & Rich, A.M. (2015). Untangling the web of influences on interprofessional education for dental students. *Journal of Dental Education* 80:677-685.

Golding, C., & Adam, L. (2016). Evaluate to improve: Useful approaches to student evaluation. *Assessment & Evaluation in Higher Education*, 41(1), 1-14.

Harris, R.C.L., Millichamp, C.J. & Thomson W.M. (2015). Stress and coping in fourth-year medical and dental students. *New Zealand Dental Journal* 111: 102-108

Kang, I., Foster Page, L.A., Anderson, V., Thomson W.M. & Broadbent, J.M. (2015). Changes in students' perceptions of their dental education environment. *European Journal of Dental Education* 19: 122-130

Lai, K.W. & Smith, L. Tertiary students' understandings and practices of informal learning. In press, *Australasian Journal of Educational Technology*.

Murray, C., Gray, A. & Chandler N.P. (2016). Eyesight: A study of dental surgery students during their clinical training. *Optometry in Practice* 17:113-120.

Murray, C. & Chandler, N.P. Final year dental students in New Zealand: Self-reported confidence levels prior to BDS graduation. In press, *New Zealand Dental Journal*.

Murray, C.M. & Chandler, N.P. (2015). Operative aspects of the undergraduate endodontic learning experience in New Zealand. *New Zealand Endodontic Journal* 49: 5-12.

Smith L., Adam, L., Meldrum, A., Moffatt, S. & Ahmadi, R. Undergraduate Bachelor of Oral Health student and educators' understandings of professionalism. In press, *New Zealand Dental Journal*.

Subramanian, J. & Thomson, W.M. The learning environment in professional doctorate and postgraduate dental education: A qualitative study. In press, *European Journal of Dental Education*.

Conference presentations and abstracts

Adam, L., Spronken-Smith, R., & Anderson, V. (2015). Re-conceptualising plagiarism: Engaging students in quality scholarship. *Proceedings of the 12th Annual International Society for the Scholarship of Teaching and Learning (ISSOTL) Conference*. (pp. 58).

Adam, L., Anderson, V., & Spronken-Smith, R. (2015). Re-thinking plagiarism in light of a bigger question: What is the purpose of university education? *Proceedings of the Higher Education Research and Development Society of Australasia (HERDSA) Conference: Higher Education in a Globalized World*, Melbourne, Australia.

Ahmadi, R., Smith, L. & Adam, L. (2016). Undergraduate oral health students' and teachers' understandings of professionalism. *Proceedings of the College of Oral Health Academics 15th Annual Meeting*, Adelaide, South Australia.

Brunton, P.A., Ghazali, A., Tarif, Z.H. & Loch, C. (2016). Repair vs. replacement of direct composite restorations: a survey of teaching programs in Oceania. *IADR/AADR/CADR General Session & Exhibition*, San Francisco, USA.

Foster Page, L.A., Chen, V., Gibson, B. & McMillan J. (2016). Overcoming structural inequalities in oral health: the role of dental curricula. *General Assembly Session International Association of Dental Research*. Symposia presentation Seoul, Korea.

Friedlander, L.T., Chandler, N.P. & Daniel, B. (2016) Five year analysis of undergraduate education using tapered hand and rotary canal instrumentation techniques. *International Endodontic Journal* 49:85.

Chandler, N.P., Gray, A. & Murray C.M. (2015) Vision: a study of clinical dental teachers. *Journal of Dental Research* 94: Spec Iss C abstract 2315487

Murray, C.M., Gray A. & Chandler, N.P. (2015) Eyesight: a study of dental students during their clinical training. *Journal of Dental Research* 94: Spec Iss C abstract 2315463

Murray, C.M. & Chandler, N.P. (2015) Eyesight status of students commencing clinical practice: A survey. *Journal of Dental Research* 94: Spec Iss A abstract 2094008

Olson, H., Adam, L., Moffat, S., & Tawse-Smith, A. (2016). Perceived Stressors of Bachelor of Oral Health Students. *Proceedings of the College of Oral Health Academics 15th Annual Meeting*, Adelaide, South Australia.

Student research

Ebbeling S, Adam, L, Meldrum A, Rich A. Barriers to Learning in the Clinical Environment: A Dental Students' Perspective (SJWRI Summer Studentship, 2015/16)

Fisher, C., Foster Page, L.A., Zeng, J., McMillan, J. & Lyons, K. Appraisal of a measure of social accountability in the dental educational environment (Honours project, 2016).

Garde, S., Tawse-Smith A. & Adam, L. Perceived stressors of undergraduate dental students at the University of Otago Faculty of Dentistry (Final year elective, 2015).

Ghazali, A., Tarif, Z., Brunton, P.A., & Loch, C. Repair vs. replacement of direct composite restorations: A survey of teaching and operative techniques in Oceania (Final year elective, 2016)

Koonne, T., Moru, P., Foster Page, L.A. Knowledge, attitudes and practices towards preventive dentistry among dental students (Final year elective, 2016).

Dental Epidemiology and Public Health Research

Programme leader: Professor Murray Thomson

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).

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 2015-16: Work in this area continues to attract international attention and to be published in the top international journals: 8 papers were published, and a number of conference presentations were made. We completed the second 3 years of the 6-year HRC programme grant and obtained an HRC project grant for the age-45 assessments. The funded aims of the dental research component for age 38 were: (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. The funded aims of the dental research component for age 45 are to: (1) produce unprecedented information on the natural history of oral health and disease; (2) test hypotheses for genetic and environmental risk factors for chronic dental diseases; (3) identify treatable early-life antecedents of high-rate dental caries and periodontitis in adulthood; (4) quantify ageing of the teeth and dentition, and relate this to early life exposures to environmental factors, along with genetic factors; and (5) quantify the public health significance and financial burden of the cost of treating acute and chronic dental conditions through life.



The Barningham building, former home of the Dunedin Multidisciplinary Health and Development Study, adjoining the west wing of the Walsh Building. Both were demolished in 2016 to make way for the new Clinical Services Building of the Faculty of Dentistry. As of late 2016 the Dunedin Study is based at Logan Park, while a new \$2.6M facility is built for the Study in Anzac Avenue near the University's premises at Forsyth Barr Stadium.

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. An example is the International Collaborative Indigenous Health Research Partnership (ICIHRP) with Australia (University of Adelaide) and Canada (University of Toronto) investigating the oral health of Indigenous mothers and their infant children.

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 2015-16: 15 papers were published.

Activity 3. Dental health services research

Description: Dental health services research in NZ, including ongoing, systematic dental workforce research, work on social accountability, barriers to oral health for Pacific adolescents, and access to orthodontic treatment for disadvantaged adolescents.

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 2015-16: 24 papers were published (this total includes 6 dental educational research papers by our team 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 2015-16: successful postgraduate completions comprised 1 Doctor of Philosophy and 1 Doctor of Clinical Dentistry. We are currently supervising 2 Doctors of Philosophy, 7 Doctors of Clinical Dentistry, and 5 Masters degrees. We also continue to informally mentor colleagues working in the wider health sector, both internationally and in New Zealand.

Key personnel and collaborations

Professor WM Thomson

Professor JR Broughton

Associate Professor LA Foster Page

Dr JM Broadbent

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

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, Canterbury District Health Board), 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 and the University of Rio Grande do Sul).

Research funding (over \$5,000)

2015. Ministry of Health Research Fund. *Exploring oral health care planning and service delivery models for dependent older adults in aged residential care facilities: feasibility and acceptability in the aged-care sector.* Smith MB, Thomson WM. (\$34,421).

2015. Health Research Council. Broadbent JM, Thomson WM, Moffitt TE, Caspi A, Poulton R. Oral health from childhood to mid-life. 2015-2020 (\$1,193,937).

2015. Maurice and Phyllis Paykel Trust. Broadbent JM, Thomson WM. A lifecourse study on chronic dental conditions and ageing of the teeth and dentition: equipment grant application. (\$12,500)

2016. New Zealand Dental Association Research Foundation. Broadbent JM, Thomson WM. A lifecourse study on chronic dental conditions and ageing of the teeth and dentition: equipment grant application. (\$13,500)

2016. Deckel Maho Gildermeister (DMG) Germany. *What are barriers and enablers for dentists to non-invasively manage proximal caries lesions?* Foster Page LA, Schwendicke F, Baker SR, Fontana M, Thomson WM. (\$32,000)

2016. Ministry of Health Research Fund. *Reading between the lines: how do young New Zealanders from lower socio-economic backgrounds feel about not getting their teeth straightened?* Foster Page LA, Antoun J, Jack H. (\$29,345)

2016. Ministry of Health Health Research Fund. *Pasifika adolescents' understandings and experiences of oral health care*. Smith L, Foster Page LA, Richards R. (\$36,097)

2016. Ministry of Health Research Fund. *Cognitive function, dependency and oral health among frail older New Zealanders: a national survey*. Thomson WM, Smith MB, Kerse NM, Ferguson CA. (\$37,789).

2016. University of Otago Research Grant. *I just want my teeth straightened*. Foster Page LA (PI), Antoun J, Jack H, Fowler P. (\$36,000).

Key publications

In total, 47 papers were published in the peer-reviewed international scientific literature during 2015-16. The total number of conference presentations made was 41 (including 21 keynote addresses – see below for details).

Key publications by researcher

Dr JM Broadbent

Broadbent JM, Zeng J, Foster Page LA, Baker S, Ramrakha S, Thomson WM. Oral health-related beliefs, behaviours, and outcomes through the life course. *Journal of Dental Research*. (2016) doi: 10.1177/0022034516634663 (2016).

Broadbent JM, Theodore M, Te Morenga L, Thomson WM, Brunton P. Ethnic and socioeconomic inequalities in dental treatment at a school of dentistry. *New Zealand Dental Journal* 112: 55-61 (2016).

Theodore M, Broadbent JM, Nagin D, Ambler A, Hogan S, Ramrakha S, Cutfield W, Williams MJ, Harrington H, Moffitt TE, Caspi A, Milne B, Poulton R. Childhood to Early-Midlife Systolic Blood Pressure Trajectories: Early-Life Predictors, Effect Modifiers, and Adult Cardiovascular Outcomes. *Hypertension* 66: 1108-1115 (2015).

Professor JR Broughton

Broughton J.R., Lawrence, H.P., and Jamieson, L.M. Tikanga Māori (Māori Customary Practices) in Oral Health Research. *Journal of Health Care for the Poor and Underserved* 27: 101-109 (2016).

Anderson, V.R., Rapana, S.T., Broughton, J.R., Seymour, G.J., and Rich, A.M. Preliminary findings from the Oranga Niho dental student outplacement project. *New Zealand Dental Journal* 111: 6-14 (2015).

Broughton, J.R., Anderson, V., Lawrence, M., Steinman, M., Nichol, J., Wright, S., Johnson, R., Johnson, M., McGibbon, M., Laing, B., and Hikairo, P. *Oranga niho me ngā tangata whaiora. Oral health and Māori mental health patients*. Research report, University of Otago, September 2013. Released June 1, 2015.

Broughton, J.R. (2015) *Michael James Manaia "Act II"* in "The Penguin Book of New Zealand War Writing." Eds, H. Ricketts and G. McLean. Penguin Random House New Zealand. ISBN 978-0-14-357309-8. Pages 426-435.

Associate Professor LA Foster Page

Foster Page LA, Chen V, Gibson B, McMillan J. Overcoming structural inequalities in oral health: the role of dental curricula. *Community Dental Health* 33:1-5 (2016).

Foster Page LA, L Gray, P Gallagher, E McKinlay, A M Rich. Untangling the web of influences on interprofessional education for dental students. *Journal of Dental Education* 80: 677-685 (2016).

Foster Page LA, Thomson WM, Beckett D, Cameron C. Can the Child Health Utility 9D measure be useful in oral health research? *International Journal of Paediatric Dentistry* 25: 349-357 (2015).

Schwendicke F, Dorfer C, Schlattmann P, Foster Page LA, Thomson WM, Paris S. Socioeconomic inequality and caries: A systematic review and meta-analysis. *Journal of Dental Research* 94: 10-18 (2015).



Master of Public Health student Deanna Beckett, supervised by A/Prof Lyndie Foster Page and Prof Murray Thomson, won the Oral Presentation Award for the Dental Epidemiology and Public Health session at the 2016 SJWRI Research Symposium.

Ms DM Shearer

Shearer DM, Thomson WM, Mann J, Poulton R. Periodontitis is not associated with metabolic risk during the fourth decade of life. In press, *Journal of Clinical Periodontology*.

Shearer DM, Thomson WM, Broadbent JM, McLean R, Poulton R, Mann J. High-risk glycosylated hemoglobin trajectories established by mid-20s: findings from a birth cohort study. *BMJ Open Diabetes Res Care*.4(1):e000243 (2016). doi: 10.1136/bmjdr-2016-000243

Professor WM Thomson

Thomson WM. Public health aspects of paediatric dental treatment under general anaesthetic. *Dentistry Journal* 4: 20 (2016). doi:10.3390/dj4020020

Thomson WM, Zeng J, Broadbent JM, Foster Page LA, Shalev I, Moffitt TE, Caspi A, Williams SM, Braithwaite AW, Robertson SP, Poulton R. Telomere length and periodontal attachment loss: a prospective cohort study. *Journal of Clinical Periodontology* 43: 121-127 (2016).

Healey DL, Gauld RDC, Thomson WM. Treatment-associated changes in malocclusion and OHRQoL: a four-year cohort study. *American Journal of Orthodontics and Dentofacial Orthopedics* 150: 811-817 (2016).

Benn AML, Broadbent JM, Thomson WM. Occurrence and impact of xerostomia among dentate adult New Zealanders: findings from a national survey. *Australian Dental Journal* 60: 362-367 (2015).

Keynote addresses

Broughton, J.R. "Taku hikoi ki hauora Māori: My journey through Māori health." Invited speaker at the Hui-A-Tau (Annual Conference) of Te Ohu Rata O Aotearoa, the Māori Medical Practitioners' Association, Papakura Marae, 24 September 2016.

Broughton, J.R. "Dentistry at the Normandy Invasion, World War II." Invited opening address at the University of Otago Sir John Walsh Research Institute Research Day, Dunedin Public Art Gallery, Dunedin, 1 September 2016.

Broughton, J.R. "A timely toothache in World War II." Invited opening address at the International Association for Dental Research, Australia and New Zealand Division Conference, Dunedin, 24 August 2015.

Broughton, J.R. "Special Operations In Dentistry." Invited opening address at the University of Otago Sir John Walsh Research Institute Research Day, Dunedin Public Art Gallery, Dunedin, 9 July 2015.

Broughton, J.R. "Ma te huruhuru te manu ka rere. With feathers a bird can fly," Invited opening address at the Dunedin Writers and Readers Festival, Regent Theatre, Dunedin, 7 May 2015.

Broughton, J.R. "Oranga Niho @ Otago" Invited opening address, Hui-a-Tau (Annual Conference), Te Ao Mārama, New Zealand Māori Dental Association, Dunedin, 17 April 2015.

Foster Page LA. *Child self-reported questionnaires in oral health research and service evaluation: what are they and do we need them?* Keynote address to the 25th Congress (biennial conference) of the International Association for Paediatric Dentistry, Glasgow, Scotland, 3 July 2015.

Thomson WM. *What can the findings of life-course research tell us about the challenges in promoting oral health through life.* Presented to the 70th Anniversary Celebration of Shanghai Stomatological Hospital, Fudan University, Shanghai, China, 25 October, 2016.

Thomson WM. *Reflections on a quarter century of research in DPH.* Keynote address to the 2016 conference of the New Zealand Society of Hospital and Community Dentistry, New Plymouth, 29 July 2016.

Thomson WM. *Beware of the fashionable: Keeping it real in oral epidemiological research.* Keynote address to the 7th International Meeting on Methodological Issues in Oral Health Research, Bergen, Norway, 13 May 2016.

Thomson WM. Two keynote addresses (*Writing a paper – what to do and what not to do and Navigating the publication process*) to the annual conference of the Indian Association of Public Health Dentistry, Manipal, India, 20 November 2015.

Thomson WM. Two keynote addresses (*Dry mouth and The Dunedin Study*) to the 47th Semana Academica de Odontologia at Universidade Federal Rio Grande Do Sul, Porto Alegre, Brazil, 8 and 9 October 2015.

Thomson WM. *The oral health of older people: what we know and what we should know.* Keynote address to the Annual Scientific Meeting, National Dental Centre Singapore, Singapore, 29 August 2015.

Thomson WM. (1) *Gerodontology research: issues, opportunities and challenges.* (2) *The Dunedin Study: documenting the natural history of oral health and disease through life.* (3) *Periodontitis in adults: natural history, antecedents and impact.* Keynote addresses to the Research Day conference, National Dental Centre Singapore, Singapore, 28 August 2015.

Thomson WM. *New Zealand's ageing population and "teeth for life": be careful what you wish for...* Keynote address to the New Zealand Dental Association biennial conference, Auckland, 20 August 2015.

Thomson WM. *Psychosocial aspects of paediatric dental GA*. Keynote address to the 25th Congress (biennial conference) of the International Association for Paediatric Dentistry, Glasgow, Scotland, 4 July 2015.

Thomson WM. *Insights from 25 years of gerodentological research*. Keynote address to the Geriatric Oral Research Group at the 93rd General Session of the International Association for Dental Research, Boston, USA, 13 March 2015.

Honours and awards

Professor Broughton was made a Companion of the New Zealand Order of Merit for services to Māori Health, theatre and the community. Queen's Birthday Honours, June 2016

Professor Broughton received the Dr Maarire Goodall Award, honouring service by Māori health professionals to Māori communities for Māori health development, by Te Ohu Rata O Aotearoa, New Zealand Māori Medical Practitioners Association, 24 September 2016.

Dr Shearer received the 2015 IADR Colgate Research in Prevention Travel Award

Dr Broadbent received the 2015 Investigator Award for Excellence in Preventive and Community Dentistry Research from the International Association of Dental Research Australia New Zealand Division.

Dr Broadbent received the 2015 Award for Basic Research, University of Otago Sir John Walsh Research Institute.

Associate Professor Foster Page was awarded a Fulbright travel Grant in 2015.

Editorial positions

Professor Thomson assumed the Editor-in-Chief position for *Community Dentistry and Oral Epidemiology* in January 2015. He also remains as Associate Editor for the *European Journal of Oral Sciences*.

Associate Professor Foster Page was appointed as Section Editor for *BMC Oral Health*, and to the Editorial Advisory Board for *Community Dentistry and Oral Epidemiology* (3-year term).

Postgraduate student completions 2015-16

Doctor of Philosophy: Dara Shearer. *Longitudinal associations between periodontal disease and glycaemic control* (Supervisors: WM Thomson, J Mann, R Poulton). Completed February 2016.

Doctor of Clinical Dentistry: Azza Al-Ani. *Genetics of hypodontia* (Supervisors: M Farella, JS Antoun, A Merriman, WM Thomson). Completed November 2016.

Molecular Microbiology Programme

Programme leader: Geoffrey Tompkins

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 2014-2016 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, Otago Innovation Ltd., Dentsply, Syngenta and other industrial concerns.

Personnel

Faculty and Staff

Associate Professor Vincent Bennani
Professor Richard Cannon
Dr Peter Cathro
Professor Mauro Farella
Dr Nick Heng
Dr Ann Holmes
Dr Mikhail Keniya
Dr Erwin Lamping
Dr Hee Ji Lee
Associate Professor Jonathan Leichter
Professor Karl Lyons
Dr Li Mei
Associate Professor Brian Monk
Dr Don Schwass
Dr Andrew Tawse-Smith
Associate Professor Geoffrey Tompkins
Dr Rajni Wilson
Dr Mathew Woods

Postgraduate Students

Peter Cathro (PhD; graduated 2016)
Gemma Cotton (PhD)
Sarah Davies (PhD; graduated 2016)
Golnoush Madani (PhD)
Bikiran Pardesi (PhD; graduated 2015)
Alia Sagatova (PhD; graduated 2016)
Syarida Safii (PhD)
Amira Salem (PhD)
Don Schwass (PhD)
Josh Dunn (MSc)
Shreya Aggarwala (DClinDent; graduated 2016)
Gareth Benic (DClinDent; graduated 2016)

James Dawson (DClinDent; graduated 2016)
Arpana Devi (DClinDent; graduated 2016)
Siddhanta Dhruvad (DClinDent; graduated 2016)
Nivea Kamalendran (DClinDent; graduated 2015)
Lydia Meredith (DClinDent; graduated 2015)



DClinDent student Gareth Benic was the winner of the Best Oral Presentation Award in the Molecular Microbiology session of the 2016 SJWRI Research Symposium.

Summer students and Honours Students

Nancy Chen (BDS summer student, 2015)
Nicholas Choo (BDS summer student, 2014)
Danyon Graham (BDS summer student 2014, 2015)
Harith Hassan (BDS summer student, 2015)
Chuen Lin Hong (BDS summer student, 2015)
Allen Hu (BDS Honours, 2016)
Kenny Kim (BDS honours, 2015)
Joanne Lee (BDS summer student, 2014)
Fay Yan (BDS summer student, 2015)

Visiting Scientists and students

Dr Mohammed Alqumber, Albaha University,
Saudi Arabia

Dr Francesca Fabiano, University of Messina,
Messina, Italy

Camille Herhusky, University of California at Berkeley,
San Francisco, USA

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

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

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

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

Associate Professor Alok Mitra, Auckland University,
Auckland

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

Associate Professor Marina Bakri, Malaysia, University
of Malaya, Kuala Lumpur

Professor Pete Magee, University of Minnesota,
Minneapolis, USA

Dr Masakazu Niimi, Chulalongkorn University,
Bangkok, Thailand

Professor Amarila Malik, Universitas Indonesia,
Depok, Indonesia

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

Current research

Structure-directed antimicrobial discovery

Principal Investigator: Brian Monk

Structure-directed discovery of next-generation antifungals

There is a paucity of structural information on existing antifungal targets and there is an emerging problem of antifungal resistance that affects both medicine and agriculture. These problems are being addressed by overexpressing in yeast the azole drug target lanosterol 14 α -demethylase, the terbinafine drug target squalene monooxygenase, the echinocandin drug target glucan synthase and drug efflux pumps from the ATP binding cassette and major facilitator superfamily. These constructs provide proteins for purification and structural resolution by X-ray crystallography plus key tools that enable targeted screens for antifungals and valuable tests of antifungal efficacy.

Since 2014 the group has deposited in the Protein Data Bank over 25 crystal structures of wild type and mutant lanosterol 14 α -demethylase from *Saccharomyces cerevisiae* in complex with a range of azole drugs and agrochemicals plus the first crystal structure of a full-length lanosterol 14 α -demethylase from a fungal pathogen (*Candida glabrata*). This information, together with our recent determination of the crystal structure of *Candida albicans* lanosterol 14 α -demethylase, is being used to design chimeric antifungals that combined the best attributes of existing antifungals and has enabled computer-based screens of large compound libraries in efforts to discover novel antifungals.

The group published 6 papers in the 2015-2016, with an additional research paper and a book chapter review in press. The group completed a Marsden Fund grant (2010-2015), a 2 year research collaboration with the agrochemical company Bayer AG (2014-2016) and a Health Research Council of New Zealand grant (2013-2016) that led to the award of a further Health Research Council grant (2016-2019) entitled "Structure-directed discovery of next-generation antifungals". In 2016 Associate Professor Monk was also awarded a grant from Lotteries Health Research to purchase an advanced HPLC machine used for protein purification. Research collaborations involve Associate Professor Joel Tyndall in the New Zealand's National School of Pharmacy, the laboratory of Professor Robert Stroud at UCSF (San Francisco), the combinatorial chemistry company MicroCombiChem (Wiesbaden, Germany) and Bayer AG Crop Protection Division (Monheim, Germany and Lyon, France). PhD student Alia Sagatova and DClinDent students Shreya Aggarwala and

Arpana Devi completed their studies in 2016, with Alia awarded a Thomas Kay Sidey postdoctoral fellowship. Summer student Danyon Graham won the 2015 junior poster competition at the IADR conference in Dunedin and the Otago Medical Research Foundation summer student speaker competition in 2016.

Candida adherence and drug-resistance

Principal investigator: Richard Cannon

The increased incidence of infections caused by drug resistant microorganisms is a major global health concern. While the multidrug resistance of bacteria is most prominent, drug resistance of fungi is also of great importance. The main cause of high-level azole drug resistance in the most common oral fungal pathogen, *Candida albicans*, 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 Cdr1 function. Site-directed mutagenesis has been used to investigate the role of amino acids, particularly cysteines, in pump function. We have also used the expression system to study ABC efflux pumps from other important fungal species such as *Candida utilis* and *Penicillium marneffeii*.

C. albicans is a diploid fungus that can mate but does so infrequently. By studying the growth rates of fusants formed *in vitro* and the survival of fusants *in vivo* we found that mating generates genotypes superior to existing strains often enough to be under slight positive selection.

In 2014-2015, this research was funded from the following sources: the Marsden Fund of the Royal Society of New Zealand, the Maurice and Phyllis Paykel Trust, the New Zealand Dental Association Research Foundation, and the University of Otago Research Committee.

Oral Bacteriology

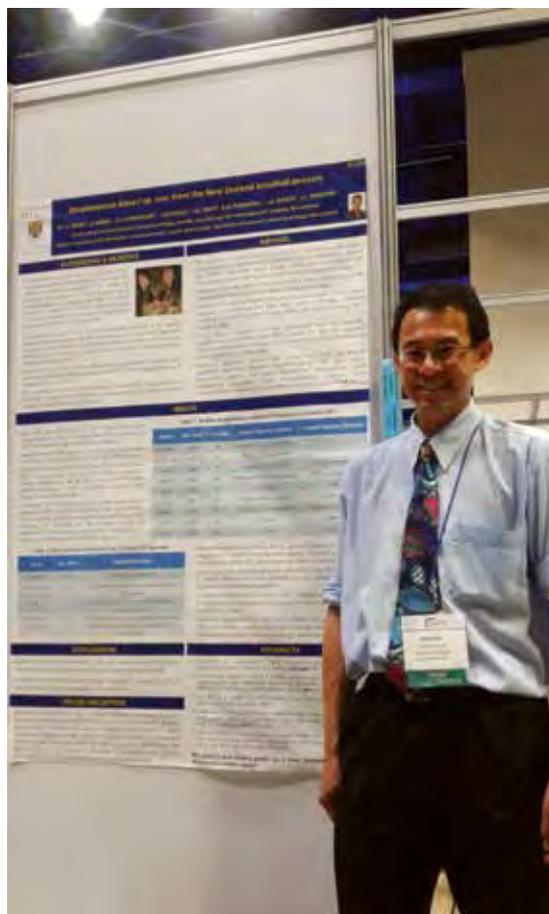
Principal investigator: Geoffrey Tompkins

Bacteria are involved in various diseases affecting the teeth and gingival tissues. Current projects in this group include: (i) development of new antimicrobials directed at the extremely alkaline-tolerant bacteria that cause root canal treatments to fail; (ii) evaluation of lasers to remove biofilms from dental implants; (iii) investigation into how periodontal bacteria acquire heme; (iv) the involvement of dental plaque bacteria in the development of aspiration pneumonia in stroke patients; (v) the effect of various antimicrobials, including chlorhexidine, manuka honey and silver-based antimicrobials affect oral microbial ecology.

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

Principal investigator: 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 alone is estimated to comprise over 700 species of microbes. Many species have long been associated with disease such as *Streptococcus mutans* (dental caries) and *Porphyromonas gingivalis* (periodontal disease). Bacterial profiling of oral samples from healthy or diseased participants using next-generation DNA sequencing technology have helped identify some species that may either contribute to disease progression or are associated with good oral health. This research group is also interested in revealing the genomic secrets of cultured species such as the antimicrobial-producing *Streptococcus salivarius* (from humans) and new oral streptococcal species isolated from other animals.



Dr Nick Heng presenting his research at the 2016 IADR General Session in Seoul.

Microbial biofilms

Principal investigators: Vincent Bennani and Li Mei

Most microorganisms live within biofilms and in the mouth these biofilms can cause diseases such as dental caries, periodontitis and peri-implantitis. We are interested in how biofilms form on oral surfaces including denture acrylic, implant titanium, and orthodontic appliances - and measuring how effective methods are for removing these biofilms. We have also investigated the use of *Streptococcal salivarius* strains as probiotics to inhibit the growth of oral pathogens and improve oral health in orthodontic patients.

Other research programmes undertaken within the Molecular Microbiology Theme overlap with and are described in respective staff members' profiles elsewhere in this volume.

Highlights

Research Prizes

Alia Sagatova : Thomas Kaye Sidey postdoctoral fellowship (2016)

Danyon Graham: Junior poster competition at the IADR conference (Dunedin, 2015); Otago Medical Research Foundation summer student speaker competition (2016).

Gareth Benic, Sir John Walsh Research Institute Research Symposium Oral Presentation prize

Chuen Lin Hong, IADR NZ Section poster prize and IADR ANZ Division Colgate poster prize

Joanne Lee, IADR NZ Section poster prize

Notable Publications

Aung, H. L., Samaranayaka, C. U. K., Enright, R., Beggs, K. T., & Monk, B. C. (2015). Characterisation of the DNA gyrase from the thermophilic eubacterium *Thermus thermophilus*. *Protein Expression & Purification*, 107, 62-67. doi: 10.1016/j.pep.2014.11.009

Bennani, V., Hwang, L., Tawse-Smith, A., Dias, G. J., & Cannon, R. D. (2015). Effect of air-polishing on titanium surfaces, biofilm removal, and biocompatibility: A pilot study. *BioMed Research International*, 2015, 491047. doi: 10.1155/2015/491047

Holmes, A.R., Cardno, T.S., Strouse, J.J., Ivnitski-Steele, I., Keniya, M.V., Lackovic, K., Monk, B.C., Sklar, L.A. & Cannon, R.D. (2016) Targeting efflux pumps to overcome antifungal drug resistance. *Future Medicinal Chemistry*. 8(12):1485-501. doi: 10.4155/fmc-2016-0050

Keniya, M. V., Fleischer, E., Klinger, A., Cannon, R. D., & Monk, B. C. (2015). Inhibitors of the *Candida albicans* Major Facilitator Superfamily transporter Mdr1p responsible for fluconazole resistance. *PLoS ONE*, e0126350. doi: 10.1371/journal.pone.0126350

Knight, E. T., Leichter, J. W., Tawse-Smith, A., & Thomson, W. M. (2015). Quantifying the association between self-reported diabetes and periodontitis in the New Zealand population. *Journal of Periodontology*, 86(8), 945-954. doi: 10.1902/jop.2015.150048

Malik, A., Sumayyah, S., Yeh, C.W. and Heng, N.C.K. (2016) Identification and sequence analysis of pWcMBF8-1, a bacteriocin-encoding plasmid from the lactic acid bacterium *Weissella confusa*. *FEMS Microbiology Letters* 363(8): pii: fnw059. doi: 10.1093/femsle/fnw059. Epub 2016 Mar 13.

Pardesi B. and Tompkins. G.R. (2014) Colony polymerase chain reaction of heme-accumulating bacteria. *Anaerobe* 32C 49-50.

Rawal, M.K., Banerjee, A., Shah, A.H., Khan, M.F., Sen, S., Saxena, A.K., Monk, B.C., Cannon, R.D., Bhatnagar, R., Mondal, A.K. & Prasad, R. (2016) Newly identified motifs in *Candida albicans* Cdr1 protein nucleotide binding domains are pleiotropic drug resistance subfamily-specific and functionally asymmetric. *Scientific Reports*. 6:27132. doi: 10.1038/srep27132

Sagatova, A., Keniya, M. V., Wilson, R. K., Monk, B. C., & Tyndall, J. D. A. (2015). Structural insights into binding of the antifungal drug fluconazole to *Saccharomyces cerevisiae* lanosterol 14 α -demethylase. *Antimicrobial Agents & Chemotherapy*. Advance online publication. doi: 10.1128/aac.00925-15

Sagatova, A.A., Keniya, M.V., Wilson, R.K., Sabherwal, M., Tyndall, J.D.A. & Monk, B.C. (2016) Triazole resistance mediated by mutations of a conserved active site tyrosine in fungal lanosterol 14 α -demethylase. *Scientific Reports*. 6:26213. doi: 10.1038/srep26213

Seymour, G.J., Cullinan, M.P. and Heng, N.C.K. (2016) Oral Biology: Molecular Techniques and Applications, Second Edition. *Methods in Molecular Biology*, volume 1537.

Tawse-Smith, A., Atieh, M. A., Tompkins, G., Duncan, W. J., Reid, M. R., & Stirling, C. H. (2015). The effect of piezoelectric ultrasonic instrumentation on titanium discs: A microscopy and trace elemental analysis in vitro study. *International Journal of Dental Hygiene*. Advance online publication. doi: 10.1111/ijdh.12142

Walker, G.V., Heng, N.C.K., Carne, A., Tagg, J.R. and Wescombe, P.A. (2016) Salivaricin E and abundant dextranase activity may contribute to the anti-cariogenic potential of the probiotic candidate *Streptococcus salivarius* JH. *Microbiology* 162:476-486

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).

Zhang, N., Magee, B.B., Magee, P.T., Holland, B.R., Rodrigues, E., Holmes, A.R., Cannon, R.D. and Schmid, J. (2015) Selective advantages of a parasexual cycle for the yeast *Candida albicans*. *Genetics* 200:1117-1132

Oral Molecular and Immunopathology

Programme Leader: Professor Alison Rich

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	Lara Friedlander
Lynda Horne	Haizal Hussaini
Ramya Jawadi	Jae-Kwang Jung
Sharla Kennedy	Trudy Milne
Praveen Parachuru	Alison Rich
Benedict Seo	

PhD and DClindent students

Nawal Abdul Rahman	Muhammad Al-Ansary
Adil Al Kharusi	Shaikha Al Samahi
Avadhoot Avadhani	Kullasit Chutipongpisit
Fiona Firth	Nurul Ibrahim
Hina Narayan	Hitesh Navani
Elizabeth Williams	Muhammed Yakin

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

Current Research Projects

Activity 1. Angiogenesis

Angiogenesis and pulp biology

Angiogenesis is upregulated in the presence of inflammation and may be altered following *in vitro* induced mechanical pulp cell injury. It is unclear if pulp inflammation arising from dental caries results in altered angiogenic expression in the apical papilla. This *in vitro* study is investigating the expression of angiogenic factors in the apical papilla obtained from immature permanent teeth with healthy and inflamed pulps arising from caries. Immunohistochemistry (IHC) of the apical papilla will be performed to assess the presence of various angiogenic factors along with analysis of gene expression with a custom-made array. Knowledge of angiogenic signalling in health and disease will improve understanding around the potential for healing following pulp injury in teeth with incomplete root development.

Effects of diabetes on angiogenesis in dental and oral tissues

Type 2 diabetes (T2D) is related to inflammatory responses and involves changes in markers that promote inflammation and those that suppress it. Several inflammatory cells and mediators are known to be important in the pathogenesis of diabetes and diabetes-related disorders including toll-like receptors (TLRs), interleukin-17 (IL-17) and regulatory T cells (Tregs). There is an established relationship between diabetes and periodontal disease but the relationship between diabetes and health of the dental pulp is unclear. T2D frequently results in poor pulp healing and subsequent pathology, but laboratory studies are required to understand why. TLR2 and TLR4 protect against bacteria entering the pulp and Tregs have been implicated but little is known about IL-17 expression in the dental pulp. The influence of T2D on these markers is unknown and enquiry around this forms the basis of this study.

Angiogenesis in inflammatory hyperplasias

Disturbance of angiogenic regulation is a feature of some reactive hyperplastic responses such as pyogenic granulomas (PG) which usually present intra-orally as a vascular gingival mass. The increased vascularity of PG is due to over-expression of vascular endothelial growth factors (VEGF) and fibroblast growth factor (FGF)-2 and under-expression of angiostatin, an angiogenesis inhibitor. PGs are non-neoplastic vascular oral lesions which can grow rapidly in the presence of stimulating factors including hormone imbalance and trauma, but are reversible unlike oral squamous cell carcinoma (OSCC). This study involves IHC and analysis of genes related to angiogenesis in PG in comparison with OSCC.

Angiogenesis and oral squamous cell carcinoma

This research has shown an upregulation of VEGF, the main angiogenesis promoter in OSCC. In addition it has shown that angiogenic factors were expressed on epithelial cells as well as endothelial cells in OSCC. The findings offer an insight into upregulation of pro-angiogenic genes in oral cancer. In the future, anti-angiogenic therapies in OSCC could prove to be useful as an adjunct to conventional surgical and chemotherapeutic treatments.

Lymphangiogenesis and oral squamous cell carcinoma

Lymphangiogenesis, the formation of new lymphatic vessels, is an essential process in normal growth and development and wound healing. The aim of this study was to investigate the differences, if any, in the expression profile of lymphatic markers and lymph vessel density (LVD) in OSCC in relation to non-specifically inflamed connective tissue (ICT) and normal oral mucosa (NOM) using IHC. The results established that the OSCC tumour microenvironment possessed significantly more lymphatic vessels expressing the lymphatic markers D2-40 and Prox-1 than the control groups. There was also higher expression of LYVE-1+ s in OSCC (compared with the ICT control tissue group). This increase in LVD may play a role in facilitating lymphatic invasion and later metastases. These molecular entities may serve as potential anti-oral cancer therapeutic targets or as potential prognostic markers.

Lymphangiogenesis in an immune-mediated lesion-oral lichen planus

Oral lichen planus (OLP) is a chronic inflammatory immune-modulated oral mucosal disease. As well as epithelial damage there is evidence that the local connective tissue environment is important in the evolution of OLP through the changes induced by chronic inflammation. Inflammatory cells secrete numerous cytokines and growth factors that alter the local fibrous tissue, blood vessels and possibly lymphatics. This study will determine the possible role of lymphangiogenesis in the pathogenesis of OLP by comparing the expression of lymphangiogenic markers in OLP groups with non-specifically inflamed oral mucosa. Clarification of the role of lymphangiogenesis in OLP may provide novel understanding on pathophysiology of OLP. Furthermore it may enhance understanding of the initial alterations towards malignant transformation of OLP, possibly leading the development of diagnostic markers and preventive drugs against malignant transformation of OLP by the modulation of lymphangiogenesis.

Activity 2. Endoplasmic reticulum stress and the unfolded protein response

In a neoplastic model-oral squamous cell carcinoma

In this study we are investigating recently discovered cellular stress pathways known as the unfolded protein response (UPR). These pathways are activated when the endoplasmic reticulum (ER), the protein-producing factory within the cell, is stressed. ER stress modulates UPR pathways, thus partially determining the cellular responses to disease. Evidence suggests that UPR components are activated to either inhibit cancer growth or promote its progression. UPR activation in cancer cells may result in protective responses including cell death with resolution of the disease or the cessation of protein production leading to lesional dormancy. Alternatively, it may result in responses that promote cancer growth and progression including the activation of pathways that protect against cell death and the formation of new blood vessels within the cancer tissue. In this project we are examining the differential expression of key UPR protein markers in OSCC, potentially malignant mucosa, and normal oral mucosa in order elucidate the role that ER stress plays in the development and prognosis of OSCC.

In relation to signalling pathways-STAT3

The molecule STAT3 is thought to lie at the centre of the mechanisms that affect cancer initiation, progression, and spread. Our objective in this project is to investigate the differential regulation of STAT3 pathway genes and proteins in oral cancer cell lines under induced cellular stress. This model will help us better understand the role of STAT3 pathways, and how cellular stresses in cancer modulate this pathway. The gene and protein regulation patterns showed that ER stress plays a role in immune-modulation in the tumour microenvironment in OSCC by up-regulating tumour-promoting cytokines.

In relation to cell deformation

Orthodontic tooth movement occurs as teeth move through the surrounding bone following the application of appropriate force. This force results in mechanical loading, with remodelling of the bone and the connective tissue cells and fibres of the periodontal ligament (PDL). We intend to identify and profile the UPR genes expressed by PDL cells that are subjected to mechanical strain in order to examine ER stress markers and apoptosis. PDL cells have been obtained and cultured from premolar teeth that were removed for orthodontic reasons and will be used to assess the role of ER stress, the UPR, and apoptosis in mechanically strained PDL cells. This has clinical applications in the prevention of root resorption in association with acceleration of tooth movement.

Activity 3. Regulation of immune responses

In periodontal diseases

The close relationship between the Th cell subsets, Tregs and Th17, and their contrasting role in influencing the immune response has led to the hypothesis that both FOXP3+Tregs and (IL17+Th17) cells influence the immune response in diseased periodontal tissues. The aim of this study therefore was to determine the presence of FOXP3+ Tregs and IL17+ cells and their possible spatial interaction in diseased periodontal tissues. The results suggest that FOXP3+ cells may have a more prominent role in periodontal disease processes when compared with IL17+ cells.

In oral squamous cell carcinoma-regulatory T cells and various cytokines

OSCC develops in an immune cell-rich environment, where inflammatory cells in the tumour microenvironment establish an anti-tumour response by secreting pro-inflammatory cytokines. At the same time the cancer cells may induce various mechanisms suppressing the anti-tumour response such as regulating a network of suppressive cytokines and the recruitment of suppressive Tregs. These escape mechanisms are seen at the local tumour site and similar mechanisms may also occur in regional lymph nodes (LN). In this project it was postulated that the escape of malignant oral keratinocytes from the primary site and their metastasis to regional lymph nodes is orchestrated by Tregs and their associated immune repertoire. Gene analysis studies demonstrated active regulation of T cell anergy and tolerance genes in primary OSCC and in metastatic lymph nodes. The immune suppression mechanisms were similar in lymph nodes with and without extracapsular (ECS) spread, though the suppression mechanism was stronger in lymph nodes with ECS.

In oral squamous cell carcinoma-IL17 and invasion

Interleukin (IL)17 is a pro-inflammatory cytokine with increased gene expression in some cancers. It has been demonstrated to exhibit both pro- and anti-tumour effects. The pro-tumour effects of IL17 are mediated either by inducing the expression of matrix metalloproteinases (MMPs) in tumour cells or stimulating increased tumour angiogenesis. The anti-tumour effects of IL17 are exerted either through increased cytotoxic T (Tc) cell or interferon (IFN) γ activity. In this study it was found that IL17 is co-expressed by multiple cell types in OSCC and it facilitated tumour progression by differential expression of genes associated with tumour metastasis, particularly those associated with extracellular matrix proteins and regulation of apoptosis.

In oral lichen planus

The aim of these studies was to compare the numbers of cells expressing FoxP3 or IL-17 in OLP with non-specifically inflamed oral mucosa and to determine which cell types expressed FoxP3 and/or IL-17 and their distribution, using IHC and quantitative real-time reverse transcriptase polymerase chain reaction (qPCR). The IHC results showed that the balance between Tregs and IL-17+ cells was altered in OLP, thus supporting the proposition that disturbance in local immune regulation is important in the pathogenesis of OLP. The observation that the IL-17+ cells were mast cells has not previously been reported in OLP and again raises questions about the role of mast cells in this condition. The gene expression experiments revealed a significantly higher expression of FoxP3 in OLP when compared to the controls. IL17 gene expression was not different between the groups. These findings suggest FoxP3+ Tregs have a more prominent role in the pathogenesis of OLP when compared to IL17+cells.

In relation to LOX family proteins and odontogenic tumours

The lysyl oxidase family is a group of copper dependant enzymes comprising lysyl oxidase (LOX) and four enzymes known as lysyl oxidase-like (LOXL)1-4. The primary function of these enzymes is to crosslink collagens and elastin in the extracellular matrix thus stabilizing the matrix. The examination of LOX family genes and proteins, in representative odontogenic tumours, will help deepen our understanding of the pathogenesis of these lesions and potentially lead to better patient management.

Activity 4. Epigenetics

In periodontal diseases

Tobacco smoking, a significant risk factor for periodontal diseases, may cause epigenetic changes in cells which can lead to gene silencing. Epigenetic changes refer to variations in gene expression or cellular phenotype caused by mechanisms other than changes in the DNA sequence. In this project, we investigated the dose-dependent effect of cigarette smoke condensate (CSC) on the DNA methylation status of genes involved in the transforming growth factor (TGF)- β signaling pathway in human gingival fibroblasts.

In squamous cell carcinoma

In this project we investigated the dose-dependent effect of CSC on the DNA methylation status of genes involved in the TGF- β signaling pathway in human oral epithelial cells. The results of our experiments may lead to the development of tools whereby differentially methylated genes may be used to assess tobacco exposure, disease progression and/or monitor treatment outcome; for both to prevent the occurrence of tobacco-related diseases and reduce their morbidity and mortality.

Highlights 2015 and 2016

Funding successes

Expression of the lysyl oxidase family in benign odontogenic tumours. N Abdul Rahman, BL Seo, AM Rich. Funding: New Zealand Dental Association Research Foundation Grant 2016-2018. \$9,442.

Lymphangiogenesis in metastatic lymph nodes of oral squamous cell carcinoma. N Ibrahim, BL Seo, AM Rich. New Zealand Dental Association Research Foundation Grant 2016-2018. \$10,800.

IL33 and IL35 expression in healthy and diseased gingival tissues. VPB Parachuru, W Duncan, E Knight. New Zealand Dental Association Research Foundation Grant 2016-2018. \$14,988.

Investigation of the presence of human papillomavirus in verrucal-papillary lesions of the oral cavity and comparison of viral detection methods. E Williams, BL Seo, HM Hussaini, D Coates, AM Rich. New Zealand Dental Association Research Foundation Grant. 2016-2018. \$8,962.

Investigation of the role of lymphangiogenesis in oral lichen planus. J-KJung, BL Seo, AM Rich. New Zealand Dental Association Research Foundation Grant 2016-2017. \$12,114.

The expression of STAT3 signalling pathway proteins in oral squamous cell carcinoma tissue. M Yakin, BL Seo, AM Rich. New Zealand Dental Association Research Foundation Grant 2016-2017. \$2,503.

Type 2 diabetes and inflammatory markers in dental pulp. L Friedlander, S Al Samahi, AM Rich, HM Hussaini, T Milne. Ministry of Health Oral Health Research Fund Grant 2016-2018. \$14,891.

Expression of STAT 3 and cytokines (IL22, IL23, Th17) within metastatic lymph nodes of oral squamous cell carcinoma. HM Hussaini, A Alkharusi, AM Rich. New Zealand Dental Association Research Foundation Grant 2015-2017. \$12,134.

The effect of mechanical strain on the unfolded protein response of periodontal ligament cells in a three-dimensional culture. FA Firth, B Seo, T Milne, M Farella. New Zealand Dental Association Research Foundation Grant 2015-2017. \$15,000.

Oral cancer cells under stress: The intertwined roles of cell stress and the dynamic signalling pathways. M Yakin, BL Seo, AM Rich. New Zealand Dental Association Research Foundation Grant 2015-2017. \$15,000.

An ABI qPCR machine for Oral Health Research. D Coates, R Cannon, T Milne, AM Rich. New Zealand Dental Association Research Foundation Grant 2015. \$15,000.

Angiogenesis in the apical papilla of immature permanent teeth associated with healthy and inflamed dental pulps. LT Friedlander, H Navani, AM Rich, T Milne, P Cathro. New Zealand Dental Association Research Foundation Grant 2015-2017. \$14,990.

Effect of cigarette smoke on TGF- β expression in oral tissues and cells. HM Hussaini, H Narayan, T Milne, AM Rich. Ministry of Health Oral Health Research Fund Grant 2015-2017. \$10,517.

In vitro effect of cigarette smoke on DNA methylation in oral epithelial cells. H Narayan, HM Hussaini, T Milne, AM Rich. Ministry of Health Oral Health Research Fund Grant 2015-2017. \$15,489.

Publications

In 2015 and 2016 members of the group published 13 papers in international peer-reviewed journals. Nine conference proceedings were published and there were numerous presentations from members of the group including invited keynote presentations by Dr Haizal Hussaini at the FDI World Dental Federation meeting in Colombo, Sri Lanka in 2015 and by Professor Alison Rich at the Oral Disease Update meeting, Oral Cancer Research and Co-ordinating Centre, Kuala Lumpur, Malaysia in 2015. Full details of the publications are available online.

Honours and Awards

2015: Alison Rich awarded Fellowship of the New Zealand Society of Pathologists.

2015: Alison Rich awarded Fellowship of Royal College of Pathologists on the basis of published works.

2016: Dawn Coates received the Sir John Walsh Research Institute Research Excellence Award for excellence in research over an extended period of time.

2016: Alison Rich nominated as the Sir John Walsh Research Institute Supervisor of the Year.

2016: Muhammed Yakin awarded the 'best oral presenter' award in the Oral Molecular and Immunopathology Programme of the Sir John Walsh Research Institute Symposium.

2016: Kullasit Chutipongpisit awarded a Travel Grant by the International Association of Oral Pathologists to present his research at the biennial meeting in Chennai.

2016: Muhammed Yakin awarded a Travel Grant by the International Association of Oral Pathologists to present his research at the biennial meeting in Chennai.

2016: Yinang Zhang, BDS4, awarded an Undergraduate Scholarship in Pathology from the Royal College of Pathologists of Australasia.

2016: Yinang Zhang, BDS4 awarded a Division of Health Sciences Summer Scholarship for 2016/7.

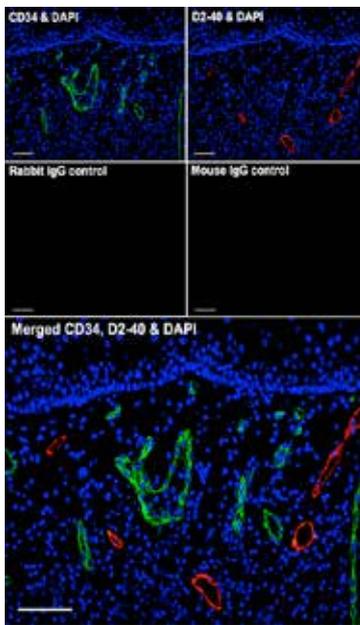
Postgraduate Student Completions

Avadhoot Avadhani (PhD, 2015)

Diogo Zaniccotti (PhD, 2015)

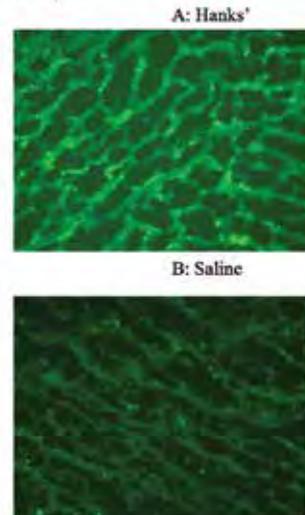
Muhammed Yakin (DCLinDent Oral Pathology, 2016)

Kullasit Chutipongpisit (DCLinDent Oral Pathology, 2016)

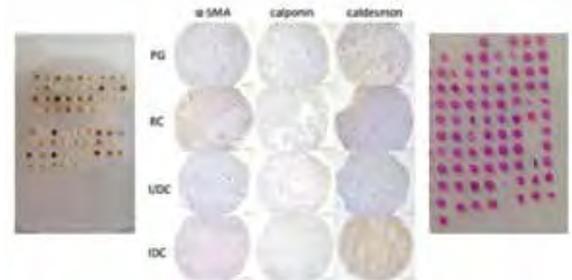


Double-labelling immunofluorescence showing D2-40+ lymphatic vessels (red) and CD34+ blood vessels (green) in oral squamous cell carcinoma from Kullasit Chutipongpisit's project.

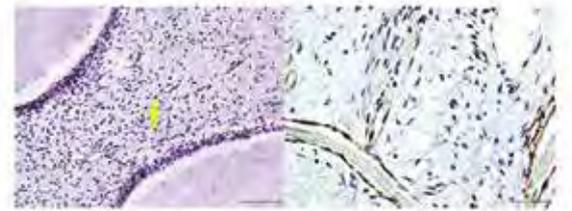
Day 4



Direct immunofluorescence photomicrographs of rat spleen stained for IgA stored in in either Hanks solution (Fig. 2a) or saline (Fig.2b) for four days. This was from a BDS elective study supervised by Dr Haizal Hussani investigating the suitability of various media for transporting fresh specimens sent from clinicians to the Oral Pathology Centre for diagnosis.



Tissue microarrays from work being undertaken by Muhammed Yakin and Dr Benedict Seo. Left to right: Paraffin-embedded wax block containing numerous tissue cores derived from odontogenic cysts, immunohistochemistry performed on the TMA, representative H&E staining.



H&E stained section of a decalcified tooth showing vital dental pulp with odontoblasts lining the dentine (left) and immunohistochemistry showing positive reaction of the endothelial cells (arrow) with Tie-2 (a receptor for angiopoietins). This is part of the DCLinDent project of Hitesh Navani, supervised by Dr Lara Friedlander.



Members of the Oral Molecular and Immunopathology Programme (2016).

Our people

1961

The Walsh Building
opens to the public

The Walsh Building is opened by the Minister of Education, the Hon. Blair Tennant. The new building is an aid to training, treatment, and research in dentistry.



Staff research profiles



LEE A. ADAM

BEd PhD PGDipArts (Otago)
Dental Education Support Officer, Faculty of Dentistry
Programme Leader, Dental Education Research

Dr Adam's research concentrates on teaching and learning in higher education. Specifically, her research focuses on how students' learning experiences and outcomes can be enhanced. Dr Adam, researches students' experiences in higher education in order to gain insights into how policy and practices might be structured to encourage students' retention and success. Other research involves examining what teachers do, in order to identify how higher education teaching practices can be improved.

Dr Adam's current research includes the following: students' understandings of plagiarism; effective feedback processes in the clinical dental learning environment; dental students' stress, mood states, and wellbeing; the impact of the physical environment on students' learning; and using students' feedback to improve teaching.

Key publications

Adam L (2015). Student perspectives on plagiarism, In T, Bretag (Ed,) *Springer handbook of academic integrity*. Singapore: Springer, doi: 10,1007/978-981-287-079-7_67-1

Adam L, Anderson V, & Spronken-Smith R (2016). "It's not fair": Policy discourses and students' understandings of plagiarism in a New Zealand university, *Higher Education* DOI: 10,1007/s10734-016-0025-9

Golding C, & Adam L (2016). Evaluate to improve: Useful approaches to student evaluation, *Assessment & Evaluation in Higher Education* 41(1) 1-14, doi: 10,1080/02602938,2014,976810

Golding C, Adam L, Scott C, Acheson C, Johnson K, Brook P, McLean A, Smith N, ... Hunter C, & Kumar V (2015). Fix build diagnose or guide? Evaluating the metaphors for learning advisors. *ATLAANZ Journal* 1

Distinctions

2015 Exceptional thesis

Dr Adam's PhD thesis titled "Troubling plagiarism: University students' understandings of plagiarism" was formally recognised by the Division of Humanities as being of exceptional quality.



JOSEPH S. ANTOUN

BDS DCLinDent (Otago)

Senior Lecturer, Department of Oral Sciences

Dr Antoun's research has focused on the clinical and psychological aspects of the long face morphology – a condition which is often associated with challenging malocclusions that require both orthodontic treatment and jaw surgery. His other research interests include craniofacial growth and development, clinical genetics, and quality of life assessment. He is also particularly interested in emerging digital technologies that can be used in clinical orthodontics and craniofacial research.

In the 2015-16 period, Dr Antoun was a primary supervisor of two completed DCLinDent theses which investigated the role of environmental and genetic factors in teeth agenesis, and the effect of oxidative stress on the craniofacial structures in a Zebrafish model. The research was supported by grants from the Otago Medical Research Foundation and New Zealand Dental Research Foundation. These two theses involved strong collaborations with Prof Tony Merriman (Biochemistry) and A/Prof Julia Horsfield (Pathology).

In addition, Dr Antoun was a co-applicant on a grant from the Lottery Grants Board which funded the purchase of a 3D facial scanner for the Faculty. This equipment is now being used in several undergraduate and postgraduate research projects across the Faculty.

Key publications

Antoun JS, Cameron C, Sew Hoy W, Herbison P, & Farella M. (2015). Evidence of secular trends in a collection of historical craniofacial growth studies. *European Journal of Orthodontics*, 37(1), 60-6.

Antoun JS, Fowler PV, Jack HC, & Farella M. (2015) Oral health-related quality of life changes in standard cleft, and surgery patients after orthodontic treatment. *American Journal of Orthodontics and Dentofacial Orthopedics*, 148(4), 568-75.

Park JE, Gray S, Bennani H, Antoun J, & Farella M. (2016). Morphometric growth changes of the nasopharyngeal space in subjects with different vertical craniofacial features. *American Journal of Orthodontics and Dentofacial Orthopedics*, 150(3), 451-8.



MOMEN ATIEH

BDS MSc DClinDent PhD (Otago)
Colgate Senior Lecturer, Department of Oral Sciences

Dr Momen Atieh has published 12 peer-reviewed articles in 2015/16, including a Cochrane review. His research has been primarily focused on assessing the risk factors of periodontal and peri-implant diseases as well as collaborating with other researchers to evaluate the quality of the current research in periodontology and oral implantology and establish evidence-based practice guidelines.

As a result of his research, he has been invited to review several articles in high-ranking dental journals (*Journal of Clinical Periodontology, Journal of Periodontology, Clinical Oral Investigations, European Journal of Oral Sciences*).

Dr Atieh has been working with a group of undergraduate students to investigate the risk indicators for peri-implant diseases at the School of Dentistry. His collaboration with the Cochrane Oral Health Group, as a lead author of one of the Cochrane reviews in Oral Implantology, has culminated in publishing one of the most anticipated Cochrane reviews: Atieh MA, Alsabeeha NH, Payne AG, Duncan W, Faggion CM, Esposito M. Interventions for replacing missing teeth: alveolar ridge preservation techniques for dental implant site development. The Cochrane Database of Systematic Reviews 28;(5): CD010176 (2015).

Key publications

Atieh MA, Alsabeeha NH, Tawse-Smith A, Faggion CM Jr, & Duncan WJ. (2015). Piezoelectric surgery vs. rotary instruments for lateral maxillary sinus floor elevation: a systematic review and meta-analysis of intra- and postoperative complications. *International Journal of Oral and Maxillofacial Implants* 30, 1262-71 (2015).

Atieh MA, Morgaine KC, & Duncan WJ. (2015). A qualitative analysis on participants' perspectives on oral implants. *Clinical Oral Implants Research*, 27, 383-91.

Atieh MA, & Leichter J. (2016). The Octagon Model: a clinical tool for assessing marginal tissue recession. *International Journal of Esthetic Dentistry*, 11, 98-109.

Atieh MA, Alsabeeha N, Tawse-Smith A, & Payne AG. (2016) Xenogeneic collagen matrix for periodontal plastic surgery procedures: a systematic review and meta-analysis. *Journal of Periodontal Research*, 51, 438-52.



VINCENT BENNANI

DDS (Reims) Docteur de l'Université de Nice Sophia Antipolis CertAdvPros (Tufts)
CertAdvImpl (Bordeaux)

Associate Professor, Department of Oral Rehabilitation

Associate Professor Bennani has two research themes linking his clinical interests and his biomaterials expertise. His research interests are focused on innovative techniques in dentistry, particularly soft tissue management in implantology. Little has been published about the challenges presented by the unique anatomy surrounding implants and how to preserve it during prosthodontic treatment. His research recognizes the need for new strategies in prosthodontics procedures.

During 2015 and 2016 A/Prof Vincent Bennani further developed his interdisciplinary research nationally and internationally with the University of Aristotle, University of Thessaloniki (Greece), Tufts University (Boston, USA) and the University of Bordeaux, (France). In 2016, A/Prof Vincent Bennani joined the international research program *Periodontics and Oral Implantology* (University of Western Australia) which brings together over 10 international research groups. This research program focuses on biomaterials and regenerative therapies, immunopathology and the treatment of peri-implant infections and clinical procedures in implant dentistry.

In 2016 A/Prof Vincent Bennani co-founded *The Biomimetic Research Group* within the Clinical and Translational Research program of the SJWRI. "Biomimetic" in dentistry means to copy what is life-like. When restoring teeth, the goal is to return the tooth to its original form and function. This research group investigates the biomaterials and techniques used to achieve that goal.

Key publications

Bennani V, Aarts J, & Schumayer M. (2016) Correlation of pressure and displacement during gingival displacement: An *in vitro* study. *Journal of Prosthetic Dentistry*, 115, 296-300

Bennani V, Ibrahim H, Al Harthi L, & Lyons K. The periodontal restorative interface: aesthetic considerations. *Periodontology 2000*. (Accepted for publication in final format, August 2016)

Bennani V, Hwang L, Tawse Smith A, Dias G.J, & Cannon R.D. (2015) Effect of air-polishing on titanium surfaces, biofilm removal and biocompatibility: A pilot study. *BioMed Research International*, Article ID 491047. <http://dx.doi.org/10.1155/2015/491047>

Kirmanidou Y, Sidira M, Drosou M.E, Bennani V, Bakopoulou A, Tsouknidas A., Michailidis N, & Michalakis K. (2016) New Ti-Alloys and Surface Modifications to Improve the Mechanical Properties and the Biological Response to Orthopedic and Dental Implants: A Review. *BioMed Research International*, Article ID 2908570, 21 pages. <http://dx.doi.org/10.1155/2016/2908570>



DOROTHY H. BOYD

BDS (Edin) MDS (Otago) FDSRCS
Senior Lecturer, Department of Oral Sciences

Dorothy Boyd's main interests are in children's coping, acceptance, preferences, and anxiety related to dental treatment, and outcomes of dental care in primary care.

A large part of her research centres on the use of the Hall Technique (HT) to place stainless steel crowns to treat decayed primary molar teeth. The HT has generated public and media interest because there is no removal of dental decay, hence no drilling, and no use of local anaesthetic injections. However, although studies so far have shown excellent clinical outcomes, children's attitudes and preferences in relation to the treatment in New Zealand are not known.

"SNAP!" – The Northland Hall Technique Project

This is a split-mouth randomised control trial with randomisation of treatment and order of treatment in 4-8-year-old children, with teeth matched for carious lesion depth, tooth and arch. The research group is measuring children's self-reported pain and anxiety when they have carious primary molar teeth restored with stainless steel crowns placed using a conventional approach, and the Hall Technique. They are also measuring clinical and radiographic outcomes. Additional measures include the dental therapist and child responses to the treatments and investigating parent/caregiver attitudes to the consent process and to their children taking part in this clinical research.

Dental therapists, dental assistants, management and clinical lead staff in Northland DHB are all involved in the study, and 3M are supporting the trial. Dorothy is enrolled in a PhD undertaking this research, with supervision from Associate Professor Lyndie Foster Page and Professor Murray Thomson. An undergraduate student, Yinan Zhang, has taken part in caregiver telephone interviews. So far recruitment to the study has been completed, baseline data have been entered onto a spreadsheet, and the data for the 6-month evaluation is ready for data-entry following which analysis will begin. The group has also completed telephone interviews for qualitative analysis of their attitudes to the consent process and participating in a clinical trial.

Key publication

Boyd DH, Foster Page LA, Thomson WM, Innes NP, & Marshall D (2017) A feasibility study of stainless steel crowns placed with the Hall Technique for primary molar carious lesion management in New Zealand primary oral health care *New Zealand Dental Journal* 113(2) 14-21



JONATHAN M. BROADBENT

BDS PhD PGDipComDent (Otago)

Associate Professor, Department of Oral Rehabilitation

Associate Professor Broadbent's research interests include the epidemiology of dental caries, tooth loss, and periodontal disease. He has special interests in dental longitudinal research and inequalities in dental health. A/Prof Broadbent is Principal Investigator for the dental component of the Dunedin Multidisciplinary Health and Development Study. As part of that project, A/Prof Broadbent has been working on research relating to blood pressure, lead exposure, fluoride, dental caries, periodontal disease, and ageing.

During 2015-2016 A/Prof Broadbent was awarded several research grants. These have been with the Health Research Council of New Zealand, the New Zealand Dental Research Foundation, and the Maurice and Phyllis Paykel trust (total value of grants awarded as principal investigator = \$1,219,937, as co-investigator \$7,415,267). A/Prof Broadbent was awarded the 2015 *Investigator Award for Excellence in Preventive and Community Dentistry Research* by the International Association of Dental Research Australia New Zealand Division, and the 2015 *Basic Research Award* by the University of Otago Sir John Walsh Research Institute. During 2015-2016 A/Prof Broadbent had 13 articles published in peer-reviewed journals, including *Hypertension*, *Science Matters Select*, *Journal of the Royal Society of New Zealand*, *Journal of Dental Research*, and the *New Zealand Dental Journal*.

Key publications

Broadbent, J. M., Zeng, J., Foster Page, L. A., Bakker, S. R., Ramrakha, S., & Thomson, W. M. (2016). Oral health-related beliefs, behaviors, and outcomes through the life course. *Journal of Dental Research*, *95*(7), 808-813. doi: 10.1177/0022034516634663

Theodore, R. F., Broadbent, J., Nagin, D., Ambler, A., Hogan, S., Ramrakha, S., ... Williams, M. J. A., Harrington, H., Moffitt, T. E., Caspi, A., Milne, B., & Poulton, R. (2015). Childhood to early-midlife systolic blood pressure trajectories: Early-life predictors, effect modifiers, and adult cardiovascular outcomes. *Hypertension*, *66*, 1108-1115. doi: 10.1161/HYPERTENSIONAHA.115.05831

Broadbent, J. M., Thomson, W. M., Ramrakha, S., Moffitt, T. E., Zeng, J., Foster Page, L. A., & Poulton, R. (2015). Community water fluoridation and intelligence: Prospective study in New Zealand. *American Journal of Public Health*, *105*(1), 72-76. doi: 10.2105/ajph.2013.301857

Broadbent, J. M., Wills, R., McMillan, J., Drummond, B. K., & Whyman, R. (2015). Evaluation of evidence behind some recent claims against community water fluoridation in New Zealand. *Journal of the Royal Society of New Zealand*, *45*(3), 161-178. doi: 10.1080/03036758.2015.1056193



MICHAEL G. BROSINAN

BDS (NUI) MDentSc (Leeds) FRCDCan
Senior Lecturer, Department of Oral Sciences

Dr Brosnan's main research interest is in the perception of oral health care providers in their treatment of children and adolescents. He also has interests around how oral health care providers can better engage adolescents to improve access to care within this group. He has recently commenced his PhD project on the Irish influence on early dentistry and medicine in New Zealand.

Dr Brosnan has had several national and international invitations to give presentations on various topics. He has supervised several undergraduate and postgraduate research projects and is actively involved as a reviewer for several international peer-reviewed journals.

Over the period 2015/2016, he has conducted research in the following areas:

- Clinical audit of sources of referral to the Paediatric Dental Department at the University of Otago School of Dentistry.
- Investigation of the oral health status of adolescents in New Zealand and perceptions of the oral health care providers for this group.
- Comparison of orofacial characteristics in children who have a history of snoring and those who do not snore.
- Research into the findings of *Our Oral Health: key findings of the 2009 New Zealand Oral Health Survey*.
- The impact of sugar sweetened beverage consumption and oral habits on tooth wear and dental decay in Māori.
- Children's views on dental attire.
- The likelihood of families having multiple children treated for dental caries under general anaesthesia.
- A comparison of the treatment needs and funding available for children referred for restorative care under general anaesthesia at the University of Otago School of Dentistry.
- The knowledge and opinions of pharmacists in Dunedin regarding sugar in paediatric medications and to assess if training or pharmacy affects this.
- Parental perception of oral health in pre-school children.

Key publications

Chow M, Costain S, Brosnan M, & Murray C (2016) Knowledge, opinions and factors influencing practices regarding sugar in oral paediatric medications: a survey of Dunedin pharmacy staff. *New Zealand Dental Journal*. 112(2):33-38.

Fogarty WP, Drummond BK, & Brosnan MG (2015) The use of radiography in the diagnosis of oral conditions in children and adolescents. *New Zealand Dental Journal* 111(4):144-50. Review.



JOHN R. BROUGHTON

CNZM ED JP BSc (Massey) BDS PhD PGDipComDent DipGrad (Otago)

Professor in Māori Health, Department of Oral Diagnostic and Surgical Sciences (joint with Preventive and Social Medicine)

Associate Dean (Māori)

Professor Broughton's research activity has been concerned in the main with *oranga niho* or Māori oral health. He was the Principal Investigator for the tri-nation International Collaborative Indigenous Health Research Partnership Grant, "Reducing disease burden and health inequalities arising from chronic dental disease among Indigenous children: an early childhood caries intervention" conducted in New Zealand, Australia and Canada. Whilst the New Zealand data from this study is still in the process of being analysed a number of collaborative papers and conference presentations have been made. A report on a study of tangata whaiora (Māori mental health patients) and oral health was released in 2015. He received numerous invitations to present at conferences in New Zealand and overseas. Research activity was also extended to the arts with national recognition for original writing for the New Zealand theatre.

Research achievements (2015-2016) include the following publication:

Broughton J.R., Lawrence, H.P., & Jamieson, L.M. (2016) Tikanga Māori (Māori Customary Practices) in *Oral Health Research. Journal of Health Care for the Poor and Underserved*, 27: 101 - 109.

Along side this publication, the following presentation was made:

Broughton, J.R. An Indigenous Māori framework for oral health research in New Zealand. Poster presentation at the General Session of the International Association for Dental Research (IADR) Seoul, Korea, 25 June 2016.

Being selected for inclusion in a major anthology of NZ war writing was a particular accolade:

Broughton, J.R. (2015) *Michael James Manaia "Act II"* in "The Penguin Book of New Zealand War Writing." Eds, H. Ricketts and G. McLean. Penguin Random House New Zealand. ISBN 978-0-14-357309-8. Pages 426-435.

Two Distinctions received were:

Companion for the New Zealand Order of Merit for services to Māori Health, theatre and the community. Queen's Birthday Honours, June 2016; and The Dr Maarire Goodall Award, honouring service by Māori health professionals to Māori communities for Māori health development, by Te Ohu Rata O Aotearoa, Māori Medical Practitioners, 24 September 2016.

Key publications

Broughton J.R., Lawrence, H.P., & Jamieson, L.M. (2016) Tikanga Māori (Māori Customary Practices) in *Oral Health Research. Journal of Health Care for the Poor and Underserved*, 27: 101 - 109.

Anderson, V.R., Rapana, S.T., Broughton, J.R., Seymour, G.J., & Rich, A.M. (2015) Preliminary findings from the *Oranga Niho* dental student outplacement project. *New Zealand Dental Journal*, 111: 6-14.

Broughton, J.R., Anderson, V., Lawrence, M., Steinman, M., Nichol, J., Wright, S., Johnson, R., Johnson, M., McGibbon, M., Laing, B., & Hikairo, P. *Oranga niho me ngā tangata whaiora. Oral health and Māori mental health patients. Research report, University of Otago, September 2013. Released June 1, 2015.*

Broughton, J.R. (2015) *Michael James Manaia "Act II"* in "The Penguin Book of New Zealand War Writing." Eds, H. Ricketts and G. McLean. Penguin Random House New Zealand. ISBN 978-0-14-357309-8. Pages 426-435.



PAUL A. BRUNTON

BChD (Leeds) MSc PhD (Manc) FDSRCSEd FDSRCS FFGDP (UK)
Professor and Dean, Faculty of Dentistry

Professor Brunton's research interests are primarily clinical and centred around clinical trials, translational research and clinical trials. Recent projects include modification of restorative filling materials to improve their therapeutic properties and multidisciplinary research with colleagues in diabetes centred around obesity. He has a track record in clinical and translational research having been involved in several multicentre international trials of restorative materials and whitening systems. Other ongoing research projects have also included craniofacial research notably around opening jaw forces and concussive brain injury and surveys in Oceania focussing on the repair versus the replacement of restorations.

Professor Brunton collaborates with academics, both in New Zealand, the USA, Europe and the UK. Current collaborations include Massey University in New Zealand, the universities of Leeds, Birmingham, Cardiff and Kings College London in the UK, the National University of Athens in Greece and the universities of Ohio and Michigan in the United States of America. He continues to actively collaborate with the European Section of the Academy of Operative Dentistry.

Key publications

Wilson NHF, Lynch CD, Brunton PA, Hickel R, H Meyer-Lueckel, Gurgan S, Pallensen U, Shearer AC, Tarle Z, Cotti E, Vanherle G & Opdam N (2016) Criteria for the replacement of restorations: Academy of Operative Dentistry European Section. *Operative Dentistry*; (S7):S48-S57.

Falland-Cheung L, Waddell JN, Lazarjan MS, Jermy MC, Winter T, Tong D, Brunton PA (2016) Use of agar/glycerol and agar/glycerol/water as a brain stimulant for ballistic testing. *Journal of the Mechanical Behaviour of Biomedical Materials*. doi:10.1016/j.jmbbm.2016.09.034

Hickey D, Sharif O, Janjua F & Brunton PA (2016) Bulk dentine replacement versus incrementally placed resin composite: A randomised controlled clinical trial. *Journal of Dentistry* 2016; 46: 18-22. <http://dx.doi.org/10.1016/j.jdent.2016.01.011>

Morgan S, Jum'ah AA & Brunton PA (2015) Assessment of efficacy and post-bleaching sensitivity of home bleaching using 10% carbamide peroxide in extended and non-extended bleaching trays. *British Dental Journal* 218: 579-82. doi: 10.1038/sj.bdj.2015.391.



RICHARD D. CANNON

BA PhD (Camb)

Professor, Department of Oral Sciences

Associate Dean (Research)

Director, Sir John Walsh Research Institute

Professor Cannon is a molecular microbiologist who is primarily interested in how microorganisms cause oral diseases and how treatments for patients with these diseases can be improved. His research covers a number of themes, from the molecular mechanisms of drug efflux pumps to oral microbial colonization and biofilm formation.

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, and is using, a unique protein expression system to study these efflux pumps in baker's yeast *Saccharomyces cerevisiae*. Other research is examining the oral environment with wireless probes and investigating the formation, and removal, of oral biofilms.

C. albicans is a diploid yeast that was, until recently, thought to be asexual. The yeast can, however, undergo sexual recombination *in vitro*. Professor Cannon, in collaboration with Dr Jan Schmid (Massey University), has shown that *C. albicans* strains can mate in the oral cavity and that mating is under slight positive selection.

Professor Cannon collaborates with several national and international research groups to investigate efflux-mediated fungal drug resistance. He is working with Associate Professor Alok Mitra (University of Auckland) on a Marsden-funded project to obtain structural insights into *C. albicans* efflux pump Cdr1. In the same project he collaborates with Professor Rajendra Prasad (Amity University, New Delhi, India) to investigate efflux pump function. Professor Cannon is also collaborating with Professor Susumu Kajiwara (Tokyo Institute of Technology, Japan) and Dr Ariya Chindamporn (Chulalongkorn University, Bangkok, Thailand) to study drug efflux pumps from the important fungi *Candida utilis* and *Penicillium marneffei*. Professor Cannon continues to collaborate with SJWRI researchers investigating the oral environment with on-body telemetry, the colonization of the mouth by fungi, and the role of oral biofilms in caries and halitosis.

Key publications

Farella, M., Loke, C., Sander, S., Songini, A., Allen, M., Mei, L., & Cannon, R. D. (2016) Simultaneous wireless assessment of intra-oral pH and temperature. *Journal of Dentistry*, 51, 49-55. doi: 10.1016/j.jdent.2016.05.012

Holmes, A. R., Cardno, T. S., Strouse, J. J., Ivnitski-Steele, I., Keniya, M. V., Lackovic, K., Monk, B. C., ... Cannon, R. D. (2016) Targeting efflux pumps to overcome antifungal drug resistance. *Future Medicinal Chemistry*, 8, 1485-1501. doi: 10.4155/fmc-2016-0050

Rawal, M. K., Banerjee, A., Shah, A. H., Khan, M. F., Sen, S., Saxena, A. K., Monk, B. C., Cannon, R. D., ... Prasad, R. (2016) Newly identified motifs in *Candida albicans* Cdr1 protein nucleotide binding domains are pleiotropic drug resistance subfamily-specific and functionally asymmetric. *Scientific Reports*, 6, 27132. doi: 10.1038/srep27132

Zhang, N., Magee, B. B., Magee, P. T., Holland, B. R., Rodrigues, E., Holmes, A. R., Cannon, R. D., & Schmid, J. (2015) Selective advantages of a parasexual cycle for the yeast *Candida albicans*. *Genetics*, 200, 1117-1132. doi: 10.1534/genetics.115.177170



PETER R. CATHRO

MDS PG Cert Tert T (Otago) PhD (Adel)
Senior Lecturer, Department of Oral Rehabilitation
Associate Dean (Clinical)

Dr Cathro's research focus is to underpin both endodontic (root canal) practice and clinical teaching. His PhD thesis was entitled *Proteomic analysis of Enterococcus faecalis cell membrane proteins under high alkaline stress conditions*. A seminal finding has been the identification of a limited number of up and down-regulated proteins which now form the basis of on-going investigations as a PhD project.

A current trend in Endodontics is the use of a more biological approach for the management of roots that have not fully developed due to infection, termed revitalisation. In order to facilitate research in this field, a suitable animal model is required. Dr Cathro proposed the use of sheep as a suitable model and this has formed the basis of a PhD which he co-supervised with three resulting publications.

The bleaching of stained teeth requires the use of toxic materials. Peter has been a supervisor in two DClintDent projects investigating the efficacy and safety of bleaching protocols.

Key publications

Cathro P, McCarthy P, Hoffmann P, & Zilm P (2016) Identification of *Enterococcus faecalis* membrane proteins using membrane shaving, 1D-SDS-PAGE and mass spectrometry. *FEBS Open Bio* 6, 586-593

Lou E, Marino V, Cathro P, Damiani F, & Heithersay G (2016) Evaluation of hydroxyl radical diffusion and acidified thiourea as a scavenger during intracoronal bleaching. *Journal of Endodontics* 42, 1126-30

Altaii M, Broberg M, Cathro P, & Richards L (2016) Endodontic regeneration and tooth revitalisation in immature infected sheep teeth. *International Endodontic Journal* – doi:10.1111/iej.12645

Altaii M, Broberg M, Cathro P & Richards L (2016). Standardisation of sheep model for endodontic regeneration/revitalisation research. *Archives of Oral Biology*, 65, 87-94. doi: 10.1016/j.archoralbio.2016.01.008



NICHOLAS P. CHANDLER

BDS PhD (Lond) MSc (Manc) LDSRCS FDSRCPSGlas FDSRCSEd FFDRCSI MRACDS
Professor, Department of Oral Rehabilitation

Professor Chandler is a specialist in endodontics with interests in dental pulp disease, endodontic surgery, ultrasound and dentists' vision. Interests in pulp sensitivity and vitality testing continue with orthodontic studies on predicting factors involved in orthodontic pain, supported by a New Zealand Dental Research Foundation grant. A grant from MBIE (led by Prof Warwick Duncan) funds research on ultrasonic diagnostic devices for dentistry. Surveys on the eyesight of dental students and teaching staff have led to one paper and three abstracts. Root canal anatomy and dentine penetration investigations involve two current clinical doctorate students. BDS (Honours) completions in 2016 involved studies of tooth preparation with ultrasonic instruments and the effect of geometric shapes on the fracture strength of restorations. During 2015-2016 Professor Chandler has contributed four chapters to the three key endodontic textbooks *Ingle's Endodontics*, *Harty's Endodontics in Clinical Practice* and *Cohen's Pathways of the Pulp*. Key collaborators within the School are Professor Warwick Duncan and Associate Professor Neil Waddell. Professor Chandler continues work with former Otago Postgraduate Visiting Fellow Professor Adeleke Oginni (Nigeria) and Dr George Bogen in California. His 2015 Research and Study leave led to new collaborations in London (Professor Bun San Chong and Dr Sharan Sidhu) and has rekindled research with Dr Alison Qualtrough (Manchester).

Honours/awards

The Alan Docking International Association for Dental Research Science Award, 2016.

Key publications

Murray, C., Gray, A. & Chandler N.P. (2016) Eyesight: a study of dental surgery students during their clinical training. *Optometry in Practice*, 17,113-120.

Chandler, N.P. (2015) Electronic apex locators may be better at determining endodontic working lengths than radiographs and could reduce patient radiation exposure. *Journal of Evidence-Based Dental Practice*, 15,28-29.

Edwards, C. E., Bennani, V. Chandler, N.P. & Lowe, B. (2015) Effectiveness of disposable (single-use) tips for dental air-water syringes. *European Journal of Prosthodontics and Restorative Dentistry*, 23,187-191.

Oginni, A.O., Adeleke, A.A. and Chandler, N.P. (2015) Root canal treatment and prevalence of apical periodontitis in a Nigerian adult subpopulation: a radiographic study. *Oral Health and Preventive Dentistry*, 13,85-90.



JUNG EUN (JOANNE) CHOI

BDentTech(Hons) PhD (Otago)
Lecturer, Department of Oral Rehabilitation

Joanne Choi's research interests are in experimental and observational research in dental materials, craniofacial biology and clinical oral physiology. She carries out qualitative and quantitative analysis of the mechanical properties and failure mechanisms of restorative dental systems. She also undertakes observational research in the oral environment using portable measurement systems. For her PhD, Dr Choi developed and validated a wired sensor system to monitor intraoral pH and temperature for long periods, the results of which can be used in identifying and evaluating factors involved with dental wear.

Dr Choi was Principal Investigator on a New Zealand Dental Association Research Foundation Project Grant on the continuous measurement of intraoral pH and temperature in individuals with and without xerostomia (with co-investigators A/ Prof Neil Waddell and Prof Karl Lyons). Her research on the link between mouth breathing during sleep and the acidity of the oral environment, promoting tooth enamel erosion and caries, was profiled by the University of Otago in 2016 (otago.ac.nz/news/news/otago527804.html) and led to national and international media coverage.

Key publications

Choi JE, Lyons KM, McLean MCB, & Waddell JN (2016). Interarch comparison of intraoral pH and temperature: A pilot study. *British Dental Journal Open* doi:10.1038/bdjopen.2016.8

Choi JE, Waddell JN, Lyons KM, & Kieser JA (2016). Intraoral pH and temperature during sleep with and without mouth breathing. *Journal of Oral Rehabilitation* 43:356-363.

Choi JE, Loke C, Waddell JN, Lyons KM, Kieser JA, & Farella M (2015). Continuous measurement of intraoral pH and temperature: Development, validation of an appliance and a pilot study. *Journal of Oral Rehabilitation* 42:563-570.



DAWN E. COATES

BSc PhD (Otago)

Senior Research Fellow, Department of Oral Diagnostic and Surgical Sciences

Dr Coates undertakes research into the cellular and molecular mechanisms involved in tissue growth and remodeling in relation to dental health and disease. She has particular expertise in the process of angiogenesis, with over 20 years of experience working in this field. Current angiogenesis research has been in relation to bisphosphonate-related osteonecrosis of the jaw which is a serious condition associated with osteoporosis and metastatic bone cancer. Stem cell research continues to be a major focus with projects investigating the mechanisms of stem cell regulation and the use of adipose, periosteum and dental pulp, for tissue regeneration. Other areas of research include; ER stress and the Unfolded Protein Response, salivary IgA, and osteogenesis. She is also currently involved in research in the fields of dental education and workforce analysis. With capability for in functional *in vitro* assays, Dr Coates now co-manages the tissue culture facility for the Dental Faculty.

A highlight in 2016 was receiving the Faculty of Dentistry's premier research honour, the Sir John Walsh Award for Research Excellence. Eight peer-reviewed journal publications were accepted in 2015-16. Keynote addresses were given at the Sir John Walsh Research Institute Research Day and at the 3rd Chinese Antler Science Symposium in China. In addition, research addresses were delivered at the 55th IADR ANZ meeting, the D4 Conference, and she attended the 94th IADR meeting in Seoul. Dr Coates' students have delivered a total of 19 presentations, as well as winning prizes at the IADR meetings. She has had 1 PhD and 2 DClinDent students complete in 2015 and 2016 and has 4 ongoing students. She has an ongoing research collaboration investigating stem cells with Dr Li in China and travelled there in both 2015 and 2016. In addition, Dr Coates collaborates with multiple researchers in the field of dentistry.

Key publications

Dong, Z., Ba, H., Zhang, W., Coates, D., & Li, C. (2016). iTRAQ-based quantitative proteomic analysis of the potentiated and dormant antler stem cells. *International Journal of Molecular Sciences*, *17*(11), 1778. doi: 10.3390/ijms17111778

Zanicotti, D. G., Coates, D. E., & Duncan, W. J. (2016). In vivo bone regeneration on titanium devices using serum-free grown adipose-derived stem cells, in a sheep femur model. *Clinical Oral Implants Research*, *28*, 64-75. doi: 10.1111/clr.12761

Zafar, S., Coates, D. E., Cullinan, M. P., Drummond, B. K., Milne, T., & Seymour, G. J. (2016). Effects of zoledronic acid and geranylgeraniol on the cellular behaviour and gene expression of primary human alveolar osteoblasts. *Clinical Oral Investigations*, *20*, 2023-2035. doi: 10.1007/s00784-015-1706-y

Baharuddin, N. A., Coates, D. E., Cullinan, M., Seymour, G., & Duncan, W. (2015). Localization of RANK, RANKL and osteoprotegerin during healing of surgically created periodontal defects in sheep. *Journal of Periodontal Research*, *50*(2), 211-219. doi: 10.1111/jre.12196



HARSHA L. DE SILVA

BDS (S Lanka) MS (Colombo) FDSRCS FFDRCS

Senior Lecturer, Department of Oral Diagnostic and Surgical Sciences

Harsha de Silva's research focuses on clinical and epidemiological aspects of maxillofacial trauma and oral cancer with special emphasis on developing clinicopathological correlations that could help prognostication in the behaviour of oral potentially malignant disorders and oral squamous cell carcinoma.

He has ongoing research collaborations with a tertiary level referral hospital in Sri Lanka to investigate the role of *Candida albicans* in the clinicopathological behaviour of oral potentially malignant disorders. Further, collaboration is being developed with another research group in Sri Lanka to study the expression of molecular markers in oral carcinogenesis.

Key publications

Ong, S. W., Tong, D. C., Thomson, W. M., De Silva, R. K., & De Silva, H. L. (2017). Third molar surgery outcomes: A comparison between intravenous sedation and general anaesthetic. *International Journal of Oral & Maxillofacial Surgery*, 46 (Suppl.1), (pp. 111). doi: 10.1016/j.ijom.2017.02.393

Coetzee, A., Goodhew, E. L., De Silva, H. L., & Thomson, W. M. (2016). Steroid prophylaxis: The knowledge and practices of New Zealand General Dental Practitioners. *New Zealand Dental Journal*, 112(4), 102-107.

Jung, T. K., De Silva, H. L., Konthasingha, P. P., & Tong, D. C. (2015). Trends in paediatric maxillofacial trauma presenting to Dunedin Hospital, 2006 to 2012. *New Zealand Dental Journal*, 111(2), 76-79.

Friedlander, L. T., Hussani, H., Cullinan, M. P., Seymour, G. J., De Silva, R. K., De Silva, H., Cameron, C., & Rich, A. M. (2015). VEGF and VEGFR2 in dentigerous cysts associated with impacted third molars. *Pathology*, 47(5), 446-451. doi: 10.1097/pat.0000000000000272



ROHANA KUMARA DE SILVA

BDS (S Lanka) FDSRCPSGlas FFDRCSI FDSRCS

Associate Professor, Department of Oral Diagnostics and Surgical Sciences

Associate Professor Rohana Kumara De Silva is an active researcher in the Faculty of Dentistry. His main goal is to help patients with dental related problems to achieve good oral health related quality of life. To implement this he has chosen two main research areas: rehabilitation of missing teeth with dental implants, and post-operative pain management.

He has a special interest in Implant supported dentures and is involved in exploring the avenues to find ways of rehabilitating partial and complete edentulous patients with economical use of dental implants. His recently completed research was to investigate the ways of rehabilitating patients in the shortest possible time following dental extractions and to investigate the use of novel sites in the upper jaw to anchor dental implants to stabilise the upper denture. These include the gross and micro-anatomical structure analysis of the human cadavers to identify the quality and quantity of the bone structure of those sites when compared to the traditional sites. His research further expands into analysing the quality of life of individuals treated with dental implants and the feasibility of using metal-free implant fixtures.

As an Oral & Maxillofacial surgeon, another area of A/Prof de Silva's 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. As a part of this ongoing research, he recently completed a research project to evaluate the efficacy of a commonly used analgesic in the management of post-operative pain after surgical removal of wisdom teeth when given as a higher dose.

In collaboration with Professor W. M Thilakaratne and Professor Samadara Siriwardena at University of Peradeniya, Sri Lanka, he undertakes research to evaluate the usefulness of tumour thickness in planning the treatment of oral squamous cell carcinoma.

He also contributes to ongoing research projects in the Department of Oral Rehabilitation of University of Otago to evaluate the patient satisfaction and surgical outcome after receiving implant-supported dentures.

He was a co-supervisor for Dr Adrian Best who completed his MDS/MBChB in 2015. Research topic – "Efficacy of Codeine in third molar surgery".

Key publications

Ma, S., Tawse-Smith, A., De Silva, R. K., Atieh, M. A., Alsabeeha, N. H. M., & Payne, A. G. T. (2016). Maxillary three-implant overdentures opposing mandibular two-implant overdentures: 10-year surgical outcomes of a randomized controlled trial. *Clinical Implant Dentistry & Related Research*, 18(3), 527-544.

Dias, G. J., De Silva, R. K., Shah, T., Sim, E., Song, N., Colombage, S., & Cornwall, J. (2015). Multivariate assessment of site of lingual nerve. *British Journal of Oral & Maxillofacial Surgery*, 53(4), 347-351.

Siddiqi, A., Kieser, J. A., De Silva, R. K., Thomson, W. M., & Duncan, W. J. (2015). 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*, 17(3), 483-496.

Friedlander, L. T., Hussani, H., Cullinan, M. P., Seymour, G. J., De Silva, R. K., De Silva, H., Cameron, C., & Rich, A. M. (2015). VEGF and VEGFR2 in dentigerous cysts associated with impacted third molars. *Pathology*, 47(5), 446-451.



BERNADETTE K. DRUMMOND

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

Professor Drummond's research focus is on improving dental care for children, including communication with very young children with the aim of all children having a good oral health-related quality of life. Ongoing studies with graduate students include investigation of the longer term clinical outcomes in children who have had early childhood caries, the changing oral biofilm in health and disease in children utilizing metagenomics, structural changes in molar incisor hypomineralisation (MIH), long term clinical management for MIH, measurement of the changing pH in the mouth over 24 hours, oral health of children of parents who are smokers and the knowledge and opinions of parents about oral healthcare for their children. She is also interested in the impact of probiotics and other novel approaches to improving children's oral health.

Grants have been obtained to investigate the effect of MGO™ 400+ Manuka Honey with Cyclopower™ on oral health in young adults; management of dental caries in children and adolescents –restorative treatment decisions by oral health practitioners in New Zealand; children's oral health-related quality of life five to seven years after comprehensive care under general anaesthesia. Research collaboration has been developed with the Department of Psychology to investigate how preschool aged children perceive their experience visiting the dental therapist or dentist.

Key publications

Drummond, B. K., Gaffney, M., & Marshall, K. (2016). An investigation of the views of parents in Otago on dental care for primary school-aged children by the Community Oral Health Service prior to the introduction of the hub-based clinic system. *New Zealand Dental Journal*, 112(4), 108-115.

Balaji, K., Milne, T. J., Drummond, B. K., Cullinan, M. P., & Coates, D. E. (2016). A comparison of salivary IgA in children with Down syndrome and their family members. *Archives of Oral Biology*, 67, 39-45. doi: 10.1016/j.archoralbio.2016.03.005

Natarajan, A. K., Fraser, S. J., Swain, M. V., Drummond, B. K., & Gordon, K. C. (2015). Raman spectroscopic characterisation of resin-infiltrated hypomineralised enamel. *Analytical & Bioanalytical Chemistry*, 407(19), 5661-5671. doi: 10.1007/s00216-015-8742-y

Broadbent, J. M., Wills, R., McMillan, J., Drummond, B. K., & Whyman, R. (2015). Evaluation of evidence behind some recent claims against community water fluoridation in New Zealand. *Journal of the Royal Society of New Zealand*, 45(3), 161-178. doi: 10.1080/03036758.2015.1056193



WARWICK J. DUNCAN

ED MDS PhD (Otago) FRACDS FICD MRSNZ
Professor, Department of Oral Sciences
Programme Leader, Clinical and Translational Research

Professor Duncan's primary research involves Periodontology and Dental Implantology. He is also an accredited Forensic Odontologist active in forensic research. He conducts clinical testing of dental implants and periodontal treatment approaches in human clinical trials, and is active in preclinical testing using animal models. Professor Duncan's personal expertise includes clinical periodontics, implant surgery, hard-tissue histomorphometry, and leading multi-disciplinary research teams. He has established several new models for multi-site testing in sheep, using the lower jaw, the maxillary sinus, and the femur; these model systems include delayed and immediate dental implants, tooth socket grafting, critical size defects, sinus grafting, peri-implant defects, peri-implantitis and periodontitis. He is also experienced with small animal models.

Professor Duncan has active collaborations with researchers in Switzerland, Korea, South Africa, USA, Brazil, UK and in New Zealand (Callaghan Innovation). He has conducted commercial research for most international dental implant companies and producers of maxillofacial grafting products and has active collaborations with several New Zealand biotech firms. At Otago he collaborates with researchers in the Department of Chemistry, National School of Pharmacy, Department of Anatomy, and with colleagues in the Sir John Walsh Research Institute. Current research includes:

- Regeneration of bone to support titanium implants with different modified surfaces
- Novel bone grafting materials - biomechanical, In vitro and in vivo analyses
- Ultrasound diagnosis of periodontal and peri-implant diseases
- Adjunctive chemotherapeutics for treatment of periodontitis and peri-implantitis

During 2015-16 Professor Duncan successfully attracted \$2.66M in research funding, the most significant being two major grants from the Ministry of Business, Innovation and Employment for the "UltraD3: Ultrasonic Dental Diagnostic Device" project (\$1.38M) and the "Silverbone - unique antibacterial biomaterial" project (\$1.15M). During this period, Professor Duncan published 21 papers, 1 book chapter and 12 conference abstracts, gave 6 media interviews, delivered 13 invited presentations, was part of one successful patent and supervised 7 doctoral candidates to completion.

Key publications

Duncan, W. J., Gay, J. H. A., Lee, M.-H., Bae, T.-S., Lee, S.-J., & Loch, C. (2016). The effect of hydrothermal spark discharge anodization in the early integration of implants in sheep sinuses. *Clinical Oral Implants Research*, 27(8), 975-980. doi: 10.1111/clr.12741

Liu, J., Schmidlin, P. R., Philipp, A., Hild, N., Tawse-Smith, A., & Duncan, W. (2016). Novel bone substitute material in alveolar bone healing following tooth extraction: An experimental study in sheep. *Clinical Oral Implants Research*, 27(7), 762-772. doi: 10.1111/clr.12673

Duncan, W. J., Lee, M.-H., Bae, T.-S., Lee, S.-J., Gay, J., & Loch, C. (2015). Anodisation increases integration of unloaded titanium implants in sheep mandible. *BioMed Research International*, 2015, 85969. doi: 10.1155/2015/85969

Siddiqi, A., Duncan, W. J., De Silva, R. K., & Zafar, S. (2016). One-piece zirconia ceramic versus titanium implants in the jaw and femur of a sheep model: A pilot study. *BioMed Research International*, 2016, 6792972. doi: 10.1155/2016/6792972



MAURO FARELLA

*DDS (Naples) Dottore di Ricerca (Reggio Calabria) SpecOrthodontics (Naples)
SpecMedStat (Milan)*

Professor, Department of Oral Sciences

Associate Dean (Postgraduate Studies)

Programme Leader, Craniofacial Biology and Clinical Oral Physiology

Professor Farella's current main research interests include normal and abnormal craniofacial growth, three-dimensional craniofacial imaging, and jaw function. In addition, he is a widely recognized expert in the pathophysiology of orofacial muscles, bruxism, and temporomandibular joint research. Additional areas of his expertise include experimental design and randomized clinical trials in dentistry, biomechanics in orthodontics, and the clinical evaluation of patient-centred interventions. Furthermore, he has introduced and 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 masticatory muscle activity and intra-oral pH, and use of oral appliances for the management of obstructive sleep apnoea in children.

In 2015-16, Professor Farella published 18 full-length articles, and obtained 10 grants from various funding bodies, including Cure Kids, Lottery Health Research, NZ Dental Association and NZ Association of Orthodontists. He has been acting as main supervisor or co-supervisor of four PhD projects, fourteen DCLinDent projects, two Honours projects, and three Elective undergraduate research projects. He has been appointed founding leader of the research programme in Craniofacial Biology and Clinical Oral Physiology of the Sir John Walsh Research Institute, and Deputy Director of the Institute itself. He is on the Editorial Board of the Journal of Oral Rehabilitation and acts as reviewer for many international journals.

Professor Farella has been appointed as the University of Otago's representative on the Management Committee of the New Zealand Consortium for Medical Devices Technologies (MedTech Core) and he is also a member of the New Zealand Biomouth Research Group. At the University of Otago, he is on the Steering Committee of the recently established Research Theme Pain@Otago, and the Management committee of the research network D4 (Diagnostics, Drugs, Devices and Discovery). He is also a member of the Center for Bioengineering, of the Neuroscience Programme and of Genetics Otago. In 2015, Professor Farella was the recipient of national and international research prizes, such as the Alan Docking Science Award from the Australian and New Zealand Division of the International Association for Dental Research, and the Sir John Walsh Award, to acknowledge the excellence achieved in dental research.

Professor Farella has ongoing collaborations with the University of Napoli Federico II (Italy), the University of Zurich (Switzerland), and the University of Witwatersrand (South Africa). Furthermore, he has collaborative projects at the University of Otago with the Departments of Anatomy, Applied Sciences, Biochemistry, Chemistry, Human Nutrition, Computer Sciences, Women's and Children's Health, Zoology, and the Otago Zebrafish Facility.

Key publications

White, A. K., Venn, B., Lu, L. W., Rush, E., Gallo, L. M., Yong, J. L. C., & Farella, M. (2015). A comparison of chewing rate between overweight and normal BMI individuals. *Physiology & Behavior*, 145, 8-13. doi: 10.1016/j.physbeh.2015.03.028

Antoun, J. S., Cameron, C., Sew Hoy, W., Herbison, P., & Farella, M. (2015). Evidence of secular trends in a collection of historical craniofacial growth studies. *European Journal of Orthodontics*, *37*(1), 60-66. doi: 10.1093/ejo/cju007

Farella, M., Loke, C., Sander, S., Songini, A., Allen, M., Mei, L., & Cannon, R. D. (2016). Simultaneous wireless assessment of intra-oral pH and temperature. *Journal of Dentistry*, *51*, 49-55. doi: 10.1016/j.jdent.2016.05.012

Gray, S., Bennani, H., Kieser, J. A., & Farella, M. (2016). Morphometric analysis of cervical vertebrae in relation to mandibular growth. *American Journal of Orthodontics & Dentofacial Orthopedics*, *149*(1), 92-98. doi: 10.1016/j.ajodo.2015.06.028



LYNDIE A. FOSTER PAGE

BSc BDS MComDent PhD PGDipClinDent (Otago)
Associate Professor, Department of Oral Sciences

As a dental epidemiologist and dental public health specialist, Associate Professor Lyndie Foster Page's research is concerned with improving oral health outcomes and reducing health inequalities. She 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 involved in cross-sectional surveys and a variety of health services research and clinical projects. Her other research interest is in dental education.

In 2015-2016 A/Prof Foster Page received grant funding from the Ministry of Health, University of Otago and Deckel Maho Gildermeister (DMG) Germany. She 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 her research with collaborators 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). A/Prof Foster Page's dental education research is with the Tairaiwhiti Interprofessional education (IPE) group and Dr Barry Gibson investigating students' perceptions of IPE, dentistry and social accountability.

Key publications

Thomson WM, Foster Page LA, Robinson PG, Do LG, Traebert J, Mohamed AR, Turton BJ, McGrath C, Bekes K, Hirsch C, del Carmen Aguilar-Diaz F, Marshman Z, Benson PE, & Baker SR. (2016). Psychometric assessment of the short-form Child Perceptions Questionnaire: an international collaborative study. *Community Dentistry and Oral Epidemiology* doi: 10.1111/cdoe.12248.

Foster Page LA, Chen V, Gibson B, & McMillan J. (2016). Overcoming structural inequalities in oral health: the role of dental curricula. *Community Dental Health* 33:1-5.

Broadbent JM, Zeng J, Foster Page LA, Baker SR, Ramrakha S, & Thomson WM. Oral health-related beliefs, behaviours and outcomes through the life course. *Journal of Dental Research* 95:808-813 (2016).

Foster Page LA, Gray L, Gallagher P, McKinlay E, & Rich AM. (2016) Untangling the web of influences on interprofessional education for dental students. *Journal of Dental Education* 80:677-685.



LARA T. FRIEDLANDER

MDS PhD (Otago) FRACDS

Senior Lecturer, Department of Oral Rehabilitation

Dr Friedlander is a researcher within the Oral Molecular & Immunopathology, Clinical & Translational, 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 pathology, permanent tooth development, healing and endodontic disease and the influence of systemic disease, particularly Type 2 diabetes. Dr Friedlander is particularly interested in the influence of general health on oral health and in 2016 was awarded a grant from the Ministry of Health to investigate the dental pulp of people with Type 2 diabetes. Collaborators in these projects have included Professor Alison Rich, Professor Bernadette Drummond, Professor Nick Chandler, Dr Trudy Milne, Dr Dawn Coates, Dr Mohammad Alansary, Dr Haizal Hussaini, Mr Hitesh Navani, Mr Kullasit Chutipongpisit and Ms Assil Russell.

Dr Friedlander is an active researcher in ARCH (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 to NZ healthcare. Dr Friedlander has led the first three projects related to vital pulp therapy in permanent teeth in was awarded external research grant funding to expand this further. Ongoing PBRN projects are looking at the use of educational modes for improving patient perceptions and understanding of endodontics in practice. Clinical collaborations have occurred around practice based research with Dr Mike Morgan and Dr Denise Bailey (University of Melbourne) and Dr Jeff Ward (eviDent PBRN)

Dr Friedlander supervises PhD, 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 and tooth development and for broader clinical research pertaining to endodontic practice, disease, and practice-based research. Collaborative research is also occurring with Dr Ben Daniel (HEDC) to develop blended learning for practitioners delivering clinical endodontics.

Key publications

Friedlander L, McElroy K, Daniel B, Cullinan M, & Hanlin S (2015) Direct pulp capping of permanent teeth in New Zealand general dental practice – A practice based research study. *New Zealand Dental Journal*, 111, 2, 58-64

Friedlander LT, Hussani H, Cullinan MP, Seymour GJ, De Silva RK, De Silva H, Cameron C, & Rich AM (2015) VEGF and VEGFR2 in dentigerous cysts associated with impacted third molars. *Pathology*, 47, 5, 446-51. doi: 10.1097/PAT.0000000000000272

Firth FA, Friedlander LT, Parachuru VP, Kardos TB, Seymour GJ, & Rich AM. (2015) Regulation of immune cells in oral lichen planus. *Archives of Dermatological Research*, 307, 4, 333-9. doi: 10.1007/s00403-015-1540-8.

Friedlander LT, Chandler NP, & Daniel B (2015) Five year analysis of undergraduate education using tapered hand and rotary instrumentation techniques. R145 *International Endodontic Journal*, e63. DOI 10.1111/iej12496



SUZANNE McE. HANLIN

MDS PGDipHeallnf (Otago) FRACDS
Senior Lecturer, Department of Oral Rehabilitation
Associate Dean (Clinical)

Suzanne Hanlin has three main fields of research that support and inform dental clinical practice and teaching in New Zealand.

1. Clinical Practice Based Research Network (PBRN) – retrospective practice assay and mixed method translational research that informs health care policy, patient care and improved oral health outcomes in the New Zealand (NZ) population. She chairs the board of the ARCH (Applied Research through Clinicians Hands) dental PBRN. Her research themes are related to practitioner understanding of clinical and research ethics of NZ dentists, patient outcomes around dental implants therapy and vital pulp therapy.
2. Dental Education – mixed method research on curriculum development in prosthodontics and cariology, evaluation of learning outcomes, assessment, translation of knowledge and development of critical thinking, and development and evaluation of blended learning modalities in research ethics.
3. Health informatics in dentistry – the use of dental health data to inform health delivery and improve patient outcomes.

Key publications

Falland-Cheung, L., Piccione, N., Zhao, T., Lazarjan, M. S., Hanlin, S., Jermy, M., & Waddell, J. N. (2016). Investigation of dental alginate and agar impression materials as a brain simulant for ballistic testing. *Forensic Science International*, 263, 169-175. doi: 10.1016/j.forsciint.2016.04.005

Hanlin, S. M., Burbridge, L. A. L., & Drummond, B. K. (2015). Restorative management of permanent teeth enamel defects in children and adolescents. In B. K. Drummond & N. Kilpatrick (Eds.), *Planning and care for children and adolescents with dental enamel defects: Etiology, research and contemporary management*. (pp. 139-155). Berlin, Germany: Springer. doi: 10.1007/978-3-662-44800-7

Beumer, J., III, 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.

Friedlander, L., McElroy, K., Daniel, B., Cullinan, M., & Hanlin, S. (2015). Direct pulp capping of permanent teeth in New Zealand general dental practice: A practice based research study. *New Zealand Dental Journal*, 111(2), 58-64.



NICHOLAS C. K. HENG

BSc(Hons) PhD (Otago)

Senior Lecturer, Department of Oral Sciences

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

- i. Bacterial genomics (whole-genome sequencing) involving state-of-the-art DNA sequencing technologies and bioinformatics.
- 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 (mainly) oral streptococci.

The scope of research conducted by Dr Heng's group during 2015-2016 included:

- i. Whole-genome sequencing of bacterial species such as *Bacillus pumilus*, *Staphylococcus aureus* and novel species of *Streptococcus* in relation to bacteriocin production; and
- ii. The use of Ion Torrent next-generation DNA sequencing technology to investigate changes in the oral microbiota (oral microbial populations) with and without the use of probiotic intervention (involving *Streptococcus salivarius*);

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, Indonesia), and (iii) Professor J.R. Tagg (BLIS Technologies – bacteriocins).

KEY PUBLICATIONS

Seymour, G.J., Cullinan, M.P., & Heng, N.C.K. (2016). Oral Biology: Molecular Techniques and Applications, Second Edition. *Methods in Molecular Biology*, 1537, Springer Protocols, Humana Press, U.S.A.

Hale, J.D.F., Wescombe, P.A., Tagg, J.R., & Heng, N.C.K. (2016). Streptococcal bacteriocin-producing strains as oral probiotic agents. In Dorit, R.L., Roy, S.M., & Riley, M.A. (eds.), *The Bacteriocins: Current Knowledge and Future Prospects*, Caister Academic Press, U.K. doi: 10.21775/9781910190371.

Malik, A., Sumayah, S., Yeh, C.W., & Heng, N.C.K. (2016). Identification and sequence analysis of pWcMBF8-1, a bacteriocin-encoding plasmid from the lactic acid bacterium *Weissella confusa*. *FEMS Microbiology Letters*, 363(8), fnw059. doi: 10.1093/femsle/fnw059.

Walker, G.V., Heng, N.C.K., Carne, A., Tagg, J.R., & Wescombe, P.A. (2015). Salivaricin E and abundant dextranase activity may contribute to the anti-cariogenic potential of the probiotic candidate *Streptococcus salivarius* JH. *Microbiology*, 162(3), 476-486. doi: 10.1099/mic.0.000237.



HAIZAL MOHD HUSSAINI

BDS MDentSc (Leeds) PhD (Otago) FDSRCSEd
Senior Lecturer, Department of Oral Diagnostic and Surgical Sciences

Dr Hussaini is an oral pathologist with research interests in oral squamous cell carcinoma. His main interest is in investigating immune responses in the tumour microenvironment of oral squamous cell carcinoma, particularly modulation of the immune system by cancer cells in the process of local invasion. This research interest began in 2007 with subsequent completion of his PhD thesis in 2013. The project is currently being expanded to include metastatic lymph node profiling as well as investigation of the role of angiogenesis and lymphangiogenesis in the metastatic spread of oral squamous cell carcinoma.

In 2015-2016, Dr Hussaini co-authored four articles and two abstracts in international peer-reviewed journals. He presented at three international conferences, one as an invited FDI speaker on oral cancer immunology in Colombo, Sri Lanka. During this period, Dr Hussaini was awarded four research grants as primary applicant and another four as a co-researcher. These research undertakings are part of the Oral Molecular and Immunopathology Research Programme of the SJWRI.

Dr Hussaini is currently research co-supervisor of a PhD student, two DClinDent (Oral Pathology) and one DClinDent (Oral Medicine) students, and one international Research Fellow visiting the Oral Molecular and Immunopathology Research Programme for 2016. In addition he is the supervisor of the research project of a BDS (Hons) student project, a BDS summer studentship project and three BDS elective projects. The summer student was awarded a competitive Royal College of Pathologist Australasia undergraduate grant.

Dr Hussaini has an international collaboration with Oral Cancer Research Coordinating Centre, Malaysia, a key research institute and tissue bank in South East Asia. Currently he has two ongoing research projects in collaboration with the centre. He is also a collaborator in a screening programme for malignant disorders, oral cancer and mucosal lesions in Cambodia and Malaysia, the results of which have been published in two international journals.

Key publications

Chher, T., Hak, S., Kallarakkal, T. G., Durward, C., Ramanathan, A., Ghani, W. M. N., Razak, I.A., Harun, M.H., Ashar, N.A.M., Rajandram, R.K., Prak, P., Hussaini, H. M., & Zain, R. B. (2016). Prevalence of oral cancer, oral potentially malignant disorders and other oral mucosal lesions in Cambodia. *Ethnicity & Health*. Advance online publication. doi: 10.1080/13557858.2016.1246431

Saleh, A., Kong, Y. H., Haron, N., Aripin, S. F., Vadiveloo, M., Hussaini, H., Zain R.B., Cheong, S. C. (2016). Oral cancer screening in private dental practices in a developing country: Opportunities and challenges. *Community Dentistry & Oral Epidemiology*. Advance online publication. doi: 10.1111/cdoe.12266

Kanagasingam S, Hussaini HM, Soo I, Baharin S, Ashar A, Patel S. (2016). Accuracy of single and parallax film and digital periapical radiographs in diagnosing apical periodontitis – a cadaver study. *International Endodontic Journal*. doi:10.1111/iej.12651

Friedlander LT, Hussaini H, Cullinan MP, Seymour GJ, De Silva RK, De Silva H, et al. (2015). VEGF and VEGFR2 in dentigerous cysts associated with impacted third molars. *Pathology*, 47, 446–451.



LUDWIG JANSEN VAN VUUREN

BTechDent NatDipDentTech (Technicon Pretoria) MTechDent (Tshwane UT)
Senior Lecturer, Department of Oral Rehabilitation

Ludwig Jansen van Vuuren's research interests are the mechanical properties and microstructure of biomaterials 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 relates the arrangement of these structures to their mechanical properties and function.

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, and nationally with the Department of Chemical and Materials Engineering (University of Auckland).

Key publications

Jansen van Vuuren, L., Kieser, J. A., Dickenson, M., Gordon, K.C. & Fraser-Miller, S. J. (2016). Chemical and mechanical properties of snake fangs. *Journal of Raman Spectroscopy*, 47(7), 787-795

Loch, C. & Jansen Van Vuuren, L (2016) Ultrastructure, biomechanical and chemical properties of the vestigial dentition of a Cuvier's beaked whale. *New Zealand Journal of Zoology*, 43(2), 171-178

Jansen van Vuuren, L., Loch, C., Kieser, J. A., Gordon, K.C. & Fraser, S. J. (2015). Structure and mechanical properties of normal and anomalous teeth in the sand tiger shark *Carharias Taurus*. *Journal of Zoo and Aquarium Research*, 3(2), 29-36

Loch, C., Jansen van Vuuren, L., Boyd, D., Duncan, W. & Foster Page, L. (2015). Ultrastructure and properties of teeth treated using the Hall Technique. *Journal of Dental Research*, 94(Spec Iss B), 2338520



WENDY-ANN JANSEN VAN VUUREN

BTechDent NatDipDentTech (Technicon Pretoria)
Lecturer, Department of Oral Rehabilitation

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

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

Key publications

Jansen van Vuuren W, Jansen van Vuuren L, Torr B, & Waddell NJ. (2016). Adhesion between zirconia and indirect composite resin, *International Journal of Adhesion and Adhesives* 69, 72-78 doi:10.1016/j.ijadhadh.2016. 03.011

Tawse-Smith A, Ma S, Wu H, Yeah A, Jansen Van Vuuren L, & Jansen van Vuuren W. (2015) Changes in surface characteristics of moderately roughened grade IV titanium disc following a standardised implantoplasty technique: An *In Vitro* study, *Brazilian Journal of Periodontology*, 25(2), 22-33.



MIKHAIL V. KENIYA

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

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 discovery of next-generation antifungals* (HRC New Zealand grant 2016-2019, PI BC 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, 2011-2015, PI BC Monk) and HRC funded project: *Structure-directed antifungal discovery* (2013-2016, PI BC Monk).

In 2015-2016 Dr Keniya developed a set of strains for yeast-based screens for specific inhibitors of lanosterol 14 α -demethylase. He developed a co-expression system allowing the production of two proteins of interest from different loci within the same yeast strain. A cognate reductase was cloned and co-expressed for *S. cerevisiae*, *C. albicans*, and agricultural pathogens *Z. tritici* and *P. pachyrhizi* in a research collaboration with Bayer AG, Monheim, Germany. Other collaborators are MicroCombiChem e.K, Germany, Perlin Lab (UMDNJ, USA) and Stroud Lab at UCSF, CA, USA. Dr. Keniya was involved in purification of lanosterol 14 α -demethylase from *Candida glabrata*, which led to its X-ray crystal structure.

Key publications

Holmes, A.R., Cardno, T.S., Strouse, J.J., Ivnitski-Steele, I., Keniya, M.V., Lackovic, K., Monk, B.C., Sklar, L.A. & Cannon, R.D. (2016). Targeting efflux pumps to overcome antifungal drug resistance. *Future Medicinal Chemistry*, 8(12), 1485-501. doi: 10.4155/fmc-2016-0050.

Sagatova, A.A., Keniya, M.V., Wilson, R.K., Sabherwal, M., Tyndall, J.D. & Monk, B.C. (2016). Triazole resistance mediated by mutations of a conserved active site tyrosine in fungal lanosterol 14 α -demethylase. *Scientific Reports*, 18;6:26213. doi: 10.1038/srep26213.

Keniya, M. V., Fleischer, E., Klinger, A., Cannon, R. D. & Monk, B. C. (2015). Inhibitors of the *Candida albicans* Major Facilitator Superfamily transporter Mdr1p responsible for fluconazole resistance. *PLoS ONE*, e0126350. .

Sagatova, A., Keniya, M. V., Wilson, R. K., Monk, B. C. & Tyndall, J. D. A. (2015). Structural insights into binding of the antifungal drug fluconazole to *Saccharomyces cerevisiae* lanosterol 14 α -demethylase. *Antimicrobial Agents & Chemotherapy*. Advance online publication. doi: 10.1128/aac.00925-15.



ELLIE T. KNIGHT

BDS DClinDent PGDipClinDent (Otago)
Senior Lecturer, Department of Oral Sciences

Dr Knight's research expertise is in periodontal epidemiology – prevalence of chronic periodontitis in NZ adults and epidemiological analytical research methods. Dr Knight's main research interest is in the field of periodontal epidemiology. This began with her doctoral thesis *Investigating the association between diabetes/smoking and periodontitis in the NZ adult population*. She is continuing with this research theme to examine the pattern and distribution of extent/severity of periodontitis in different age groups in the NZ population, in comparison to other nations' large population studies. As an early-career researcher and a new member of academic staff, Dr Knight is also expanding her research profile – currently, she is looking at the pattern of systemic antibiotic prescription by dental specialists in NZ.

Key publications

Knight E. T., Liu J., Seymour G. J., Faggion Jr. C. M. & Cullinan M. P. (2016). Risk factors that may modify the innate and adaptive immune responses in periodontal diseases. *Periodontology 2000*, 71(1), 22-51.

Knight E. T. (2016). Review of the book Mucogingival esthetic surgery. *New Zealand Dental Journal*, 112(2), 18.

Knight E. T., Leichter J. W., Tawse-Smith A. & Thomson W. M. (2015). Quantifying the association between self-reported diabetes and periodontitis in the New Zealand population. *Journal of Periodontology*, 86(8), 945-54.

Leichter J. W. & Knight E. T. (2015). Xenogenic collagen matrix for the treatment of gingival recession. Poster presentation in absentia. *Journal of Dental Research*, 94(Spec Iss A), 1325.



ERWIN LAMPING

Dipl-Ing PhD (TUG)

Senior Research Fellow, Sir John Walsh Research Institute

Dr Lamping is an experienced yeast molecular biologist interested in the structure and function of eukaryotic membrane proteins - especially integral membrane proteins associated with drug resistance of oral fungal pathogens and human cancer cells [e.g. ATP-binding cassette (ABC) transporters and the antifungal drug target Erg11].

An integral part of his research is the continuous improvement of molecular tools for the efficient, precise, and predictable heterologous membrane protein expression in the eukaryotic model organism *Saccharomyces cerevisiae*; they include highly efficient one-step cloning strategies that eliminate the need for plasmids or commercial cloning kits and engineering of small DNA regulatory elements that, when positioned just upstream of the ATG start codon of yeast genes, allow easy and predictable tuning of protein expression in yeast.

In the period 2015-16 Dr Lamping published two research articles (see publications) and 11 poster and/or oral presentations in two national and 9 international conferences. He also supervised PhD candidate Golnoush Madani and summer students Joanne Lee and Annie van Wichen during that time period. Annie van Wichen was one of ten finalists invited to present their work at the 233rd Otago Medical School Research Society summer studentship competition.

Key publications

Panapruksachat, S., Iwatani, S., Oura, T., Vanittanakom, N., Chindamporn, A., Niimi, K., Niimi, M., Lamping, E., Cannon, R. D. & Kajiwara, S. (2016). Identification and functional characterization of *Penicillium marneffe* pleiotropic drug resistance transporters *ABC1* and *ABC2*. *Medical Mycology*, 54, 478-491. doi: 10.1093/mmy/myv117

Watanasrisin, W., Iwatani, S., Oura, T., Tomita, Y., Ikushima, S., Chindamporn, A., Niimi, M., Niimi, K., Lamping, E., Cannon, R. D. & Kajiwara, S. (2016). Identification and characterization of *Candida utilis* multidrug efflux transporter *CuCdr1p*. *FEMS Yeast Research*, 16, fow042. doi: 10.1093/femsyr/fow042



HEE JI LEE

PhD (Otago)

Research Fellow, Sir John Walsh Research Institute

Dr Lee's research interests encompass probiotics, antibiotics and antifungals with specific experience in the development of novel methods for the control of multidrug-resistant (MDR) microbial infections using either combination drug therapy or probiotic treatment. Since joining SJWRI in 2014 as a part-time Research Fellow, Dr Lee has been working on a Marsden-funded project "Fungal drug resistance- not as simple as A-B-C". The objective of this project was to increase understanding of the structure/function relationships of the important ATP-binding cassette (ABC) protein Cdr1 in the human pathogen *Candida albicans*, with the ultimate objective of using this increased knowledge of its role in substrate transport to guide antifungal drug design. Dr Lee's specific role in the project was to analyse the External Loop components of Cdr1, since they appear to present an excellent potential target for the design of novel pump inhibitors having activity against drug resistant *C. albicans* strains.

In 2015-16, Dr Lee supervised two Summer Research Students, Chuen Lin Hong (Health Sciences Division Summer Studentship) and Nancy Chen (externally funded by Blis Technologies) in collaborative studies with Blis Technologies. Chuen Lin Hong was runner up in the IADR NZ Section Colgate poster competition in 2016 (Dunedin, New Zealand) and won the IADR ANZ Division poster competition at the June 2016 conference in Seoul, Korea.

Key publications

Choo, K. H., Lee, H. J., Knight, N. J., Holmes, A. R., & Cannon, R. D. (2016). Multilocus sequence typing (MLST) analysis of *Candida albicans* isolates colonizing acrylic dentures before and after denture replacement. *Med Mycol*. doi:10.1093/mmy/myw128

Jitmuang, A., Nation, R. L., Koomanachai, P., Chen, G., Lee, H. J., Wasuwattakul, S., et al. (2015). Extracorporeal clearance of colistin methanesulphonate and formed colistin in end-stage renal disease patients receiving intermittent haemodialysis: implications for dosing. *J Antimicrob Chemother*, 70(6), 1804-1811. doi:10.1093/jac/dkv031

Lamping, E., Madani, G., Lee, H. J., Niimi, M., & Cannon, R. D. (2017). Structure-function analyses of multidrug transporters. In *Candida albicans: Cellular and Molecular Biology* (2nd Ed) R. Prasad. Springer International, ISBN 978-3-319-50409-4, doi: 10.1007/978-3-319-50409-4_18, Chapter 18:379-406.



JONATHAN W. LEICHTER

BA (Connecticut) DMD (Tufts) CertPeriodontology (Harv)
Associate Professor, Department of Oral Sciences

Associate Professor Leichter's research interests are in the fields of periodontology, dental implants, dental trauma and laser applications in dentistry. His multi-disciplinary research has resulted in publications in high-ranking international peer reviewed journals in periodontology, endodontics, cariology and dental materials. His clinical research into lasers in periodontology has established that Er:YAG lasers are the only monotherapy for the treatment of periodontitis that is equivalent to the 'gold standard' of scaling and root planing. His work with dental lasers is opening up novel treatment strategies for peri-implantitis as well. The scope and quality of Associate Professor Leichter's research has been recognized in the way of being invited to act as a reviewer for four international peer reviewed dental journals and in invitations to present his research in New Zealand, Australia, Asia and in the US.

In the past two years, Associate Professor Leichter has had nine publications appear in print or accepted in final form in international peer reviewed dental journals. The two most recent manuscripts were accepted in *Periodontology 2000*, the highest-ranking dental journal, with an impact factor of 4.949. His research has been presented at seven international IADR and periodontology meetings. He is the chief writer for the Oral Health Research Review, a translational research publications subscribed to by over 2500 dental health professionals. He established an international research collaboration with Alessandro Quaranta at the University of Western Australia and maintains research collaborations with Professor Patrick Schmidlin at the University of Zurich. He has obtained industry funding for his research from Geistlich Pharma, Johnson and Johnson and a consortium of dental implant manufacturers, funding which has been critical in supporting his research and the research of postgraduate students. He has been a research supervisor for six doctoral candidates in this review period, involved in project development, study design, clinical research supervision and thesis editing. His international reputation has been recognized through invitations to present his research at national and international meetings and through my international collaboration on the Asia Pacific Oral Health Advisory Committee and the Geistlich Mucograft Expert Roundtable. He has contributed to the international research environment by assessing funding applications for the Australian Dental Research Foundation and acting as a referee for four international journals.

Key publications

Murray, C. M., Thomson, W. M. & Leichter, J. W. (2016). Dental implant use in New Zealand: A 10-year update. *New Zealand Dental Journal*, 112(2), 49-54.

Milne, T. J., Coates, D. E., Leichter, J. W., Soo, L., Williams, S. M., Seymour, G. J. & Cullinan, M. P. (2016). Periodontopathogen levels following the use of an Er:YAG laser in the treatment of chronic periodontitis. *Australian Dental Journal*, 61, 35-44. doi: 10.1111/adj.12306

Kennedy, R., Murray, C. & Leichter, J. (2016). Dental implant treatment following trauma: An investigation into the failure to complete Accident Compensation Corporation funded care. *New Zealand Dental Journal*, 112(1), 5-9.

Knight, E. T., Leichter, J. W., Tawse-Smith, A. & Thomson, W. M. (2015). Quantifying the association between self-reported diabetes and periodontitis in the New Zealand population. *Journal of Periodontology*, 86(8), 945-954. doi: 10.1902/jop.2015.150048



CAROLINA LOCH SANTOS DA SILVA

BSc (FU Santa Catarina) MSc (FU Paraná) PhD (Otago)
Lecturer, Department of Oral Sciences

Dr Loch's research is focused on evolutionary oral biology and comparative dental morphology, mainly using animal teeth to gather a wide range of information about the biology, evolution and interactions with the environment of fossil and recent species. Comparative dental anatomy and ultrastructure are some of the key components of her research.

She is also interested in dental hard tissues processing and analyses using modern analytical techniques such as electron microscopy, biomechanical testing, geochemical analysis and micro-computed tomography.

Research achievements in 2015-16:

- Appointed as Lecturer in Oral Biology, University of Otago
- Awarded a grant from the MBIE Unlocking Curious Mind Fund and a travel grant from the Society for Marine Mammalogy
- Published 8 papers in peer-reviewed journals
- Presented 4 research papers at international conferences
- Member of the organising committee for two international conferences
- Board member of the Society for Marine Mammalogy
- Co-supervised one Honours and one DClinDent student

Key publications

Loch, C., Boessenecker, R.W., Churchill, M. & Kieser, J.A. (2016). Enamel ultrastructure of fossil and modern pinnipeds: evaluating hypotheses of feeding adaptations in the extinct walrus *Pelagiarctos*. *The Science of Nature*, 103:44. doi: 10.1007/s00114-016-1366-z

Duncan, W.J., Gay, J., Lee M.H., Bae T.S., Lee S.J. & Loch C. (2016). The effect of hydrothermal spark discharge anodisation in the early integration of implants in sheep sinuses. *Clinical Oral Implants Research*, 27(8), 975-980. doi: 10.1111/clr.12741

Loch, C., Kieser, J.A. & Fordyce, R.E. (2015). Enamel Ultrastructure in Fossil Cetaceans (Cetacea: Archaeoceti and Odontoceti). *PLoS ONE*, 10(1), e0116557. doi:10.1371/journal.pone.0116557

Drehmer, C.J., Sanfelice, D. & Loch, C. (2015). Dental anomalies in pinnipeds (Carnivora: Otariidae and Phocidae): occurrence and evolutionary implications. *Zoomorphology*, 134(2), 325-338. doi: 10.1007/s00435-015-0255-x



KARL M. LYONS

MDS PhD (Otago) CertMaxillofacialPros (UCLA) FRACDS

Professor of Restorative Dentistry and Head of Department, Department of Oral Rehabilitation

Professor Lyons has carried out clinical and *in vitro* research in dental implants and materials and in microbial adhesion to dental obturator prostheses, particularly adhesion of *C. albicans* and *S. epidermidis*. His research has included collaborative projects involving undergraduate students and postgraduate students including DClintDent and PhD students.

Professor Lyons has undertaken collaborative work with Dr Azam Ali from the Centre for Materials Science and Technology, who has recently been awarded an HRC Explorer Grant for a project titled "No Drill No Fill". He has also carried out work on dental tourism with Associate Professor Brent Lovelock from the Department of Tourism on a project that received support from a UORG Grant, with Professor Grigoris Polyzois from the University of Athens on the use of flexible dentures, and with Professor John Beumer from UCLA that has resulted in the co-authoring of a number of book chapters in an oral implant textbook that also included contributions from a number of colleagues in the Department of Oral Rehabilitation. Professor Lyons has co-supervised four DClintDent students to completion and he is currently supervising a number of DClintDent and PhD projects; one PhD project investigating intraoral pH and temperature has resulted in a number of publications with Dr Joanne Choi and Associate Professor Neil Waddell.

Key publications

Choi, J.E., Lyons, K.M., McLean, M.C. & Waddell, J.N. (2016). Interarch comparison of intraoral pH and temperature: A pilot study. *BDJ Open* 2, article number 16008 (2016); doi:10.1038/bdjopen.2016.8

Cannon, R.D., Lyons K.M, Chong K, Newsham-West K, Niimi K, & Holmes A.R. (2016) Adhesion of yeast and bacteria to oral surfaces; pages 165-190, DOI: 10.1007/978-1-4939-6685-1_10. In *Oral Biology: Molecular Techniques and Applications* 2nd edition edited by Seymour G. J., Cullinan, M. P., and Heng, N. C. K. Oral Biology volume 1537 of the series *Methods in Molecular Biology* (series ISSN 1064-3745) Springer Protocols, Spring New York

Choi, J.E., Waddell, J.N., Lyons, K.M., & Kieser, J.A. (2015). Intraoral pH and temperature during sleep with and without mouth breathing. *Journal of Oral Rehabilitation*, December 15, doi:10.1111/joor

Beumer, J., Sung, E.C., & Lyons, K.M. (2015). Chapter 14: Implants in irradiated tissues; pages 391-404. In *Fundamentals of Implant Dentistry Volume 1: Prosthodontic Principles* edited by Beumer, J., Faulkner, R. F., Shah, K. C., and Moy, P. K. (ISBN 978-0-86715-585-3 (B5853)) Quintessence Publishing Co, Chicago



SUNYOUNG MA

BDS DClinDent (Otago)

Senior Lecturer, Department of Oral Rehabilitation

Dr Ma's research interests involve clinical trials using different materials (titanium vs zirconia) or treatment modalities involving dental implants for patients, particularly in the older age group that need to replace their missing teeth. The main research outcomes of interest include 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. Dr Ma is also the primary investigator evaluating the clinical stability of zirconia abutments in association with low-temperature degradation and wear at the titanium-zirconia implant-abutment interfaces.

With 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 (7 articles in peer-reviewed journals and 3 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 completing 2 book chapters specifically in the area of implant overdentures. She has supervised several undergraduate and postgraduate research projects and is actively involved as a reviewer for multiple international peer-reviewed journals and grant applications. Dr Ma was also the recipient of 2016 J. Morita Junior Investigator Award for Geriatric Oral Research, IADR and the SJWRI 2015 Publication Award, University of Otago.

Key publications

Ma, S., Waddell, J. N., Atieh, M. A., Alsabeeha, N. H. & Payne AG (2016). Maxillary three-implant overdentures opposing mandibular two-implant overdentures: 10-year prosthodontic outcomes. *International Journal of Prosthodontics*, 29(4), 327-336.

Koka, S., Baba, N. & Ma, S. (2016). The benefits of implant overdentures. In: Goodacre CJ, Naylor WP (ed). *Implant overdentures – From diagnosis to maintenance*. Foundation for Oral Rehabilitation (E-book).
www.for.org/en/digital-textbooks/book/implant-overdentures

Ma, S., Tawse-Smith, A., De Silva, R. K., Atieh, M. A., Alsabeeha, N. H. M. & Payne, A. G. (2015). Maxillary three-implant overdentures opposing mandibular two-implant overdentures: 10-year surgical outcomes of a randomized controlled trial. *Clinical Implant Dentistry and Related Research*, 18(3), 527-544.

Ma, S. & Fenton, A. (2015). Screw- versus cement-retained implant prostheses: a systematic review of prosthodontic maintenance and complications. *International Journal of Prosthodontics*, 28(2), 127-145.



ALISON M. MELDRUM

BDS MDS (Otago)

Senior Lecturer, Department of Oral Sciences

Associate Dean (Undergraduate Studies)

Alison Meldrum's 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 parents to the 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.

Alison has developed collaborations with Southland dental therapists in the delivery of a motivational message to prevent dental caries in preschoolers. A paper on these findings was accepted for an oral presentation at the International Association of Paediatric Dentistry in Glasgow U.K. in July 2015. She has also collaborated with Dunedin pharmacies to deliver oral health messages using specifically designed oral health brochures.

Key publication

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.



TRUDY J. MILNE

PhD (Qld UT) NZCS

Senior Research Fellow, Department of Oral Diagnostic and Surgical Sciences

Dr Milne's interest in gene expression continues with collaborative projects looking at the development of bone cells. In particular, furthering 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 tissue culture model has been developed to culture human osteoblasts in an *in vitro* 3-dimensional, mechanically-active environment with the hope of synthesizing a bone matrix capable of producing the remodelling dynamics naturally occurring bone. A 3-D tissue culture model is also being developed to study the effect of mechanical strain on the unfolded protein response of periodontal ligament cells.

Research continues in the area of oral diseases looking at the link between poor dental outcomes for smokers and DNA methylation with a goal to identifying differentially regulated proteins in fibroblasts and epidermal cells. Angiogenesis and inflammatory markers found in dental pulp and their association with Type 2 diabetes is also under investigation. The development of multiplex qPCR assays for the quantitation of disease-causing oral pathogens also continues.

Dr Milne co-supervises students on a number of collaborative projects, including two DCLinDent projects looking at the effect of mechanical strain on osteoblasts and fibroblasts with Professor Murray Meikle, Professor Mauro Farella, Professor Richard Cannon, Dr Benedict Seo and DCLinDent (Orthodontics) candidates Yana Itskovich and Fiona Firth. As a member of the Molecular and Immunopathology Research Group and in collaboration with Professor Alison Rich, Dr Lara Friedlander, Dr Haizal Hussaini and Peter Cathro, Dr Milne is also co-supervising two PhD candidates, Hina Narayan and Shaikhah Alsamahi as well as DCLinDent candidate (Endodontics) Hitesh Navani. Dr Milne has been assisted with grants from the New Zealand Dental Association Research Fund and The Ministry of Health Oral Health Research Fund. Following a number of successful collaborations Dr Milne has published six co-authored peer-reviewed articles in 2015-2016.

Key publications

Avadhani A.V., Parachuru, V.P.B., Milne, T., Seymour, G.J. & Rich, A. (2016). Multiple cells express interleukin 17 in oral squamous cell carcinoma. *Journal of Oral Pathology & Medicine* DOI: 10.1111/jop.12465.

Bisanz, J. E., Suppiah, P., Thomson, M., Milne, T., Yeoh, N., Nolan, A., Ettinger, G., Reid, G., Gloor, G., P. Burton, J. P., Cullinan, M.P., and Stebbings, S.M., (2016). The oral microbiome of patients with axial spondyloarthritis compared to healthy individuals. *PeerJ* DOI: 10.7717/peerj.2095.

Zafar, S., Coates, D., Cullinan, M.P., Drummond, B.K., Milne, T. & Seymour, G.J., (2016). Effects of zoledronic acid and geranylgeraniol on the cellular behaviour and gene expression of primary human alveolar osteoblasts. *Clinical Oral Investigations*, 20, 2023-2035 .

Milne, T., Coates, D., Leichter, J., Soo, L., Williams, S., Seymour, G. & Cullinan, M. (2015). Periodontopathogen levels following the use of an Er:YAG laser in the treatment of chronic periodontitis. *Australian Dental Journal* DOI: 10.1111/adj.12306.



SUSAN M. MOFFAT

BA PhD DPH (Otago) CertDentTherp (Wgtn)
Senior Lecturer, Department of Oral Sciences

Susan Moffat's field of research includes dental public health, dental therapy history, and dental therapy/Oral Health workforce and education. 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 and Oral Health workforce and education research, with her work doing some of the groundwork for an ongoing research foundation for the disciplines.

Susan has collaborated with other Faculty staff on dental public health, dental workforce/education, and clinical research projects, and has collaborated internationally with researchers in Australia, the United States, and other countries, particularly on projects requiring a knowledge of dental therapy practice in New Zealand.

In 2015, Susan completed her PhD, which centred on the establishment of the New Zealand School Dental Service (SDS). Her research placed the development of the SDS within New Zealand's social, economic and political history, and emphasised the contribution of the early dental nurses to the founding of the service.

Key publications

Tanny L., Komabayashi, T., Long, D. L., Yahata, Y., Moffat, S.M. & Tāne, H. (2016). The effect of education on oral health students' attitudes in Australia and New Zealand. *European Journal of Dentistry*, 10, 491-5. Available from: <http://www.eurjdent.com/text.asp?2016/10/4/491/195178>

Moffat, S.M., Meldrum, A.M., Aitken, W.A.E. & Coates, D.E. (2016). The acceptability of primary health care nurses delivering oral health messages. *Journal of Dental Research*, 95(Spec Iss B), 0514. Retrieved from <http://www.iadr.org/>

Foster Page, L. A., Moffat, S., Thomson, W. M., Ahmadi, R., Schwass, D. R., Meldrum, A., & Beckett, D. (2016). Resin infiltration of caries in primary molars in a community setting: 2-Year RCT findings. *Caries Research*, 50(2), 205-206. doi: 10.1159/000445087

Foster Page, L. A., Thomson, W. M., Schwass, D., Ahmadi, R., Beckett, D., & Moffat, S. (2015). Resin infiltration of caries in primary molars: 1-year RCT findings. *Journal of Dental Research*, 94(Spec Iss A), 2896. Retrieved from <http://www.iadr.org/>



BRIAN C. MONK

BSc(Hons) (Well) PhD (Monash)
Associate Professor, Department of Oral Sciences
Director, Molecular Biosciences Laboratory

There is a paucity of structural information on existing antifungal targets and there is an emerging problem of antifungal resistance that affects both medicine and agriculture. These problems are being addressed by overexpressing in yeast the azole drug target lanosterol 14 α -demethylase, the terbinafine drug target squalene monooxygenase, the echinocandin drug target glucan synthase and drug efflux pumps from the ATP binding cassette and major facilitator superfamilies. These constructs provide proteins for purification and structural resolution by X-ray crystallography plus key tools that enable targeted screens for antifungals and valuable tests of antifungal efficacy.

Since 2014 Associate Professor Monk's group has deposited in the Protein Data Bank over 25 crystal structures of wild type and mutant lanosterol 14 α -demethylase from *Saccharomyces cerevisiae* in complex with a range of azole drugs and agrochemicals plus the first crystal structure of a full-length lanosterol 14 α -demethylase from a fungal pathogen (*Candida glabrata*). This information, together with our recent determination of the crystal structure of *Candida albicans* lanosterol 14 α -demethylase, is being used to design chimeric antifungals that combined the best attributes of existing antifungals and has enabled computer-based screens of large compound libraries in efforts to discover novel antifungals.

The group published 6 papers in 2015-2016, with an additional research paper and a book chapter review in press. The group completed a Marsden Fund grant (2010-2015), a 2 year research collaboration with the agrochemical company Bayer AG (2014-2016) and a Health Research Council of New Zealand grant (2013-2016) that led to the award of a further Health Research Council grant (2016-2019) entitled "Structure-directed discovery of next-generation antifungals". In 2016 Associate Professor Monk was also awarded a grant from Lotteries Health Research to purchase an advanced HPLC machine used for protein purification. Research collaborations involve Associate Professor Joel Tyndall in the New Zealand's National School of Pharmacy, the laboratory of Professor Robert Stroud at UCSF (San Francisco), the combinatorial chemistry company MicroCombiChem (Wiesbaden, Germany) and Bayer AG Crop Protection Division (Monheim, Germany and Lyon, France). PhD student Alia Sagatova and DClintDent students Shreya Aggarwala and Arpana Devi completed their studies in 2016, with Alia awarded a Thomas Kay Sidey postdoctoral fellowship. Summer student Danyon Graham won the 2015 junior poster competition at the IADR conference in Dunedin and the Otago Medical Research Foundation summer student speaker competition in 2016.

Key publications

Rawal, M.K., Banerjee, A., Shah, A.H., Khan, M.F., Sen, S., Saxena, A.K., Monk, B.C., Cannon, R.D., Bhatnagar, R., Mondal, A.K. & Prasad, R. (2016). Newly identified motifs in *Candida albicans* Cdr1 protein nucleotide binding domains are pleiotropic drug resistance subfamily-specific and functionally asymmetric. *Scientific Reports*, 6, 27132. doi: 10.1038/srep27132

Sagatova, A.A., Keniya, M.V., Wilson, R.K., Sabherwal, M., Tyndall, J.D.A. & Monk, B.C. (2016). Triazole resistance mediated by mutations of a conserved active site tyrosine in fungal lanosterol 14 α -demethylase. *Scientific Reports*, 6, 26213. doi: 10.1038/srep26213

Sagatova, A., Keniya, M. V., Wilson, R. K., Monk, B. C. & Tyndall, J. D. A. (2015). Structural insights into binding of the antifungal drug fluconazole to *Saccharomyces cerevisiae* lanosterol 14 α -demethylase. *Antimicrobial Agents & Chemotherapy*. Advance online publication. doi: 10.1128/aac.00925-15

Keniya, M. V., Fleischer, E., Klinger, A., Cannon, R. D. & Monk, B. C. (2015). Inhibitors of the *Candida albicans* Major Facilitator Superfamily transporter Mdr1p responsible for fluconazole resistance. *PLoS ONE*, e0126350. doi: 10.1371/journal.pone.0126350



HANNA OLSON

Tandhygienistexamen (Gothenburg) MHS (Kristianstad)
Lecturer, Department of Oral Sciences

Hanna Olson holds a Master's Degree in Integrative Health Sciences from the University of Kristianstad, Sweden. In 2015, she joined the University of Otago as a Lecturer in the Department of Oral Sciences, and is now Head of Discipline for Dental Hygiene. She has many years of work experience as a dental hygienist in Sweden and Norway, providing care for patients of all ages in different settings such as private practice, the Community Dental Service, Oral and Maxillofacial Surgery clinic, Hospital Dentistry, and outreach oral health care and Health Promotion. Some of her research interests are multi-professional teamwork, Inter-professional education, healthcare supervision and oral health education.

In 2016, Hanna presented and reported on research findings from Bachelor of Oral Health students' self-perceived stressors at two symposia. First, at the SJWRI and Faculty of Dentistry Research Symposium held at the Dunedin Public Art Gallery, followed by an international presentation at the College of Oral Health Academics 16th Symposium in Adelaide, Australia.

In the beginning of the same year, Hanna was as a speaker at the public Integrative Health Symposium, Hunter Centre, Dunedin, Otago, where she gave an overview of her recently completed postgraduate studies and Masters by Thesis.

Key publications

Olson, H., Adam, L., Moffat, S. & Tawse-Smith, A. (2016). Perceived stressors of Bachelor of Oral Health students. *Proceedings of the Sir John Walsh Research Institute Research Symposium*. (pp. 19-20). Retrieved from <http://www.otago.ac.nz/sjwri/news/otago621026>

Olson, H., Adam, L., Moffat, S. & Tawse-Smith, A. (2016). Perceived stressors of Bachelor of Oral Health students. Oral presentation at the 15th Annual meeting of the College of Oral Health Academics (COHA): Leading the Way in the Scholarship of Learning and Teaching, Adelaide, Australia.

Olson, H. (2015). *Integrated study of fluoride and adverse health aspects: A mixed method study*. Masters by Thesis. Kristianstad University, School of Health and Society. URN: urn:nbn:se:hkr:diva-16649. Retrieved from <http://hkr.diva-portal.org/smash/record.jsf?pid=diva2%3A1088178&dswid=-9000#sthash.PyLbBx2P.dpbs>



ALISON M. RICH

BDS (Otago) MSc PhD (Melb) FRACDS FFOP(RCPA) FRCPath
Professor of Oral Pathology and Head of Department, Department of Oral
Diagnostic and Surgical Sciences
Deputy Dean, Faculty of Dentistry
Programme Leader, Oral Molecular and Immunopathology

Professor Rich's research interests relate to gaining a greater understanding of the pathogenesis of oral diseases to complement the clinical specialty 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 postgraduate and undergraduate students undertaking related projects. Specialist techniques she has expertise in include light microscopic analysis, immunofluorescence microscopy, immunohistochemistry, histomorphometric analysis and analysis of gene regulation. She is a Board Member of the New Zealand Dental Research Foundation, and since 2014 has been the leader of the Oral Molecular and Immunopathology Programme of the Sir John Walsh Research Institute.

Professor Rich's 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 and is on the Research Committee of the Australian Council of Educational Research (ACER) UMAT Test Management Committee.

Research achievements in 2015-16 included the enrollment and progression of excellent PhD and DClinDent students under her supervision, and success in attracting significant grant funding from the New Zealand Dental Research Foundation and the Ministry of Health Oral Health Research Fund. Professor Rich's 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 a number of on-going projects.

Professor Rich was delighted to become a Fellow of the New Zealand Society of Pathologists in 2015 and to be awarded a FRCPath on the basis of published works. She was the Sir John Walsh Research Supervisor of the Year in 2016.

Key publications

Avadhani AV, Parachuru VPB, Milne TJ, Seymour GJ, & Rich AM. (2016). Multiple cells express interleukin 17 in oral squamous cell carcinoma. *Journal of Oral Pathology Medicine* doi: 10.1111/jop.12465.

Seo B, Coates D, Seymour GJ, & Rich AM (2016). Unfolded protein response-related gene regulation in inflamed periodontal tissues with and without Russell bodies. *Archives of Oral Biology*, 69, 1-6.

Sinon SH, Rich AM, Parachuru VPB, Firth FA, Milne T, & Seymour GJ. (2016) Downregulation of toll-like receptor-mediated signalling pathways in oral lichen planus. *Journal of Oral Pathology Medicine*, 45, 28-34.

Firth FA, Friedlander LT, Parachuru VPB, Kardos TB, Seymour GJ, & Rich AM. (2015) Regulation of immune cells in oral lichen planus. *Archives of Dermatological Research*, 307, 333-339.



DONALD R. SCHWASS

BSc (Waik) BDS DClinDent (Otago)

Senior Lecturer, Department of Oral Rehabilitation (to 2016)

Associate Dean (Capital Building Project)

Dr Schwass' research interests focus on the assessment and application of diagnostic tools for cariology, the management of dental caries, and the use of micro-CT (micro-computed tomography) and CBCT (cone beam computed tomography) for evaluation of mineralised tissues.

In collaboration with Dr Carla Meledandri (Department of Chemistry, University of Otago), Dr Schwass developed several methods for size-controlled synthesis of silver nanoparticles, engineered for optimal antimicrobial and optical properties, specifically designed for managing oral infections including separate applications for treating dental caries, periodontitis and peri-implantitis.

Dr Schwass is part of a research team conducting a sheep animal trial involving bilaterally artificially induced periodontal disease and periodontitis, to validate the development of a topical antimicrobial gel formulation for treating periodontitis and/or peri-implantitis.

Supervision and collaboration

Co-supervisor for Gemma Cotton, PhD candidate: 'Development of a Gel-based silver nanoparticle formulation for management of periodontal infections and peri-implantitis'

Co-supervisor for David Ko, DClinDent (Periodontics) candidate: 'How well does cone-beam computerized tomography determine the amount of bone healing in grafted maxillary sinuses prior to implant placement?'

Lead supervisor for Dhruvad Siddhanta, DClinDent (Prosthodontics) candidate: 'Incorporation of silver nanoparticles in glass ionomer restorative materials conferring substantive antimicrobial effects'

Co-supervisor for Karla Rovaris da Silva, PhD candidate on a Brazilian Government Scholarship, enrolled at State University of Campinas (UNICAMP), Piracicaba Dental School, Sao Paulo, Brazil: 'Evaluation of scanning and reconstruction protocols of micro-CT images for detection of incipient caries'.

Collaboration with Associate Professor Mark Jermy, (Department of Mechanical Engineering, University of Canterbury), Dr Malcom Battin (Clinical Director, Neonatal Intensive Care Unit, Auckland City Hospital and the University of Auckland) and Fisher and Paykel Healthcare 'Generalised upper airway geometry using Cone Beam CT', assisted by Dr Carolina Loch Santos da Silva.

Collaboration with Dr Maite Cevallos, University of Brasilia, Brasil on clinical trial exploring various caries management strategies including an ultraconservative approach (UCT protocol), Atraumatic restorative treatment (ART protocol), and a conventional approach (CRT protocol). Using micro-CT to evaluate treatment effects on the state of sub-lesion dentine mineralization, involving calibration standards developed at Otago.

IP activity

Antimicrobial alginate gel formulation containing silver nanoparticles and α -lipoic acid. Cotton G, Meledandri CJ, Schwass DR (2015). US application 62/237,291. Date of filing 5 October 2015.

Pending Patent NZ2016/050162 (PCT application filed 4 October 2016)

Sale and IP transfer of patent-protected technology involving *Assembly of micelle aggregates of surfactant micelles and silver nanoparticles and use as an antibacterial agent* to a dental manufacturer in the USA. 21 July 2015

Key publications

Tiu, J., Cheng, E., Hung, T.-C., Yu, C.-C., Lin, T., Schwass, D. & Al-Amleh, B. (2016). Effectiveness of crown preparation assessment software as an educational tool in simulation clinic: A pilot study. *Journal of Dental Education*, 80(8), 1004-1011.

Faulkner, R. F., Beumer, J., III, Shah, K. C., Schwass, D. R. & Wadhvani, C. (2015). Restoration of the posterior quadrants of partially edentulous patients: Examination and prosthodontic procedures. In J. Beumer, III, R. F. Faulkner, K. C. Shah & P. K. Moy (Eds.), *Fundamentals of implant dentistry: Prosthodontic principles (Vol. 1)*. (pp. 231-283). Hanover Park, IL: Quintessence.



BENEDICT L. SEO

BDS DClInDent (Otago)

Senior Lecturer, Department of Oral Diagnostic and Surgical Sciences

Dr Seo investigates the pathogenesis of oral cancer, odontogenic lesions and immune-mediated oral diseases, with a particular focus on the unfolded protein response (UPR) and endoplasmic reticulum (ER) stress. Techniques such as epithelial/cancer and PDL cell culture, qRT²-PCR, IHC, ICC, histochemistry, ELISA, transcription factor assays and *in vitro* assays (viability, caspase-based, TUNEL) are employed in his research. Other active areas of his cancer research include HPV phenotyping in verruco-papillary lesions, the expression of lymphangiogenic factors in metastatic oral cancer and STAT3 pathways in oral cancer under *in vitro*-induced stress. For odontogenic tumours, he is currently focusing on investigating the role and the expression of lysyl oxidase family members and caldesmon in the pathogenesis of benign odontogenic cysts and tumours. He is also continuing to investigate the role of mechanical stress on the UPR pathways in human PDL cells using a 3-dimensional tissue culture system.

Between 2015 and 2016, Dr Seo attracted over \$85,000 in research funding in his capacity as a supervisor/co-investigator for 8 grants related to DClInDent research projects and 1 related to his international collaboration with Korea. In the same period he co-supervised 5 DClInDent students in Oral Pathology, 1 in Orthodontics and 2 BDS final year students. In addition, Dr Seo contributed to 2 PhD projects through his expertise in epithelial and cancer cell culture and related *in vitro* assays. In this period, he was involved in authoring 3 articles for peer reviewed journals, as well as co-authoring 7 abstracts accepted and presented at various conferences at national and international levels.

He has an active research partnership with the Kyungpook National University in Korea, the University of Malaysia, Oral Cancer Research and Coordination Centre and the National University of Malaysia, as well as with Dunedin Public Hospital.

Key publications

Seo, B., Coates, D. E., Seymour, G. J. & Rich, A. M. (2016). Unfolded protein response-related gene regulation in inflamed periodontal tissues with and without Russell bodies. *Archives of Oral Biology*, 69, 1-6. doi: 10.1016/j.archoralbio.2016.04.009

Rich AM, Seo B, & Parachuru VP. (2016) The nexus between periodontics and oral pathology. *Periodontology 2000*. Accepted for publication: September 2016.

Seo B, Hussaini H, & Rich AM. (2016) Second opinion oral pathology referrals in New Zealand. *Pathology*. Accepted for publication: November 2016.



DARA M. SHEARER

BDS (Cork) MComDent (Otago)
Research Fellow, Department of Oral Sciences

Dara's research interests include analysis of intergenerational, periodontal, glycaemic, and cardiovascular 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 aims to clarify longitudinal associations between parental and cohort periodontal health.
- (2) The investigation of cross-sectional and longitudinal associations between chronic periodontitis and cardiometabolic risk. There is some evidence for a role for chronic periodontitis in the pathogenesis of atherosclerotic cardiovascular disease in susceptible individuals. The chronic inflammation of periodontitis may up-regulate systemic levels of inflammation which contributes to the initiation, maintenance and exacerbation of atherosclerotic cardiovascular disease. There are a number of biomarkers that are regarded as risk factors or markers for future CVD. It is reasonable to assume that, if the inflammatory burden of periodontitis does have an influence on CVD risk, it may be observed in some of these biomarkers well before any other CVD signs become manifest. This research makes use of Dunedin study periodontal data at ages 32 and 38, and a range of early cardiovascular risk factors/risk markers collected at age 38.

Dr Shearer received the 2015 IADR Colgate Research in Prevention Travel Award.

Key publications

Shearer, D. M., Thomson, W. M., Broadbent, J. M., McLean, R., Poulton, R. & Mann, J. (2016). High-risk glycosylated hemoglobin trajectories established by mid-20s: findings from a birth cohort study. *BMJ Open Diabetes Research & Care*, 4, e000243. doi: 10.1136/bmjdr-2016-000243



LEE SMITH

BA BTchg PGDip MA PhD (Otago)
Research Fellow, Department of Oral Sciences

Dr Lee Smith has expertise in qualitative research involving young people, research on marginalised populations, and educational research. In the period 2015-2016 she co-edited a published book, three book chapters, four collaborative research articles, and one sole author article. During this period, she also wrote a report for the Centre of Inter-Professional Education in the Health Sciences, where she evaluated an assessment module titled the *Economic Barriers Project*, included in a number of year 3 and 4 health science courses.

Dr Smith received a grant from the Ministry of Health Oral Health Research Fund in 2016 and is currently undertaking fieldwork for the study *Pasifika adolescents' understandings and experiences of oral health care*. Her research in the dental and oral health fields is currently being published.

Key publications

Smith, L. A., Anderson, V. & Blanch, K. (2016). Five beginning teachers' reflections on enacting New Zealand's national standards. *Teaching & Teacher Education*, 54, 107-116. doi: 10.1016/j.tate.2015.11.014

Smith, L., Nairn, K. & Sandretto, S. (2016). Complicating hetero-normative spaces at school formals in New Zealand. *Gender, Place & Culture*, 23(5), 589-606. doi: 10.1080/0966369X.2015.1034245

Smith, L. A. (2015). 'Oh they drink here harder I think': Young people and alcohol consumption at three New Zealand secondary school formals. *Journal of Youth Studies*, 18(1), 118-132. doi: 10.1080/13676261.2014.933201

Smith, L. A. (2015). Queer students and same-sex partners at the school formal. In A. C. Gunn & L. A. Smith (Eds.), *Sexual cultures in Aotearoa New Zealand education*. (pp. 82-98). Dunedin, New Zealand: Otago University Press.



ANDREW A. TAWSE-SMITH

DDS (Colombian Sch of Dent) CertPeriodontology (Göteborg)
Student Affairs Officer and Associate Professor, Faculty of Dentistry
Associate Dean (International), Division of Health Sciences

Associate Professor 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.

Associate Professor 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.

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.

Key publications

Ma, S., Tawse-Smith, A., De Silva, R. K., Atieh, M. A., Alsabeeha, N. H. M., & Payne, A. G. T. (2016). Maxillary three-implant overdentures opposing mandibular two-implant overdentures: 10-year surgical outcomes of a randomized controlled trial. *Clinical Implant Dentistry & Related Research*, 18(3), 527-544. doi: 10.1111/cid.12325

Bennani, V., Hwang, L., Tawse-Smith, A., Dias, G. J. & Cannon, R. D. (2015). Effect of air-polishing on titanium surfaces, biofilm removal, and biocompatibility: A pilot study. *BioMed Research International*, 2015, 491047. doi: 10.1155/2015/491047

Liu, J., Schmidlin, P. R., Philipp, A., Hild, N., Tawse-Smith, A. & Duncan, W. (2015). Novel bone substitute material in alveolar bone healing following tooth extraction: An experimental study in sheep. *Clinical Oral Implants Research*. Advance online publication. doi: 10.1111/clr.12673

Tawse-Smith, A., Atieh, M. A., Tompkins, G., Duncan, W. J., Reid, M. R. & Stirling, C. H. (2015). The effect of piezoelectric ultrasonic instrumentation on titanium discs: A microscopy and trace elemental analysis in vitro study. *International Journal of Dental Hygiene*. Advance online publication. doi: 10.1111/idh.12142



W. MURRAY THOMSON

MA (Leeds) BSc BDS MComDent (Otago) PhD (Adel) FICD FADI
Professor and Head of Department, Department of Oral Sciences
Programme Leader, Dental Epidemiology and Public Health

Professor Thomson conducts research in the broad fields of dental epidemiology, dental public health and dental health services research. His published output includes 283 papers in the peer-reviewed international scientific literature to date, and his Scopus h index is 38. His research falls into the broad categories of (1) life-course epidemiology and longitudinal research, (2) periodontal epidemiology and risk factors, (3) gerodentological research, and (4) dental public health and health services research.

During the 2015-2016 period, Professor Thomson published 35 papers in the peer-reviewed international literature, along with one book chapter, two major reports and a commentary. He made (or was a co-author on) 19 conference presentations, including 12 keynote addresses, and gave three talks on his research to community groups.

Notable achievements during this period were obtaining 6 research grants (1 as PI, for \$37,789; and 5 as CoI, totalling \$1,241,541) and the supervision to completion of 1 PhD student. In January 2015, he became the fifth Editor-in-Chief of *Community Dentistry and Oral Epidemiology*. He has continued as Associate Editor for the *European Journal of Oral Sciences*, having been in that role since November 2012.

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.

Key publications

Thomson WM. (2016). Public health aspects of paediatric dental treatment under general anaesthetic. *Dentistry Journal*, 4, 20 doi:10.3390/dj4020020

Thomson WM, Zeng J, Broadbent JM, Foster Page LA, Shalev I, Moffitt TE, Caspi A, Williams SM, Braithwaite AW, Robertson SP, & Poulton R. (2016). Telomere length and periodontal attachment loss: a prospective cohort study. *Journal of Clinical Periodontology*, 43, 121-127.

Healey DL, Gauld RDC, & Thomson WM. (2016). Treatment-associated changes in malocclusion and OHRQoL: a four-year cohort study. *American Journal of Orthodontics and Dentofacial Orthopedics*, 150, 811-817.

Benn AML, Broadbent JM, & Thomson WM. (2015). Occurrence and impact of xerostomia among dentate adult New Zealanders: findings from a national survey. *Australian Dental Journal*, 60, 362-367.



GEOFFREY R. TOMPKINS

BSc PhD PGDipSci (Otago)

Associate Professor, Department of Oral Sciences

Programme Leader, Molecular Microbiology

Associate Professor Tompkins' principal research pursuit is in determining how the bacteria involved in periodontal disease acquire iron, an essential nutrient for all living cells. Additional pursuits involve collaborations with members of the Faculty of Dentistry from diverse disciplines including orthodontics, endodontics, periodontics, cariology, material sciences and respiratory infection.

He co-supervises Andrew Tawse-Smith's PhD research involving the destruction of microbial biofilms that form on titanium implants resulting in subgingival inflammation and deterioration of the implant (Thesis title: *Presence and origin of titanium particles in peri-implant tissues*). In conjunction with Associate Professor Jonathan Leichter, he guided Dr James Dawson (graduated 2016) through his DClintDent research component (Thesis title: *Effect of diode laser irradiation on bacterial viability in an in vivo biofilm formed on a titanium implant surface*).

He contributed to the collaborative research of Dr Don Schwass, Dr Carla Melandandri (Department of Chemistry) and recent (2017) graduate Dr Gemma Cotton (Department of Chemistry) in developing and testing antimicrobials and delivery systems with which to treat dental caries.

In collaboration with Professor Warwick Duncan, Associate Professor Natalie Medlicott (School of Pharmacy) and Dr. Dawn Coates, he co-supervised PhD student Syarida Safii in developing antimicrobial formulations of manuka-derived products for treatment of periodontal disease. Syarida submitted her thesis in 2017, titled *Subgingivally delivered manuka-derived products as an adjunct to scaling and root-planing in the treatment of periodontal disease*.

With Professor Maggie-Lee Huckabee (University of Canterbury), he co-supervised the Ph.D. research of Dr Sarah Perry (University of Canterbury) who assessed the risk to stroke patients of aspiration pneumonia caused by oral bacteria (thesis title: *Predicting and preventing aspiration pneumonia in patients with acute stroke and dysphagia*).

In collaboration with Dr Peter Cathro and Dr Nicholas Heng, he co-supervises PhD student Amira Salem whose proposed thesis title is *Novel therapeutic targets of endodontic infections*.

With Professor Bernadette Drummond and Dorothy Boyd, he co-supervises DClintDent student Victoria Kashchuk whose thesis entitled *Effect of MGO™ 400+ Manuka Honey with Cyclopower™ on dental plaque activity and gingival health in young adults* is to be submitted in 2017.

With Dr Sunyoung Ma, he guided BDS summer student Michelle Chew who compared methods of re-using implant abutments (2016-17).

Key publications

Safii, S. H., Tompkins, G. R. & Duncan, W. J. (2017). Periodontal application of Manuka honey: Antimicrobial and demineralising effects In Vitro. *International Journal of Dentistry*, 2017, 9874535. doi: 10.1155/2017/9874535

Hsu, B., Lee, S., Schwass, D. & Tompkins, G. (2017). Antimicrobial activity of chemomechanical gingival retraction products. *Journal of the American Dental Association*. Advance online publication. doi: 10.1016/j.adaj.2017.03.006



Kim, K. H., Loch, C., Waddell, J. N., Tompkins, G. & Schwass, D. (2017). Surface characteristics and biofilm development on selected dental ceramic materials. *International Journal of Dentistry*, 2017, 7627945. doi: 10.1155/2017/7627945

Tawse-Smith, A., Atieh, M. A., Tompkins, G., Duncan, W. J., Reid, M. R. & Stirling, C. H. (2016). The effect of piezoelectric ultrasonic instrumentation on titanium discs: A microscopy and trace elemental analysis *in vitro* study. *International Journal of Dental Hygiene*, 14(3), 191-201. doi: 10.1111/idh.12142



DARRYL C. TONG

ED BDS MB ChB PhD (Otago) MSD (Wash) FFDRCSI FDSRCS FFACOMS ACS
Professor, Department of Oral Diagnostic and Surgical Sciences

Professor Tong's expertise is in clinical and systematic review-based research in oral and maxillofacial surgery including dentoalveolar surgery, pathology, trauma, dental implantology, and other clinical aspects of the specialty. Of particular interest however is maxillofacial trauma and ballistic injury especially in theatres of conflict. Professor Tong's PhD involved looking at war injuries of the face and jaws from an integrated historical and surgical viewpoint. Other research interests include forensic biology, subconcussive injury using a forensic head model system and veterans' health research topics.

Key publications

Broadbent, J. M., Singh, J. K., Masri, N. S., Tong, D. C., & Duncan, W. J. (2016). Oral health of New Zealand service personnel in WW1. *New Zealand Dental Journal*, 112(1), 10-14.

Falland-Cheung, L., Pittar, N., Tong, D. & Waddell, J. N. (2015). Investigation of dental materials as skin simulants for forensic skin/skull/brain model impact testing. *Forensic Science, Medicine, & Pathology*, 11(4), 552-557. doi: 10.1007/s12024-015-9718-0

Cox, B., McBride, D., Broughton, J. & Tong, D. (2015). Health conditions in a cohort of New Zealand Vietnam veterans: Hospital admissions between 1988 and 2009. *BMJ Open*, 5, e008409. doi: 10.1136/bmjopen-2015-008409

Tong, D. C., Winter, T. J., Jin, J., Bennett, A. C. & Waddell, J. N. (2015). Quantification of subconcussive impact forces to the head using a forensic model. *Journal of Clinical Neuroscience*, 22(4), 747-751. doi: 10.1016/j.jocn.2014.11.018



J. NEIL WADDELL

MDipTech(Dent Tech) (TN) PhD PGDipCDTech (Otago) HDE (UN)
Associate Professor, Department of Oral Rehabilitation
Programme Leader, Biomechanics and Oral Implantology

Associate Professor 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* modeling of the effects of blunt force trauma to the head and accumulative damage to the brain; Forensic biology, *in vitro* modeling of blunt force trauma, forensic odontology, wounding and ballistic blood splatter analysis and development of simulant materials for forensic modeling.

Completed postgraduate students

Tiu, J, 2015, PhD. Al Wabari A, 2015, MDentTech. Jansen van Vuuren W, 2015, MDentTech.

Key Collaborations

Waddell JN (PI), Li KC, Meledandri C, Prior D and Lyons K. Collaborative group from University of Otago Department of Oral Rehabilitation, Department of Geology and Department of Chemistry to develop a nano-gold infiltration process to increase the flexural strength and toughness of alumina and zirconia. 2015 – present.

Duncan WJ, Harris P, Chandler NP and Waddell JN. Collaborative group from University of Otago School of Dentistry and Callaghan Innovation that aims to develop an ultrasonic dental diagnostic device (UltraD3) to improve the early diagnosis of gum disease around teeth and titanium dental implants. Supported by Ministry of Business Innovation and Employment (MBIE) Targeted Research grant (PI - Duncan WJ and Harris P, CI - Chandler NP and Waddell JN). 2015 – present.

Hammer N, Tong D and Waddell JN. Collaborative group from University of Otago School of Dentistry and Department of Anatomy investigating biomechanical properties of human skin/skull/brain system for the purpose of developing simulant materials and mathematical modeling systems. 2016 – present.

Key publications

Choi JE, Lyons K, McLean M & Waddell JN. (2016). Interarch comparison of intraoral pH and temperature: A pilot study. *British Dental Journal Open*, 2, 16008; doi:10.1038/bdjopen.2016.8; published online 25 November 2016.

Barazanchi A, Li KC, Al-Amleh B, Lyons K, & Waddell JN. (2016). Additive Technology: Update on Current Materials and Applications in Dentistry. *Journal of Prosthodontics*, 26, 156-163 doi: 10.1111/jopr.12510.

Li KC, Tran L, Prior DJ, Waddell JN, & Swain MV. (2016). Porcelain bonding to novel Co-Cr alloys: Influence of interfacial reactions on phase stability, plasticity and adhesion. *Dental Materials*, 32, 1504-1512. <http://dx.doi.org/10.1016/j.dental.2016.09.008>

Blackburne WB, Waddell JN, Swain MV, Alves de Sousa RJ & Kieser JA. (2016). Biomechanical investigation of impact induced rib fractures of a porcine infant surrogate model. *Journal of the Mechanical Behaviour of Biomedical Materials*, 62, 588-598. DOI:<http://dx.doi.org/10.1016/j.jmbbm.2016.05.025>



RAJNI K. WILSON

BSc(Hons) PhD (Otago)

Postdoctoral Fellow, Sir John Walsh Research Institute

Dr Wilson's research interests are in drug discovery by probing the structure, function, and drug binding mechanisms of *Saccharomyces cerevisiae* Erg11p and the homologous enzyme of human and plant fungal pathogens. The aim is to develop novel antifungals by implementing effective methods for structure-directed drug discovery. Dr Wilson's molecular biological, biochemical and structural biology expertise includes the design and preparation of mutant constructs for the preparation of recombinant proteins, the solubilisation of recombinant proteins with detergent, purification by Ni-NTA affinity and size exclusion chromatography (SEC). She has set up successful crystal trials and analysed X-ray crystallographic data for protein structure determination. Her chemical expertise includes multi-step organic and inorganic syntheses leading to poly-functional compounds. Dr Wilson has characterised these compounds by chromatographic and spectroscopic techniques as well as by more specialised techniques including magnetic moment, conductivity measurements, electrochemistry (cyclic voltammetry and controlled potential coulometry) and X-ray crystallography. Dr Wilson is an Associate Investigator on the Health Research Council of New Zealand project grant *Structure-directed discovery of next-generation antifungals* awarded to PI Associate Professor Brian Monk.

Key publications

Tyndall, J. D. A., Sabherwal, M., Sagatova, A., Keniya, M. V., Negroni, J., Wilson, R. K., Woods, M. A., Tietjen, K. & Monk, B. C. (2016). Structural and functional elucidation of yeast lanosterol 14 α -demethylase in complex with agrochemical antifungals, *PLoS One*, 11, 1-18.

Sagatova, A., Keniya, M. V., Wilson, R. K., Sabherwal, M., Tyndall, J. D. A. & Monk, B. C. (2016). Triazole resistance mediated by mutations of a conserved active site tyrosine in fungal lanosterol 14 α -demethylase, *Scientific Reports*, 6, 26213.

Mathus, S. J., Wilson, R. K., Larsen, D. S. & Brooker, S. (2016). Acridine-based ligands from cobalt(II) mediated arrangement of diphenylamine-based starting materials, *Supramolecular Chemistry*, 28, 98-107.

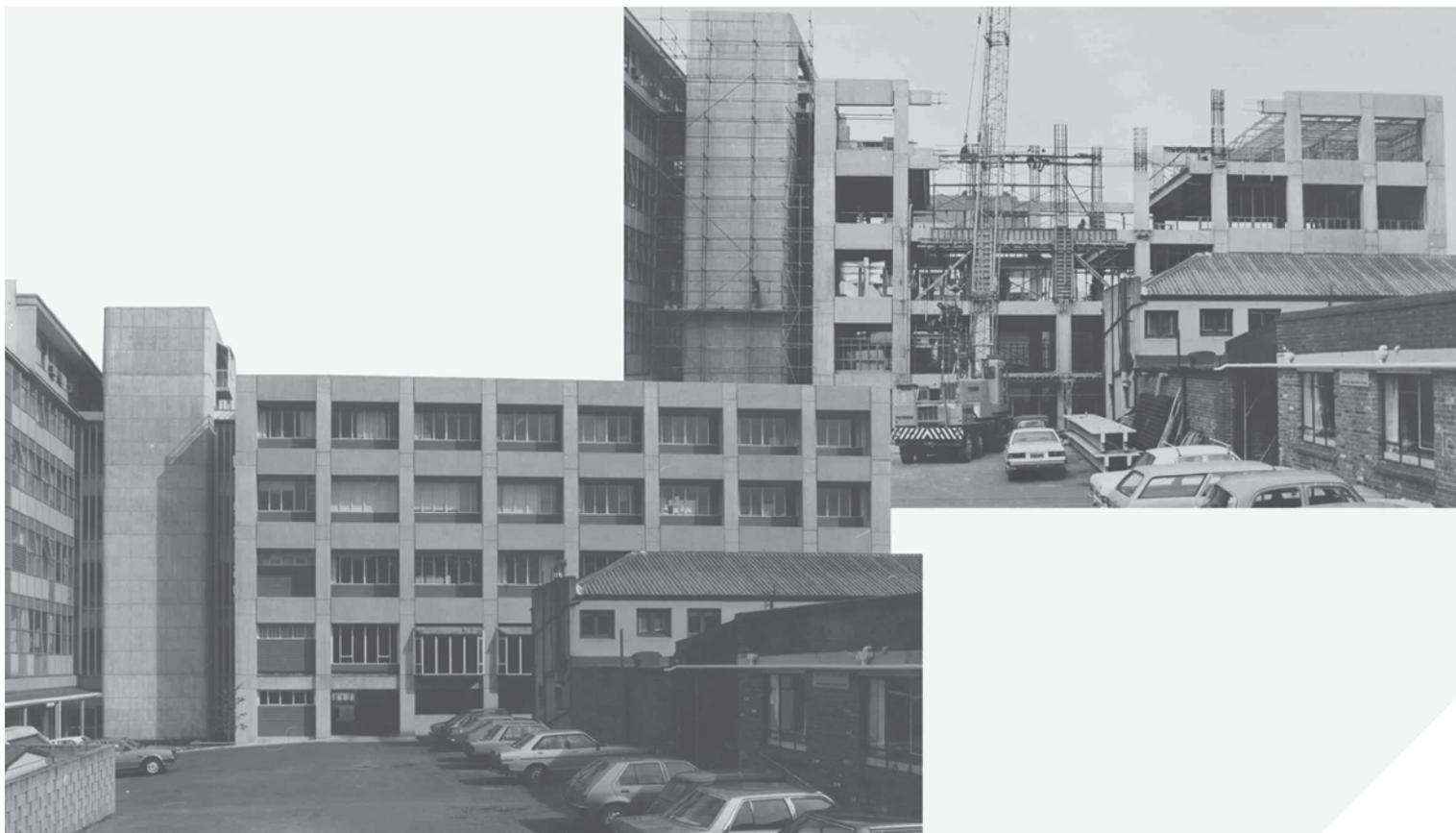
Sagatova, A., Keniya, M. V., Wilson, R. K., Wilbanks, S. M., Monk, B. C. & Tyndall, J. D. A. (2015). Structural insights into the binding of the antifungal drug Fluconazole to *Saccharomyces cerevisiae* lanosterol 14 α -demethylase. *Antimicrobial Agents and Chemotherapy*, 59, 4982-4989.

Our achievements

1981

Additional 'West Wing' is built

As the school expands, the additional 'West Wing' is built to house offices, research space and the dental library.



Selected summaries of postgraduate research conducted by our staff and students, 2015-16

NAWAL RADHIAH ABDUL RAHMAN

DClinDent candidate (Oral Pathology)

Primary supervisor: Professor Alison Rich

Expression of lysyl oxidase family in odontogenic lesions

Odontogenic lesions are lesions that arise from the tooth forming apparatus. These lesions are found mostly within the facial skeleton and may exhibit locally aggressive infiltrative behavior. Lysyl oxidase (LOX) and LOX-like (LOXL) 1-4 are enzymes whose primary function is to maintain connective tissue homeostasis but they have been linked to aggressive behaviour in some cancers. This research investigates the expression of LOX family proteins focusing on ameloblastoma (AM), odontogenic keratocyst (OKC), hyperplastic dental follicle (DF) and dentigerous cyst (DC). Results: 1) LOXL4 is overexpressed in the epithelium of OKC which may suggest the aggressive behaviour of this lesion. 2) DC serves as an appropriate control compared to DF. 3) AM and DF show no difference in the protein expression which may reflect the rudimentary nature of these lesions.

LEE ADAM

PhD graduate

Primary supervisor: Professor Rachel Spronken-Smith (Higher Education Development Centre)

Graduated August 2015

Troubling plagiarism: University students' understandings of plagiarism

This qualitative study explored students' perceptions of plagiarism alongside university plagiarism policy documents. Results revealed that intentional as well as unintentional plagiarism was viewed as dishonesty, both in policy documents, and by the students. Students believed they were not being taught the skills they needed to avoid plagiarising unintentionally. Further, they did not see the relevance of learning to paraphrase, summarise, and reference. The findings indicated that a more educative approach to plagiarism is required. Plagiarism policy needs to allow for students' struggles to learn acceptable text integration. Incidences of unintentional plagiarism should be viewed as teaching and learning opportunities, and students should be proactively supported through the process of learning to become academic writers.

This thesis was formally recognised by the Division of Humanities as being of exceptional quality.

SHREYA AGGARWALA

DClinDent graduate (Endodontics)

Primary supervisor: Professor Robert Love

Graduated December 2016

The efficacy of an antimicrobial peptide-polymer gel preparation on common endodontic pathogens

Reduction of the microbial load within the root canal system is crucial for successful root canal treatment. Antimicrobial peptides (AMPs) can possess a broad spectrum of antimicrobial activity to combat infections whilst being minimally toxic to host cells. This study assessed the *in vitro* antimicrobial efficacy of a synthetic AMP, BM2, in Poloxamer 407 (P407), an injectable polymer gel, against the common endodontic microorganisms *Candida albicans*, *Streptococcus gordonii*, *Streptococcus mutans*, and *Enterococcus faecalis*. Comparisons were made between BM2 in solution, P407 gel, BM2 in P407 gel, and saturated calcium hydroxide. BM2-loaded P407 gels demonstrated antimicrobial effects at concentrations eight times higher than that in solution and greater than calcium hydroxide. BM2 in a polymer gel may have potential for use as an antimicrobial agent in root canal treatment.

AZZA AL-ANI

DClinDent graduate (Orthodontics)

Primary supervisor: Dr Joe Antoun

Graduated December 2016

Genetic and environmental factors associated with hypodontia

Hypodontia is the most prevalent craniofacial malformation in humans, with the majority of affected individuals lacking only one or two teeth. Both genetic and environmental factors are involved in its aetiology, with the latter playing a more significant role. Individuals with hypodontia present a significant clinical challenge for orthodontists. This study investigated the association between hypodontia genetic polymorphisms of candidate genes PAX9, MSX1, AXIN2, and EDA, and examined the association of environmental factors, such as exposure to smoking during pregnancy, with hypodontia. Results revealed some evidence that polymorphisms of the EDA and PAX9 genes were associated with specific phenotypes of non-syndromic hypodontia. Furthermore, a biologic gradient was observed that strongly suggested an association between maternal cigarette smoking during pregnancy and having a child with hypodontia.

MOHAMAD AL-DUJAILI

DClinDent graduate (Orthodontics)

Primary supervisor: Professor Mauro Farella

Graduated December 2015

Growth factor expression in the rat condyle: Implications for craniofacial development

The mandible is particularly important in growth and development, as it contributes to the morphology of the face and certain malocclusions. The mandibular condylar cartilage is a site of growth and development of the mandible. The aims of this research were to extract RNA from the condylar tissue, to assess an array of growth factors, and to appraise the changes in their regulation, over several time points in an animal model. The growth factor genes investigated were expressed in all samples. Across all time points, and relative to the reference housekeeping genes, subtle up and down regulation of genes involved in chondrogenesis and osteogenesis was noted. This highlights the potential for the techniques adopted to be used in future research directions.

ADIL ALKHARUSI

DClinDent candidate (Oral Medicine)

Primary supervisor: Dr Haizal Hussaini

Expression of STAT 3 and cytokines (IL22, IL23, TH17) within metastatic lymph nodes of Oral Squamous cell carcinoma (OSCC)

Metastasis is defined as the spread of a cancer from one organ (the primary site) to a distant organ (the secondary site) when there is no direct contact between the two sites. Lymph nodes present in the neck are usually the first sites of metastasis from oral squamous cell carcinoma (OSCC). This process is mediated by interactions between cancer cells and the immune system and current thought is that at some critical stage the immune system can get hijacked by the cancer cells which allows them to spread and grow. The immune system plays part of its role through cytokines, small proteins which function as signalling molecules. Some cytokines have been linked with the process of metastasis in different types of cancer. Cytokines exert their effect by using another protein called STAT3. STAT3 mediates the expression of a variety of genes which are key players in many cellular processes such as cell growth and cell death. Our study is designed to compare the expression of STAT3 and specific cytokines (IL22, IL23, Th17) in lymph nodes from patients with OSCC compared with normal non-diseased lymph nodes. The ability to produce a pro-inflammatory response is paramount in eliminating early tumour invasion. We postulate the modulation

process by cancer cells occurs early in the process of lymph node metastasis and there may be previously unrecognised evidence of this activity in histologically negative nodes. If we can show that modulation of STAT3 occurs in negative nodes this information can be used to provide extra (positive) prognostic data for the patient. It may also provide a better understanding and reference point for the practice of post-surgical prophylactic irradiation.

SHAIKHAH ALSAMAHI

PhD candidate

Primary supervisor: Dr Lara Friedlander

Type 2 Diabetes and inflammatory markers in the dental pulp

Our study aims to investigate the expression of a range of specific inflammatory markers associated with innate and adaptive immunity in the pulp of mature permanent teeth from healthy participants and those with Type 2 diabetes (T2D). Type 2 diabetes is a chronic systemic disease and growing public health concern worldwide. One of the causes of T2D is related to inflammatory responses involving changes in markers that affect inflammation. Several inflammatory cells and mediators are important including toll-like receptors, interleukin-17 and regulatory T cells. Better understanding of these markers in the dental pulp in the presence of T2D may improve health outcomes and understanding potential dental treatment outcomes for these patients. We will use laboratory techniques to evaluate the morphology of the dental pulp and inflammatory marker expression in the dental pulp from healthy and T2D participants.

OLIVIA APPERLEY

DClinDent graduate (Special Needs Dentistry)

Primary supervisor: Professor Jules Kieser

Graduated December 2015

Management of xerostomia following radiotherapy: A clinical trial of a novel emulsion for potential use as a saliva substitute

Radiotherapy to the head and neck region can lead to a reduction in salivary flow and the feeling of dry mouth (xerostomia). Management of dry mouth symptoms is challenging and current treatment options are limited. Researchers have developed a new formulation to act as a saliva substitute. This study evaluated the efficacy of this new product by testing it in a group of patients with dry mouth following radiotherapy. The new formulation was compared to

a currently available product and a placebo using tests of chewing and swallowing, the feeling of oral dryness and product acceptability. The new formulation resulted in an improvement in the feeling of dry mouth; however, there was no difference in the tests of chewing and swallowing or product acceptability.

ANGEL BABU

DClinDent graduate (Paediatric Dentistry)

Primary supervisor: Professor Bernadette Drummond
Graduated December 2016

Comparison of orofacial characteristics in children with and without long term histories of snoring

Sleep Disordered Breathing (SDB) refers to breathing problems during sleep that affect children and adults. It includes a range of nocturnal breathing habits ranging from primary snoring to severe forms of obstructive sleep apnoea. SDB may be associated with facial development in children. A study to investigate the facial features of New Zealand children who have a history of chronic snoring was carried out. The study compared the orofacial features of children with and without a history of snoring. Children with a history of snoring showed an increased frequency of waking at night, increased maxillary width, increased incidence of permanent tooth defects, and were more likely to show dark circles under the eyes.

GARETH BENIC

DClinDent graduate (Orthodontics)

Primary supervisor: Dr Li Mei
Graduated December 2016

Biofilm management with oral probiotics in patients with fixed orthodontic appliances

Orthodontic patients have a greater risk of plaque buildup due to the increased difficulty of cleaning around braces. Decay and gum inflammation can occur if dental plaque is not removed. This research aimed to investigate the efficacy of the oral probiotic *Streptococcus salivarius* M18 in managing biofilm formation in patients wearing braces. Probiotics have shown benefits in general dental patients; however, their efficacy in orthodontic patients was unclear. The design of the study was a randomised, triple-blind, placebo-controlled trial that included a one month intervention and a three month treatment-free follow-up. The research found that oral probiotics significantly decreased the volatile sulphur compound levels in patients with braces, but had no positive effect on plaque index or gingival index. A longer intervention and follow-up period are needed for further research.

CATHERINE CARLETON

DClinDent graduate (Orthodontics)

Primary supervisors: Dr Joe Antoun, Associate Professor Julia Horsfield (Pathology)
Graduated December 2016

A novel model for exploring causes and treatments of craniofacial birth defects

Craniofacial birth defects can result in severe functional limitations and disfiguration as well as psychosocial issues. One common example is cleft lip and/or palate (CL/P), which has an incidence of 1.5 per thousand live births in New Zealand. The exact cause of CL/P is unknown but alcohol, diabetes and smoking are known risk factors. This research created an environment of oxidative stress, much like that seen in maternal smoking, in developing zebrafish embryos, in an attempt to cause facial defects like CL/P. These developmental defects were then 'rescued' with the antioxidant Riboceine™. These findings may have significance in the future, as treatment with antioxidants may help to prevent craniofacial birth defects such as CL/P.

KULLASIT CHUTIPONGPISIT

DClinDent graduate (Oral Pathology)

Primary supervisor: Professor Alison Rich
Graduated December 2016

Lymphangiogenesis in oral squamous cell carcinoma

Lymphangiogenesis, the formation of new lymphatic vessels, is an essential process in normal development and in wound healing. It is also observed in pathological processes, including tissue inflammation and malignancies, where it may contribute to tumour metastasis. This study evaluated the expression and lymphatic vessel density (LVD) of the most commonly used lymphatic vessel antibody markers: D2-40, Prox-1, LYVE-1 and VEGFR-3 in oral cancer in relation to non-specifically inflamed connective tissue and normal oral mucosa. Significantly more lymphatic vessels expressing D2-40 and Prox-1 were found in oral cancer tissue than in control groups. D2-40 was the most specific and sensitive marker. Increased LVD may play a role in facilitating lymphatic invasion metastasis. These molecular entities may serve as potential anti-oral cancer therapeutic targets.

JAMES DAWSON

DClinDent graduate (Periodontology)

Primary supervisor: Associate Professor Geoffrey Tompkins

Graduated December 2016

Effect of diode laser irradiation on bacteria viability in an in vivo biofilm formed on a titanium implant surface

Dental implants have been used in tooth replacement for almost fifty years. They are generally small titanium screws placed into the jawbone, and have a rough surface to enhance integration into bone. Unfortunately, this characteristic provides a protective niche for bacteria. When an implant becomes infected, they are extremely difficult to debride. Lasers are effective at cleaning implants under experimental conditions. However, the natural biofilm formed on implants in the mouth contains hundreds of species of bacteria. This study assessed the laser parameters required to destroy bacterial communities grown on titanium surfaces maintained in human mouths without damaging those surfaces. The optimal effect was produced by a commercially available diode laser, opening the way for application of lasers in the treatment of infected implants.

THERESE DE CASTRO

PhD graduate

Primary supervisor: Professor Jules Kieser (to 2014), Professor Warwick Duncan

Graduated May 2016

“Bloody fabrics”. Systematic investigation of drip bloodstain appearance on apparel fabrics

Interpretation of clothing evidence during criminal investigations requires a better understanding of the interactions between blood and fabrics by the forensic community. This research investigated the effect of physical properties of fabrics on the final appearance of drip bloodstains. It found that the formation of these stains was highly complex. Dried stains visible on the surface of the fabric were larger than immediately after the impact event, indicating that within fabric spreading (wicking) of blood due to capillary action had occurred. These results highlighted the importance of considering the age, fibre type, and structure, as well as surface roughness and compressibility, of the fabric before interpreting bloodstain patterns on apparel.

ARPANA DEVI

DClinDent graduate (Endodontics)

Primary supervisor: Professor Robert Love

Graduated December 2016

Enhancing the efficacy of antimicrobial peptide BM2, against mono-species biofilms, by combining with detergents

This study investigated if a detergent regime would enhance the antimicrobial ability of synthetic antimicrobial peptide BM2. Strains of microorganisms (*Enterococcus faecalis*, *Streptococcus gordonii*, *Streptococcus mutans* and *Candida albicans*) were grown as planktonic cells or mono-species biofilms and exposed to a dilution series of BM2, various detergents, and combinations of BM2 and detergents at different times. Minimum inhibitory and cidal concentrations were determined using a broth micro-dilution method, and biofilm detachment measured using a crystal violet based assay. Within the limits of this in vitro study, a combination of BM2 and detergent SDS showed enhanced antimicrobial action against certain endodontic microorganisms occurring as planktonic cells and in biofilms and offered the potential to develop an effective intra-canal medicament for endodontics.

FIONA FIRTH

DClinDent candidate (Orthodontics)

Primary supervisor: Professor Mauro Farella

The effect of mechanical strain on the unfolded protein response of periodontal ligament cells in a three-dimensional culture

Orthodontic tooth movement is mediated by the responses of cells in the periodontal ligament (PDL), which attaches teeth to the surrounding bone. Cell signal balance is essential to maintain a stable environment (homeostasis), while still inducing tooth movement. The function of the endoplasmic reticulum (ER), a cellular sub-structure, is vital to homeostasis. When the ER becomes stressed due to a shift from homeostasis, signalling pathways (the unfolded protein response) are activated in an attempt to lessen stress. If the unfolded protein response is inadequate, programmed cell death (apoptosis) occurs. PDL cells will be obtained from teeth and cultured in a novel three-dimensional hydrogel material. This study will assess the role of the unfolded protein response and apoptosis in PDL cells by profiling the genes expressed following the application of mechanical strain.

WILLIAM FOGARTY

DClinDent candidate (Paediatric Dentistry)
Primary supervisor: Professor Murray Thomson

Adolescent oral health in New Zealand in 2009

Adolescents are known to be at risk of developing dental decay, gum disease, dental fluorosis, dental trauma/injury, and anxiety related to dental visits or undergoing dental procedures. There is a need for an update of the limited information available about New Zealand adolescents; how severely they are affected by these oral health factors, and what puts them at risk. The New Zealand Ministry of Health conducted a national oral health survey in 2009; designed to be representative of the whole New Zealand-based population at the time. Data about adolescent oral health were gathered through interviews and dental examinations. The aim of this research project is to further analyse that data, thereby providing more detailed information regarding the oral health of New Zealand adolescents.

NURUL RUZIANTEE IBRAHIM

DClinDent candidate (Oral Pathology)
Primary supervisor: Professor Alison Rich

Lymphangiogenesis in metastatic lymph nodes of oral squamous cell carcinoma

Spread of the cancer cells (metastasis) from a primary tumour is a crucial negative prognostic factor in oral squamous cell carcinoma (OSCC), which significantly reduces survival rates in patients affected. The aim of this study was to investigate the expression of markers associated with lymphangiogenesis (vascular endothelial growth factor (VEGF)-C, D, VEGF receptor 3 (VEGFR3) and prospero homeobox 1 protein (PROX1)) in cervical lymph nodes from OSCC patients by means of immunohistochemistry. We have found that VEGFC was significantly overexpressed in lymph nodes containing OSCC metastasis compared with the nodes without metastatic deposits. This finding strongly suggests that VEGFC is an important growth factor involved in OSCC lymph node metastasis.

YANA ITSKOVICH

DClinDent graduate (Orthodontics)
Primary supervisor: Dr Trudy Milne
Graduated December 2016

Engineering 3-D constructs of human bone matrix in a mechanically-active environment

The current gold standard for bone repair is an autologous bone graft, which has limitations of availability and morbidity. This study aimed to develop a 3-D tissue culture model, which would enable an "off the shelf" bone replacement material to be grown and studied in the laboratory. To mimic the natural environment, osteoblasts (bone cells) were grown in a 3-D gel under mechanical strain. The cells were successfully grown inside the gel and deposited a mineralised bone matrix. The 3-D gel stiffness will need to be modified to enable testing under various mechanical stimulation regimens. Further work will be carried out using this model in the future.

NIVETHANAN KAMALENDRAN

DClinDent graduate (Paediatric Dentistry)
Primary supervisor: Dr Nicholas Heng
Graduated August 2015

Oral microbiota of children undergoing comprehensive treatment for severe early childhood caries

This research investigated the oral microbiome before and after comprehensive restorative and preventive dental treatment for S-ECC in preschool-aged children. A metagenomic approach was used with next-generation semiconductor (Ion Torrent™) DNA sequencing technology to perform bacterial profiling on dental plaque samples. The results highlighted that bacterial profiles at each time point the participants were examined (pre-treatment, two week post-treatment and three month post-treatment) were different. Comparing the oral microbiota before and after comprehensive restorative dental treatment demonstrated changes in bacterial composition after treatment across most species. Some species that had reduced numbers following treatment did show an increase in numbers after three months, but not to the same levels as in the pre-treatment profile. This confirmed that many children remain at high risk even after comprehensive dental treatment, which suggested much additional work remains to be done to accomplish truly longer term preventive antimicrobial therapies targeted at caries-associated bacteria. The significance of this research is that for the first time in New Zealand, the oral microbiota in children with S-ECC has been profiled before and at two time points after comprehensive restorative dental and preventive treatment under general anaesthesia.

SHAHRZAD KHAYAMI

DClinDent graduate (Orthodontics)

Primary supervisor: Professor Mauro Farella

Graduated May 2015

The effect of occlusal vertical dimension on swallowing pattern

Open bite represents one of the most challenging malocclusions to treat and is highly prone to relapse, while the exact aetiology remains controversial. The pressures exerted by the tongue and circumoral muscles during functional and postural activity may significantly influence the development of open bite, yet the key question that remains is, does tongue thrust swallowing cause open bite malocclusion, or is open bite malocclusion the cause of tongue thrust swallowing? A large range of data was collected from pressure transducers and electromyographic electrodes while the bite was progressively changed in a group of participants. When an acute open bite was induced, swallow duration and intensity increased while the swallow waveform remained unchanged. This indicated an adaptive yet central command during swallowing and supported the hypothesis that tongue pressure change in relation to open bite is causative. Conversely, the observed changes in intraoral pressures and swallow duration emphasised the adaptive nature of swallowing and speculatively indicated that the position of the tongue changes in relation to open bite.

SEUNG YOUNG KO

DClinDent graduate (Periodontology)

Primary supervisor: Professor Warwick Duncan

Graduated December 2015

The accuracy of cone beam computed tomography (CBCT) to determine newly formed bone within grafted maxillary sinus in sheep

CBCT is a 3-D X-ray device commonly used in dentistry. Placement of dental implants requires good bone, but this is often not the case in the upper jaw. Sinus grafting is surgery that inserts a bone graft inside the upper jaw. This procedure increases bone quantity for implant placement. Assessment of the outcome of graft healing is necessary before implant placement. CBCT may be useful to determine this. This research was carried out to establish whether CBCT can determine new bone within grafted sinus in sheep. CBCT was compared with two reference techniques: micro-computed tomography and histology. The results showed that due to lack of resolution, CBCT

cannot assess the amount of new bone formed around graft material that is an important step before implant placement.

LEONID LANDER

DClinDent graduate (Periodontology)

Primary supervisor: Professor Warwick Duncan

Graduated December 2016

Alveolar ridge preservation in the sheep model

Post-extraction remodelling results in significant reduction in the width of the edentulous jawbone, which may preclude the placement of dental implants. Alveolar ridge preservation (ARP) procedures have been shown to reduce these changes. This study compared four novel products against a commonly-used bovine bone grafting material in an extraction socket model. A challenging extraction socket model representative of a real-life clinical situation was created. Control sites grafted with bovine material showed a threefold decrease in reduction of the alveolar ridge width. The test materials, however, were unable to demonstrate significant width preservation, although the results suggested that barrier membranes play an important role in ARP procedures.

DONNA KENNEDY LANGLEY

MComDent candidate

Primary supervisor: Professor Murray Thomson

Exploring the role of primary dental healthcare clinicians in the detection and diagnosis of mouth cancer in New Zealand

The incidence of mouth cancer in NZ is increasing. Although some improvements in survival rates have been reported, significant disparities persist. Early diagnosis of mouth cancer is crucial to improve survival. It requires at-risk individuals to seek healthcare in the early stages of disease and clinicians to be aware of the risk factors and clinical presentation of malignant lesions. Dentists and clinical dental technicians were surveyed about mouth cancer. The information gained was compared with case data from the NZ Cancer Registry (01.01. 2012 – 31.12.2013) to understand the role of dental clinicians in mouth cancer diagnosis, and identify gaps in their knowledge which may lead to delays in diagnosis. International studies suggest regular dental care is associated with diagnosis at earlier stages of disease. Hospital records of mouth cancer cases treated within the CDHB in the study period were reviewed to determine whether dental attendance was associated with tumour stage at diagnosis.

KAI CHUN LI

PhD graduate

Primary supervisors: Professor David Prior (Geology), Associate Professor Neil Waddell
Graduated August 2015

Microstructure and phase stability of three dental cobalt chromium alloys used for metal-ceramic restorations during thermal processing

This research investigated the crystallographic and microstructural changes in dental Co-Cr alloys used in metal-ceramic restorations during routine high temperature sintering conditions. Co-Cr alloys were found to exhibit substantial change in crystal structure and microstructure at the conventional sintering conditions used. These changes resulted in the development of unfavourable properties, which detrimentally affected the reliability of the metal-ceramic restorations. Finer initial microstructures had significant impact on reducing the changes in crystal structure and microstructure, which raised the resistance to developing unfavourable properties in the alloy. The better retention of the optimal properties such as ductility, significantly improved the adhesion strength between the metal and ceramic due to the larger resultant surface energy required from plastic deformation of the alloy.

COREEN WYE YIN LOKE

DClinDent graduate (Orthodontics)

Primary supervisor: Professor Mauro Farella
Graduated December 2015

Wireless monitoring of intra-oral pH

Intra-oral pH plays a significant role in the pathogenesis of tooth wear as well as early decalcifications in patients with orthodontic appliances. However, there is currently very little information about intra-oral pH variation over time and in real life settings. The aims of this research were to develop a wireless monitoring intra-oral pH device, and to collect preliminary data in a sample of healthy volunteers for over 24 hours. The average intra-oral pH was significantly lower during sleeping hours than in waking hours. There was also variation between individuals in the intra-oral pH recovery time following acidic stimuli. This new device has the potential to provide new insights into the relationship between intra-oral pH and dental wear, white spot lesions and dental caries.

OVINI MASI

DClinDent candidate (Endodontics)

Primary supervisor: Professor Karl Lyons

The mechanical and bonding characteristics of enhanced restorative materials for root filled posterior teeth

The mechanical and bonding characteristics of restorative materials in tandem with the inherent properties of the tooth structure are integral components that determine the durability of coronal restorations in structurally undermined root filled teeth. Consequently, the exposure of the tooth to occlusal forces and the oral fluids challenges the development of novel restorative materials. These materials mimic the biomechanics of the tooth structures when interacting with the oral environment. It is prudent to provide an optimum seal, strength and thus prevent failure of the coronal restoration. These restorative materials are developed on the premise that their enhanced material properties will reduce the limitations present in conventional restorative dental materials. This research analysed and evaluated the enhanced material properties of a bioactive resin modified glass ionomer material and a bulk fill restorative material tested against conventional resin composites used for root filled posterior teeth. Bovine teeth specimens were used to test for shear bond strength on an Instron machine and failure analysis determined using SEM (Scanning electron microscope) images in investigating these materials.

KATY MCLAUGHLIN

DClinDent graduate (Periodontology)

Primary supervisor: Dr Dawn Coates
Graduated December 2015

BRONJ: The effects of zoledronic acid on the VEGF receptors and implications for osteoblast growth and maturation

The pathogenesis of bisphosphonate related osteonecrosis of the jaw (BRONJ) is not well understood, although its clinical presentation and response to treatment reflect a failure to heal. Vascular endothelial growth factor (VEGF) is involved in the formation of both bone and new blood vessels and plays a role in tissue formation, modelling and remodelling in response to injury. VEGF is upregulated in cells treated with potent bisphosphonates and therefore any inhibition of this pathway in BRONJ may be via the VEGF receptors. This research investigated the effects of inhibiting the VEGF receptors (VEGFR1 and VEGFR2) on osteoblast mineralisation and the

ability to form nodules. The results indicated that the VEGF/VEGFR1 pathway is important, but not essential, to osteoblast growth and maturation *in vitro*. The mechanism of VEGFR1 inhibition by the potent nitrogen bisphosphonate, zoledronic acid, was also investigated and remains to be elucidated.

LYDIA MEREDITH

DClinDent graduate (Orthodontics)

Primary supervisor: Professor Mauro Farella
Graduated December 2015

The influence of interproximal reduction on enamel roughness and bacterial adhesion

In orthodontics, interproximal reduction (IPR) involves removing some enamel to reduce the width of a tooth. Sometimes this is preferable to removing a whole tooth when straightening them with braces. However, one concern is the roughness created, which may collect more bacteria and increase the risk of tooth decay. This research investigated the effect of IPR on human teeth. It found that surfaces were indeed made rougher with this procedure and that there was a positive relationship between the surface roughness and bacterial adhesion (that is, more bacteria stuck to the rougher enamel). In conclusion, all surfaces that are subjected to IPR should be polished as smoothly as possible following this procedure in order to reduce bacterial adhesion.

SUSAN MOFFAT

PhD graduate

Primary supervisor: Professor Barbara Brookes (History and Art History)
Graduated December 2015

From innovative to outdated? New Zealand's school dental service 1921-1989

This research traced the development of New Zealand's School Dental Service (SDS) from 1921 to 1989, using key archival sources and the opinions and experiences of dental nurses. An innovative solution to an overwhelming health issue, the SDS achieved its goal to extend care to all children, and proved itself adaptable in dealing with the Depression, war, and the baby boom. Despite its success, dental surveys in the 1970s revealed that New Zealand children had heavily-filled teeth and adults were still losing their teeth early. The SDS once more showed its adaptability, implementing a new diagnosis and prevention programme. Cuts in health spending, however, led to reduced student intakes, delays in introducing new treatment techniques and equipment, and workforce dissatisfaction.

SOO-WEE ONG

DClinDent candidate (Oral Surgery)

Primary supervisor: Associate Professor Rohana De Silva

Third molar surgery outcomes: A comparison between intravenous sedation and general anaesthetic

The surgical extraction of third molar teeth (wisdom teeth) is one of the most common surgical procedures carried out in dentistry. Some wisdom teeth can be extracted under local anaesthesia alone, while more complex impactions may require intravenous sedation (IV) or general anaesthesia (GA). Each of the latter has advantages and disadvantages over the other, and determining which is suitable for the patient can be complex. This study explored the differences between IV sedation and GA in terms of patient recovery, oral-health-related quality of life (OHRQoL), anxiety, level of satisfaction and post-operative pain. Patients opting for GA scored more highly on negative affectivity and dental anxiety at baseline. Post-surgery, they reported taking more days off before returning to normal activities, as well as having higher incidence of sore throat and nausea. Patients with negative affectivity and higher anxiety opt for third molar surgery carried out under GA but this results in more nausea, sore throat and days off normal activities.

ASSIL RUSSELL

DClinDent candidate (Endodontics)

Primary supervisor: Professor Nick Chandler

The Butterfly Effect: An investigation of sealer penetration and adaptation in root canals

The butterfly effect is an optical phenomenon seen in some cross-sections of roots. This research investigated the behavior of root canal sealers and ProRoot MTA in roots with and without the butterfly effect. Cracks formation in roots undergoing apical resection and ultrasonic root-end cavity preparation was also studied. This research found that the butterfly effect influences sealer penetration and adaptation inside root canals. Roots with the butterfly effect have inferior penetration mesio-distally. Superior adaptation to radicular dentine may enhance entombment of bacteria, which could lead to improved treatment outcomes. Root-ends with the butterfly effect have a significantly higher number of bucco-lingual cracks following resection and ultrasonic root-end preparation. This might explain the development of some vertical root fractures, which usually run bucco-lingually. Canal obturation with MTA may be protective.

ALIA SAGATOVA

PhD graduate

Primary supervisor: Associate Professor Brian Monk
Graduated December 2016

Investigating resistance mutations in the drug target of triazole drugs

Fungal organisms can cause a variety of conditions, ranging from minor infections such as thrush or ringworm, to life-threatening disseminated infections, particularly in people with impaired immune systems. Treatment of fungal disease relies heavily on the use of drugs called triazoles that target a vital fungal enzyme, lanosterol 14 α -demethylase. The use of triazoles has led to the emergence of resistant strains due to mutations in the enzyme. X-ray crystallography was used to reveal molecular structures of the mutated enzyme. These structures enabled identification of the molecular mechanisms of resistance to triazole drugs. This study will aid structure-directed discovery of new drugs designed to overcome resistance mechanisms due to these mutations.

AMIRA SALEM

PhD candidate

Primary supervisor: Associate Professor Geoff Tompkins

Novel therapeutic targets for endodontic infections

The demand for root canal treatments is a world-wide burden on the health sector. A considerable proportion of treatments fail (9%-69%), primarily as a result of persistent bacterial infection. *Enterococcus faecalis*, the bacterium most associated with persistent root canal infections, is capable of producing biofilms and persisting in root canals despite medications that raise the pH to 11 and above. A recent study reported the identification of membrane proteins that are up-regulated by exposure of *E. faecalis* to extreme alkalinity and with the ability to form biofilms. The study will assess the involvement of the identified alkaline-stress response proteins in the endodontic pathogenicity of *E. faecalis* with the intention of validating these proteins as targets for novel therapeutic agents.

AJAY SHARMA

PhD graduate

Primary supervisor: Professor Warwick Duncan
Graduated August 2015

Effect of electrochemically modified titanium-zirconium (TiZr) alloy implant surface on osseointegration: an *in vitro* and *in vivo* study

For decades titanium has been the biomaterial of choice for dental/orthopaedic implants. Recently, titanium-zirconium (TiZr) alloy has been developed as an alternative implant material with higher mechanical strength. Bone healing around implants may also be enhanced by modifying the surface of the metal. One such method involves an electrochemical process called anodization which significantly enhances the speed and quality of bone healing (osseointegration). The study was focused on anodizing TiZr implant (α TiZr), investigating their surface characteristics, bioactivity by laboratory experiments and the effect on osseointegration by sheep study. The results indicated that α TiZr showed a nano-micro porous, hydrophilic, biocompatible surface with significantly higher percentages of bone to implant contact and new bone fill compared to machined TiZr surfaces.

DARA SHEARER

PhD graduate

Primary supervisor: Professor Murray Thomson
Graduated May 2016

Longitudinal associations between periodontitis and glycated haemoglobin

A two-way link between periodontal disease and glycaemia (blood glucose) has been acknowledged in middle-aged and older adults and in individuals with type 2 diabetes. However, little was known of this link in a young and healthy cohort. This study described developmental trajectories of both conditions for participants between ages 26 and 38 in the Dunedin Multidisciplinary Health and Development Study, and explored the associations between them. Four periodontal ("very low", "low", "medium" and "high") and three glycaemia ("low", "medium" and "high") trajectory groups were identified. An association between periodontal disease and glycaemia could not be demonstrated at this early stage in life. This suggested that any influence periodontal disease may have on glycaemia (and vice versa) develops later in life.

DHRUPAD SIDDHANTA

DClinDent graduate (Prosthodontics)
Primary supervisor: Dr Don Schwass
Graduated December 2016

Mechanical properties of a silver nanoparticle modified glass-ionomer

Glass-ionomers are useful dental restorative materials and, in part due to their tooth decay-preventing qualities are used in oral health care programmes around the world. Recurrent decay can, however, still be observed around glass-ionomer restorations because fluoride release is sustained at clinically useful levels for relatively short periods of time. Silver is known for its intense anti-microbial nature and may be a suitable addition to glass-ionomers. This study investigated the mechanical properties (strength, hardness and elastic modulus) of a silver nanoparticle modified glass-ionomer restorative that was developed by inter-departmental collaboration. The mechanical properties were found to be similar to those of a commercially available material. The results of this promising proof-of-concept encourage further investigations involving this new product.

ADLIN SUHAIMI

DClinDent candidate (Special Needs Dentistry)
Primary supervisor: Professor Alison Rich

Pre-radiation dental assessment of head and neck cancer patients

Head and Neck Cancer (HNCa) is a debilitating condition that affects patient physically and emotionally. Radiotherapy treatment to the head and neck area will have side effects on oral health and therefore it is important to plan ahead for any interventional and preventive dental care that may be required. This research provided an insight on the approach of hospital dentists in New Zealand and Malaysia regarding dental assessment prior to radiotherapy treatment for HNCa patients and problems face by them in providing dental treatments for these patients. This study highlights the importance of effective communication between health professionals and the need of developing clinical guideline to support effective dental treatment and management strategies for these patients.

WAN SYASLIZA MOHAMED THANI

DClinDent graduate (Special Needs Dentistry)
Primary supervisor: Professor Alison Rich
Graduated May 2016

Oral candida carriage and antifungal susceptibility in patients receiving antipsychotic medication

This study investigated the oral fungi present in patients receiving antipsychotic medications and the antifungal resistance of those fungi. It was found that a higher proportion of patients on antipsychotic medications were colonised with *Candida* species than those not receiving this medication. The most common fungal species in patients' mouths was *C. albicans*. Although the antipsychotic fluphenazine had low antifungal activity, when combined with the commonly prescribed antifungal medication fluconazole it reduced the antifungal effect of fluconazole. This indicated that careful consideration is necessary when prescribing fluconazole to individuals taking fluphenazine or medications of a similar class. Other antifungal agents may be more appropriate for individuals taking such antipsychotic medications.

JANINE TIU

PhD graduate
Primary supervisor: Professor Warwick Duncan
Graduated August 2016

Tooth preparations: Measuring, understanding, and reporting tooth preparation and its influence on the fracture of all-ceramic crowns

Preparing a tooth for a dental crown is a fundamental principle in fixed prosthodontics. Crowns are routinely placed by dentists, so investigation into the geometry of the tooth preparation and its influence on its success is important and of interest to dentists and the general public. This research found that the geometries of tooth preparations by general dentists in New Zealand were greater than the recommended values. Further analysis modelled these geometries using an experimental and numerical method to generate a fracture initiating from the inner surface, spreading to the outer surface, in alignment with clinical failures. The results showed that the current recommendations might not be as responsible for clinical success as previously reported.

PENG SIM (PATRICK) WONG

DClinDent graduate (Prosthodontics)

Primary supervisor: Professor Karl Lyons

Graduated December 2015

Effect of glaze powder coating on adhesion of resin cements to zirconia ceramic

Zirconia is currently the strongest ceramic material in dentistry. However, because of the microstructure of the material, zirconia is very difficult to bond with resin (dental) cement. Because of this, the recommended protocol for bonding zirconia restorations to teeth involves the use of an adhesive system containing phosphate monomers. However, there is limited evidence that the phosphate monomer bond is comparable to an etched-silanised glass-ceramic. This study evaluated the effect of using a glazed porcelain layer (glazed zirconia) on the bond efficacy between a zirconia ceramic and resin cements. The results showed the resin bond to glazed zirconia was significantly better than to zirconia when using the phosphate monomer system.

DIOGO ZANICOTTI

PhD graduate

Primary supervisor: Professor Warwick Duncan

Graduated December 2015

De novo bone formation in the presence of titanium devices using adipose-derived stem cells grown in serum-free conditions

This research investigated the potential of adipose-derived stem cells (ADSC), grown in a clinical grade medium, for bone regeneration in the presence of titanium implants. Cultured human and ovine ADSC were tested *in vitro* and *in vivo* in order to evaluate the bone regeneration in the presence of titanium implants. The results of the *in vitro* experiments showed that ADSC differentiated into bone cells have the potential to be used for bone regeneration in the presence of titanium implants. However, the *in vivo* experiments showed a lack of improvement in bone regeneration using ADSC in the presence of titanium implants.

MUHAMMED YAKIN

DClinDent graduate (Oral Pathology)

Primary supervisor: Professor Alison Rich

Graduated December 2016

The differential regulation of signal transducer and activator of transcription-3 pathway under endoplasmic reticulum stress in oral squamous cell carcinoma

Oral cancer is a significant health issue with high rates of morbidity and mortality. Despite recent advances in diagnosis and management, there has been no real improvement in the survival of patients. Research is being undertaken to identify molecules and pathways that may be responsible for the development and progression of cancer. One highlighted molecule is STAT3. It is thought to lie at the centre of the mechanisms that affect cancer initiation, progression, and spread. This research investigated the differential regulation of STAT3 pathway genes and proteins in oral cancer under induced cellular stress. Results showed that cellular stress adversely affected the immune response to oral cancer through the STAT3 pathways. The research found potential targets for tailored immunotherapy that could ultimately be used to improve the survival of patients with oral cancer.

Research funding 2015-16

Competitive external research funding awarded to SJWRI investigators in 2015-16

This includes projects led by other departments or institutions, but excludes non-competitive commercial research contracts and SJWRI-administered awards such as the Fuller Scholarships in Dentistry. Funding is in New Zealand dollars, GST exclusive. Awards are sorted by funding round, in chronological order of award. Data courtesy Lorraine Harris, Research and Enterprise.

Faculty of Dentistry affiliations:

ODSS: Department of Oral Diagnostics and Surgical Sciences

OR: Department of Oral Rehabilitation

OS: Department of Oral Sciences

Other affiliations are University of Otago unless otherwise noted.

* Postgraduate research student (at time of application)

PI = Principal Investigator

Personnel	Project Title	Funding Body	Funding Round	Awarded	Start	End
Jonathan Leichter (PI, OS) James Dawson* (OS)	Effect of diode laser irradiation on viability of bacteria in an in vivo biofilm, formed on titanium implant surfaces	New Zealand Society of Periodontology	Research Grant	\$8,000	Jan 2015	Dec 2016
Wendy-Ann Jansen van Vuuren (PI, OR)	Proto-Tech Thermocycler Unit	New Zealand Lottery Grants Board	Lottery Health - Research Equipment	\$15,417	Apr 2015	Mar 2016
Mauro Farella (PI, OS) Joseph Antoun (OS)	3dMD Trio Imaging System and Software (for 3D imaging of the face)	New Zealand Lottery Grants Board	Lottery Health - Research Equipment	\$90,000	May 2015	Apr 2016
Avadhoot Avadhani* (PI, ODSS) Alison Rich (ODSS)	American Association for Cancer Research Annual Meeting March	Maurice and Phyllis Paykel Trust	Grant-in-Aid (Project/Equipment, Travel & Conference),	\$1,000	Apr 2015	Mar 2016
Dawn Coates (PI, OS) Richard Cannon (OS) Trudy Milne (OS) Alison Rich (ODSS)	An ABI qPCR machine for Oral Health Research	Maurice and Phyllis Paykel Trust March	Grant-in-Aid (Project/Equipment, Travel & Conference),	\$10,000	Apr 2015	Mar 2016
Diogo Zaninotti* (PI, OS) Warwick Duncan (OS)	Europario 8 Paykel Trust Travel & Conference), March	Maurice and Phyllis (Project/Equipment,	Grant-in-Aid	\$800	Apr 2015	Mar 2016
Jonathan Broadbent (PI, OR) Avshalom Caspi (Duke U) Terrie Moffitt (Duke U) Richie Poulton (Prev & Soc Med) Murray Thomson (OS)	Oral health from childhood to mid-life	Health Research Council of NZ (HRC)	Project - Full Application	\$1,193,937	Jul 2015	Dec 2016
Dawn Coates (PI, OS) Richard Cannon (OS) Trudy Milne (OS) Alison Rich (ODSS)	An ABI qPCR machine for Oral Health Research	New Zealand Dental Association Research Foundation	Research Grant	\$15,000	Aug 2015	Jul 2016

Personnel	Project Title	Funding Body	Funding Round	Awarded	Start	End
Matthew Woods (PI, OS)	Precision balance and pH meter for dental research including drug discovery	New Zealand Dental Association Research Foundation	Research Grant	\$9,845	Aug 2015	Jul 2016
Joseph Antoun (PI, OS) Mauro Farella (OS) Tony Merriman (Biochem) Murray Thomson (OS) Azza Al-Ani* (OS)	Finding the Missing Link for Hypodontia Foundation	New Zealand Dental Association Research Foundation	Research Grant	\$10,243	Sep 2015	Aug 2017
Lara Friedlander (PI, OR) Peter Cathro (OR) Trudy Milne (OS) Alison Rich (ODSS) Hitesh Navani* (OR)	Angiogenesis in the apical papilla of immature permanent teeth associated with healthy and inflamed dental pulps	New Zealand Dental Association Research Foundation	Research Grant	\$14,990	Sep 2015	Aug 2016
Fiona Firth* (PI, OS) Mauro Farella (OS) Trudy Milne (OS) Benedict Seo (ODSS)	The effect of mechanical strain on the unfolded protein response of periodontal ligament cells in a three-dimensional culture	New Zealand Dental Association Research Foundation	Research Grant	\$15,000	Oct 2015	Sep 2017
Haizal Hussaini (PI, ODSS) Trudy Milne (OS) Alison Rich (ODSS) Hina Narayan* (ODSS)	In vitro effect of cigarette smoke on DNA methylation in oral epithelial cells	New Zealand Dental Association Research Foundation	Ministry of Health Oral Research Fund	\$15,489	Oct 2015	Sep 2017
Haizal Hussaini (PI, ODSS) Trudy Milne (OS) Alison Rich (ODSS) Hina Narayan* (ODSS)	Effect of cigarette smoking on TGF- β expression in oral tissues and cells	New Zealand Dental Association Research Foundation	Ministry of Health Oral Research Fund	\$10,517	Oct 2015	Sep 2017
Haizal Hussaini (PI, ODSS) Alison Rich (ODSS) Adil Alkharusi* (ODSS)	Expression of STAT 3 and cytokines (IL22, IL23, TH17) within metastatic lymph nodes of Oral Squamous cell carcinoma (OSCC)	New Zealand Dental Association Research Foundation	Research Grant	\$12,134	Oct 2015	Sep 2017
Muhammed Yakin* (PI, ODSS) Benedict Seo (ODSS) Alison Rich (ODSS)	Oral cancer cells under stress: The intertwined roles of cell stress and the dynamic signalling pathways	New Zealand Dental Association Research Foundation	Research Grant	\$15,000	Oct 2015	Sep 2016
Leonard Chia* (PI, ODSS) Lyndie Foster Page (OR) Murray Thomson (OS) Darryl Tong (ODSS)	Clinicians' Perspectives on Special Needs Dentistry in New Zealand	New Zealand Dental Association Research Foundation	Ministry of Health Oral Research Fund	\$2,000	Oct 2015	Aug 2017
Joanne Choi (PI, OS) Mauro Farella (OS) Karl Lyons (OR) Neil Waddell (OR)	Continuous measurement of intraoral pH and temperature of individuals with and without xerostomia	New Zealand Dental Association Research Foundation	Research Grant	\$5,500	Sep 2015	Dec 2016

Personnel	Project Title	Funding Body	Funding Round	Awarded	Start	End
Suzanne Hanlin (PI, OR) Lara Friedlander (OR) Sunyoung Ma* (OR)	A 5 year retrospective assay (audit) of the outcomes of implant therapy in New Zealand private dental practice	New Zealand Dental Association Research Foundation	Research Grant	\$13,000	Oct 2015	Sep 2017
Neil Waddell (PI, OR) Kai Chun Li* (OR) Karl Lyons (OR) Carla Meledandri (Chemistry) David Prior (Geology)	Gold nanoparticle reinforcement of biomedical dental ceramics	New Zealand Dental Association Research Foundation	Research Grant	\$12,000	Oct 2015	Sep 2016
Warwick Duncan (PI, OS) Paul Harris (Callaghan)	UltraD3: Ultrasonic Dental Diagnostic Device	Ministry of Business, Innovation and Employment	High-Value Manufacturing and Services - Targeted Research	\$1,199,868	Oct 2015	Sep 2018
Stephen Sullivan (PI, Physiotherapy) Andrew Gray (Prev & Soc Med) Phillip Handcock (Phys Ed) Reuben Johnson (Surgical Sci, DSM) Hamish Osborne (Medicine, DSM) Darryl Tong (ODSS)	What is the long-term impact of sports concussions on the brain health of former community (amateur) rugby players?	University of Otago	University of Otago Research Grants 2016	\$15,000	Jan 2016	Dec 2016
Mauro Farella (PI, OS) William Sew Hoy* (OS) Joseph Antoun (OS) Nicholas Chandler (OR)	Factors associated with orthodontic pain in children and adolescents	Foundation for Orthodontic Research & Education, NZAO	FORENZAO Charitable Trust	\$4,668	Jan 2016	Dec 2017
Jonathan Broadbent (PI, OR)	A lifecourse study on chronic dental conditions and ageing of the teeth and dentition: equipment grant application	Maurice and Phyllis Paykel Trust	Grant-in-Aid (Project/Equipment, Travel & Conference), October	\$12,500	Mar 2016	Feb 2017
Robert Love (PI, ODSS) Arunjith Ramawarrier* (OR)	The effect of keratin based biocomposites on human dental pulp stem cells - potential for regeneration of pulp, dentine and periapical tissues	Maurice and Phyllis Paykel Trust	Grant-in-Aid (Project/Equipment, Travel & Conference), October	\$7,000	Jan 2016	Mar 2017
Zebulun Laqekoro* (PI, OR) Vivienne Anderson (HEDC) Lyndie Foster Page (OS)	Pacific young people's perspective of oral health and oral health care	Health Research Council of NZ (HRC)	Pacific Health Research Summer Studentships	\$5,000	Dec 2015	Feb 2016
Ngareka Bensemam* (PI, ODSS) John Broughton (ODSS)	Oranga Niho Mokopuna: A literature review of early childhood caries in Aotearoa	Health Research Council of NZ (HRC)	Māori Health Research Summer Studentships - Career Development Award	\$5,000	Dec 2015	Feb 2016

Personnel	Project Title	Funding Body	Funding Round	Awarded	Start	End
Brian Monk (PI, OS)	AKTA pure 25 M1 with fraction collector F9-C	New Zealand Lottery Grants Board	Lottery Health - Research Equipment	\$109,133	Apr 2016	Mar 2017
Mauro Farella (PI, OS) Grace Nichols* (OS)	Cross correlation analysis of intraoral and oesophageal pH in patients with gastroesophageal reflux disorder	New Zealand Society of Gastroenterology Inc	Research Grant	\$5,000	Jun 2016	Nov 2017
Ghassan Idris* (PI, OS) Mauro Farella (OS)	92nd European Orthodontic Society Congress, Sweden	Maurice and Phyllis Paykel Trust	Grant-in-Aid (Project/Equipment, Travel & Conference), March	\$1,200	Aug 2016	Sep 2016
Neil Waddell (PI, OR) Paul Brunton (OS) Darryl Tong (ODSS) Lisa Falland* (OR)	Development of a skin/skull/brain model to measure impact forces to the head and brain injury mechanisms	Maurice and Phyllis Paykel Trust	Grant-in-Aid (Project/Equipment, Travel & Conference), March	\$7,000	Jul 2016	Jun 2018
Richard Cannon (PI, OS) Paul Brunton (OS) Carolina Loch Santos da Silva (SJWRI) Neil Waddell (OR)	Making a good impression: from fossils to false teeth	Ministry of Business, Innovation and Employment	Unlocking Curious Minds - Contestable Fund	\$26,106	Jun 2016	Nov 2017
Brian Monk (PI, OS) Mikhail Keniya (OS) Joel Tyndall (Pharmacy) Rajni Wilson (OS) David Perlin (Rutgers U)	Structure-directed discovery of next-generation antifungals	Health Research Council of NZ (HRC)	Project - Full Application	\$1,197,552	Jul 2016	Jun 2019
Richie Poulton (PI, Psychology) Wickliffe Abraham (Psychology) Timothy Anderson (Medicine, UOC) George Baxter (Physiotherapy) Joanne Baxter (Dean's Office, DSM) Antony Braithwaite (Pathology, DSM) Jonathan Broadbent (OR) Simon Chapple (Psychology) Jennie Connor (Prev & Soc Med) Nigel Dickson (Prev & Soc Med) Lyndie Foster Page (OS) Leigh Hale (Physiotherapy) Bob Hancox (Prev & Soc Med) Ahmad Hariri (Duke U)	A lifecourse study on aging processes to inform early intervention strategies	Health Research Council of NZ (HRC)	Programme Application	\$4,994,717	Jul 2016	Jun 2021



Personnel	Project Title	Funding Body	Funding Round	Awarded	Start	End
Ramakrishnan Mani (Physiotherapy)						
Joel Mann (Human Nutrition)						
Rachael McLean (Prev & Soc Med)						
Terrie Moffitt (Duke U)						
Sandhya Ramrakha (Psychology)						
Alida Righarts (Prev & Soc Med)						
Kirsten Robertson (Marketing)						
Stephen Robertson (Women's & Children's Health, DSM)						
Lisa Te Morenga (Human Nutrition)						
Reremoana Theodore (Psychology)						
Murray Thomson (OS)						
Robert Walker (Medicine, DSM)						
Debra Waters (Prev & Soc Med)						
Michael Williams (Medicine, DSM)						
Sarah Young (Pathology, DSM)						
Jay Belsky (UC Davis)						
Maria Bleil (U Washington)						
Avshalom Caspi (Duke U)						
Carol Cheung (Singapore Eye Res Inst)						
William Edwards (Te Pou Tiringa)						
Zoltan Endre (UNSW)						
Nadine Foster (Keele U)						
Ross Keenan (Canterbury DHB)						
Tracy Melzer (NZ Brain Research Ltd)						
Malcolm Sears (McMaster U)						
Kumar Sharma (UC San Diego)						
Tien Wong (Singapore National Eye Centre)						
Bob Hancox (PI, Prev & Soc Med)	The Next Generation Studies	Health Research Council of NZ (HRC)	Project - Full Application	\$1,195,332	Jul 2016	Jun 2019
Joanne Baxter (Dean's Office, DSM)						
Jonathan Broadbent (OR)						
Andrew Gray (Prev & Soc Med)						
Richie Poulton (Psychology)						
Rosalina Richards (Prev & Soc Med)						
Judith Sligo (Prev & Soc Med)						
Murray Thomson (OS)						
Jay Belsky (UC Davis)						

Personnel	Project Title	Funding Body	Funding Round	Awarded	Start	End
Neil Waddell (PI, OR) Paul Brunton (OS) Lisa Falland* (OR) Darryl Tong (ODSS)	Development of skin/ skull/brain model to measure impact forces to the head and brain- injury mechanisms	Neurological Foundation of New Zealand	Project Grant, April	\$12,000	Jul 2016	Jun 2017
Kullasit Chutipongpisit* (PI, ODSS) Alison Rich (ODSS)	18th International Congress on Oral Pathology and Medicine, India Sept 2016	Maurice and Phyllis Paykel Trust	Grant-in-Aid (Travel & Conference), June	\$1,000	Aug 2016	Sep 2016
Nawal Abdul Rahman* (PI, ODSS) Haizal Hussaini (ODSS) Alison Rich (ODSS) Benedict Seo (ODSS)	Expression of the lysyl oxidase family in benign odontogenic tumours	New Zealand Dental Association Research Foundation	Research Grant	\$9,442	Aug 2016	Dec 2017
Venkata Praveen Parachuru* (PI, ODSS) Warwick Duncan (OS) Ellie Knight (OS)	IL33 and IL35 expression in healthy and diseased gingival tissues	New Zealand Dental Association Research Foundation	Research Grant	\$14,988	Sep 2016	Dec 2018
Sy Yin Chai* (PI, OR) John Aarts (OR) Vincent Bennani (OR) Andrew Gray (Prev & Soc Med) Bronwyn Lowe (Clothing & Textile Sci) Karl Lyons (OR) Raj Das (U Auckland)	The effect of preparation design on stress distribution and fracture strength of porcelain laminare veneers	New Zealand Dental Association Research Foundation	Research Grant	\$6,500	Oct 2016	Sep 2017
Lara Friedlander (PI, OR) Haizal Hussaini (ODSS) Trudy Milne (OS) Alison Rich (ODSS) Shaikha Samahi* (OR)	Type 2 Diabetes and inflammatory markers in the dental pulp	New Zealand Dental Association Research Foundation	Ministry of Health Oral Research Fund	\$14,891	Oct 2016	Sep 2018
Jae-Kwang Jung (PI, OS) Haizal Hussaini (ODSS) Alison Rich (ODSS) Benedict Seo (ODSS)	Investigation of the role of lymphangiogenesis in oral lichen planus	New Zealand Dental Association Research Foundation	Research Grant	\$12,144	Oct 2016	Sep 2018
Elizabeth Williams* (PI, ODSS) Dawn Coates (OS) Haizal Hussaini (ODSS) Alison Rich (ODSS) Benedict Seo (ODSS)	Investigation of the presence of human papillomavirus in verrucal- papillary lesions of the oral cavity and comparison of viral detection methods	New Zealand Dental Association Research Foundation	Research Grant	\$8,962	Oct 2016	Apr 2018
Murray Thomson (PI, OS) Catherine Ferguson (OS) Moir Smith* (Public Health, UOW) Ngair Kerse (U Auckland)	Cognitive function, dependency and oral health among frail older New Zealanders: a national survey	New Zealand Dental Association Research Foundation	Ministry of Health Oral Research Fund	\$37,789	Oct 2016	Sep 2017
Lyndie Foster Page (PI, OS) Joseph Antoun (OS) Peter Fowler (Canterbury DHB) Hannah Jack* (OS)	I just want my teeth straightened	University of Otago Research Grants 2017		\$36,281	Jan 2017	Dec 2017

Personnel	Project Title	Funding Body	Funding Round	Awarded	Start	End
Nurul Ibrahim* (PI, ODSS) Haizal Hussaini (ODSS) Alison Rich (ODSS) Benedict Seo (ODSS)	Lymphangiogenesis in metastatic lymph nodes of oral squamous cell carcinoma	New Zealand Dental Association Research Foundation	Research Grant	\$10,800	Jan 2017	Dec 2018
Lee Smith (PI, OS) Lyndie Foster Page (OS) Rosalina Richards (Prev & Soc Med)	Pasifika adolescents' understandings of and experiences of oral health	New Zealand Dental Association Research Foundation	Ministry of Health Oral Research Fund	\$36,076	Jan 2017	Dec 2017
Muhammed Yakin* (PI, ODSS) Alison Rich (ODSS) Benedict Seo (ODSS)	The expression of STAT3 signalling pathway proteins in Oral Squamous Cell Carcinoma tissue	New Zealand Dental Association Research Foundation	Research Grant	\$2,503	Jan 2017	Dec 2018
Jonathan Broadbent (PI, OR) Murray Thomson (OS)	Equipment request - Lifecourse study on chronic dental conditions and ageing of the teeth and dentition	New Zealand Dental Association Research Foundation	Research Grant	\$13,500	Mar 2016	Feb 2017
Mauro Farella (PI, OS) Joseph Antoun (OS) Nicholas Chandler (OR) Tony Merriman (Biochemistry) William Sew Hoy* (OS)	Genetic and psychological factors associated with orthodontic pain in children and adolescents	New Zealand Dental Association Research Foundation	Research Grant	\$8,441	Nov 2016	Oct 2017
Mauro Farella (PI, OS) John Hamilton (ODSS) Ajith Polonowita (ODSS) Divya Ramanan* (OS) Sandro Palla (U Zurich)	Jaw muscle overload as a possible cause of orofacial pain and headache	New Zealand Dental Association Research Foundation	Research Grant	\$12,350	Oct 2016	Sep 2018
Lyndie Foster Page (PI, OS) Joseph Antoun (OS) Hannah Jack* (OS)	Reading between the lines: how do young New Zealanders from lower socio-economic backgrounds feel about not getting their teeth straightened?	New Zealand Dental Association Research Foundation	Ministry of Health Oral Research Fund	\$29,168	Nov 2016	Oct 2017
Ludwig Jansen van Vuuren (PI, OR) Warwick Duncan (OS) Neil Waddell (OR)	Development of a simulant model for clinically relevant testing of implant- and natural tooth-supported all-ceramic restorations	New Zealand Dental Association Research Foundation	Research Grant	\$8,000	Oct 2016	Sep 2018
Warwick Duncan (PI, OS) Carla Meledandri (Chemistry) Anthony Molteno (Molteno Ophthalmic Ltd) Michael Smith* (OS)	"Silverbone" - unique antibacterial biomaterial	Ministry of Business, Innovation and Employment	2016 Science Investment Round (Smart Ideas - Full Proposal)	\$999,804	Oct 2016	Sep 2019
Ashleigh Raikuna* (PI, OS) Lyndie Foster Page (OS) Maree Inder (Psych Med, UOC) Murray Thomson (OS)	Effects of severe early childhood caries on Pacific Island families	Health Research Council of NZ (HRC)	Pacific Health Research Summer Studentships	\$5,000	Nov 2016	Feb 2017

Commercial and non-competitive research funding awarded to SJWRI researchers in 2015-16

Personnel	Title	Contracting Body	Total award (Excl GST)	Start Date	End Date
Richard Cannon (PI, OS)	Taking drug target expression to the next level - Priming Partnership 2015	University of Otago	\$30,629	Jan 2015	Feb 2016
Richard Cannon (PI, OS)	Sir John Walsh Research Institute Research Centre Funding 2015	University of Otago	\$25,000	Jan 2015	May 2016
Richard Cannon (PI, OS)	Sir John Walsh Research Institute Research Centre Funding 2016	University of Otago	\$25,000	Jan 2016	Mar 2017
Bernadette Drummond (PI, OS) Victoria Kashchuk* (OS)	Effect of MGO 400+ Manuka honey Ewith Cyclopower on oral health including dental plaque activity and gingival health in young adults	Manuka Health New Zealand Ltd	\$56,428	Sep 2016	Apr 2017
Warwick Duncan (PI, OS)	Evaluation of novel bone replacement grafting products for tooth socket preservation and maxillary sinus elevation in a sheep animal model	Resorba Medical GmbH	\$53,430	Jan 2015	Nov 2016
Mauro Farella (PI, OS)	FORENZAO Orthodontic Professorial Discretion Fund	Foundation for Orthodontic Research & Education, NZAO (FORENZAO) Charitable Trust	\$10,000	Jan 2016	Dec 2017
Lyndie Foster Page (PI, OS)	Exploring the barriers and enablers for dentists to non-invasively manage proximal caries lesions	DMG Dental Materials Gesellschaft mbh	\$32,068	Jul 2016	Jun 2017
Don Schwass (PI, OS)	Evaluating efficacy of a topical antimicrobial gel formulation for treating peri-implantitis in a sheep model	Otago Innovation Limited	\$30,000	Jun 2016	Nov 2016
Murray Thomson (PI, OS)	Journal of Community Dentistry and Oral Epidemiology editorship	Wiley Periodicals Inc	\$144,800	Jan 2015	Dec 2017
Murray Thomson (PI, OS)	Community Water Fluoridation - resources update	Health Promotion Agency	\$10,000	Oct 2016	Feb 2017

Fuller Scholarships in Dentistry awarded in 2015-16

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 recipient

Student (Discipline)	Personnel	Start Date	End Date	Title	Awarded (Excl GST)
Shreya Aggarwala (Endodontics)	Robert Love (ODSS)	Jan 2015	Dec 2016	The antimicrobial efficacy of the antimicrobial peptide, BM2, in an ex vivo model	\$3,000
Azza Al-Ani (Orthodontics)	Joseph Antoun (OS)	Jan 2015	Dec 2016	Finding the missing link for hypodontia	\$3,000
Angel Babu (Paediatric Dentistry)	Bernadette Drummond (OS)	Jan 2015	Dec 2016	Comparison of orofacial characteristics in children who have a history of snoring and those who do not snore	\$1,950
James Dawson (Periodontology)	Jonathan Leichter (OS)	Jan 2015	Dec 2016	Effect of iodine laser irradiation on viability of bacteria in an in vivo biofilm, formed on titanium	\$3,000
Arpana Devi (Endodontics)	Robert Love (ODSS)	Jan 2015	Dec 2016	Enhancing the efficacy of antimicrobial peptide BM2	\$3,000
Dhrupad Siddhanta (Prosthodontics)	Don Schwass (OS) Basil Al-Amleh (OR) Karl Lyons (OR) Carla Meledandri (Chemistry)	Jan 2015	Dec 2016	Mechanical properties and antibacterial effects of a silver nanoparticle modified glass ionomer restorative material	\$3,000
Muhammed Yakin (Oral Pathology)	Alison Rich (ODSS) Benedict Seo (ODSS)	Jan 2015	Dec 2016	The Relationship between Endoplasmic Reticulum Stress and STAT3 Pathways in Oral Squamous Cell Carcinoma	\$3,000
Sobia Zafar (Paediatric Dentistry)	Dawn Coates (OS)	Jan 2015	Dec 2016	Bisphosphonate Related Osteonecrosis of the Jaw (BRONJ)	\$2,966*
Assil Russell (Endodontics)	Nicholas Chandler (OR) Lara Friedlander (OR)	Oct 2015	Sep 2017	The Butterfly effect: an investigation of sealer penetration and adaptation in filled root canals	\$2,000
Humza Ahmed (Endodontics)	Nicholas Chandler (OR)	Jan 2016	Dec 2017	To investigate the effect of additional sealer application on the continuous wave of condensation obturation technique	\$2,000
Nurul Ibrahim (Oral Pathology)	Alison Rich (ODSS)	Jan 2016	Dec 2017	Oral squamous cell carcinoma (OSCC)	\$2,000
Austin Kang (Student, OS)	Joseph Antoun (OS) Mauro Farella (OS) Li Mei (OS)	Jan 2016	Dec 2017	Assessing three-dimensional tooth movements during orthodontic activations using an E-typeodont	\$2,000
Ovini Masi (Endodontics)	Karl Lyons (OR)	Jan 2016	Dec 2017	Mechanical bonding characteristics of a bioactive composite resin used in two restorative techniques for posterior root filled teeth	\$2,000

Faculty of Dentistry redevelopment

2015

The University approves a major redevelopment, and construction commences on the new Clinical Services Building in 2016.



Research Publications 2015-2016

All data courtesy the Publications & Outputs Office, Research and Enterprise.

Edited Book - Research

Taylor, J. A., & Kieser, J. A. (Eds.). (2016). *Forensic odontology: Principles and practice*. Chichester, UK: John Wiley & Sons, 496p. doi: 10.1002/9781118864418

Drummond, B. K., & Kilpatrick, N. (Eds.). (2015). *Planning and care for children and adolescents with dental enamel defects: Etiology, research and contemporary management*. Berlin, Germany: Springer, 175p. doi: 10.1007/978-3-662-44800-7

Chapter in Book - Research

Bogen, G., Kuttler, S., & Chandler, N. (2016). Vital pulp therapy. In K. M. Hargreaves, L. H. Berman & I. Rotstein (Eds.), *Cohen's pathways of the pulp*. (11th ed.) (pp. 849-876). Elsevier.

Kieser, D. C., Eberhardt, T. L., Dickson, G., & Waddell, J. N. (2016). Applied forensic sciences. In J. A. Taylor & J. A. Kieser (Eds.), *Forensic odontology: Principles and practice*. (pp. 355-376). Chichester, UK: John Wiley & Sons. doi: 10.1002/9781118864418.ch11

Kieser, J. A., Taylor, J. A., Khouri, Z., & Churton, M. (2016). Foundation knowledge in forensic odontology. In J. A. Taylor & J. A. Kieser (Eds.), *Forensic odontology: Principles and practice*. (pp. 1-22). Chichester, UK: John Wiley & Sons. doi: 10.1002/9781118864418.ch1

Adam, L. (2015). Student perspectives on plagiarism. In T. Bretag (Ed.), *Springer handbook of academic integrity*. Singapore: Springer. doi: 10.1007/978-981-287-079-7_67-1

Beumer, J., III, 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.

Beumer, J., III, Faulkner, R. F., Lyons, K., & Okabe, H. (2015). Restoration of edentulous maxillae 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. 115-149). Hanover Park, IL: Quintessence.

Beumer, III, J., Sung, E. C., & Lyons, K. (2015). Implants in irradiated tissues. In J. Beumer, III, R. F. Faulkner, K. C. Shah & P. K. Moy (Eds.), *Fundamentals of implant dentistry: Prosthodontic principles (Vol. 1)*. (pp. 391-404). Hanover Park, IL: Quintessence.

Drummond, B. K., & Harding, W. (2015). Examination and treatment planning for hypomineralized and/or hypoplastic teeth. In B. K. Drummond & N. Kilpatrick

(Eds.), *Planning and care for children and adolescents with dental enamel defects: Etiology, research and contemporary management*. (pp. 99-112). Berlin, Germany: Springer. doi: 10.1007/978-3-662-44800-7

Faulkner, R. F., Beumer, J., III, Shah, K. C., Schwass, D. R., & Wadhvani, C. (2015). Restoration of the posterior quadrants of partially edentulous patients: Examination and prosthodontic procedures. In J. Beumer, III, R. F. Faulkner, K. C. Shah & P. K. Moy (Eds.), *Fundamentals of implant dentistry: Prosthodontic principles (Vol. 1)*. (pp. 231-283). Hanover Park, IL: Quintessence.

Hanlin, S. M., Burbridge, L. A. L., & Drummond, B. K. (2015). Restorative management of permanent teeth enamel defects in children and adolescents. In B. K. Drummond & N. Kilpatrick (Eds.), *Planning and care for children and adolescents with dental enamel defects: Etiology, research and contemporary management*. (pp. 139-155). Berlin, Germany: Springer. doi: 10.1007/978-3-662-44800-7

Mahoney, E. K., & Farah, R. (2015). Molar incisor hypomineralization: Structure, composition, and properties. In B. K. Drummond & N. Kilpatrick (Eds.), *Planning and care for children and adolescents with dental enamel defects: Etiology, research and contemporary management*. (pp. 73-84). Berlin, Germany: Springer. doi: 10.1007/978-3-662-44800-7

Shah, K. C., Beumer, J., III, Faulkner, R. F., Love, R., & Chang, T.-L. (2015). Restoration of the posterior quadrants of partially edentulous patients: Patient selection and treatment planning. In J. Beumer, III, R. F. Faulkner, K. C. Shah & P. K. Moy (Eds.), *Fundamentals of implant dentistry: Prosthodontic principles (Vol. 1)*. (pp. 201-229). Hanover Park, IL: Quintessence.

Smith, L. A., & Gunn, A. C. (2015). Challenging the pervasiveness of heteronormativity. In A. C. Gunn & L. A. Smith (Eds.), *Sexual cultures in Aotearoa New Zealand education*. (pp. 209-239). Dunedin, New Zealand: Otago University Press.

Thomson, W. M. (2015). Subjective aspects of dry mouth. In G. Carpenter (Ed.), *Dry mouth: A clinical guide on causes, effects and treatments*. (pp. 103-115). Berlin, Germany: Springer. doi: 10.1007/978-3-642-55154-3_7

Chapter in Book - Other

Drummond, B. K., & Kilpatrick, N. (2015). Final comments. In B. K. Drummond & N. Kilpatrick (Eds.), *Planning and care for children and adolescents with dental enamel defects: Etiology, research and contemporary management*. (pp. 169-170). Berlin, Germany: Springer. doi: 10.1007/978-3-662-44800-7

Journal - Research Article

- Adam, L., Anderson, V., & Spronken-Smith, R. (2016). 'It's not fair': Policy discourses and students' understandings of plagiarism in a New Zealand university. *Higher Education*. Advance online publication. doi: 10.1007/s10734-016-0025-9
- Ajay Sharma, L., Ali, M. A., Love, R. M., Wilson, M. J., & Dias, G. J. (2016). Novel keratin preparation supports growth and differentiation of odontoblast-like cells. *International Endodontic Journal*, 49(5), 471-482. doi: 10.1111/iej.12476
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- Atieh, M. A., Alsabeeha, N., Tawse-Smith, A., & Payne, A. G. T. (2016). Xenogeneic collagen matrix for periodontal plastic surgery procedures: A systematic review and meta-analysis. *Journal of Periodontal Research*, 51(4), 438-452. doi: 10.1111/jre.12333
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Conference Contribution - Poster Presentation (not in published proceedings)

Avadhani, A., Milne, T., Seymour, G., & Rich, A. (2015, October). *Interleukin-17 induces matrix metalloproteinase activation and invasion in oral cancer*. Poster session presented at the Otago Spotlight Series: Cancer Research, Wellington, New Zealand.

Salmon, D. M., Sullivan, S. J., Johnson, R., Osborne, H., Tong, D., Lodge, E., & Macleod, G. (2015, August-September). *The relationship between neck strength and head impact kinetics in rugby union players*. Poster session presented at the Medical Sciences Congress (MedSci), Queenstown, New Zealand.

Seo, B., Coates, D., Seymour, G., & Rich, A. (2015, October). *Endoplasmic reticulum stress is associated with the modulation of apoptosis-associated unfolded protein response genes in oral squamous cell carcinoma in vitro*. Poster session presented at the Otago Spotlight Series: Cancer Research, Wellington, New Zealand.

Sjoeholm, A., Jackson, P., & MacFadyen, E. (2015, July). *CPAP management of a very preterm infant with complete unilateral cleft lip and palate: Collaborative solutions and recommendations*. Poster session presented at the Perinatal Society of New Zealand (PSNZ) 35th Annual Scientific Meeting, Dunedin, New Zealand.

Conference Contribution - Verbal presentation and other Conference outputs

Ahmadi, R., Smith, L., & Adam, L. (2016, September). *Undergraduate oral health students and teachers' understandings of professionalism*. Verbal presentation at the 15th Annual meeting of the College of Oral Health Academics (COHA): Leading the Way in the Scholarship of Learning and Teaching, Adelaide, Australia.

Cannon, R. (2016, June). *Antimicrobial resistance of fungi in oral microbiota*. Verbal presentation at the 94th General Session of the International Association of Dental Research (IADR), Seoul, Republic of Korea.

Foster Page, L. (2016, June). *The mouth as a site of structural inequalities: An example from dental school curricula*. Verbal presentation at the 94th General Session of the International Association of Dental Research (IADR), Seoul, Republic of Korea.

Idris, G. (2016, November). *Efficacy of a mandibular advancement appliance on sleep disordered breathing in children: A randomised controlled trial*. Verbal presentation at the Women's and Children's Health Research Symposium, Dunedin, New Zealand.

Lyons, K. (2016, August). *Multidisciplinary approach in the management of maxillofacial prosthodontics patients*. Keynote presentation at the Regional Conference on Maxillofacial Prosthodontics, Kuala Lumpur, Malaysia.

Lyons, K. (2016, August). *Restoration of maxillary defects*. Keynote presentation at the Regional Conference on Maxillofacial Prosthodontics, Kuala Lumpur, Malaysia.

Lyons, K. (2016, August). *Restoration of extraoral defects*. Verbal presentation at the Regional Conference on Maxillofacial Prosthodontics, Kuala Lumpur, Malaysia.

Lyons, K. (2016, August). *Case discussion*. Verbal presentation at the Regional Conference on Maxillofacial Prosthodontics, Kuala Lumpur, Malaysia.

Lyons, K. (2016, August). *Live patient demo workshop*. Verbal presentation at the Regional Conference on Maxillofacial Prosthodontics, Kuala Lumpur, Malaysia.

Moffat, S. (2016, May). *From innovative to outdated? New Zealand's School Dental Service 1921-1989*. Verbal presentation at the Te Aō Marama Oranga Niho CPD Hui, Rotorua, New Zealand.

Olson, H., Adam, L., Moffat, S., & Tawse-Smith, A. (2016, September). *Perceived stressors of Bachelor of Oral Health students*. Verbal presentation at the 15th Annual meeting of the College of Oral Health Academics (COHA): Leading the Way in the Scholarship of Learning and Teaching, Adelaide, Australia.

Broadbent, J. (2015, April). *The dental workforce: Retrospection, projections and the road ahead*. Verbal presentation at the Health Workforce Research and Policy Symposium: Questions, Conundrums and the Road Ahead, Wellington, New Zealand.

Broughton, J. (2015, March). *Indigenous advances in oral health research with Maori communities in Aotearoa/New Zealand*. Verbal presentation at the International Association for Dental Research (IADR) General Session and Exhibition, Boston, MA.

Broughton, J. (2015, May). *Oranga niho: An international-lwi-Otago research collaboration*. Verbal presentation at the Hui Poutama: Māori Research Symposium, Dunedin, New Zealand.

Foster Page, L. (2015, March). *Evidence and clinical practice*. Verbal presentation at the International Association for Dental Research (IADR) General Session and Exhibition, Boston, MA.

Thomson, W. M. (2015, March). *Insights from 25 years of epidemiological research into the oral health of older people*. Keynote presentation at the International Association for Dental Research (IADR) General Session and Exhibition, Boston, MA.

Thomson, W. M. (2015, March). *Oral health inequalities in New Zealand*. Verbal presentation at the International Association for Dental Research (IADR) General Session and Exhibition, Boston, MA.

Tong, D. (2015, May). *I don't know what I am doing but let's crack on...* Plenary presentation at the Royal Australasian College of Surgeons (RACS) Annual Scientific Congress, Perth, Australia.

Tong, D. (2015, May). *100 years on: War surgery of the face and jaws*. Keynote presentation at the Royal Australasian College of Surgeons (RACS) Annual Scientific Congress, Perth, Australia.

Tong, D. (2015, May). *New Zealand Expeditionary Force Medical Services at Gallipoli*. Verbal presentation at the Royal Australasian College of Surgeons (RACS) Annual Scientific Congress, Perth, Australia.

Tong, D. (2015, May). *Patterns of maxillofacial injury: Fitting into the big picture*. Verbal presentation at the Royal Australasian College of Surgeons (RACS) Annual Scientific Congress, Perth, Australia.

Tyndall, J. D. A., Sagatova, A., Keniya, M. V., Sabherwal, M., Wilson, R., Negroni, J., ... Monk, B. C. (2015, August-September). *Structural studies of the membrane protein CYP51 reveals resistance mechanism against short-chain azole antifungals*. Verbal presentation at the Queenstown Molecular Biology (QMB) Meetings, Queenstown, New Zealand.

Other Research Output

Inaugural Professorial Lecture

Brunton, P. (2016, April). *It's all about the patients*. University of Otago, Dunedin, New Zealand. [Inaugural Professorial Lecture].

Tong, D. (2016, May). *Faces of war and peace*. University of Otago, Dunedin, New Zealand. [Inaugural Professorial Lecture].

Duncan, W. (2015, July). *Surfaces, screws, smiles: Translational research with dental implants*. University of Otago, Dunedin, New Zealand. [Inaugural Professorial Lecture].

Awarded Doctoral Degree (Staff)

Adam, L. (2015). *Troubling plagiarism: University students' understandings of plagiarism* (PhD). University of Otago, Dunedin, New Zealand.

Moffat, S. M. (2015). *From innovative to outdated? New Zealand's School Dental Service 1921-1989* (PhD). University of Otago, Dunedin, New Zealand. Retrieved from <http://hdl.handle.net/10523/5990>.

2018

New Clinical Services Building

Expected opening of the Clinical Services Building, which will include new facilities for teaching clinics, primary care, multi-disciplinary specialist services and clinical research.



Research degree completions and enrolments

PhD students 2015-16

Students whose degrees have been conferred (i.e those who have been awarded their degree and have graduated) are listed in **bold**

Name	Primary Supervisor	Other Supervisors	Thesis Title	Status (end 2016)
Mohammad Alansary	Prof 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	Under examination
Shaikhah Alsamahi	Dr Lara Friedlander	Dr Trudy Milne, Prof Alison Rich, Dr Haizal Hussaini	Effect of diabetes on dental pulp	Confirmed
Avadhoot Avadhani	Prof Alison Rich	Prof Gregory Seymour, Dr Trudy Milne	Role of IL 17 in the development of oral squamous cell carcinoma	Conferred
Angela Benn	Prof Murray Thomson	Dr Nicholas Heng, A/Prof Jonathan Broadbent	Dental plaque ecology in a New Zealand cohort at ages 32 and 38	Confirmed
Dorothy Boyd	A/Prof Lyndie Foster Page	Prof Murray Thomson	Outcomes of restorative caries management in children in primary care	Provisional
Michael Brosnan	Prof Paul Brunton (to 2016), Prof Tom Brooking (History)	Prof Darryl Tong	Adolescent oral health care in New Zealand and the perceptions of oral health care providers	Provisional
Joanne Choi	Prof Jules Kieser (to 2014), Prof Mauro Farella	A/Prof Neil Waddell, Professor Karl Lyons	Development of intra-oral system to measure pH using wireless microelectronic sensors	Conferred
Therese de Castro	Prof Jules Kieser (to 2014), Prof Warwick Duncan	Dr Michael Taylor (ESR), Dr Debra Carr (Cranfield)	Statistical analysis of bloodstain formation and investigation of the interaction of blood and apparel fabrics	Conferred
Lisa Falland	Prof Paul Brunton	Prof Darryl Tong, A/Prof Neil Waddell	Development of an anatomical head model, using simulant materials, to measure subconcussive brain injury mechanisms	Confirmed
Jennifer Hughes (McDowell)	Prof Jules Kieser (to 2014), Prof Richard Cannon	A/Prof Lynne Hall, Prof Sue Black (Dundee), Prof Abby Smith (Marine Science)	Taphonomic effects on juvenile skeletal remains in a marine environment	Under examination
Ghassan Idris	Prof Mauro Farella	Ms Winifred Harding, Mr Chris Robertson (DSM)	Efficacy of a mandibular advancement appliance on sleep disordered breathing in children	Conferred
Ludwig Jansen van Vuuren	A/Prof Neil Waddell	Prof Warwick Duncan	Development of a simulant model for clinically relevant testing of implant and natural tooth supported all ceramic restorations	Confirmed
Kai Chun Li	Prof David Prior (Geology)	A/Prof Neil Waddell	Microstructure and phase stability of three dental cobalt chromium alloys used for metal-ceramic restorations during thermal processing.	Conferred

Name	Primary Supervisor	Other Supervisors	Thesis Title	Status (end 2016)
Anne-Christine (Anki) Lindstrom	Prof Jules Kieser (to 2014), Prof Warwick Duncan	A/Prof Jurian Hoogerwerff (Chemistry), A/Prof Neil Waddell	Postmortem alterations on skeletonised material recovered from marine environments	Conferred
Sunyoung Ma	Prof Michael Swain (to 2014), Prof Alison Rich	Prof Warwick Duncan	Alveolar ridge resorption and implant prostheses	Confirmed
Golnoush Madani	Prof Richard Cannon	Dr Erwin Lamping, A/Prof Alok Mitra (Auckland)	Biochemical and structural analysis of fungal ABC membrane protein Cdr1p	Confirmed
Hina Narayan	Prof Alison Rich	Dr Trudy Milne, Prof Gregory Seymour, Dr Haizal Hussaini	In vitio effects of cigarette smoke on DNA methylation in oval cells	Deferred
Norhasnida (Anis) Nordin	Prof Murray Thomson	Dr Lyndie Foster Page	Oral health-related quality of life (OHRQoL) in young children and their families	Under examination
Bikiran Pardesi	Dr Geoffrey Tompkins	Dr Nick Heng, Prof Iain Lamont	Identification and characterization of the high-affinity heme-binding site expressed by <i>Porphyromonas gingivalis</i>	Conferred
Andrew Quick	Prof Jules Kieser	A/Prof Gillian Johnson (Physiotherapy)	The influence of orthodontic and orthognathic therapy on mandibular motion	Conferred
Arunjith Ramawarrier	Prof Robert Love	A/Prof George Dias	Biocomposite scaffolds for regeneration of pulp and periapical tissues	Under examination
Syarida Safii	Prof Warwick Duncan	A/Prof Natalie Medicott (Pharmacy), Dr Dawn Coates, A/Prof Geoffrey Tompkins	Subgingivally delivered manuka honey as an adjunct to scaling and root planing in the treatment of chronic periodontitis	Confirmed
Alia Sagatova	Associate Prof Brian Monk	A/Prof Joel Tyndall, Dr Mikhail Keniya	Discovery and development of multifunctional triazole drugs	Conferred
Amira Salem	A/Prof Geoffrey Tompkins	Mr Peter Cathro, Dr Nicholas Heng	Novel therapeutic targets for endodontic infections	Confirmed
Donald Schwass	Prof Jules Kieser	Dr Carla Meledandri (Chemistry), Dr Geoff Tompkins	Novel application of silver nanoparticles for prevention and management of dental caries	Confirmed
Benedict Seo	Prof Alison Rich	Prof Gregory Seymour, Dr Dawn Coates	Unfolded protein response in the tumorigenesis of oral squamous cell carcinoma	Confirmed
Ajay Sharma	Prof Warwick Duncan	A/Prof Neil Waddell	Effect of electrochemically modified titanium-Zirconium alloy implant surface on osseointegration: an in vitro and in vivo study	Conferred
Dara Shearer	Prof Murray Thomson	Prof Richie Poulton, A/Prof Jim Mann	Longitudinal associations between periodontal disease and glycaemic control	Conferred

Name	Primary Supervisor	Other Supervisors	Thesis Title	Status (end 2016)
Vanda Symon	A/Prof Natalie Medicott (Pharmacy)	Dr Susan Heydon (Pharmacy), Prof Jules Kieser (to 2014)	Fact and fiction: Communicating science through the crime fiction of Ngaio Marsh	Under examination
Andrew Tawse-Smith	Prof Warwick Duncan	Prof Michael Swain, Dr Geoff Tompkins	A critical evaluation of titanium particle formation about implants and their role on implant longevity	Confirmed
Janine Tiu	Prof Warwick Duncan	A/Prof Neil Waddell, Dr Basil Al-Amleh	Preparation geometry and its effect on the survivability of full crowns	Conferred
Noel Ye Naung	Prof Warwick Duncan	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
Diogo Zaniccotti	Prof Warwick Duncan	Dr Dawn Coates, Prof Gregory Seymour	Adipose-derived stem cells for bone regeneration around titanium implants	Conferred

DClinDent completions 2015-16

Name	Discipline	Completed	Primary Supervisor	Other Supervisors	Thesis Title
Shreya Aggarwala	Endodontics	2016	Prof Robert Love	A/Prof Brian Monk	The antimicrobial efficacy of the antimicrobial peptide, BM2 in an ex vivo model
Azza Al-Ani	Orthodontics	2016	Dr Joseph Antoun	Prof Mauro Farella, A/Prof Tony Merriman, Prof Murray Thomson	Finding the missing link for hypodontia
Mohamad Al-Dujaili	Orthodontics	2015	Prof Mauro Farella	Dr Trudy Milne, Prof Richard Cannon	Growth factor expression in the rat condyle; implications for craniofacial development
Olivia Apperley	Special Needs Dentistry	2015	Prof Jules Kieser & A/Prof Maggie-Lee Huckabee	Ms Eithne MacFadyen, Prof Natalie Medicott, Prof Alison Rich	Management of xerostomia following radiotherapy: a randomised, double blind, crossover trial of a novel emulsion for use as a saliva substitute
Angel Babu	Paediatric Dentistry	2016		Prof Bernadette Drummond	Comparison of the orofacial characteristics in children who are habitual snorers and children with no history of snoring – A descriptive study
Gareth Benic	Orthodontics	2016	Dr Li (Peter) Mei	Dr Nicholas Heng, Prof Mauro Farella	Efficacy of the oral probiotic Streptococcus salivarius in managing biofilm formation in patients wearing fixed orthodontic appliances: A double-blind randomized placebo-controlled trial
Catherine Carleton	Orthodontics	2016	Dr Joseph Antoun	A/Prof Julia Horsfield (Pathology, DSM), Prof Mauro Farella	A novel model for exploring the causes and treatment of craniofacial birth defects in children

Name	Discipline	Completed	Primary Supervisor	Other Supervisors	Thesis Title
Kullasit Chutipongpisit	Oral Pathology	2016	Prof Alison Rich	Dr Praveen Parachuru, Dr Haizal Hussaini, Dr Lara Friedlander	Lymphangiogenesis in oral squamous cell carcinoma
James Dawson	Periodontics	2016	A/Prof Jonathan Leichter	Andrew Tawse-Smith, Dr Geoffrey Tompkins	Effect of diode laser irradiation on viability of bacteria in a non-periodonal-biofilm whilst on various titanium implants surface
Arpana Devi	Endodontics	2016	Prof Robert Love	A/Prof Brian Monk	Enhancing the efficacy of antimicrobial peptide, BM2
Yana Itskovich	Orthodontics	2016	Prof Mauro Farella	Prof Murray Meikle, Dr Trudy Milne, Prof Richard Cannon	A new approach to engineering 3-dimensional constructs of human bone matrix in a mechanically-active environment
Seung Young (David) Ko	Periodontics	2015	Prof Warwick Duncan	A/Prof Jonathan Leichter, Don Schwass, Andrew McNaughton	The accuracy of CBCT to determine tissue development within grafted maxillary sinus, using sheep model
Leonid Lander (Khimovich)	Periodontics	2015	Prof Warwick Duncan	A/Prof Jonathan Leichter, Prof Patrick Schmidlin (Zurich)	Evaluation of novel bone replacement grafting products for tooth socket preservation in a sheep animal model
Coreen Loke	Orthodontics	2016	Prof Mauro Farella	A/Prof Sylvia Sander (Chemistry)	Wireless monitoring of intra-oral pH
Katy Mclaughlin	Periodontics	2015	Dr Dawn Coates	A/Prof Mary Cullinan, Prof Greg Seymour	BRONJ: The effects of zoledronic acid on the VEGF receptors and implications for osteoblast growth and maturation)
Lydia Meredith	Orthodontics	2015	Dr Li Mei	Prof Mauro Farella, Prof Ricahrd Cannon	The influence of enamel surface roughness on bacterial adhesion
Wan Mohamed Thani	Special Needs Dentistry	2015	Eithne MacFadyen	Prof Alison Rich, Prof Richard Cannon	Are patients on antipsychotic drugs at risk of developingazole-resistant oral candidal infection?
Dhrupad Siddhanta	Prosthodontics	2015	Don Schwass	Dr Basil Al-Amleh, Dr Carla Meledandri (Chemistry), Prof Karl Lyons	Mechanical properties and antibacterial effects of a silver nanoparticle modified glass ionomer restorative material
Peng Sim (Patrick) Wong	Prosthodontics	2016	A/Prof Neil Waddell	Prof Karl Lyons	Interventions for replacing missing teeth: oral implants in molar extraction sockets (delayed, early and immediate placement) restored with single implant crowns
Muhammed Yakin	Oral Pathology	2015	Prof Alison Rich	Dr Benedict Seo, Dr Haisal Hussaini	The differential expression of STAT3 pathway genes under ER stress in OSCC
Sobia Zafar	Paediatric Dentistry	2016	Prof Bernadette Drummond	Dr Dawn Coates, A/Prof Mary Cullinan, Prof Greg Seymour	The role of osteoclasts in Bisphosphonate Related Osteonecrosis of the Jaw

Enrolled DClindEnt students

Name	Discipline	Primary Supervisor	Other supervisors	Project title	Commenced
Nawal Radhiah Abdul Rahman	Oral Pathology	Prof Alison Rich	Dr Benedict Seo, Dr Haizal Hussaini	Expression of the Lysyl Oxidase family in odontogenic lesions	2015
Hassan Ahmed	Prosthodontics	Prof Paul Brunton	Dr Carolina Loch, Prof Karl Lyons	A novel approach to treat root cavities in the elderly	2016
Humza Ahmed	Endodontics	Prof Nicholas Chandler	Peter Cathro	The effect of an additional application of sealer during continuous wave of condensation obturation	2015
'Adil Al Kharusi	Oral Medicine	Dr Haizal Mohd Hussaini	Prof Alison Rich	Expression of STAT3, IL17, IL23 and IL22 in metastasised lymph nodes of OSCC	2015
Abdullah Barazanchi	Prosthodontics	A/Prof Neil Waddell	Dr Kai Chun Li, Dr Basil Al-Amleh, Prof Karl Lyons	3D printed CoCr for prosthodontic applications	2015
Sy Yin (Adeline) Chai	Prosthodontics	A/Prof Vincent Bennani	John Aarts, Prof Karl Lyons	The effect of preparation design on stress distribution and fracture strength of porcelain laminate veneers	2016
Deepak Chellappa	Endodontics	Peter Cathro		Comparing the antimicrobial efficacy of contemporary irrigation techniques in curved root canals	2016
Maggie Hsiao-Mei Chen	Prosthodontics	Dr Sunyoung Ma	A/Prof Andrew Tawse-Smith, Prof Karl Lyons	Accuracy and the clinical significance of torque-limiting devices for dental implants	2016
Leonard Chia	Special Needs Dentistry	Prof Darryl Tong	A/Prof Lyndie Foster Page, Prof Murray Thomson	Clinicians' perspective on special needs dentistry in New Zealand	2015
Abbey Corbett	Paediatric Dentistry	A/Prof Lyndie Foster Page	Prof Nick Chandler, Prof Bernadette Drummond, Mike Brosnan	TBC	2016
Fiona Firth	Orthodontics	Prof Mauro Farella	Dr Trudy Milne, Dr Benedict Seo	A mechanical strain model for the assessment of periodontal ligament cell endoplasmic reticulum stress in three-dimensional culture	2015
William Fogarty	Paediatric Dentistry	Prof Murray Thomson	Mike Brosnan	Adolescent oral health in New Zealand in 2009	2015
Poppy Horne	Periodontology	A/Prof Lyndie Foster Page	A/Prof Jonathan Leichter, Prof Murray Thomson, Dr Ellie Knight	Psychosocial aspects of periodontal disease diagnosis and treatment	2016
Nurul Ruziantee Ibrahim	Oral Pathology	Prof Alison Rich	Dr Benedict Seo, Dr Haizal Hussaini	Lymphangiogenesis in metastatic lymph nodes of oral squamous cell carcinoma	2016
Austin Kang	Orthodontics	Prof Mauro Farella	Dr Joseph Antoun, Dr Li Mei, Dr Azam Ali (Applied Science)	Three-dimensional tooth movement assessment using an E-typodont	2016

Name	Discipline	Primary Supervisor	Other supervisors	Project title	Commenced
Victoria (Yur'Evna) Kashchuk	Paediatric Dentistry	A/Prof Geoffrey Tompkins	Dorothy Boyd, Prof Bernadette Drummond	Effect of 'MGO™ 400+ Manuka Honey with Cyclopower™' on dental plaque activity and gingival health in young adults	2015
Caleb Lawrence	Orthodontics	Prof Mauro Farella		Developing a lateral cephalic norm for NZ Māori	2016
Ana Low	Orthodontics	Dr Joseph Antoun	Dr Li Mei, A/Prof Geoff Tompkins, Prof Mauro Farella	The effect of removal of excess composite around orthodontic brackets	2016
Ovini Masi	Endodontics	Prof Karl Lyons	A/Prof Neil Waddell, Peter Cathro	Mechanical characteristics of a bioactive resin modified glass ionomer used in two restorative techniques for root filled teeth	2015
Hitesh Navani	Endodontics	Dr Lara Friedlander	Dr Haizal Mohd Hussaini, Prof Alison Rich, Dr Trudy Milne	Angiogenesis in the apical papilla of immature permanent teeth	2015
Soo-Wee Ong	Oral Surgery	A/Prof Rohana De Silva		Third molar surgical outcomes: a comparison between intravenous sedation and general anaesthesia	2015
Aravind Parachuru Venkata	Paediatric Dentistry	Prof Bernadette Drummond	Dr Nicholas Heng, Ms Alison Meldrum	Review of OH & OHR Q of L 5 years following comprehensive care under GA for early childhood caries	2016
Divya Ramanan	Orthodontics	Prof Mauro Farella		TBC	2016
Frances Ruddiman	Periodontology	Prof Warwick Duncan	A/Prof Jonathan Leichter, Prof Patrick Schmidlin	Dental implant abutment-interface seals that prevent marginal bone loss: an intra-oral in vivo study in the mandible of sheep	2015
Assil Russell	Endodontics	Prof Nicholas Chandler	Dr Lara Friedlander	The butterfly effect: An investigation of sealer penetration, adaptation and crack formation in filled root canals	2015
Nina Scott	Endodontics	Prof Murray Thomson	Peter Cathro	Dental trauma in New Zealand adults: a secondary analysis of national survey and ACC data	2015
William Sew Hoy	Orthodontics	Prof Mauro Farella	Dr Joseph Antoun, Prof Nick Chandler	Genetic and psychological factors associated with orthodontic pain	2015
Yevgeny (Eugene) Sheftel	Periodontology	Prof Warwick Duncan	A/Prof Jonathan Leichter, Prof Patrick Schmidlin	Evaluation of novel bone replacement grafting products for maxillary sinus augmentation in a sheep model	2015
Allauddin Siddiqi	Periodontology	TBC		TBC	2016
Adlin Suhaimi	Special Needs Dentistry	Prof Alison Rich	A/Prof Jonathan Broadbent	Pre-radiation dental assessment of head and neck cancer patients	2015

Masters completions 2015-16

Name	Programme	Supervising Department	Completed
Ahmed Al Wabari	Master of Dental Technology	Oral Rehabilitation	2015
Wendy Jansen Van Vuuren	Master of Dental Technology	Oral Rehabilitation	2015
Sunitha Gowda	Master of Community Dentistry	Oral Sciences	2016
Geoffrey Hunt	Master of Community Dentistry	Oral Sciences	2016

Masters enrolments as of end 2016

Name	Programme	Supervising Department	Status
Ellen Clark	Master of Community Dentistry	Oral Sciences	Under examination
Donna Kennedy Langley	Master of Community Dentistry	Oral Sciences	Under examination

Summer research studentships

Each year the Division of Health Sciences offers Summer Research Scholarship Programmes, which involve undergraduate students completing a ten-week research project over the summer break in an area of interest to them such as clinical or laboratory-based research, biomedical science, ethics, or public health. The following students were awarded studentships and undertook summer research projects within the SJWRI/Faculty of Dentistry over the summers of 2014-15 and 2015-16:

2014-15

KHAI HOW CHOO

Which *Candida albicans* strains adhere to acrylic dentures?

Supervisors: Prof Richard Cannon, Dr Ann Holmes, Dr Hee Ji Lee, Dentistry

Funder: Otago Medical Research Foundation – Lions Club of Dunedin South

Candida albicans is the principal fungal cause of denture stomatitis – inflammation of the mucosa beneath dentures. The ecology of *C. albicans* strains causing denture stomatitis is poorly understood. We used multilocus sequence typing to track changes in the *C. albicans* strains in the mouths of people following delivery of new dentures. We found *C. albicans* strains that were common to several individuals. Some people had more than one strain type. Some strains were maintained in individuals for up to six months despite renewal of dentures, others were acquired during the study. There was preliminary evidence for strain microevolution with time.

DANYON GRAHAM

The effect of second-site mutation on triazole resistance in yeast

Supervisor: A/P Brain Monk, Dentistry

Funder: Otago Medical Research Foundation – Crowe Horwath

Fungal infections caused by drug resistant fungi are a serious and growing public health concern. Mutations in yeast lanosterol 14 α -demethylase (Erg11p) reduce susceptibility to triazole drugs, severely limiting therapeutic options. A *Saccharomyces cerevisiae* hyper-expression system was used to investigate the effects of two common, clinically relevant mutations (Y140H and I471T) in Erg11p. Cell-based analysis revealed that the Y140H + I471T double mutation conferred resistance to short-tailed but not long-tailed triazole drugs. The chemistry of the linkage between the triazole head group and the rest of the drug, together

with a long tail, may stabilise the drug in the binding pocket and limit the desensitising effect of the double mutation. Improved design of long-tailed azole drugs may lead to a new generation of antifungals that will circumvent the resistance problem.

JOANNE LEE

Extracellular cysteine residues contribute to the structural and functional integrity of the *Candida albicans* multidrug efflux pump Cdr1p

Supervisors: Dr Erwin Lamping, Prof Richard Cannon, Dr Hee Ji Lee, Dentistry

Funder: Division of Health Sciences

Candida albicans is the most common cause of hospital-acquired fungal infections and is often life-threatening in immunocompromised patients, especially for multidrug resistant isolates overexpressing the archetypal fungal multidrug efflux pump Cdr1p. Despite its importance, little is known about Cdr1p structure and function. This project studied the significance of six invariable cysteines in the large extracellular loops of Cdr1p. Replacing each cysteine with a serine affected either the function and/or folding and trafficking of the protein to the cell surface, consistent with the notion that conserved extracellular cysteines often contribute to the structural and/or functional integrity of integral membrane proteins.

2015-16

SARAH EBBELING

Barriers to learning in the clinical environment: Dental students' perspectives

Supervisors: Alison Meldrum, Dr Lee Adam, Prof Alison Rich, Faculty of Dentistry

Funder: Faculty of Dentistry

Continuous identification of barriers that are hindering students' education is essential for effective teaching and learning. This study explored students' experiences in the clinical dental setting. Students described how a lack of consistency in the Dental School, the grading system and the nature of self-assessment restricted their learning. Differences in tutor teaching styles, approachability and interest in teaching were also discussed in relation to how this facilitated or hindered learning. The barriers to learning that the data identified pose a range of challenges to dental educators in their endeavour to create the most effective teaching and learning environment.

DANYON GRAHAM

The molecular basis of triazole inhibition of an antifungal target

Supervisors: A/P Brian Monk, Dr Rajni Wilson, Faculty of Dentistry

Funder: Otago Medical Research Foundation - Healthcare Otago Charitable Trust

Mutations in yeast lanosterol 14 α -demethylase (Erg11p) can reduce the susceptibility of pathogenic fungi to the well-tolerated and widely-used triazole drugs, limiting therapeutic options. A *Saccharomyces cerevisiae* hyperexpression system was used to investigate the effects of two common, clinically relevant mutations (Y140H and I471T) in Erg11p. Cell-based and molecular analysis revealed that the Y140H + I471T double mutation conferred resistance to short-tailed but not medium or long-tailed azoles. The chemistry of the linkage between the haem-bound triazole head group and the rest of the drug, together with a medium length tail, may stabilise the drug in the binding cavity and limit the desensitising effect of the double mutation. Improved design of medium-tailed azole drugs may lead to a new generation of antifungals that will circumvent the resistance problem.

ALI HYESOO HAN

Development of an electronic catalogue for animal remains located in the Faculty of Dentistry Dental Anatomy Museum

Supervisors: Dr Carolina Loch, Dr Jonathan Broadbent, Dr Praveen Parachuru, Faculty of Dentistry; Dr Sian Halcrow, Anatomy

Funder: Faculty of Dentistry

The Dental Anatomy Museum has operated using an incomplete and undetailed hardcopy catalogue. An electronic catalogue of the Comparative Anatomy Section was developed to begin completely cataloguing the collection. Specimens were identified, matched to original entries, catalogued onto Ehive, photographed, labelled, packed, ordered and stored. 398 specimens were present in 83 taxonomic groups with total area of 93,851 cm². The jaw was the most common object type. The catalogue allows improved facilitation of education and research, achieving standards in collection management, building public trust, possibly attracting donors and funders and aiding its curation and the Dental School Building Project.

HARITH F HASSAN

Identifying essential amino acid residues in the antifungal target, Erg11p

Supervisors: Dr Mikhail Keniya, A/P Brian Monk, Faculty of Dentistry

Funder: Division of Health Sciences

The emergence of resistance to antifungal drugs, particularly the widely-used azoles, has become a major problem for both public health and agriculture. Azoles inhibit lanosterol 14 α -demethylase (Erg11p), a key enzyme in the production of ergosterol which is required for growth of fungi. In this study, we conducted alanine mutagenesis of four conserved amino acid residues of *Saccharomyces cerevisiae* Erg11p. The mutagenesis suggests that the amino acid residues are not required for normal function of Erg11p. Instead, the mutations conferred an increased susceptibility to short-tail but not long-tail triazoles that is not explained by a modest reduction in the level of expression of mutant Erg11p.

CHUEN LIN HONG

Searching for harmless mouth bacteria capable of killing disease-causing bacteria

Supervisors: Dr Hee Ji Lee, Dr Erwin Lamping, Prof Richard Cannon, Faculty of Dentistry

Funder: Division of Health Sciences

Previous studies have shown that some harmless streptococcal bacteria commonly found in the mouth can help protect against strep throat infections by inhibiting the growth of disease-causing streptococci. In this study, 50 of these harmless streptococci were tested on two different agar media for their inhibitory activity against bacteria capable of causing two serious infections of childhood - diphtheria and middle ear infections. Higher proportions of harmless bacteria inhibited the disease-causing bacteria on agar medium supplemented with yeast extract than on blood-containing agar medium. Future studies should try to identify the inhibitor-enhancing factor present in yeast extract.

JIN YUET (JEANETTE) LEE

Development of an electronic database for the human remains in the Dental Anatomy Museum

Supervisors: Dr Jonathan Broadbent, Dr Praveen Parachuru, Faculty of Dentistry; Dr Sian Halcrow, Anatomy OSMS

Funder: Faculty of Dentistry

The A.M. Carter Collection at the Faculty of Dentistry is the only dedicated collection of dental-related anatomy specimens in New Zealand. Upcoming disturbances associated with the redevelopment of the Walsh Building created an urgent need to review the collection – something that has not been done for many years. In this project, the current status of the human anatomy specimens was investigated. The storage and care of specimens was considered in light of guidelines provided the New Zealand Museums Standards Scheme and the Human Tissue Act (2008). It is anticipated that the research carried out in this project will facilitate ongoing research and teaching in the Faculty of Dentistry.

CHANTELLE ROSSOUW

Finding the genes that cause open bite of the teeth

Supervisor: Prof Mauro Farella, Dr Joseph Antoun, Azza Al-Ani, Florence Bennani, Faculty of Dentistry; Prof Tony Merriman, Biochemistry OSMS

Funder: Otago Medical Research Foundation - Southern Trust

The purpose of this study was to investigate the association between anterior open bites (AOBs) and genetic factors and to determine the facial traits of AOB patients. Nineteen AOB patients and 73 control patients were identified using radiographic tracing techniques. DNA was then extracted from existing blood samples of each patient and genetic analysis was completed on the growth hormone receptor (GHR) gene. A significant preliminary association between AOBs and the GHR gene was discovered from the genetic analysis. Further, it was found that the gonial angle and overbite depth indicator (ODI) were characteristic facial traits of open bite patients. Although individual facial traits are the result of many small underlying factors, a significant association between such AOB cases and the GHR gene may provide predictive measures for such patients in the future.

ANNIE VAN WICHEN

Understanding the structure of multi-drug efflux pump Cdr1p in the fungal pathogen *Candida albicans*

Supervisors: Dr Erwin Lamping, Dr Hee Ji Lee, Faculty of Dentistry

Funder: Otago Medical Research Foundation - Southern Victorian Charitable Trust

Over-expression of the model fungal multidrug efflux pump Cdr1p, found in the major opportunistic fungal pathogen *Candida albicans*, causes multidrug resistance. This has the potential for serious consequences such as prolonged treatment or even death for the infected patient. The aim of this project was to determine whether we could employ the novel NanoBRET™ technology developed by Promega Corporation, Wisconsin, USA, to investigate possible homo-dimerization of Cdr1p in live cells. For this purpose we created a genetically modified yeast strain that over-expressed Cdr1p to which a NanoBRET molecule was physically linked. The results from these experiments confirmed, for the first time, that the highly sensitive and robust NanoBRET technology could be used in yeast cells. We also confirmed that Cdr1p function was not significantly altered by the NanoBRET extension. We can now proceed to investigate Cdr1p homo-dimerisation in live yeast cells.

FAY (XUEFEI) YAN

Overcoming bad breath with good bacteria

Supervisors: Prof Richard Cannon, Dr Li Mei, Prof Mauro Farella, Faculty of Dentistry

Funder: Otago Medical Research Foundation

Bad breath is a significant social stigma for many people. Good bacteria, called probiotics, have been used to treat diseases of the mouth such as tooth decay. The tongue's rough surface provides a large area on which bad breath-generating bacteria can live. Tongue brushing can reduce bacteria on the tongue. The purpose of this study was to investigate the effect of tongue brushing and/or taking lozenges of good bacteria on reducing bad breath. Volunteers (35) either did tongue brushing and/or took good bacteria lozenges or nothing for 4 weeks. Various measures of bad breath were recorded at three stages (at the start, after 4 weeks, and after 8 weeks). Bad breath was reduced by 31%, 26% or 30% in the groups using tongue brushing, probiotics or the combined treatment, respectively. Our preliminary results suggest that tongue brushing and/or use of good bacteria may reduce the level of bad breath.

BDS Honours research students

2014/15

Student name	Supervisors	Project title	Scholarship funder
Sharifa Al Balushi	Dr Li (Peter) Mei, Prof Mauro Farella, Dr Janet Rountree	Implementation of a questionnaire based on patients' satisfaction within the Orthodontic Clinic at the University of Otago	Faculty of Dentistry
Ahmad Al-Hassiny	Dr Lara Friedlander, Prof Alison Rich, Dr Praveen Parachuru, Dr Haizal Hussaini	Angiogenesis in healthy and inflamed dental pulps	NZ Dental Association
Kyoung Hoon (Kenny) Kim	Dr Donald Schwass, Dr Neil Waddell, Dr Geoffrey Tompkins	Effect of Dental Ceramic Surface Characteristics on Biofilm Growth and Wettability	Auckland Dental Association
Yindi Jiang	A/Prof Lyndie Foster Page, Prof Karl Lyons, A/Prof Jonathan Broadbent	Different shades of grey: To drill or not to drill?	Faculty of Dentistry
Jeffrey Ong	Dr Lara Friedlander, Ms Suzanne Hanlin, Dr Ben Daniel	Practices and philosophies towards vital pulp therapy- a PBRN study	NZ Dental Association
Nicholas Pittar	A/Prof Darryl Tong, A/Prof Neil Waddell, Taylor Winter, Lisa Falland	Scalp simulation – a novel approach to site-specific biomechanical modelling of the skin	NZ Dental Association
Haris Redzepagic	A/Prof Jonathan Broadbent, Dr John Hamilton, Bridget Heer	Oral fitness and the Adolescent Oral Health Scheme	Faculty of Dentistry

2015/16

Student name	Supervisors	Project title	Scholarship funder
King Chung (Jonathan) Chu	A/Prof Vincent Bennani, Mr John Aarts, A/Prof Nick Chandler, Mr Andrew Gray, Dr Bronwyn Lowe	The effect of different geometric shapes and angles on fracture strength of IPS e.max milled ceramic onlays	NZDA Sir John Walsh Scholarship
Calum Fisher	A/Prof Lyndie Foster Page, Dr Jimmy Zheng, Prof John McMillan, Prof Karl Lyons	Development of a measure of social accountability in dentistry	NZDA RC Tonkin Scholarship
Allen Hu	Dr Harsha De Silva, Prof Richard Cannon	A study of Candida albicans strains in lesions of Oral Squamous Cell Carcinoma (OSCC) and in Oral Potentially Malignant Disorders (OPMD)	NZDA RC Tonkin Scholarship
Carrol Jin	Dr Li Mei, Mrs Florence Bennani, Mr Andrew Gray, Prof Mauro Farella	Survival analysis of different retainers – a clinical audit	Auckland Dental Association Scholarship
Daniel Sim	A/Prof Lyndie Foster Page, Prof Murray Thomson, Dr Clair Cameron	Exploring socioeconomic status differences in young children's oral health	NZDA Sir John Walsh Scholarship

SJWRI seminars 2015-16

Presenter	Institution	Date	Title of Seminar
Dr Konstantinos Michalakis	Aristotle University School of Dentistry	5 August 2015	Predictably addressing patients' aesthetic needs: a real challenge
Dr Antonio Barone	School of Dental Medicine University of Pisa	11 August 2015	Bone Healing
Prof Svante Twetman	Faculty of Health Medical Sciences University of Copenhagen	18 August 2015	Oral Biofilms in Health and Disease
Paul Wong	PhD Candidate University of Sydney	15 September 2015	Simulating dental biomechanics using finite element analysis
Marco Esposito	Freelance Researcher	12 October 2015	Diagnosis and treatment of peri-implantitis: from the scientific evidence to personal opinions
Prof Paula Moynihan	Centre of Oral Health Research Newcastle University	20 October 2015	Sugars: effect on dental caries, policy on intake and strategies for reduction
Prof Roman Maev	Institute for Diagnostic Imaging University of Windsor, Canada	12 November 2015	Recent advances in diagnostic ultrasonics
Ralf Jaeger	University of Greifswald	21 January 2016	Estimating future dental services' supply & demand in Northern Germany in 2030
A/Prof Falk Schwendicke	Charite Dental Hospital, Germany	21 January 2016	Evidence Translation: Oneway road or roundabout – the example of caries removal
Moiria Smith	Health Promotion and Policy Research Unit Department of Public Health, University of Otago Wellington	26 April 2016	Confronting children's cariogenic environments – A view from the inside
A/Prof Praveen Arany	School of Dental Medicine University at Buffalo, NY	13 June 2016	Therapeutic biophotonics in dentistry: From antimicrobial to stem cell regeneration
Dr Xuebin Yang	Leeds Dental Institute University of Leeds, UK	15 August 2016	Stem cell therapy & skeletal tissue engineering – Clinical reality
Prof Sabine Sten	Department of Archaeology & Ancient History Uppsala University Campus Gotaland, Sweden	19 October 2016	What can archaeological teeth from cattle and humans tell us about age and tooth ache
Prof Ananda Dasanayake	Department of Epidemiology New York University College of Dentistry	21 November 2016	Oral Health and systemic diseases: Unfinished business
Prof Sungho Park	Department of Conservative Dentistry Yonsei University, Seoul, Korea	24 November 2016	Pulpal blood flow measurement using ultrasound doppler imaging

2019

Completion of the Redevelopment

The completion of the full interior refurbishment of the Walsh Building and New Zealand's National Centre for Dentistry, providing quality dental care, research informed teaching and internationally recognised research.



