Showcasing the best of postgraduate research at the University of Auckland

14 - 17th OCTOBER 2013

Programme

Presented by the University of Auckland's Postgraduate Students' Association and the School of Graduate Studies

www.auckland.ac.nz/exposure
Exposure began as a PGSA initiative in 2003. Now organised with the School of Graduate Studies, Exposure is an opportunity for postgraduate students to showcase their work to an audience, gain public recognition, receive feedback and network with employers.

Students can enter the following categories:
1. Poster Display
2. Oral Presentation
3. Variety Showcase

The winners and two runners up from each category receive generous cash prizes.

All events are open to members of the public.

About the PGSA

The Postgraduate Students’ Association is an incorporated society dedicated to strengthening the postgraduate community at the University of Auckland.

The association is run by a board of representatives from each faculty. Our vision is to create and foster a sense of identity and community for all postgraduate students and provide an effective voice promoting the distinct and unique academic, professional and school interests of postgraduates within the University and the wider community.

About the School of Graduate Studies

The School of Graduate Studies is located at the Graduate Centre in the East Wing of the Clock Tower on the City Campus. The University’s Dean of Graduate Studies and Postgraduate Advisers are located in the Graduate Centre.

The staff advise current and prospective postgraduate students on regulations, admission and enrolment, doctoral administration and examination processes, thesis submission, annual report processes and dispute procedures.

The School of Graduate Studies also produces regular e-newsletters to both postgraduate students and staff, and runs the annual 3 Minute Thesis competition.
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Vice-Chancellor (Research)

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Roisin Bennett
Marinus Ferreira
Yan Guo
Vladimir Krstic
Natalie McGuire
Hadas Ore

Business School
Amrita Lal

Faculty of Education
Sue Smith

Faculty of Engineering
Sharidah Abdul Azis
Luqman Bachtiar
Chrislyn Braganza
Ronald Ping Man Chan
Jichao Chen
Arash Farjoood
Emily Hargrave-Thomas
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Jun Shariffuddin
Howard Wang
Sahan Wasala

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John Bai

Faculty of Medical and Health
Sciences
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Lucy Goodman
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The University of Auckland
Society Poster Competition
Abstracts

Faculty of Arts
Yan Guo
Samantha Lagos

Business School
Amrita Lal

Faculty of Engineering
Sharidah Abdul Azis
Luqman Bachtiar
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John Bai
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Abstracts

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Anaise Irvine
Michelle Johansson
Sarah Kiernan

Faculty of Education
Jane Luton

Faculty of Medical and Health Sciences
Prachi Didmishe

National Institute of Creative Arts and Industries
Val Smith
Sorawit Songsataya
Sophie Williams
Rewa Wright
Kimberley Young

Faculty of Science
Norliza Julmohammad
Jacob Martin

Maps
City Campus
Musgrove Studio
WELCOME LETTER

Kia Ora!

It gives me great pleasure to welcome you to the Postgraduate Students’ Association eleventh annual research exposition: Exposure. This forum allows your fellow students, professors, and the general public to see, and indeed celebrate, the ground-breaking postgraduate research being undertaken at the University.

The Postgraduate Students’ Association is dedicated to providing a sense of belonging within our community to encourage students to challenge themselves and thrive at the University of Auckland. Exposure is an avenue to do this by allowing postgraduate students the ability to showcase their research, network with fellow students, and develop their communication and presentation skills.

I would like to thank this year’s sponsors, for without them Exposure would be impossible: Fisher & Paykel Healthcare, The University of Auckland Society, Douglas Pharmaceuticals, Copy and Print and Displayways.

Special thanks also to the University faculties as well: Faculties of Arts, Business, Education, Engineering, Medical and Health Sciences and Science. Thanks also to our Exposure Chair Sarah Knox, and the committee who spent many hours tirelessly planning these events along with volunteers from the PGSA and School of Graduate Studies. They all have worked for several months to put together an exciting and enlightening Exposure 2013.

A hearty welcome to our participants and judges, alongside visitors from the University and beyond. I wish all the participants good luck with their presentations, posters, and variety performance. On behalf of the Exposure Committee and the PGSA, we all hope you have an enjoyable, stimulating, and eye-opening experience at Exposure 2013.

Yours sincerely,

Rob Tedesco
PGSA President
LETTERS OF SUPPORT

Since 2003, Exposure has showcased research carried out by postgraduate students at the University of Auckland. Masters and doctoral students have enlightened, entertained and enthralled audiences with their poster displays, oral presentations, live performances, and through multimedia. I am sure that entries this year will do the same.

With over 2000 doctoral students and several hundred research masters students, the University of Auckland is a hotbed for postgraduate research. The theses being written, and the creative works being produced, will benefit our society, economy and nation.

The School of Graduate Studies is delighted to work with the Postgraduate Students’ Association on Exposure 2013. On behalf of the School I would like to thank all of those who have made this exposition possible, from the organisers to the presenters, the sponsors to the judges. I am sure that Exposure 2013 will be a huge success.

Associate Professor Caroline Daley
Dean of Graduate Studies

Celebrating academic excellence for the eleventh successive year, Exposure is established as a key contributor to core activities at the University of Auckland.

As the country’s leading research-led University, the University of Auckland is committed to supporting excellent research and research-led teaching. Research is an exciting endeavour, and events like Exposure are vital in encouraging many of our brightest emerging researchers in their fields.

The University of Auckland seeks to promote intellectual independence in a world-class research environment, where passion for exploration, eagerness to succeed and strong work ethics are valued as the mainstays of research excellence. Exposure promotes these attributes in an exciting way.

From the ranks of our postgraduate students today, distinguished research leaders will emerge, equipped with knowledge and understanding of our increasingly globalised world. They will develop ideas that will shape our society’s future. Their vision will become our reality. The University of Auckland strives to prepare its postgraduate students for their upcoming tasks by encouraging them to reflect on current knowledge, integrating teaching with research strengths, and providing them with the best possible technologies.

In giving postgraduate researchers the chance to showcase their work at Exposure, the Postgraduate Students’ Association is making an important contribution to fostering academic distinction and research excellence.

I would like to thank the Postgraduate Students’ Association for organising yet another magnificent exposition of our research students’ talents and accomplishments. My congratulations and best wishes go to all participants in this marvellous event.

Distinguished Professor Jane Harding
Deputy Vice-Chancellor (Research)
EXPOSURE COMMITTEE

Roxana Alvaradou Oral Competition Team Leader
Jennifer Gao Marketing Lead and Oral Competition Team Member
Susannah Godbaz Oral Competition Team Member
Muhammad Jamaluddin Variety Showcase Team Leader
Sarah Knox Exposure Chair and Variety Showcase Team Leader
Emma Farmer Registrations Lead
Sharan Liew Minutes and Poster Team Member
Thea Lyle PGSA Administrator
Alizera Nejati Exposure Deputy Chair and Oral Competition Team Member
Penny Newton Communications and Events Officer, School of Graduate Studies
Melody Runge Poster Team Leader
Zarqa Shaheen Oral Competition Team Member
Paul Smith Variety Showcase Team Member

EXPOSURE JUDGES 2013

Margaret Allen
Professor Andrew Barrie
Chris Berry
Helen Borne
Jane Bradley
Naomi Bradshaw
Dr Susan Carter
Dr Lisa Chant
Gabriella Davila
Dr Christine Dureau
Megan Fowie
Helen Gallot
Dr Bernard J. Guillemin
Liz Hardiman
Dr Annette Keogh
Catherine Kerins
Denise Lazelle
Associate Professor Corinne Locke
Gretchen Lutz-Spalinger
Dr Rose Martin
Dr Steve Matthewman
Marie McEntee
Dr Michael Neve
Jennie Oakley
Frazer Orr
Michelle Park
Dr Te Oti Rakena
Christopher Rollins
Kristal Sawatzke
Laura Shepherd
Mark Shore
Evelien Van Vliet
Helen Whitehead

Bright Sparks Challenge

The Bright Sparks Challenge seeks to encourage postgraduates at the University of Auckland to consider the potential commercial applicability of the research they undertake.

Spark is a student-led organisation seeking to foster an entrepreneurial culture amongst staff and students at the University of Auckland through the educational and inspirational speaker series Vision 2 Business, the Ideas 2 Business Workshop and various challenges. To encourage more postgraduates to think entrepreneurially and enter the Spark Ideas and $100k Challenges, Spark and PGSA have once again joined forces to bring the Bright Sparks Challenge to Exposure entrants.

The Challenge simply asks postgraduates, in 500 words, to describe: how their research can be translated into a product or service, what need is addressed, who will use it and what is needed to make this happen. The winning entry is awarded with a cash prize of $1000.
**EXPOSURE CALENDAR OF EVENTS 2013**

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<th>Venue</th>
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<td>Fisher &amp; Paykel Healthcare Oral Prelims</td>
<td>14 Oct</td>
<td>1-11 Short Street</td>
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<tr>
<td>The University of Auckland Society Poster Display</td>
<td>14 – 16 Oct</td>
<td>Engineering Neon Foyer</td>
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<tr>
<td>Fisher &amp; Paykel Healthcare Oral Finals</td>
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<td>Musgrove Studio</td>
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<td>Variety Showcase</td>
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<td>Musgrove Studio</td>
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<td>Exposure Prize Giving</td>
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**Exposure Timetable for the Fisher & Paykel Healthcare Oral Presentations**

**Stream A: Monday 14 October 2013**
**Venue: 1-11 Short Street, Building 810, Room 326**

**Session 1: 9am – 1pm**

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<thead>
<tr>
<th>Researcher</th>
<th>Topic</th>
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</thead>
<tbody>
<tr>
<td>Rob Tedesco</td>
<td>THE VALUE OF BEETHOVEN? THE ECONOMICS AND HISTORY OF THE AUCKLAND PHILHARMONIA</td>
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</tr>
<tr>
<td>Eppuje Eryn Kwon</td>
<td>CSI IN FACULTY ENGINEERING – BLOOD, GUNS AND MORE BLOOD</td>
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<tr>
<td>Anastasia Baddre</td>
<td>KIWI JEW OR JEWISH KIWI? CONSTRUCTIONS OF JEWISHNESS AND JEWISH COMMUNITY IN NEW ZEALAND</td>
<td>Arts</td>
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<tr>
<td>Sue Smith</td>
<td>STUDENTS SPEAK ABOUT ‘STUDENT SPEAK’: STUDENTS’ PERCEPTIONS OF FORMATIVE ASSESSMENT RESULTS</td>
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<tr>
<td>Nikini Puhulwelle Gamage</td>
<td>SOFT TISSUE DEFORMATIONS IN “SHAKEN BABY SYNDROME”</td>
<td>Engineering</td>
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<tr>
<td>Dominic Dagbanja</td>
<td>THE RIGHT TO REGULATE IN THE PUBLIC INTEREST AND INTERNATIONAL INVESTMENT LAW IN GHANA: RECONCILING INVESTMENT TREATY STANDARDS WITH CONSTITUTIONALISM</td>
<td>Law</td>
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<tr>
<td>Roisin Bennett</td>
<td>ALTERNATIVE EDUCATION UNITS: INSTITUTES OF EDUCATION EQUITY OR HOLDING CELLS FOR PROBLEMATIC STUDENTS?</td>
<td>Arts</td>
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<tr>
<td>Sharain Liew</td>
<td>NANOSTRUCTURED TITANIUM DIOXIDE THIN FILMS IN 30 MINUTES VIA MICROWAVE-HYDROTHERMAL REACTION</td>
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<tr>
<td>Hadas Ore</td>
<td>“OTHER WAYS TO RETURN”: JEWISH-ISRAELI MIGRANT WOMEN SAVOUR HOME IN NZ</td>
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<td>Yan Guo</td>
<td>WHY DO DOCTORS WRITE?</td>
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**Lunch 1pm – 1.30pm**
### Session 2: 1.30pm – 5.30pm

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</table>
| Dr. Susan Carter  
Dr. Christine Dureau  
Gretchen Lutz-Spalinger | FACULTY OF ARTS / FACULTY OF BUSINESS & ECONOMICS / FACULTY OF EDUCATION / FACULTY OF ENGINEERING / FACULTY OF LAW / NATIONAL INSTITUTE OF CREATIVE ARTS AND INDUSTRIES |

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<th>Researcher</th>
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<tbody>
<tr>
<td>Courtney Addison</td>
<td>SELF-CARE STRATEGIES FOR CONTESTED ILLNESS: NEW ZEALANDERS LIVING WITH CHRONIC FATIGUE SYNDROME</td>
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<td>Nathaniel Burbury</td>
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<td>Amrita Lal</td>
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<td>Shameer Sathar</td>
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### Stream B: Monday 14 October 2013
**Venue:** 1-11 Short Street, Building 810, Room 340

### Session 1: 9am – 1pm

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<thead>
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</thead>
</table>
| Dr. Steve Matthewman  
Catherine Kerins  
Margaret Allen | FACULTY OF SCIENCE / FACULTY OF MEDICAL & HEALTH SCIENCES |

<table>
<thead>
<tr>
<th>Researcher</th>
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<tbody>
<tr>
<td>Susann Beier</td>
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<tr>
<td>Kate Dowson</td>
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<tr>
<td>Lucy Goodman</td>
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<td>Mohanraj Krishnan</td>
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<td>Lily Yu-Li Chang</td>
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<td>Researcher</td>
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<tr>
<td>Rachael Robson</td>
<td>THE EFFECT OF DEXAMETHASONE ON THE PRETERM FETAL SHEEP RESPONSES TO ACUTE ASPHYXI iniciation</td>
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<tr>
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<tr>
<td>Yangsi Liu</td>
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**Lunch 1pm – 1.30pm**

**Session 2: 1.30pm – 5.30pm**

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<td>Jane Bradley</td>
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<td>Jennie Oakley</td>
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<tr>
<td>Jerry Gao</td>
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<tr>
<td>Elizabeth Hammond</td>
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<td>Sandy Lin</td>
<td>CELL CYTOCOMPATIBILITY OF POLYMER TISSUE SCAFFOLDS</td>
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<td>Tracey-Lee Dalton</td>
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<td>John Bai</td>
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<td>Antonia Verstappen</td>
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Fisher & Paykel Healthcare

www.fphcareers.com
SELF-CARE STRATEGIES FOR CONTESTED ILLNESS: NEW ZEALANDERS LIVING WITH CHRONIC FATIGUE SYNDROME
Courtney Addison
DEPARTMENT OF ANTHROPOLOGY

20,000 New Zealanders suffer from Chronic Fatigue Syndrome (CFS/ME), a debilitating and poorly understood neuro-immune illness. The illness is characterised by a diffuse host of bodily symptoms, may be ‘triggered’ by acute viral infection, and often lasts for decades. The conflicting body of literature addressing CFS/ME identifies neither cause nor cure, and a treatment protocol is likewise uncertain. For these reasons, CFS/ME can be considered a contested illness. This paper is based on one chapter of my Masters thesis in medical anthropology, which seeks to understand the personal and interpersonal aspects of living with CFS/ME. Through semi-structured interviews with fifteen CFS/ME sufferers, I explore how my informants manage their illness in a context of limited medico-scientific knowledge and aid. I show that they do so through self-directed research, selective uptake of professional advice, privileging of embodied knowledge, and experimental trial-and-error treatment. In doing so the patient-practitioner relationship is transformed, as sufferers occupy an informed and motivated role in managing their illness, which they feel physicians cannot adequately treat. These findings align with anthropologists’ work on self-management, which addresses the emergence of patient-experts as responsibilised agents of neoliberal medical care. This work has been fruitfully applied to conditions such as asthma and diabetes, but is yet to be used in relation to contested illnesses like CFS/ME. I argue that the contested status of CFS/ME, and the epistemological gaps around it, leaves space for sufferers’ experience to take precedence. Moreover, there is an ethical imperative to prioritise sufferers’ experience, given the present inadequacy of biomedicine, and the malleability of socio-structural responses to CFS/ME at this nascent stage.

KIWI JEW OR JEWISH KIWI? CONSTRUCTIONS OF JEWISHNESS AND JEWISH COMMUNITY IN NEW ZEALAND
Anastasia Baddre
DEPARTMENT OF ANTHROPOLOGY

While the title question is a bit simplistic and there certainly is not a simple answer, it suggests some of the issues with which Jews living in New Zealand grapple in constructing and understanding their Jewishness and provides a good prompt to start this investigation. Like all Jews outside of Israel, Jews in New Zealand are in the minority and, as such, concerns about identity and self-definition are part and parcel of their religious and/or cultural practices. Though largely invisible in wider New Zealand society, they are in continuous interaction with New Zealanders of European descent and a variety of other ethnic and religious groups and are constantly involved in a process of compromise over practice, expression, resources, and belonging. It is these difficulties, or even contradictions, in being Jewish and Kiwi, that I argue provide both a view into New Zealand and an interesting way of thinking about the construction of Jewishness and the practices and meanings associated with being Jewish as it is understood and lived with in the particular historical and cultural context of present-day Auckland. And so, this paper will explore these issues from multiple perspectives, including the constitution of the Jewish community, relationships with Israel, resource and population constraints on religious practice and belonging, concerns about security and continuity, pluralism of practice and belief, the ways in which Jews feel they fit (or do not fit) into New Zealand society, and how that society sees (or does not see) them. By looking at the ways in which these intersect in the constructions of Jewishness and the Jewish community in Auckland, it is possible to see how fluid and situational Jewish identity is and, at the same time, how Jews in Auckland generally understand themselves, as a group, to be distinct and different from other New Zealanders.

ALTERNATIVE EDUCATION UNITS: INSTITUTES OF EDUCATION EQUITY OR HOLDING CELLS FOR PROBLEMATIC STUDENTS?
Roisin Bennett
DEPARTMENT OF SOCIOLOGY

Each year 3500 New Zealand secondary students between the ages of 13-16 experience alienation from the mainstream schooling systems due to long term truancy, suspension, or exclusion. These young people are commonly identified as being in crisis as many are dependent on alcohol and drugs, have gang affiliations, and have been victims and perpetrators of abuse. Due to the rights of all children under the age of 16 to attend school, Alternative Education (AE) units
have been created to cater for these students. Through the application of a political ecology framework, which allows for the exploration of influences and power relationships across individual’s ecological systems, my research analyses the narratives presented during in-depth interviews, to ecological systems, my research analyses the influences and power relationships across individual’s

Through the application of a political ecology have been created to cater for these students. Through the application of a political ecology framework, which allows for the exploration of influences and power relationships across individual’s ecological systems, my research analyses the narratives presented during in-depth interviews, to assess how the policies surrounding AE and at-risk youth have been interpreted and implemented. In addition to this, the experience of the young people and their parents/caregivers is utilised to assess whether AE plays a positive role in contributing to the equitable attainment of education and social justice, or if it is merely a holding cell for undesirable and difficult students.

LIMITED CONVENTIONALISM ABOUT MORALS
Marinus Ferreira
DEPARTMENT OF PHILOSOPHY

Irrespective of any questions about what our moral principles should be, there is a persistent problem about how to apply them: handling cases where those principles don’t determine a single best option, or a set of equally best options where it doesn’t matter which one we take. Unless our principles can give a unique solution to every moral problem, we will have instances of the ‘underdetermination problem’, where even a sincere and conscientious application of our principles can only narrow the range of options to choose from, each of which matches the principles as well as the other but all of which are mutually exclusive. We are then left in a situation where not anything goes (many options are disqualified as not matching our principles sufficiently well), but there is uncertainty about what you should do, and what other people in your situation will do. I emphasise the social aspect of the underdetermination problem: there are cases where what course of action is best for you to take depends on what other people do, but you can’t predict their behaviour in these problem cases because they may take any of the sufficiently good but mutually exclusive options available, and you don’t know which. I offer a demonstration that these problems can be addressed by a novel use of an existing approach in the literature: conventions in the sense analysed by David Lewis. We can understand people as developing conventions about how to develop the existing principles in such a way that it determines which of the sufficiently good candidates to take, and then coordinate their behaviour with these conventions. I then discuss a range of resulting mechanisms which societies can use to move past underdetermination problem cases, and analyse some social phenomenon as instances of those mechanism, e.g. conventional authority.

WHY DO DOCTORS WRITE?
Yan Guo
SCHOOL OF EUROPEAN LANGUAGES AND LITERATURES

Abstract: Doctors who have written creatively for publication have increased significantly in recent years, and creative writing by doctors not only enjoys great popularity among the wider public, but also whets the research appetite of professional critics. One commonly asked question about such a phenomenon is, what motivates doctors to write creatively. This project explores the wide range of doctors’ motives for creative writing, which is essentially the doctors’ desire to communicate with the wider public, with such an effective and satisfying method as literature, so as to release pressure at work, to depict hospitals and other medical institutions, to make amends for errors during practice, to justify doctors’ proper function and roles, to seek understanding and empathy among the public, or to test the public response to certain ethical issues. Though fame or fun, or to stay away from medicine are also legitimate motives for many doctors. Background: This presentation is the first section of my thesis “A Comparative Study of Physician-Writers’ Representation of What Makes a Good Doctor”. My thesis involves a comparative study of creative writing by physician-writers of the contemporary period from such English speaking countries as Australia and the U.S.A., and such Asian countries as China and Japan. On the one hand, how insightfully but diversely each physician-writer represents the subject of “what makes a good doctor” is examined comparatively, albeit they may be written in extremely different linguistic and cultural backgrounds; on the other hand, how readers respond to what is set up or illuminated in the text by physician-writers is explored. A study of the interactions between the physician-writer, the text, and the reader can illuminate the thinking on such medical ethics as to what makes a good doctor.

PHILOSOPHICAL ANALYSIS OF SELF-DECEPTION
Vladimir Krstic
DEPARTMENT OF PHILOSOPHY

My project is concerned with trying to understand how supposedly rational human animals can often be so irrational. My particular interest is in self-deception. Here’s an example: when a person believes he smokes because he enjoys it and to soothe his nerves, I claim that he has deceived himself into holding these beliefs, because the ‘enjoyment’ of inhaling the smoke is essentially suffocation. Why do smokers kid themselves in this way? I say in order to hide from themselves the sad truth that they’re addicted and as a result cannot stop. But, this explanation is conceptually problematic: it’s easy enough to understand how a person hides a truth from another, but how to hide it from himself? The conceptual
problem is therefore the apparent unattainability of self-deceiving: you wouldn’t bite the hook if you had recognized the lure. Attempting to resolve this, a current wide-spread explanation postulates the self as having compartments, whereby one subsystem can deceive the other. This offers a reasonable explanation of how self-deception is possible but it faces the objection that it will not be my fault for smoking if I have been deceived into it by a part of me. My project aims to provide a more satisfactory account of self-deception. I’m developing an account according to which self-deception is prompted by our not knowing who we really are, because in self-evaluation we replace the real self with the one whom we want to be (the Superself). Explicitly, we deceive ourselves that we already embody ideals towards which we strive, and organize our beliefs accordingly: e.g. ‘I’m in control of my life, so I can quit when I want, even if others can’t’. My analysis enables us to avoid postulating compartments of the self and appeals rather to failures in self-knowledge and self-evaluation: the Superself deceived the self.

MIGRANT COMMUNITY REPRESENTATION: THE CARIBBEAN IN NEW ZEALAND
Natalie McGuire
DEPARTMENT OF ART HISTORY

How significant in terms of cultural identity is it for migrant communities living in New Zealand to be visually represented? This research looks at the effect of visibility in New Zealand museums on migrant cultures, focusing on a case study of the Caribbean community in Auckland. Why the Caribbean? Since the 1960s, there have been several waves of migrants from the British Caribbean to New Zealand. Although aspects of Caribbean culture are recognizable in New Zealand, especially Reggae, the community itself is relatively invisible on the cultural landscape. Coming from Barbados, I feel a responsibility to establish tangible heritage for the community here through creating an archive of ‘migration stories’. This Caribbean diaspora is unique as it was almost exclusively comprised of Euro-Caribbeans for the first decade of its existence, and today still predominantly so, which differs vastly from the larger Afro-Caribbean diasporas in the UK and USA. This racial dynamic addresses how being the only majority Euro-Caribbean community in the entire world affects their attitudes and functionality as a society. How do they look to be represented as Caribbean people? I aim to provide an analysis of migrant community exhibitions held in New Zealand in terms of content, community-museum collaboration, and the progression of exhibition planning; and then to explore the effect of invisibility and the concept of cultural identity for the Caribbean community in New Zealand, through creating a film archive of migration stories. But as a white Barbadian conducting this research, where does my voice fit in with critical cultural theory? I can’t identify completely with a Euro-centric mindset, but I’m excluded in post-colonial theory, which deals with an Afro-Caribbean viewpoint. So ultimately this research highlights an overlooked area in race-related cultural studies, contributing awareness to both New Zealand and the Caribbean’s social history.

“OTHER WAYS TO RETURN”: JEWISH-ISRAELI MIGRANT WOMEN SAVOUR HOME IN NZ
Hadas Ore
DEPARTMENT OF ANTHROPOLOGY

The research project is an ethnography of the everyday experiences of 25 Jewish-Israeli migrant women, exploring how women remember and recreate “home” after immigration by involving their senses (mainly the smell, taste, and texture of food) and emotions as these are materialized by their domestic food practices, such as grocery shopping, home cooking and baking, casual and festive hospitalities and dieting for weight management. Through the prism of their food practices and memory, the study demonstrates that women reconstitute home as a multidimensional place by negotiating social boundaries with lands, between people, and within themselves. The nostalgic journey home that is instigated by food is used by these women to contest a Zionist ideology which portrays them as inadequate mothers, and to simultaneously make a claim of belonging.

BUSINESS SCHOOL
CUSTOMER RESOURCE INTEGRATION IN BEAUTY BLOGS
Amrita Lal
DEPARTMENT OF MARKETING

The service-dominant logic (SDL) has been of great interest to marketers in the last decade. SDL, a replacement to the traditional goods-dominant view of marketing, uses an integrative approach to propose a converging perspective on service marketing where service is treated as the fundamental basis of exchange. Central to this perspective is the idea of resource integration, particularly customer resource integration. Customer resource integration has not been thoroughly examined within marketing from a theoretical and practical perspective. This research examines customer resource integration within the context of beauty blogs. Beauty blogs have received little attention from academics even though they have a significant impact on bloggers themselves, audiences, and organisations. The bloggers, as customers, play a huge role in integrating resources. They share information with readers about products and brands based on their own personal experiences, opinions, and feelings. Readers consider this
information to be more trustworthy than what is provided by marketing professionals and thus gain valuable insight into potential purchase decisions. In addition, they are able to interact, allowing them to integrate resources. This study adopts a netnographic approach to explore how customer resource integration manifests itself on beauty blogs. The empirical data is retrieved using a non-participant observation method and the data consists of blog content from a large number of beauty blogs. Leximancer is used to analyse the main concepts that exist within the beauty blogs. This research seeks to provide a working definition of customer resource integration by carrying out a systematic literature review on the work to date. It then seeks to examine the manifestation of customer resource integration in beauty blogs by exploring the practices that actor’s engage in online and linking these practices to customer resource integration.

FACULTY OF EDUCATION

STUDENTS SPEAK ABOUT ‘STUDENT SPEAK’: STUDENTS’ PERCEPTIONS OF FORMATIVE E-ASSESSMENT RESULTS
Sue Smith
SCHOOL OF CURRICULUM AND PEDAGOGY

The New Zealand Curriculum offers a vision that young people will become “confident, connected, actively involved, lifelong learners” developing competencies including Managing Self. Encapsulating post-structuralist Social Cognitive Theory and sociocultural theories, formative assessment theory envisages students being active participants rather than passive recipients in the learning process. As educationalists seek to make this a reality for learners, attention is being given to the practices and tools of formative assessment and their potential to enhance self-regulated learning. e-asTTle is an online assessment tool developed in New Zealand. It offers results and feedback in the form of a Student Speak Individual Learning Pathways (SSILP) report. Marketed as a tool for formative assessment, use of the report within classroom formative assessment practice was introduced at the subject school in 2011. How these reports are received and used by students has become an area of interest and questions have arisen around the students’ emotional reactions, their ability to engage with the document and process its information, its usefulness to them for future learning, and other mediating factors. Responding to an identified gap in research, this study asks the question, “How do relationships, reading ability and self-efficacy relate to the way students react, respond to and use their SSILP reports?” Quantitative data from questionnaires will establish levels of student positivity affecting their responses, and investigate relationships between their reactions, response, and use of the reports and mediating factors (relationships, reading ability and self-efficacy).

SOFT TISSUE DEFORMATIONS IN “SHAKEN BABY SYNDROME”
Nikini Puhulwelle Gamage
AUCKLAND BIOENGINEERING INSTITUTE

“Shaken baby syndrome” (SBS) is a well-known phrase used to describe head injuries inflicted on young infants by their caregivers. As the name implies, it is thought that these injuries are caused by violent shaking, and has an incidence of between 14 and 40 per 100,000 infants under the age of one, per year. A detailed computational model of the infant head is necessary to address the ambiguity surrounding the diagnosis of SBS. The research involved the construction of a finite element model to mimic the mechanical interactions between the brain and the skull. To validate this numerical approach, a separate physical phantom and an analytical model were constructed. Initially the effects of linear shaking modalities were investigated. The physical phantom incorporated a plastic cube filled with gel and instrumented with pressure transducers. This physical model was subjected to linear sinusoidal motion, and the pressure signals recorded. An analytical solution was also identified and these two were then used to validate a computational model. Secondly, the effect of the cerebrospinal fluid (CSF) was examined. A phantom and analytical model were constructed to predict the contact and internal pressures of the gel under a linear shaking motion. Again, a computational model was created and validated. Thirdly, a more realistic geometry was incorporated into the model. The infant brain was segmented from high resolution MRI images and the pressures for a realistic linear shaking mechanism were identified. Future models will investigate the fontanelle on the infant skull, the tethered links between the brain and skull, and the effect of the CSF under a rotational motion. It is hoped that this will help to predict mechanical indices on the infant brain under shaking motion and thus help find the link between a shaking motion and the common injuries seen in infants with SBS.
The hierarchical ZnO nanostructures, branched nanorods, were prepared through a multi-step growth method on glass substrates without any capping agents. The process includes magnetron sputtering deposition of ZnO seed particles and hydrothermal growth of ZnO nanorods. The morphology, growth process and microstructure were characterized using scanning electron microscopy (SEM), a high resolution transmission electron microscope (HRTEM), and X-ray diffraction (XRD). The hierarchical structure consists of large primal nanorods as the trunks and much smaller secondary nanorods as the branches. Both the trunks and branches are single crystal grown along [0001] direction. The ZnO seed particles which experienced Ostwald ripening are essential for the growth of branched nanostructures. Raman scattering, photoluminescence (PL) emission, and UV-Vis absorption were applied to measure the defects and optical property. The hierarchical ZnO nanostructures exhibited the enhanced photocatalytic performance in degradation of Rhodamine B (RhB) under UV light, which can be attributed to the increased surface area, improved light harvesting, active surfaces, dense branch network, and the large amount of defects.

TOWARDS PACEMAKERS FOR STOMACHS – OPTIMIZING GASTRIC PACING
Shameer Sathar
AUCKLAND BIOENGINEERING INSTITUTE

Gastric pacing has been investigated for modulating gastric motility in diseased states. However, to advance this field, new pacing protocols are needed that directly improve gastric motility while increasing the efficiency of existing pacing devices. This study presents a mathematical tissue model for investigating slow wave entrainment during pacing, its validation with experimental data gathered by high-resolution electrical mapping performed in a pig model. The model is used to predict the effect of anisotropic conductivities on slow wave entrainment, and the effect of gastric pacing on ectopic dysrhythmias. A diffusion based slow wave propagation model is used, with cell activity modeled as a finite-state machine. Initially, normal slow-wave antegrade propagation was modeled in accordance with experimental data. Then, these simulation parameters were applied to compare the model, in tandem with experimental studies in which an external pacing signal entrains native slow wave activity. The effect of different pacing frequencies on entrainment is demonstrated. Finally, this model was also used for simulating the effect of external stimuli for entraining a distal ectopic focal pacemaker. Two cases were studied with different fiber directions. The results show that the pacing frequency and orientation of the fibers relative to the stimulation and ectopic site plays a critical role in gastric pacing efficacy. The optimal external pacing frequency for entraining a natural pacing frequency of 3.16 cpm was found to be 3.8 cpm. This model is the first biophysically-based tissue model for realistic simulations of gastric pacing, and the first to consider the role of anisotropy in optimizing pacing location. The utility of this model extends to analysis of motility disorders and obesity.

A VIRTUAL LABORATORY FOR DISSECTING DIGESTIVE HEALTH AND DISEASE
Jerry Gao
AUCKLAND BIOENGINEERING INSTITUTE

Digestive diseases are a massive global disease burden. In 2004, over 104 million ambulatory care visits relating to digestive diseases were made in the United States, and the total direct costs were 97.8 billion US dollars. Many of these diseases, such as intestinal pseudo-obstruction, slow-transit constipation and gastroparesis (poor stomach emptying) arise because the gut fails to deliver co-ordinated contractions. This mechanical motion is regulated by an underlying electrical activity termed ‘slow waves’. Understanding this underpinning electrical activity is critical in curing and preventing digestive diseases. Slow waves are generated and propagated by specialised cells called interstitial cells of Cajal (ICC), which lie throughout the muscle layers in the gut. Loss and injury of ICC has been observed in several digestive diseases, but the functional consequences of ICC depletion are unknown. Experimental strategies for evaluating ICC structure-function relationships are extremely limited, and therefore mathematical modelling is becoming a productive solution. This work presents a novel integrative modelling framework as a “virtual laboratory” for investigating ICC structure-function relationships. First, realistic virtual ICC tissues were “grown” by adapting an algorithm widely used in the petroleum industry to statistically model oil reservoirs. Imaging data of healthy and severely diseased ICC tissue samples were used to inform this algorithm, and by extracting and interpolating the real image properties, virtual ICC tissue of any size and at any diseased state can be generated. Virtual ICC tissues across a spectrum of depletion levels were generated and coupled to mathematical models of slow wave propagation to examine the corresponding bioelectrical activity. ICC structure-function relationships governing digestive health and disease were then elucidated. This “virtual laboratory” modelling framework can now be used to gain key
When a bullet passes through an object, the fragments at the exit site follow the direction of the bullet. This is called forward spatter. However, a small number of fragments ejection back towards the shooter from the entry site. This is called backspatter. This project aims to prepare the foundations for backspatter research, and increase the understanding of its mechanism from an engineering perspective. Backspatter research is important, as it may provide additional information such as proximity of the shot or the type of weapon used. Such information can be used to strengthen and help crime scene reconstruction. Despite this, backspatter is a relatively poorly understood subject due to difficulties arising from availability of samples to experiment on and collect data. Different from animal or human samples, making a physical model that accurately mimics the ballistic response of the human head will allow easy access to samples that are free of ethical concerns at a relatively low cost. In order to produce such model, more than 80 material combinations were screened. After the screening, 10 anatomically correct half-cranial 3D models with full skin-skull-brain layers were made out of the best material combinations and subsequently tested. Various data such as backspatter pattern and high speed camera footage were collected from the tests, and are currently being analysed. It was observed that the physical model behaved in a similar manner to the animal samples both chronologically and morphologically. The physical model also proved to be excellent at illustrating the different mechanisms at work to generate backspatter. With further analysis and development of full-cranial 3D models, major factors affecting the ballistic response of the system may be identified, which will help explain the mechanisms of backspatter phenomenon more clearly.

NANOSTRUCTURED TITANIUM DIOXIDE THIN FILMS IN 30 MINUTES VIA MICROWAVE-HYDROTHERMAL REACTION
Sharain Liew
DEPARTMENT OF CHEMICAL AND MATERIALS ENGINEERING

Nanostructured thin films are being extensively studied particularly in photocatalysis and photovoltaics. One of these materials includes titanium dioxide thin films due to the presence of its photoactive crystalline phase (anatase). Currently, a hydrothermal reaction is used to grow these thin films as it requires neither harsh precursors nor extreme temperatures. However, this technique requires a long reaction time (~ 24-48 hours) for the structures to grow which is not commercially cost effective. This work, meanwhile, demonstrates an easier and quicker alternative by combining microwave irradiation with hydrothermal reaction. Nanostructured titanium dioxide ($\text{TiO}_2$) anatase thin films were successfully grown on glass substrates via a rapid microwave-hydrothermal reaction of diluted acidic solution of titanium isopropoxide. This technique has successfully achieved reasonable $\text{TiO}_2$ film growth within a short duration of 30 minutes at 120°C in a simple microwave-digester system. The resulting film thickness was 133 nm with an average particle size of 33 nm. This study has proven that microwave-hydrothermal reaction can be an environmentally friendly alternative as there was no need to use harsh chemicals and harmful organic solvents. Furthermore, this simple method is cleaner as it is conducted in an isolated system at low temperature and with less energy consumption. The highlight of this work is that substantial film growth is achieved in a short time instead of the usual long hours needed. These nanostructured films can be potentially used as photocatalysis or photoanodes in dye-sensitized solar cells.

DEVELOPMENT OF A PROTOTYPE SURGICAL TOOL WITH REMOTE TIP TACTILE SENSING FOR MINIMALLY INVASIVE SPINAL SURGERY
Harriet Peel
DEPARTMENT OF MECHANICAL ENGINEERING

Pedicle implantation by Minimally Invasive Spine Surgery refers to spinal surgery where multiple small incisions are made by the surgeon to access the spine and implant screws into the pedicles. While there are numerous benefits to MISS for both patient and carer, there is also the risk of significant neurological trauma due to close proximity of nerve roots if the pedicle bone is penetrated. There are few surgical tools designed that are suitable specifically to guide the surgeon’s screw placement during spinal surgery. Therefore, this project proposes to use Fabry Perot Interferometry to develop a spinal probe which can aid in correctly positioning the pedicle screws. The probe will measure the varying forces used to penetrate the bone tissue and feed this information back to the surgeon. Previous studies show that bone density variation throughout the pedicle is sufficiently predictable that the force variation on the sensor could be used to navigate through the pedicle. It is further proposed that the sensor is first tested on sheep or porcine spinal tissue, and previous studies show that this is a viable alternative to cadaveric studies.
UNLOCKING THE ATOMIC GEOGRAPHY: GRAIN BOUNDARY SIMULATIONS
Nathaniel Burbery
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Computer simulations enable investigation of the underlying mechanisms involved in deformation and damage in crystalline materials on fundamental length and time scales, beyond feasible or commercially viable limits of experimental observations. Dislocation dynamics (DD) can provide an intermediate scale link between simulations of underlying atomistic mechanisms and “macro” models which are useful for materials design. However, a true representation of grain boundary (GB) effects has not yet been successfully accommodated into 3D DD simulations, which requires an atomistic basis. To determine the significance of GBs in truly polycrystalline FCC metals, this presentation will use atomistic simulations to demonstrate some fundamental behaviours and to indicate the key parameters necessary to model the dynamic GB − dislocation behaviours. These simulations will be used to demonstrate if GBs play a critical role in the plastic deformation response in FCC metals.

FACULTY OF LAW
THE RIGHT TO REGULATE IN THE PUBLIC INTEREST AND INTERNATIONAL INVESTMENT LAW IN GHANA: RECONCILING INVESTMENT TREATY STANDARDS WITH CONSTITUTIONALISM
Dominic Dabanja

This research is aimed at ascertaining whether the international investment treaties (IITs) of Ghana are compatible with the State’s obligations under the Constitution of Ghana to protect the public interest in the areas of development, human rights, and the environment. The compatibility is measured in terms of whether Ghana’s IITs limit, or have the potential to restrict, public policy choices and the regulatory autonomy needed to protect the public interest. The research addresses the dilemma of how IITs may be used, if needed at all, to protect legitimate foreign investment while respecting the State’s constitutional obligations to protect the interests of the society at large. The research proposition is that Ghana’s investment treaty standards, being absolute, ill-defined in scope and intended to limit the State’s regulatory actions, are incompatible with the country’s constitutional obligations to protect the public interest. The incompatibility is manifested by the ability of the investment treaty standards to freeze or limit legislative autonomy and other constitutionally permitted governmental actions necessary for development policymaking and implementation and the protection of human rights and the environment. A number of factors justify this research at this time. These include the dearth of research on the relationship between IIT obligations and constitutional obligations in Ghana, reforms in investment regulation at the international level since the entry into force of Ghana’s IITs, and ongoing international debate about ‘balancing’ investor and State interests. Thus, a review of Ghana’s IITs taking into account recent changes in international investment rule-making and, in particular, in relation to constitutional requirements governing the protection of the public interest is a fundamental prerequisite for the effective protection of both legitimate investment and the public interest. The research will reveal the limitations of Ghana’s IITs and contribute to a way of approaching investment protection without compromising the public interest.

NATIONAL INSTITUTE OF CREATIVE ARTS AND INDUSTRIES (NICAI)
THE VALUE OF BEETHOVEN? THE ECONOMICS AND HISTORY OF THE AUCKLAND PHILOSTRAHMONIA
Rob Tedesco
DEPARTMENT OF MUSIC

This paper examines the process of professionalization in orchestral ensembles and the dynamics of cultural and economic “value” in the context of modern day orchestral performance in Auckland, New Zealand. Using data collected from ethnographic and archival sources, I examine the economic, cultural, and organizational process of symphonic orchestra formation. How does society define value for such ensembles? Who plays a role in these decisions? How is social and cultural capital for the orchestra turned into economic capital for the general public? In 1947, with the creation of the New Zealand Symphphony, commentators viewed the establishment as a sign of the “cultural maturity” of the country and praised government decisions to fund the orchestra. Subsequent cycles of funding have allowed the creation of subsequent ensembles, the largest being the Symphonia of Auckland in 1967; by 1975 it was a full-time professional symphony orchestra. By 1980, however, the orchestra was near insolvency; a lack of financial support from the Auckland community had effectively doomed the organization. Declaring bankruptcy, the orchestra was disbanded, only to re-emerge in 1981 as a new orchestra supported by the players of the Symphonia themselves, soon known as the Auckland Philharmonia, as the players felt the city needed an orchestra. This research focuses on how musicians and members of the community responded to the altering Auckland orchestra scene and how they continue to respond to the changing cultural and economic conditions of the symphonic concert, in order to create a structure for classical music production.
COLONIAL-MODERN ARCHITECTURE IN THE PACIFIC: CONVERSATIONS WITH MY FATHER
Louise Stevenson
ELAM SCHOOL OF FINE ARTS

This presentation restages an encounter between my father and his experiences as an architect in the British Colonial Service in 1950s Lagos, Nigeria and 1960s Honiara, Solomon Islands. Using both my father's and my own film and photography this contemporary restaging provokes questions via the agency of oral history to form alternative narratives of modern architecture in the Pacific. In her recent book, Third World Modernism, Duangfang Lu states "canonical architecture in the Pacific. In her recent book, Third history to form alternative narratives of modern restaging provokes questions via the agency of oral my own film and photography this contemporary Honiara, Solomon Islands. Using both my father's and father and his experiences as an architect in the British Colonial Service in 1950s Lagos, Nigeria and 1960s posted in the construction of such architectural historiographies? How can diverse trajectories developed in third world countries embody differing perspectives on the progression and failure of modernism? The documented buildings, from secondary and technical training schools to regional post offices and telephone exchanges, represent paradigm shifts in colonial modern attitude and usage. While this presentation discusses a singular personal oral history and idiosyncratic artistic methodology, it also encompasses the postcolonial concerns in Arnold, Ergut, and Ozkaya's Rethinking Architectural Historiography 2006. In relation to this, are the the intermediary silences in a conversation defined by what they are not? Is something "lost" or does it remain "other" to prompt alternative architectural narratives?

FACULTY OF HEALTH AND MEDICAL SCIENCES (FMHS)

EX-VIVO STENTED CORONARY ARTERY HEMODYNAMICS USING 4D FLOW MEASUREMENTS AND COMPUTATIONAL FLOW DYNAMICS (CFD)
Susann Beier
AUCKLAND MRI RESEARCH GROUP, MERCY ANGIOGRAPHY, DEPARTMENT OF ENGINEERING SCIENCE

Background: Stenting is the standard treatment for diseased coronary arteries and yet 40% of stent patients develop a re-narrowing of the artery. Blood flow changes, based on the stent's design, are believed to be a leading cause.

Objectives: This study aims to quantify blood flow changes introduced by different stents to improve stent design and increase understanding of the clinical outcome. Methods: Two common stents (Omega and Biomatrix Flex) in a straight vessel were computationally reconstructed from micro CT scans. Rigid 3D models were rapid prototyped and connected to a steady flow circuit. The flow was measured with Phase Contrast-MR. Identical computational flow models were solved in ANSYS CFX. Both methods used an inlet flow velocity of 0.4 m/s, accounting for dimensional 6-fold scaling. The MR flow data was co-registered, yielding a 3D volume of more than 90 million velocity sample points, which the CFX data was validated against.

Results: Significant differences between the two stent designs were found; Omega created jet-like blood flow acceleration, whereas the Biomatrix flow boundary layer did not detach between stent cells, creating no overall acceleration of the blood stream. The wall shear stress was lower for the Omega stent at 0.43 Pa, compared with 0.57 Pa for the Biomatrix. In both stents, the highest wall shear stresses were found around the stent connectors, reaching a peak of 1.61 Pa for Biomatrix and 1.2 Pa for Omega. Discussion: This study demonstrates the blood flow changes introduced by different stent designs, giving insight into potential clinical outcome.

FACULTY OF SCIENCE

THE QUESTION OF REINFORCEMENT: WHAT MAKES SOME STIMULI SO SPECIAL?
John Bai
DEPARTMENT OF PSYCHOLOGY

An animal moving through its environment will encounter a number of different stimulus events, some of which will increase the behaviour that produced that particular event. These stimulus events have traditionally been classed as “reinforcers” and have been thought to increase both the rate and persistence of behaviour through a “strengthening” process. Additionally, past research has suggested that non-reinforcing stimuli can acquire “reinforcing properties” either by being paired with “primary reinforcers” or by signalling the onset of these primary reinforcers. However, more recent research shows that brief stimulus events may increase both response rate and persistence, even when uncorrelated with primary reinforcers. These stimuli provide a potential middle-ground for examining the processes underlying reinforcement and the characteristics that distinguish reinforcers from other stimuli. To explore these intriguing results, we arranged two stimulus contexts with food available at equal rates and added additional response-dependent stimulus events in one context. Contrary to previous findings, our preliminary data suggests that these stimuli do not increase persistence or response rate.
CARING FOR INFORMAL CAREGIVERS: DEVELOPING CRITICAL SUCCESS FACTORS THAT ARE ASSOCIATED WITH POSITIVE OUTCOMES FOR CAREGIVERS OF PEOPLE WITH DISABILITIES OR CHRONIC ILLNESS

Tracey-Lee Dalton
SCHOOL OF NURSING

Background: Informal caregivers provide the backbone of care in New Zealand and Europe. It is imperative that adequate informal care be made available for the future, given the many factors encouraging and promoting people to remain in their own homes, such as deinstitutionalisation of young people with disabilities and ageing-in-place. This has placed increasing pressure on our strained care resources, and is exacerbated by the ageing of baby boomers and medical advances.

Objectives: To determine how to support informal caregivers by developing critical success factors that are associated with positive outcomes for caregivers of people with disabilities or chronic illness.

Methods: A sequential mixed methods approach was adopted using qualitative (interviews), followed by quantitative (on-line survey) research. The interviews were used for exploratory purposes, while the larger sample of the survey allows the results to be generalised, in regards to determining best practice for supporting caregivers.

Results: The results of the qualitative phase show some evidence of success factors in relation to caregiving, apparent by some satisfaction with the social welfare system. There was also recognition of the rewarding elements of caregiving. However, this positivity is greatly overshadowed by negativity, an indication that success factors are generally lacking.

Discussion: Caregivers play a vital role in our health system and wider society. The irony is, although caregivers are invaluable in their worth, they are undervalued in our current system; indicating there is a need to develop best practices associated with positive outcomes and thereby attract or retain informal caregivers.

SUBSIDISATION OF AFTER-HOURS CARE FOR CHILDREN UNDER 6: EFFECTS ON PRIMARY CARE SERVICES

Kate Dowson
DEPARTMENT OF HEALTH SYSTEMS

Background: In 2011 the Auckland After-Hours Initiative was implemented to improve access to after-hours care, this included subsidising fees for children under 6 at participating Accident & Medical (A&M) clinics. The Minister of Health has also issued a directive for free after-hours care for under 6s in A&M clinics nationwide. Some GPs fear unintended consequences of this policy will result in reduced general practice funding (through funding ‘clawback’), and loss of continuity of care.

Objectives: This study aims to investigate the consequences of this subsidy on ‘within-hours’ general practice services in Auckland.

Methods: PHO data was used to compare utilisation of subsidised A&Ms before and after the initiative (2010 versus 2012). This was considered alongside funding data showing clawback from selected practices. Interviews with a small sample of Auckland GPs were carried out to understand GP perceptions of the effects of the subsidy on funding levels and continuity of care.

Results: There has been higher than expected utilisation at A&Ms after-hours as a result of this subsidy. This has resulted in a significant increase in clawback of capitation funding at some practices. Through this combination of quantitative and qualitative data, this research will explore the extent of unintended consequences of this policy on GP practices.

Discussion: This subsidy aims to achieve universal coverage through low co-payments for patients. This research will shed light on the nature of trade-offs between enhancing access, and other important primary care aims such as continuity of care.

SUPER RESOLUTION IMAGING OF HIPPOCAMPAL SYNAPSES

Lucy Goodman
DEPARTMENT OF PHYSIOLOGY AND UNIVERSITY OF EXETER, UNITED KINGDOM

Background: The postsynaptic density (PSD) is a dense region of protein that lies beneath the postsynaptic membrane of excitatory glutamatergic synapses. Understanding the ‘molecular architecture’ of the PSD scaffolding proteins may reveal whether structural changes in architecture are correlated with synaptic plasticity. Objectives: Previous electrophysiology experiments have indicated that two N-terminal isoforms of SAP97 are thought to regulate surface expression of glutamate receptors. However, the ~200 nm resolution limit of traditional optical microscopy has greatly complicated detailed study of protein arrangements within the densely packed PSD.
Recently developed super resolution imaging techniques have overcome these limitations. Methods: We have applied a single molecule localisation method of super resolution imaging known as dSTORM to image the distribution of synaptic proteins in cultured rat hippocampal neurons. Results: Super resolution imaging of Homer, Bassoon, β-actinin, Shank, PSD-95, and GluR1 reveals physically discernible distributions that are not resolvable with conventional optical microscopy. Transient overexpression of the SAP97 isoforms alters synapse morphology and protein distribution, a process thought to underlie synaptic plasticity. Dendritic spine morphology can be resolved using super resolution imaging of antibodies targeting transiently expressed EGFP. Discussion: Our data reveal heterogeneity in synaptic protein distribution at super resolution, which could dictate diverse functional roles in the PSD.

USING NEXT GENERATION SEQUENCING TO DETECT MITOCHONDRIAL DNA HETEROPLASMY IN BOVINE OOCYTES FOLLOWING AGEING AND OVARIAN STIMULATION

Elizabeth Hammond
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Background: Mitochondria are the most abundant organelles in oocytes due to their high energy demands. Mitochondrial DNA (mtDNA) is transmitted to offspring uniparentally from the oocyte. mtDNA mutations accumulate following ageing in a number of tissues due to oxidative damage and replication errors, causing mtDNA heteroplasmy. It is unknown whether poor oocyte quality following ageing and ovarian stimulation is associated with increasing mtDNA heteroplasmy levels. Unlike conventional sequencing technologies, next generation sequencing (NGS) has the potential to detect low levels of mtDNA heteroplasmy and could therefore be used to investigate this in single oocytes. Objectives: To determine how accurately the Illumina Miseq platform can quantify mtDNA heteroplasmy in single bovine oocytes, and whether heteroplasmy levels increase following both ageing and ovarian stimulation. Methods: Samples underwent Illumina Truseq DNA library preparation and were run on the Illumina Miseq 2x 205 base paired end platform for mtDNA heteroplasmy quantification. To determine the accuracy of this platform, artificial heteroplasmy was treated by mixing cloned *Bos Indicus* and *Bos Taurus* mtDNA at various frequencies. Results: The Illumina Miseq platform can accurately detect mtDNA heteroplasmy at low frequencies. Discussion: We have determined from our control experiments that the Illumina Miseq platform will provide a novel and effective way to study the effects of both ageing and ovarian stimulation on mtDNA heteroplasmy in single bovine oocytes. Accumulation of mtDNA mutations in oocytes following ageing and ovarian stimulation could consequently lower oocyte quality and negatively affect embryo development.

EARLY LIFE DETERMINANTS OF CHILDHOOD OBESITY WITH PARTICULAR EMPHASIS ON ASSOCIATIONS WITH GENETICS AND PHYSICAL ACTIVITY

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Background: Childhood obesity is a major public health issue in New Zealand, which is associated with an increased long-term risk of cardiovascular disease and premature mortality. Obesity susceptibility loci initially identified through genome wide association studies have provided new insights into genetic factors that contribute to the development of obesity. Objectives: To investigate the association between genetic variants and obesity in the Children of Screening for Pregnancy Endpoints (SCOPE) cohort. To determine if physical activity can compensate for the effect of obesity related gene variants in children. Method: This study is a cross-sectional survey of 6 year old Auckland children with prospectively collected detailed pregnancy data at 15 and 20 weeks gestation, late pregnancy, and after delivery. Polymorphic variants from obesity related genes will be genotyped using high throughput Sequenom genotyping assays. Physical activities of children are measured using accelerometers. We will assess directional and non-directional relationships between physical activity and gene variants and predict quantitative measurements on how physical activity influences obesity susceptibility in the child. Results: My systematic literature review has identified fifty obesity polymorphisms that will be genotyped in the Children of SCOPE. Gene variants will be correlated with quantitative measurements of physical activity and non-parametric tools will allow for overall model testing, enabling the exploration of interrelationships among allele frequencies and lifestyle factors within SCOPE. Discussion: This study may identify novel approaches which can be applied to reduce childhood obesity. These in turn will generate novel intervention targets and direct future strategies for making health improvements.
CELL CYTOCOMPATIBILITY OF POLYMER TISSUE SCAFFOLDS
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Background: Polymer tissue scaffolds for use in tissue engineering has received huge interest and is a growing area. The goal for tissue scaffolds is to assist the body in healing itself, by mimicking the natural extra cellular matrix, which provides mechanical support and encourages tissue growth and regeneration. A novel manufacturing method which uses the nanofibrillar composite (NFC) concept has the potential to produce nanoporous scaffolds using a completely solvent-free process. This is advantageous compared to the popular electrospinning technique, which normally requires toxic organic solvents in the fabrication process and may be harmful to cells, even if there are only the slightest traces left, especially for more sensitive applications.

Objectives: To explore scaffolds fabricated using the MFC manufacturing technique and test for cell cytocompatibility using cell culture methods.

Methods: Poly(L-lactide) (PLLA) and glycol modified poly(ethylene teraphthalate) (PETG) scaffolds were manufactured using the NFC technique. The cell cytocompatibility of the polymer scaffolds were tested by culturing mouse osteoblastic MC3T3-E1 cells and conducting live dead staining and alamar blue assays. Cells were cultured on the polymer scaffolds for 14 days before being dehydrated, critically point dried, and coated with platinum for scanning electron microscopy (SEM).

Results: Live dead staining and SEM images confirm there is a confluent layer of live cells covering the surface of the NFC scaffolds after seven days of cell culture. Cell numbers have also increased throughout the seven days.

Discussion: Positive preliminary results show that scaffolds manufactured using the NFC technique have the potential to promote cell growth.

T-TUBULE AND JUNCTIONAL PROTEIN ORGANISATION IN JPH2 TRANSGENIC MICE
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Background: Cardiomyocytes contain plasma membrane invaginations known as transverse tubules (t-tubules), which allow action potentials to propagate into the cell interior. Regions of the sarcoplasmic reticulum (SR) membrane form close associations with the t-tubule membrane, known as junctions. Several key excitation-contraction (E-C) coupling proteins are localised to junctional regions, such as SR calcium release channels, the ryanodine receptors (RyRs), making E-C coupling efficiency reliant on t-tubule and junction organisation. Disorganisation of both t-tubules and junctions is observed in heart failure, however the underlying mechanisms are still unclear. It has been suggested that, in cardiomyocytes, junction formation is promoted by the protein junctophilin-2 (JPH2), which is reduced in some models of heart failure.

Objectives: To investigate the influence of JPH2 expression on t-tubule and junctional protein organisation.

Methods: T-tubule, JPH2, and RyR immunocytochemistry were performed on isolated cardiomyocytes from mice in which JPH2 was acutely knocked down along with control animals. These cells were imaged using confocal laser scanning and super-resolution microscopy techniques, and image analysis was performed on the data sets.

Results: T-tubule organisation was disrupted following JPH2 knockdown, with a reduction in the proportion of regular t-tubules in line with the z-discs observed and increased longitudinal and oblique extensions. Preliminary analysis suggests that RyR arrangement was also altered in JPH2 knockdown.

Discussion: There is potential loss of junctional integrity, which could contribute to the calcium handling abnormalities observed in these mice. These results indicate that altered JPH2 expression can have a severe effect on mouse cardiomyocyte organisation.

DIETARY PRACTICES OF BURMESE REFUGEE CHILDREN AGED 2-12 YEARS LIVING IN THE AUCKLAND REGION
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Background: New Zealand has a long history of accepting refugees, and currently has a quota for 750 refugees each year. Since 2000, Myanmar is one of the countries contributing to the highest number of refugees coming to New Zealand. From 2000 to 2013, the total number of Burmese quota refugees in New Zealand is 2236 which is about a quarter of the total quota refugees in New Zealand. As Burmese make up the highest proportion of refugees in New Zealand from Asian countries, and malnutrition in refugee children is a serious problem both prior to arrival in camps and during protracted refugee experiences, this study aims to assess post-migration dietary behaviours of Burmese refugee children aged 2-12 years.

Objectives: To identify the post-migration dietary practices of 2-12 year old Burmese refugee children, and to assess whether these practices meet the food and nutrition guidelines of New Zealand.

Methods: It is an observational cross-sectional study. The structured questionnaire survey will be performed with the minimum sample size of 75 children. The
caregivers of the Burmese refugee children will be recruited as participants regardless of the duration they have lived in New Zealand. All major ethnic groups of Myanmar people will be involved.

Results and Discussion: The preliminary results show that the dietary practices of Burmese refugee children satisfactorily met with the food and nutrition guidelines of Ministry of Health. However, some caregivers have little knowledge on determining the healthy food and have some difficulty in obtaining the food for their family.

THE EFFECT OF DEXAMETHASONE ON THE PRETERM FETAL SHEEP RESPONSES TO ACUTE ASPHYXIA
Rachael Robson
DEPARTMENT OF PHYSIOLOGY

Background: Women presenting with premature labour are routinely given glucocorticoids to improve lung development. We have recently observed that brain injury is significantly increased in preterm fetal sheep when dexamethasone is given 4 hours before an asphyxial insult, which is thought to be caused by persistent bradycardia.

Objectives: To deduce whether greater bradycardia during asphyxia would cause greater hypotension, and whether this is one mechanism augmenting neural injury.

Methods: 0.7 gestation fetal sheep (103-4 days) were instrumented to permit continuous monitoring of fetal blood pressure (BP), heart rate (FHR), carotid and femoral blood flow (CaBF & FBF), electroencephalographic (EEG) activity, and cortical impedance. 4-5 days post-surgery, ewes received an i.m. injection of saline (3 ml, n=6) or dexamethasone (12 mg / 3 ml, n=6). Four hours later fetal asphyxia was induced by 25 min of complete umbilical cord occlusion (UCO).

Results: Dexamethasone attenuated hypertension during the first 6 min of UCO (p<0.05). Dexamethasone did not alter the fall in FHR between groups, but did attenuate the initial vasoconstriction. CaBF was elevated in the dexamethasone group between min 6-11 (p<0.05). There were no differences in EEG suppression, however, the rise in impedance was slower and weakened by dexamethasone (p<0.05). Discussion: In contrast to our hypothesis, dexamethasone did not cause greater bradycardia or hypotension. While early peripheral vasoconstriction was attenuated, this only affected the early BP rise and did not compromise cerebral perfusion. Intriguingly, the reduced rise in impedance with dexamethasone suggests that there was less cerebral oedema and that dexamethasone may protect brain cells during UCO.

BACTERIAL ncRNA AS MEDIATORS OF CELLULAR COMMUNICATION BETWEEN BACTERIA AND THEIR HOST DURING INFECTION
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DEPARTMENT OF SURGERY, DEPARTMENT OF MOLECULAR MEDICINE AND PATHOLOGY

Background: The rise in antibiotic resistance has necessitated a search for new ways of interfering with infection processes. Classically, bacterial proteins, lipids, and small molecules have been known as mediators of the infection process. Recently, non-coding RNA molecules (ncRNA) that control gene expression have been described. ncRNA has been shown to act both within and across species. For example, viral ncRNAs can manipulate human cell responses and bacterial ncRNA can influence the behaviour of Caenorhabditis elegans. We have therefore hypothesised that bacterial ncRNA can influence human cells to aid bacterial infection.

Aims: We aim to determine if (a) the uropathogenic Escherichia coli (UPEC) expresses ncRNA that could bind to human mRNA, (b) if UPEC releases ncRNA into the extracellular environment, and (c) if UPEC ncRNA is delivered into human cells.

Methods: A bioinformatics analysis of bacterial ncRNA to identify sequences that could target human mRNA was undertaken. Electron and fluorescent microscopy was used to evaluate potential means of delivery of ncRNA into human cells while RT-qPCR validated ncRNA transfer.

Results: We have identified ncRNA sequences in UPEC that may target human mRNA. Transmission electron microscopy has shown that UPEC releases membrane vesicle whilst qRT-PCR has demonstrated that these vesicles carry ncRNA. Growing UPEC under conditions mimicking various stages of infection changes the ncRNA content of the vesicles.

Discussion: Release of vesicles that carry ncRNA by UPEC is a novel phenomenon. The next important question is whether vesicles deliver their ncRNA content into human cells to influence the infection process.

INTRA-AMNIOTIC IGFI TREATMENT OF THE GROWTH-RESTRICTED Ovine FETUS ALTERS SIZE, EARLY POSTNATAL GROWTH VELOCITY AND ADULT BODY COMPOSITION
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LIGGINS INSTITUTE, GRAVIDA: NATIONAL CENTRE FOR GROWTH AND DEVELOPMENT, DEPARTMENT OF PAEDIATRICS: CHILD AND YOUTH HEALTH

Background: Fetal growth restriction (FGR) is associated with increased risk of accelerated postnatal growth and later non-communicable disease. There
are no current therapies established to treat FGR. Intra-amniotic insulin-like growth factor 1 (IGF1) treatment of FGR in sheep increases in utero growth, but postnatal effects are unknown. Objectives: To investigate the effects of intra-amniotic IGF1 treatment of FGR on postnatal growth and body composition. Methods: FGR was induced by uteroplacental embolisation. FGR fetuses received saline (FGR-Saline; n=23) or 360 µg IGF1 (FGR-IGF1; n=27) intra-amniotically once weekly for five weeks from 107 d (term, 148 d). Controls (n=31) were un-operated and un-embolised. Growth was measured through adulthood (18 months) when body composition was measured by dual x-ray absorptiometry. Data were analysed by ANOVA with Tukey’s post hoc test.

Results: Control lambs had greater birthweights than FGR-Saline and FGR-IGF1 lambs (females: 5.6±0.4, 4.4±0.4, 5.2±0.4 kg respectively; males: 6.5±0.2, 5.7±0.2, 5.3±0.2 kg). FGR-Saline lambs grew fastest in the first week after birth (53.4±2.2, 65.3±2.5, 56.7±2.3 g·kg\(^{-1}\)·d\(^{-1}\)) and FGR-IGF1 lambs grew fastest in the second week (39.3±1.9, 43.5±2.2, 46.4±2.0 g·kg\(^{-1}\)·d\(^{-1}\)). At 18 months, FGR-IGF1 females were lighter than Controls (81.6±8.6, 77.2±8.5, 75.1±8.6 kg) with greater relative lean mass (31.6±5.9, 36.4±5.8, 39.1±5.9 %) and less abdominal fat relative to total fat mass (49.2±1.6, 46.9±1.6, 44.8±1.7 %). There were no differences amongst groups in males. Discussion: Intra-amniotic IGF1 treatment of FGR has sex-specific effects on postnatal growth and adult body composition. Whether these changes are associated with altered metabolic health requires investigation.

CHARACTERISING GLUTATHIONE EFFLUX PATHWAYS IN THE RAT LENS
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DEPARTMENT OF OPTOMETRY AND VISION SCIENCE, DEPARTMENT OF MEDICAL SCIENCES, NZ NATIONAL EYE CENTRE

Background: Of all the ocular tissues, the lens has the highest concentration of the antioxidant glutathione, exceeding levels found in the liver and kidney which regulate plasma glutathione levels. By analogy to the liver, we hypothesize that the lens serves as a reservoir of glutathione that can be supplied to anterior tissues of the eye. Objectives: To demonstrate glutathione efflux from the rat lens, and to identify and functionally characterise the mechanisms involved. Methods: Lenses were cultured in artificial aqueous humour, and media glutathione levels were measured. Molecular and immunohistochemical techniques were employed to identify putative glutathione efflux transporters. To test MRP1 functionality, lenses were preloaded with calcein-AM or monochlorobimane in the presence of inhibitors and cultured for one hour. Media and lenticular calcein or monochlorobimane-glutathione levels were then quantified using spectrophotometry.

Results: Basal glutathione efflux was observed from the lenses. Of the eight previously known glutathione efflux transporters, four were found at the transcript level in the lens. Of these, MRP1 and MRP5 were detected at the protein level with MRP1 localised to the lens epithelium. Functional assays using calcein or monochlorobimane and the MRP1 inhibitor MK571, revealed MRP1 to be functional and most likely to mediate glutathione efflux from the lens.

Discussion: These findings provide evidence for the lens in supplying glutathione to the anterior ocular tissues and implicate MRP1 as the major transporter involved. When this glutathione reservoir is eliminated during cataract surgery, reduced glutathione availability to the anterior eye could render tissues more susceptible to oxidative stress and consequent ocular pathologies.

CARING FOR VULNERABLE COMMUNITIES: THIRD SECTOR PRIMARY CARE PROVIDERS IN A CHANGING POLICY ENVIRONMENT
Antonia Verstappen
DEPARTMENT OF HEALTH SYSTEMS AND TE KUPENGA HAUORA MAORI

Background: Third sector primary care providers play an important role in the provision of primary care services to vulnerable communities, and are especially important in service provision to low-income, indigenous, and vulnerable groups. Current policy changes may compromise the ability of these organisations to provide primary care services. Objectives: To determine the current threats and opportunities facing third sector providers from recent policy changes within the primary health care sector, and how these may impact on primary care accessibility for vulnerable New Zealanders. Methods: A qualitative approach was used in conjunction with a comprehensive review of the literature. Semi-structured interviews were undertaken with six senior health sector leaders who comprised a mixture of expert health professionals, academics, and health professionals involved in third sector primary care governance.

Results: A changing policy environment has produced a series of threats and opportunities, which may affect the progress of third sector organisations. These policy changes are seeing mergers between PHOs that are causing these organisations to lose their ability to pursue independent PHO strategy, and are eroding third sector primary care services. The erosion of these services is of concern to senior health sector leaders. Discussion: The loss of third sector providers from the primary care landscape could have serious implications for the health system. If the ability for third sector organisations to provide services to vulnerable communities is reduced, this raises important questions about how the primary care sector will need to respond to meet the needs of these communities.
AN EYE EXAMINATION IN A SPORADIC ANIMAL MODEL: THE OCTODON DEGUS, FOR EARLY DETECTION OF ALZHEIMER’S DISEASE
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Background: In Alzheimer’s disease (AD), complaints related to vision occur earlier than cognitive impairments in patients. Transgenic animal models and a naturally occurring model of AD – the Octodon degus, studied in our laboratory show expression of AD-related proteins and oxidative stress in the retina. These findings are consistent with a major part of ocular tissues in signalling the pathology of AD. However, it is unclear whether molecular findings in the retina are linked to clinical ocular complaints reported by AD patients.

Objectives: To determine whether the outcome of clinical ocular tests relate to the age related AD pathology.

Methods: A colony of 66 Octodon degus that develop AD as a function of age was used in the study. Animals were assigned to 4 different groups according to age – group 1 (< 1 year), group 2 (1-2 years), group 3 (3-4 years), group 4 (> 5 years). An eye examination involving retinoscopy, tonometry, pupil response, and ocular health assessment was performed on each animal.

Results: Assessment of ocular refractive error showed high hyperopia across all age groups. Tests that assessed likely pathology in the eyes showed a high incidence of ocular health problems among older animals and an age-related change in intraocular pressure. There was also decreased pupil response in the older group.

Discussion: Clinical ocular data in Octodon degus is consistent with reported human AD findings. Octodon degus have age-related clinical ocular characteristics that may be correlated with the age related molecular abnormalities in the eye.

The University of Auckland Society Poster Abstracts

FACULTY OF ARTS
WHY DO DOCTORS WRITE?
Yan Guo
SCHOOL OF EUROPEAN LANGUAGES AND LITERATURES

Doctors who have written creatively for publication have increased significantly in recent years, and creative writing by doctors not only enjoys great popularity among the wider public, but also whets the research appetite of professional critics. One commonly asked question about such a phenomenon is, what motivates doctors to write creatively. This project explores the wide range of doctors’ motives for creative writing, which is essentially the doctors’ desire to communicate with the wider public, with such an effective and satisfying method as literature, so as to release pressure at work, to depict hospitals and other medical institutions, to make amends for errors during practice, to justify doctors’ proper function and roles, to seek understanding and empathy among the public, or to test the public response to certain ethical issues. Though fame or fun, or to stay away from medicine are also legitimate motives for many doctors.

HUMAN-ENVIRONMENT INTERACTION IN PREHISTORY: WHY DO PEOPLE DO WHAT THEY DO?
Samantha Lagos
DEPARTMENT OF ANTHROPOLOGY

From stalking mammoths on the open plains, armed with bows and arrows and living in caves, something fundamentally changed in human populations; a shift in lifestyle brought houses and villages, monumental architecture, agriculture, and other ‘complex’ developments. This ‘Neolithic Revolution’ marks a tipping point in human history. While such dramatic change is differentially attributed to increasing populations, the development of religion, the exhaustion of natural resources, and similar, the transition from a mobile hunter-gatherer lifestyle to one of settled farmers is seen as unidirectional and inevitable. However, the fact that contemporary populations continue to practice pastoralism or hunter-
The service-dominant logic (SDL) has been of great interest to marketers in the last decade. SDL, a replacement to the traditional goods-dominant view of marketing, uses an integrative approach to propose a converging perspective on service marketing where service is treated as the fundamental basis of exchange. Central to this perspective is the idea of resource integration, particularly customer resource integration. Customer resource integration has not been thoroughly examined within marketing from a theoretical and practical perspective. This research examines customer resource integration within the context of beauty blogs. Beauty blogs have received little attention from academics even though they have a significant impact on bloggers themselves, audiences, and organisations. The bloggers, as customers, play a huge role in integrating resources. They share information with readers about products and brands based on their own personal experiences, opinions and feelings. Readers consider this information to be more trustworthy than what is provided by marketing professionals and thus gain valuable insight into potential purchase decisions. In addition, they are able to interact, allowing them to integrate resources. This study adopts a netnographic approach to explore how customer resource integration manifests itself on beauty blogs. The empirical data is retrieved using a non-participant observation method and the data consists of blog

**BUSINESS SCHOOL**

**CUSTOMER RESOURCE INTEGRATION IN BEAUTY BLOGS**
Amrita Lal
DEPARTMENT OF MARKETING

The service-dominant logic (SDL) has been of great interest to marketers in the last decade. SDL, a replacement to the traditional goods-dominant view of marketing, uses an integrative approach to propose a converging perspective on service marketing where service is treated as the fundamental basis of exchange. Central to this perspective is the idea of resource integration, particularly customer resource integration. Customer resource integration has not been thoroughly examined within marketing from a theoretical and practical perspective. This research examines customer resource integration within the context of beauty blogs. Beauty blogs have received little attention from academics even though they have a significant impact on bloggers themselves, audiences, and organisations. The bloggers, as customers, play a huge role in integrating resources. They share information with readers about products and brands based on their own personal experiences, opinions and feelings. Readers consider this information to be more trustworthy than what is provided by marketing professionals and thus gain valuable insight into potential purchase decisions. In addition, they are able to interact, allowing them to integrate resources. This study adopts a netnographic approach to explore how customer resource integration manifests itself on beauty blogs. The empirical data is retrieved using a non-participant observation method and the data consists of blog

**FACULTY OF ENGINEERING**

**FIXING YOUR HIP & KNEE PAIN: DESIGNING IMPLANT USING ION BEAM SPUTTERING**
Sharidah Abdul Azis
DEPARTMENT OF CHEMICAL AND MATERIALS ENGINEERING

There have been a lot of efforts to coat orthopaedic implants especially hip and knee joint with hydroxyapatite (HA), but the films end up being quite thick and unstable, and tend to break away from the implant. In this present study, HA coating on TiAl6V substrate was deposited using an ion beam sputtering technique. This technique basically combines the ion bombardment and sputtering process that could produce HA coatings with a good adhesion and low porosity without changing its bulk properties. Owing to its biomedical applications, the crystalline phases present in the HA must be controlled for a good performance of the coating. From the results of this study we found that 600 °C is the best post deposition heat treatment in order to obtain a better characterization of the coating. Bioactivity on the HA coatings was also investigated in a simulated body fluid (SBF) which reveals better apatite formation with higher post deposition heat treatment and would potentially enhance the formation of new bone. Overall from this study, a thin, uniform and dense nanostructure of HA coating with 500 nm in thickness was fabricated successfully on a TiAl6V substrate. The findings from this study will further improve the HA coated implant in order to produce good tissue-implant interfaces and establish a good coating system for biomedical applications.

**IDENTIFYING ODORANTS USING FLY-MOSQUITO OLFACTORY SENSORS AND MULTI-LAYER PERCEPTRON CLASSIFICATION TECHNIQUES FOR AN OLFACTORY BIOSENSOR DEVICE**
Luqman Bachtiar
DEPARTMENT OF ENGINEERING SCIENCE

Olfactory cues are a very important group of external stimuli for insects as it affects their behaviour, which ultimately dictates their feeding and mating habits. We propose to combine the Olfactory Sensory Neuron (OSN) response array of the Anopheles Gambiae mosquito and Drosophila Melanogaster fruit-fly to produce a cross-species sensory system for odorant detection. In this work, we employ the Artificial Neural Network (ANN) classification method to analyse the insect odour responses. Using a hybrid Multi-Layer
Perceptron system we successfully identified all chemicals tested. Thus, our proposed olfactory biosensor design is effective and with further development it potentially provides an alternative to the human nose for identifying odours and/or flavours.

ESTIMATING TRAVEL TIME ON AUCKLAND’S MOTORWAYS
Chrislyn Braganza
DEPARTMENT OF ENGINEERING SCIENCE

Variable message signs on motorways give travellers estimates of expected travel time. These can be useful in deciding which routes to take in order to avoid congestion. It is therefore important that these estimates are accurate. Several methods proposed in literature for estimating travel time were first explored. One class of methods are ‘trajectory based’, that estimate vehicle speeds along a road section to find total travel time. The simplest and most common such method is to use the average of the speeds detected in a section. These methods are found to work well during times of free flowing traffic. Another class of methods are ‘data-driven’, such as using linear regression on historically collected data to build a model. Current detector measurements are then inputted to find travel time. A new method is proposed that uses linear regression and a least squares approach to find the number of cars in a section at a start time. Travel time can then be found for every later time interval by finding when a car enters and leaves the section, using car counts at either end. This method works well under congestion. However due to detector inaccuracy in measuring car counts, this method does not perform well under free flowing conditions. Therefore a combination of methods could be used to give good estimations during all traffic conditions. These methods are to be tested on a simulation of a section of Auckland’s motorways. An extension is to make travel time predictions, which take into account changing road conditions when providing travel time information.

TWO-WHEELED ROBOTS: PREDICTING THE FUTURE
Ronald Ping Man Chan
DEPARTMENT OF MECHANICAL ENGINEERING

Two-wheeled robots dynamically balance on two co-axial wheels. Their configuration gives them the flexibility to navigate narrow corridors and sloped terrain. However, everything has limits. For two-wheeled robots they include motor speed, and torque limits, and traction limits. To account for these limits, we propose using a linear model predictive controller (MPC) with constraint tightening. Other controllers can become unstable when these limits are exceeded, but the MPC controller makes sure this will not happen. MPC is like a game of chess, looking several moves ahead, while constraint tightening makes the controller robust to disturbances and uncertainties. Based on simulations with motor voltage and current limits, a conventional LQR controller is unstable for a large step change in speed, but the MPC controller slows response time and limits speed as necessary to maintain stability. At low speeds, the performance for both controllers is identical.

PARTIAL DISCHARGE LOCALIZATION
Jichao Chen
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Partial discharge in a high voltage underground cable may cause progressive deterioration of insulating materials and ultimately lead to electrical breakdown. It can be extremely dangerous to the health of the insulation system. Therefore, it is necessary to develop a system to detect and localize a partial discharge source in a power cable. Thus people only need to dig at the position where the partial discharge occurs. Nowadays, only single-sided commercial equipment exists. A double-sided measurement system is proposed in this project due to higher accuracy in longer cables. Algorithms are studied and simulated and the hardware is being developed.

HYDRAULIC PERFORMANCE OF SEDIMENT RETENTION PONDS
Arash Farjood
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

This study addresses the effect of different inlet and outlet configurations and the influence of baffles on the hydraulic performance of a model pond. The physical model is a trapezoidal pond with top dimensions of 4.1 × 1.6 × 0.3 m deep and side and end slopes of 2:1. For simulating the sediment forebay, the inlet pipe fills a rectangular tank of 0.3 × 1.6 × 0.2 m. For dewatering the pond, three perforated T-bars are fixed to an outlet riser to simulate a floating decant dewatering system. Tracer experiments were carried out using Rhodamine-WT fluorescent dye to obtain residence time distribution (RTD) curves and subsequently assess the hydraulic efficiency. Solid and partial-width baffles were also investigated for their influence on the hydraulic efficiency of the system. Compared with the conventional point inlet and outlet system, the results herein showed that distributing the inflow over the entire width of the pond could successfully improve the hydraulic efficiency, albeit with short circuiting along the sloping side walls. Monitoring the dye aided recognition of preferential flow paths which were subsequently removed by modifying the inlet. On the other hand, the outlet span was adjusted to boost the residence times. Hydraulic efficiencies of about 0.50 compared with 0.18 for the conventional system,
UNDERSTANDING EARLY OSTEOARTHRITIS
Emily Hargrave-Thomas
DEPARTMENT OF CHEMICAL AND MATERIALS ENGINEERING

Osteoarthritis is a disease of the joints where the normally smooth cartilage surface becomes frayed and eventually lost. There are currently no ways of repairing lost cartilage; instead, current treatments focus only on reducing pain with medication and surgery. A better understanding of the progression from healthy cartilage to osteoarthritis is needed to enable detection of the crucial early osteoarthritic state. With this knowledge, researchers may be able to develop treatments to prevent the progression of osteoarthritis. We believe the detectable changes may occur in the calcified cartilage and bone beneath cartilage in early osteoarthritis. This study detects changes in the stiffness and hardness of these two materials at three scales using macroscopic 3 point bending, microscopic indentation, and nanoindentation. Using these techniques, we found no significant changes in the calcified cartilage layer at any scale. In the bone, we found an increase in the hardness in early osteoarthritis but this difference was only significant at the micro and nano scale, not at the macroscopic scale. If doctors and researchers hope to develop tests to detect early osteoarthritis, they must consider these smaller scales. Macroscopic, noninvasive tests such as full joint loading are unlikely to detect the subtle changes observed in this study. However, small biopsies or high-resolution, small-scale MRI may be able to detect these changes. With a better understanding of the changes occurring in the bone beneath cartilage, we may be able to prevent the progression of osteoarthritis and limit the debilitating effects of this disease.

SHOCK PROOF
Mamoon Jamil
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

Earthquake damage to infrastructure costs billions of dollars a year on average worldwide. Well-designed modern buildings reliably safeguard the life of occupants by avoiding collapse. The next level is to minimise damage such that the structure can return to full service immediately or soon after a strong earthquake. This research focuses on multi-storey office-type buildings. The low-damage system under development is most suitable for low-medium rise buildings in low-high seismic zones. Building owners, occupants, business, and insurance providers can all benefit from low-damage buildings. The literature review showed that existing systems typically use energy dissipation devices such as friction or viscous dampers to reduce the severity of shaking of the building. Post-tensioned (PT) joint technology which self-centres the building after an earthquake has recently been developed. PT technology has some drawbacks such as the tendency for PT strands to relax, resulting in a decrease in joint strength. Here, a novel system is under development which replaces PT and utilises gravity to achieve a similar self-centring effect. Friction damping is also built-in to the joint. 1:20 scale shake table tests and SAP2000 finite element modelling has shown excellent self-centring and low-damage response. Peak inter-storey drift in the shake table earthquake tests for near fault earthquakes was much higher than the design standard prescribed limits. This is mainly because the model was designed for a low seismic zone (Auckland) and tested to earthquakes scaled for a high seismic zone (Wellington). 1:5 scale tests are planned, followed by a preliminary design procedure for the system.

ESTROGEN IN WATER: FEMINIZE OUR SOCIETY & AQUATIC LIFE? SOLVING BIG PROBLEMS WITH FENTON-LIKE NANO SIZE CATALYST
Sabrina Karim
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

Endocrine Disrupting Chemicals (EDCs) are a class of exogenous xenobiotic that mimic or inhibit the natural actions of the endocrine system in animals and humans. Although these chemicals are present in the environment at nano to micro levels, they can have far reaching consequences on the health of humans and the environment. One EDC compound that needs attention is 17-ethinylestradiol, the active ingredient in the birth control pill, a major synthetic estrogen being excreted by humans which contributes to artificial estrogenicity. The use of nanoscale zero-valent iron (nZVI) for degrading EDCs has received attention due to its small size, resulting in a large specific surface area which can result in enhanced reactivity, greater portability, ease of field deployment, and cost effectiveness. This study investigates the degradation of 17-ethinylestradiol by nZVI and a bimetallic of nZVI with nickel (nZVI/Ni) in oxygenated and oxygen-deficient environments. In addition, the study focuses on identifying the by-products of the degradation. The degradation rate of 17-ethinylestradiol by nZVI is influenced by key environmental indicators such as solution pH (especially pH=5) and the presence of dissolved oxygen. Three different intermediates were
determined during the degradation of 17-ethinylestradiol which were Ethyl, 2-(2,2-diphehlycyclopropyl)-1,2-dimethoxy-1-methyl (pH3) 3-hydroxyestra-1,3,5-triene-17-one (pH5), and 19-nor-17a-pregn-1,3,5(10)-trien-20-yne-3,17-diol, known as Estrogen (pH7). These three intermediates contributed to variable estrogenicity thus contributed to knowledge on selecting the best operation condition. This study exhibits that the nZVI technology could be a promising approach for EDCs wastewater treatment.

Supervisor: Associate Professor Naresh Singhal

CSI IN ENGINEERING - BLOOD, GUNS AND MORE BLOOD
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When a bullet passes through an object, the fragments at the exit site follow the direction of the bullet. This is called forward spatter. However, a small amount of fragments eject back towards the shooter from the entry site. This is called backspatter. This project aims to develop a new experimental system for backspatter research, and increase the understanding of its mechanism from engineering perspective. Backspatter research is important, as it may provide additional information such as proximity of the shot or types of weapon used. Such information can be used to strengthen and help crime scene reconstruction. Despite this, backspatter is a relatively poorly understood subject due to difficulties arising from availability of samples to experiment on and collect data. Different from animal or human samples, making a physical model that accurately mimics the ballistic response of the human head will allow easy access to samples that are free of ethical concerns at a relatively low cost. In order to produce such model, more than 80 material combinations were screened. After the screening, 10 anatomically correct half-cranial 3D models with full skin-skull-brain layers were made out of best material combinations and subsequently tested. Various data such as backspatter pattern and high speed camera footage were collected from the tests, and are currently being analysed. It was observed that the physical model behaved in a similar manner to the animal samples both chronologically and morphologically. The physical model also proved to be excellent at illustrating the different mechanisms at work to generate backspatter. With further analysis and development of full-cranial 3D models, major factors affecting the ballistic response of the system may be identified, which will help explain the mechanisms of backspatter phenomenon more clearly.

CONFINED COMPRESSION OF CHONDROCYTE-HYDROGEL CONSTRUCT LEADS TO HIGHLY INHOMOGENEOUS STRAIN DISTRIBUTION WITHIN
Sophia Leung
AUCKLAND BIOENGINEERING INSTITUTE

Introduction: The influence of mechanical stimuli on chondrocytes in the articular cartilage is important for tissue regulation and maintenance. Numerous 3D in vitro models of hydrogels have been used to study the effect of mechanical influence on cartilage cells, the chondrocytes. Those studies assumed that applied mechanical stimuli are transferred evenly to the 3D construct, resulting in homogeneous strain distribution. However the actual strain pattern within the construct has not been measured. Therefore, the aim of this study is to develop a new experimental system for analyzing the strain patterns within 3D hydrogel upon confined compression and its effect on the chondrocytes seeded within.

Methods: Murine chondrocytes were seeded into either 4% agarose or 4 mg/ml collagen gel (28 x 18 x 3 mm) blocks and cultured for 7 days. Cell-gel blocks were placed in a novel device that applied uniaxial compression at 50 μm increments to a maximum of 15% compression. Using carbon dust to trace gel movement, a set of high contrast images were captured at each increment. Image analysis was conducted using a MATLAB program to produce corresponding strain maps. The top, middle, and bottom zones of the cell-gel blocks were analysed.

Results and Conclusion: Both hydrogel scaffolds showed a variation of the level of strain within. In both gels, the top and bottom zones showed similar strain patterns, with the top zone receiving the highest level of strain. Both scaffolds showed the middle zone having the least strain. Moreover the amount of inhomogeneity increased as the amount of compression increased. Therefore our future work includes achieving cell mechanical environment similar to the in vivo situation by controlling the type and magnitude of mechanical stimulation.

RAPID MICROWAVE-HYDROTHERMAL GROWTH OF NANOSTRUCTURED TITANIUM DIOXIDE (TiO2) THIN FILMS
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Nanostructured titanium dioxide (TiO2) thin films were successfully grown on glass substrates via a rapid microwave-hydrothermal reaction of diluted acidic solution of titanium isopropoxide. Combining microwave irradiation with hydrothermal reaction has successfully achieved reasonable TiO2 film growth within a short duration of 30 minutes at 120 °C in a simple microwave-digester system. This method
proved to be a very efficient and quick alternative to the classical hydrothermal process that usually requires long reaction times (~ 24-48 hours) to achieve reasonable film growth. The resulting film thickness was 133 nm with an average particle size of 33 nm. The average particle density coverage was $1.15 \times 10^{11}$ NPs/cm$^2$ based on surface morphological results. The films were of the anatase crystalline phase based on the x-ray diffraction patterns. This study has also proven that the microwave-hydrothermal reaction can be an environmentally friendly alternative as there was no need to use harsh chemicals and harmful organic solvents. Furthermore, this simple method is cleaner as it is conducted in an isolated system at low temperature and with less energy consumption. These nanostructured films can then be used to fabricate photoanodes used in dye-sensitized solar cells (DSSCs) which will not be included in this poster.

**DEVELOPING AN EFFICIENT TIMBER FLOOR**

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This proposal is introducing the stub girder flooring system which is new to timber structure and consists of LVL beam covered by CLT floor panel separated by a series of short shear connections called stubs. The present work focused on the analytical calculation to predict the optimized flooring system dimensions for future experimental tests. The proposed model contains the structural parameters such as the beams, the stubs, and CLT panel with various related materials. The outcomes are presented in the form of load deflection diagrams, charts, and graphs. One concludes that the suggested flooring system can be a possible alternative for mid to long span frames.

**SAVE ENERGY WITH SMART HOMES**

Ankur Mishra  
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

The model for domestic electricity consumption is proposed using a bottom-up approach. The model takes into account the behavior of general household appliances in detail and also the response of home consumption to such behavior. The major appliances under consideration are thermal consumption based loads like hot water cylinders since the potential of load shifting is higher because of their larger response times. The knowledge of appliance usage is obtained from house metered data for several houses. The data is used to construct several scenarios by isolating usage pattern. These usage patterns are merged with the above mentioned domestic load model to recreate the load patterns for validation. Therefore a model validated with existing real data, is then used to evaluate the load shedding potential of one house by random appliance stock and usage probability. The study is extended to a group of houses, with appliance variation. The appliance variation and usage patterns for individual houses are produced using a stochastic analysis. The research concludes by comparing simulated load patterns to actual usage patterns and evaluating total potential demand response scenarios.

**HIGH PRESSURE PROCESSING (HPP) OF HONEY FOR THE IMPROVEMENT OF NUTRITIONAL VALUE**

Noor Akhmazilla Mohd  
DEPARTMENT OF CHEMICAL AND MATERIALS ENGINEERING

The present study was undertaken to assess the effect of high pressure processing (HPP) on total phenolic content (TPC) in manuka honey. Manuka honey is known for its amazing antimicrobial action and antioxidant properties. The effect of HPP (200, 400 and 600 MPa) at ambient and moderate temperatures (53.41 ± 0.30 °C, 65.29 ± 1.77 °C, and 71.92 ± 1.63 °C) and their combination for different processing time (5, 10, and 15 minutes) was investigated. Conventional thermal processing (51.74 ± 0.03 °C, 61.90 ± 0.10 °C, and 71.58 ± 0.04 °C) were also carried out as comparison to HPP. Operating HPP at 600 MPa (26.80 ± 0.95 °C to 30.18 ± 2.14 °C) for 10 minutes was found to be the most effective process with 47.16% increment in TPC as compared to unprocessed honey, whereas no significant increase (p < 0.05) was observed in thermal processing as well as in combined HPP - thermal processing. Therefore, HPP at ambient temperatures could be an appropriate method to produce tastier and more nutritive manuka honey.

Industrial relevance: The preservation of total phenolic content (TPC) as a main phytochemical component in honey is very important with direct impact on nutritional value and antioxidant activity. A significant increase in the TPC was obtained by processing. Results demonstrated the HPP capability to increase TPC in manuka honey by 47%. From a nutritional perspective, this result is associated with the production of a higher antioxidant honey, known to prevent certain diseases such as cancer. The study generates a new approach in honey processing which can guarantee the high nutritional quality of honey and its original natural freshness.

**SOFT TISSUE DEFORMATIONS IN “SHAKEN BABY SYNDROME”**

Nikini Puhulwelle Gamage  
AUCKLAND BIOENGINEERING INSTITUTE

Shaken baby syndrome (SBS), is a form of child abuse assumed to be caused by the intentional violent shaking of an infant, and has an incidence of between 14 and 40 per 100,000 infants under the age of one, per year. A detailed computational model of the infant head is necessary to address the ambiguity...
surrounding the diagnosis of SBS. This research involved the construction of a finite element model to mimic the mechanical interactions between the brain and the skull. To validate this numerical approach, separate physical phantom and analytical models were constructed. The first experiments investigated the effects of a linear shaking modality. The physical phantom incorporated a plastic cube filled with gel and instrumented with pressure transducers. This physical model was subjected to linear sinusoidal motion, and the pressure signals recorded. An analytical solution was also identified and these two models were then used to validate a computational model. Secondly the effect of the cerebrospinal fluid (CSF) was examined. A phantom and analytical model were constructed to predict the contact and internal pressures of the gel under a linear shaking motion. Again a computational model was created however this is yet to be validated. Future models will investigate tethered links between the brain and skull and the effect of the CSF under a rotational motion. It is hoped that this will help find the link between a shaking motion and the common injuries seen in infants with SBS.

BREAKING THE SPINE – HOW DOES ANCHORAGE BETWEEN THE INTERVERTEBRAL DISC AND VERTEBRAL BONE FAIL?
Samantha Rodrigues
DEPARTMENT OF CHEMICAL AND MATERIALS ENGINEERING

The intervertebral disc in the spine comprises three regions: the soft gel-like nucleus in the centre, the firm multi-layered annular wall around it, and the endplates which form a disc-bone transition. Annulus-bone anchorage is particularly important as it holds the disc and vertebrae together, allowing forces to be transferred between both tissues. Little is known about this region. However some studies suggest that failure of this junction is related to a common back-pain condition known as “disc herniation”. Therefore, the aim of this study is to investigate the failure mechanism of the annulus-bone anchorage system. The annulus experiences large tensile forces when the disc is twisted, bent, or compressed. Hence, the annulus and its corresponding anchorages have to be exposed to extreme tensile forces to achieve failure. Experiments were performed on bone-disc bone segments from mature sheep spines in three ways: (a) by loading samples in excessive torsion (i.e. rotation), (b) by loading the disc in excessive extension (i.e. bending at this soft-hard tissue junction.

FROM WASTE TO WEALTH: SAVING THE ENVIRONMENT USING SHELL WASTE
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There has been a dramatic increase in mussel and other shellfish farming around the world especially in New Zealand and as a result, this part of the aquaculture industry creates a large by-product of shells which are mostly disposed to landfill. This study aimed to investigate the feasibility of utilizing mussel shells as environmental friendly material for the treatment of wastewater; in this study, three types of powder produced from the mussel shells: the raw shell powder, calcium oxide (lime), and hydroxyapatite. These powders were used to act as a photocatalyst in the degradation of methylene blue via photocatalysis. Mussel shells are a rich source of calcium carbonate which in this research are used as a calcium source to form lime (calcium oxide) and then hydroxyapatite (HAP) by using a novel pyrolysis-wet slurry precipitation method. Photocatalysis is considered a non-waste generating technology, representing a robust alternative wastewater treatment for dye effluent when common wastewater treatment technologies are insufficiently effective and have several drawbacks including high operating costs and the generation of toxic by-products. The chemical analyses of the HAP and other derivatives from mussel shells and the applications in the photocatalytic degradation of dyes are presented. This potentially provides a greener route for recovering and recycling waste shells into hydroxyapatite which can be used as an alternative photocatalyst in the photocatalytic degradation of wastewater components. The results from this work have demonstrated two existing environmental sustainability problems to be solved: pollution remediation, and the transformation of a significant existing waste material into a useful commodity.
INTELLIGENT AND COMPREHENSIVE MONITORING SYSTEM FOR SWIMMING POOL SAFETY
Howard Wang
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

With the popularity of swimming pools, the number of drowning people has shown an upward trend. On the one hand, traditional safety precautions for swimming pool largely depend on manual monitoring, which is labor intensive and inaccurate. On the other hand, the effective digital monitoring system for pool safety is currently unavailable. This paper describes an intelligent and comprehensive monitoring system (ICMS) for swimming pool safety. As an automatic and digital monitoring system, the ICMS performs better in detection time and location accuracy than manual monitoring. The whole monitoring system mainly consists of three monitoring subsystems: underwater ultrasonic detection subsystem (UUDS), underwater video detection subsystem (UVDS) and virtual pool fence subsystem (VPFS). By using a high performance underwater ultrasonic sensor, the UUDS can detect and locate the drowning people in less than one second and the detection range can reach up to 70 meters. With the help of image processing and computer vision technology, the UVDS is capable of detecting multiple drowning people at the same time; it can process a video sequence up to 25 frames per second. Actually, the UVDS can be looked at as an important auxiliary system of the UUDS. Once the swimmer is drowning, the UUDS and UVDS can detect and locate the drowning people respectively, and then trigger the alarm system immediately. If someone intruded into the pool perimeter when the pool is out of service, the VPFS can detect intruders and trigger alarm bell as well. In order to make it easier for authorized users to access the monitoring system in different ways, the ICMS provides multiple user access interfaces. The ICMS employs a uniform data interface, security network protocol and high efficient network communication model to improve the robustness and efficiency of the system. In conclusion, the ICMS, which has integrated multiple technologies, outperforms manual monitoring in efficiency, accuracy and reliability.

AEROCOUSTIC ANALYSIS OF NOISE GENERATION FROM A LARGE SCALE WIND TURBINE BLADE WITH SWEEP TIP
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Aeroacoustic noise from a rotating blade such as that found in a wind turbine is a result of the generation of vortices and their interaction with solid bodies. Blade Vortex Interaction (BVI) on a wind turbine can occur at high tip speed ratios where the local Reynolds number is relatively high. The tip vortices from a blade can interact with its own trailing edge or the surface of the following blade. This highly unsteady flow can be impulsive and can have large amplitude pressure fluctuations. The recent development of silent helicopter rotor blades by Eurocopter in 2011 showed a significant reduction of the noise generation due to BVI. Application of a similar method may help to minimize the acoustic noise generation from wind turbines. The present work is an investigation of the effectiveness of the sweep angle near the tip of a wind blade for overall noise reduction at high turbulent intensity. Large Eddy Simulations with the Flowcs-Williams and Hawkings acoustic analogy are used to predict the flow field and sound generation from the rotating blade with three different sweep angles. A significant overall acoustic noise reduction was observed at the highest tip sweep angle at lower frequencies.

FACULTY OF MEDICAL AND HEALTH SCIENCES (FMHS)

IDENTIFICATION OF CIRCULATING MICRORNA CANDIDATES AS BIOMARKERS OF THE CANCER-ASSOCIATED DOWN-REGULATION OF THE HEPATIC DRUG METABOLISING ENZYME CYP2C19
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Background: The hepatic enzyme CYP2C19 is important in the biotransformation of numerous drugs. Due to inherited genetic variation up to 3% of individuals in healthy Caucasian populations lack functional copies of CYP2C19 and are poor metabolisers of these medications. However, up to 37% of cancer patients without this null genotype exhibit a poor metaboliser phenotype. The mechanism underlying CYP2C19 genotype–phenotype discordance is unknown.

Objectives: Identify circulating microRNA (miRNA) differentially expressed in patients concordant or discordant for CYP2C19 genotype and phenotype, for future investigation as biomarkers of discordance.

Methods: Circulating miRNA was extracted from serum samples of cancer patients previously identified as either concordant (n=6) or discordant (n=5) for CYP2C19 genotype and metaboliser phenotype. Samples were then subjected to microarray analysis using Affymetrix GeneChip microRNA V3 arrays to comprehensively screen for those miRNAs, which
were altered in abundance between the two sample cohorts.
Results: 36 circulating miRNAs were identified as significantly (p < 0.002, LIMMA analysis) associated with the down-regulation of CYP2C19 activity. Of these, 28 were increased, and 8 decreased, in genotype–phenotype discordant patients. They included human microRNAs miR-606 and miR-3128, and the small nucleolar RNA (snoRNA) snoU13 (ENSG00000239055).
Discussion: This preliminary dataset will allow us to comprehensively screen for those miRNAs, which samples of cancer patients previously identified as phenotype discordant patients. They

THE PHARMACOKINETICS OF ADENOSINE AMINE CONGENER (ADAC) IN PLASMA AND INNER EAR
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DEPARTMENT OF PHYSIOLOGY

Background: Noise-induced hearing loss (NIHL) is a global health problem affecting up to 5% of the population. As the injury to the inner ear is mostly due to oxidative stress, which continues after noise exposure, there is a window of opportunity to rescue cochlear tissues and prevent the hearing loss within the first 48 hours after exposure. We have shown that NIHL can be prevented by administration of drugs acting on adenosine receptors in the cochlea, and a selective A1 adenosine receptor agonist Adenosine Amine Congener (ADAC) has emerged as a potentially treatment for NIHL.
Objective: To investigate pharmacokinetic parameters of ADAC in rats. Method: After systemic and local administrations, plasma and cochlear samples are analysed by high pressure liquid chromatography to determine ADAC concentrations.
Results: Both administration routes follow one-compartment bolus pharmacokinetic model with first-order output. In plasma, the majority of ADAC distributes in tissues, and its half-life is estimated at 4.5 minutes. ADAC is capable of crossing the round window membrane of the cochlea after local injection, and the estimated diffusion rate is 2.7%. ADAC has a longer half-life of 37 minutes in cochlear fluids, and with the optimal dose, ADAC will remain in its therapeutic range for approximately 4 hours in perilymph.
Discussion: ADAC stays effective in cochlear fluids longer than plasma, but the local administration technique requires the involvement of ear specialists. Therefore, this study suggests that ADAC has a potential to be developed as a clinical otological treatment, and both local and systemic administration routes are equally important.

THE CLINICAL SIGNIFICANCE OF ERB IN HUMAN CANCER
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Background: The function of oestrogen receptor alpha (ERα) in breast and ovarian cancer is increasingly understood, and its prognostic values are clinically evident as seen in routine breast cancer tumour subtyping by immunohistochemistry. Despite having an opposing, anti-tumour effect, the understanding of the closely related oestrogen receptor beta subtype (ERβ) and its molecular involvement in human cancer is still unclear.
Objectives: To evaluate the clinical significance of using ERβ expression and ERα:ERβ expression ratio as prognostic markers in human cancer.
Methods: The Cancer Genome Atlas (TCGA) is a data portal that contains extensive genomic characterisation and analyses on several human cancers. Tumour data sets generated using Agilent gene expression microarray and the associated patient clinical information were retrieved from TCGA. Bioinformatic analyses on the expression of ERα and ERβ were performed. The expression of ERα, ERβ, and ratio of the two were then correlated with patient clinical information such as tumour grade, tumour stage, overall survival time, presence of metastasis, and treatment response.
Results: Higher ERβ expression and lower ERα: β expression ratio correlated with better overall survival time in different hormonally regulated human cancers.
Discussion: This study has shown that ERβ expression level or ERα:ERβ expression ratio may be a better predictor of patient prognosis in human cancer than ERα expression alone.

BEFICIHAL EFFECT OF ANTIOXIDANT TREATMENT ON WOUND HEALING AND REACTIVE OXYGEN SPECIES-ASSOCIATED FUNCTIONS IN KERATOCONUS
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Background: Keratoconus manifests as a conical protrusion of the cornea, and is characterised by stromal thinning. This causes debilitating visual impairment, which may necessitate corneal transplantation. Therapeutic targets related to disease mechanisms are currently lacking, as pathobiology remains unclear. Many pathological features may be manifestations of defects in wound healing and reactive oxygen species (ROS)-associated functions. In many tissue and cell types, antioxidant exposure has beneficial effects on both these pathways.
Objectives: This study investigated the effect of antioxidant treatment on wound healing and ROS-
associated functions in keratoconus. Methods: Stromal cells were isolated from human central keratoconic corneas, with and without ex vivo riboflavin treatment, and control untreated non-keratoconic corneas (N=9). Total RNA was extracted and reverse-transcribed into complimentary DNA. The expression of 22 genes – 8 normal and 4 repair-type stromal extracellular matrix (ECM) constituents, 8 antioxidants and 2 ROS-synthesising oxidases – was quantified using quantitative polymerase chain reaction. Results: In stromal cells from untreated keratoconic corneas (compared with untreated normal corneas) these 22 genes were differentially expressed. In treated keratoconic corneas (compared with untreated keratoconic corneas), 6/8 normal ECM constituents and 7/8 antioxidants were upregulated. A reduction in 2/4 repair-type ECM molecules and 2/2 oxidases was observed. Discussion: Antioxidant treatment encourages the synthesis of a normal ECM and reduces ROS levels in keratoconus. This supports the occurrence of wound healing and ROS-associated abnormalities in keratoconus. By targeting the causative disease mechanisms, the application of antioxidants may have therapeutic potential in the clinical management of keratoconus.

THE ROLE OF MELATONIN IN INFERTILITY
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DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY

Background: Granulosa cells have an important role in supporting the maturation of oocytes. Oxidative damage to these cells can interfere with oocyte maturation, and thereby negatively impact female fertility. Given that melatonin is a potent and universal antioxidant, here we investigate its ability to reduce ovarian oxidative stress and improve fertility. Objectives: To investigate in vitro if melatonin can reduce DNA and lipid oxidative damage in granulosa cells. Methods: Hydrogen peroxide and antimycin A were used as inducers of oxidative stress. An optimal dose of hydrogen peroxide and antimycin A for experiments was determined by monitoring cell proliferation and death post treatment. Subsequently, granulosa cells were co-treated with a range of melatonin concentrations plus either inducer. Oxidative stress levels were measured through assessment of DNA and lipid damage. Results: There was a decrease in cell proliferation, with increasing concentrations of hydrogen peroxide and antimycin A. Treatment of granulosa cells with either inducer of oxidative stress were found to have a higher amount of dead cells when compared with controls. Experimental results from granulosa cells co-treated with melatonin and either hydrogen peroxide or antimycin A are currently being analysed. Discussion: Further research on the role melatonin plays in reproduction will improve our understanding on its effectiveness as an antioxidant. This may lead to the future use of melatonin as a therapeutic agent to improve fertility.

MECHANISMS OF RIBOSOMAL ACTIVATION IN RESPONSE TO RESISTANCE EXERCISE TRAINING
Vandre Figueiredo
LIGGINS INSTITUTE

Background: Resistance Exercise Training (RT) leads to muscle hypertrophy as a result of increased muscle protein synthesis (PS). Currently little is known of the mechanisms governing the increase in the synthetic capacity within muscle (ribosome content), which is dictated by Ribosomal Biogenesis (RB). RB is a process that involves the transcription of ribosomal DNA (rDNA) by RNA polymerase I, through activation of Upstream Binding Factor (UBF) protein. Objectives: To determine whether key effectors of RB in response to RT are increased. We hypothesized that cyclin D1, upstream regulator of UBF, and UBF would both be activated following RT. Methods: Muscle biopsies were taken before training, at rest, and 1 hour after a single bout of RT and again after 8 weeks of RT in male subjects (n=14, 18-36y). Muscle protein homogenates were analysed for anabolic signalling pathway (mTOR and ERK), together with cyclin D1 and UBF phosphorylation. Results: The ERK and mTOR pathways were activated after each exercise bout, as expected. Total Cyclin D1 levels were consistently increased 1.8 fold after exercise, but not further with training. UBF phosphorylation was increased >4 fold over baseline with training but did not respond acutely to the exercise bout. Discussion: We demonstrate that Cyclin D1 is up-regulated acutely and that UBF phosphorylation is chronic elevated due to training. Cyclin D1 activates CDK, which increases UBF phosphorylation, and consequently increases rDNA transcription. In conclusion, RB is a necessary adaptation to support and maintain an increased protein synthetic capacity in response to RT.

EXPLORING CELL PLASTICITY: THE CORNEAL KERATOCYTE AND BEYOND
Carol Greene
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Background: Corneal keratocytes have a remarkable ability to heal wounds in the cornea throughout life and also exhibit a high level of cell plasticity. It has been shown in our laboratory that it is possible to induce human and rat stromal keratocytes to express neuron specific proteins by adding specific growth factors to the culture medium. Objective: To carry out ex vivo and in vivo experiments
to uncover the extent of corneal keratocyte plasticity. Furthermore, to explore and compare the potential of other cell types to exhibit similar cell plasticity.

Methods: Corneal slice tissue and keratocytes cell culture were used for in vitro experiments. Immunohistochemistry and RT-PCR were used to investigate protein and gene expression, respectively.

Results: Keratocytes expressed Nestin, NF-200, and MAP2 when cultured in a neuronal differentiation medium containing EGF, FGF and IGF-1. RT-PCR revealed upregulation of GAD1, SYN1, SOX2, SOX10, and NOTCH1. Subsequent in vivo studies also confirmed the expression of Nestin, MASH1, and NF200. Adult rat xiphosternum derived chondrocytes cultured in the same neurogenic media expressed NF-200, MAP2, GAP43, and β-Ill-tubulin.

Discussion: Apart from producing neuron specific proteins such as NF-200 and MAP2, the genes SOX2, SOX10 and NOTCH1, which are associated with neurogenesis, were up-regulated in corneal slices cultured in the neurogenic medium. The expression of genes such as GAD1 and SYN1, which are associated with neurotransmitter synthesis and synapse formation, indicate that the neuronal cells produced might be functional. Similar to corneal stroma, cartilage from adult rats contained cells that displayed neurogenic potential.

KNOWLEDGE AND BELIEFS SURROUNDING THE PREVENTION OF PREGNANCY AND SEXUALLY TRANSMITTED INFECTIONS (STIS) AMONG MIGRANT ASIAN STUDENTS
Sheena Gow
SCHOOL OF NURSING

Background: New Zealand has recently seen an increase of unwanted pregnancies and sexually transmitted infections (STIs) among the migrant Asian population. In Asia, schools tend to take on a traditional approach to sex education where limited information is given to students. As a result, these individuals are more at risk of unsafe sexual behaviour.

Objectives: This study aims to ascertain Asian international students’ knowledge and beliefs pertaining to pregnancy and STI prevention.

Methods: A questionnaire was developed to obtain participants’ sources of sexual health information, knowledge of contraception, and its effectiveness in pregnancy prevention and STI transmission.

Results: While there was a basic understanding of contraception among the 62 participants who came from eight Asian countries, greater than 50% of them believed that natural remedies are effective in pregnancy prevention. Participants from Muslim countries are significantly more likely to use natural contraception than participants from non-Muslim countries (p=0.003-p=0.012). 16-37% of participants were also unsure of which situations put them at higher risk of getting pregnancy and STIs.

Discussion: Despite the limited sample size and language barriers of the participants, this study has shed light on areas where knowledge of sexual health among international students can be improved. Evidently, participants lacked vital sexual health information that can lead to risky sexual behaviour, and possibly resulting in unwanted pregnancies and STIs. As society becomes increasingly sexually liberal, the young Asian population needs to have better knowledge of sexual health in order to protect themselves from the dire consequences of unsafe sexual encounters.

WHAT DO PHARMACY STAFF IN NEW ZEALAND THINK ABOUT PROVIDING SERVICES TO YOUNG PEOPLE?
Emma Horsfield
SCHOOL OF PHARMACY

Background: Research suggests there may be potential to increase youth healthcare access through community pharmacies because they are conveniently located, open long hours, no appointment is necessary and they offer many services relevant to young people. However few studies have investigated this opportunity.

Objective: To explore the views of community pharmacy personnel on providing services to young people.

Methods: A youth participatory approach was used and an interview guide was developed with a Youth Advisory Group (YAG). Nineteen semi-structured, qualitative interviews were conducted, and the recorded transcribed data were analysed thematically using a general inductive approach. Results were discussed with the YAG and their feedback was used to guide the interpretation and conclusions made.

Results: Participants reported mostly positive experiences and attitudes towards youth. Common barriers discussed tended to be those perceived from the young person’s perspective, such as low health-literacy, cost, embarrassment, and concerns about confidentiality. Some participants discussed issues with communication and rapport. Nearly all participants said they would like more training on youth health and thought this should be available for pharmacy staff as well as pharmacists. The YAG feedback highlighted a need for better information about what pharmacies do, what services and advice are available, and costs and confidentiality rights for young people.

Discussion: The findings of this study indicate that pharmacy staff care about the well-being of young people and want to help, but will need support to optimise potential for increasing youth healthcare access through pharmacies. Training for personnel and raising young people’s awareness about pharmacies were identified as possible facilitators.
IMPACT OF USING A CHECKLIST IN ROBOTIC-ASSISTED LAPAROSCOPIC RADICAL PROSTATECTOMY (RALRP) ON PATIENT SAFETY AND THEATRE EFFICIENCY
Jiamei Jing
SCHOOL OF NURSING

Background: The Da Vinci robotic surgical system was first brought into New Zealand in 2007. It has been mainly used for robotic-assisted laparoscopic radical prostatectomy (RALRP). The introduction of this robotic technology has brought many challenges to operating room (OR) nursing teams. In addition, due to the successful deployment of a checklist system in aviation and other healthcare departments, a checklist has been developed and trialled to help OR personnel fully prepare the OR and provide optimal patient care during RALRP.

Objectives: To explore the impact of using a checklist in RALRP on patient safety and theatre efficiency.

Methods: Theatre personnel working in RALRP, including OR nurses and perioperative assistants were invited to join a focus group after the trial of the checklist to assess the impact on patient safety and theatre efficiency. The focus group discussions were audiotaped, then analysed using thematic analysis.

Results: The RALRP checklist was found to serve as a guideline and a reminder for theatre personnel in OR. It was reported that use of the checklist was associated with improved theatre readiness, less interrupted procedural flow, and improved time efficiency. As a result, theatre personnel working in RALRP reported experiencing positive changes in self-confidence, teamwork, and safety of practice.

Discussion: The RALRP checklist was found to be an effective tool to guide them to set up RALRP theatre, and to work through the procedure. However, coordinated efforts are needed to sustain its use in order to maintain its expected effectiveness.

THE CONTRIBUTION OF THE EXTRACELLULAR MATRIX TO INTRACELLULAR CALCIUM HANDLING IN RAT CARDIAC TRABECULAE
Sarbjot Kaur
DEPARTMENT OF PHYSIOLOGY

Background: Traditionally, the extracellular matrix (ECM) in the heart has been thought of providing mechanical scaffolding for the contracting myocytes. However, we noticed that the amplitude of the intracellular Ca2+ transients (measured by 340/380 fura-2 fluorescence) that underlie contraction was reduced in isolated myocytes in comparison to Ca2+ transients from multicellular trabeculae.

Objectives: To investigate the contribution of ECM to intracellular Ca2+ handling within cardiac myocytes.

Methods: To investigate this further we continuously measured intracellular Ca2+ (340/380 fura-2) and isometric force in electrically stimulated rat cardiac trabeculae exposed to enzymes that dismantle the linkages between the ECM and the myocytes, similar to that used for isolation of cardiac myocytes.

Results: Isometric stress decreased in trabeculae from 38.37 ± 3.50 mN mm-2 to 15.10 ± 2.63 mN mm-2 (n = 4) and [Ca2+]i (340/380 ratio) decreased from 2.17 ± 0.24 to 1.58 ± 0.08, P < 0.05 during enzyme treatment, in 1mM [Ca2+]0 at 0.2 Hz frequency at room temperature. Immediate changes in intracellular Ca2+ were noticed, when the enzyme solution was washed off, and trabeculae were fixed using 2 % paraformaldehyde. Immunohistochemical techniques were then used to identify key proteins linking the ECM, and the myocytes that might also modulate intracellular Ca2+, such as the endothelial cell marker (RECA-1), laminin, integrins, and connexin-43.

Discussion: We discuss the potential involvement of endothelial cells (ECM) in the modulation of intracellular Ca2+ within the cardiac trabeculae.
treated with ATPγS and neomycin showed significant difference from the control (47.8±12.1, p<0.01) but is insignificant against ATPγS treatment alone. This suggests a cytotoxic effect of ATPγS.

Discussion: This study demonstrates that ATP signalling does not aid hair cell survival in the cochlea exposed to neomycin and prolonged stimulation of P2 receptor by ATPγS demonstrates significant cytotoxicity.

CELL PROLIFERATION DYNAMICS IN THE ADULT SHEEP AND HUMAN NEUROGENIC NICHE
Victoria Low
DEPARTMENT OF ANATOMY WITH RADIOLOGY, CENTRE FOR BRAIN RESEARCH, DEPARTMENT OF PHARMACOLOGY AND CLINICAL PHARMACOLOGY & DEPARTMENT OF PSYCHOLOGY

Background: Progenitor cell proliferation in transgenic rodent models of Huntington’s disease (HD) have not reflected observations made in the human HD brain. In the subventricular zone (SVZ), animal models of HD have demonstrated no change in proliferation, while in humans there is a prominent increase in proliferation in HD cases.

Objective: Despite numerous transgenic HD mouse models showing decreased proliferation in the subgranular zone (SGZ) in the hippocampus, this decrease has not been previously reported in humans with HD. Furthermore, we are currently developing a transgenic HD sheep model, which, with its gyrencephalic brain, more closely resembles the human proliferative regions in comparison to rodent models.

Methods: In this study we examined SGZ proliferation in 14 HD and 8 normal human brains, and SGZ and SVZ proliferation in 8 normal sheep brains (4 young, 4 old) using a range of cell-cycle protein markers including proliferating cell nuclear antigen and bromodeoxyuridine in sheep.

Results: The results showed minimal proliferation in the human SGZ, comparable with previous studies on normal human hippocampal proliferation. Additionally, no significant difference in SGZ proliferation between normal and HD cases was observed. Furthermore, like humans, the sheep SGZ is less proliferative than the SVZ, and proliferation in the sheep SVZ resembles that reported in the human SVZ.

Discussion: Proliferation in the sheep SGZ and SVZ resembles that of the human, suggesting that sheep are a good model of progenitor proliferation in humans. Moreover, due to the rarity of proliferation in the human hippocampus, hippocampal plasticity in humans may not primarily involve cell proliferation.

EXPRESSION OF NALP3 INFLAMMASOME BY ENDOTHELIAL CELLS IN RESPONSE TO NECROTIC TROPHOBLAST DEBRIS
Jia Wei
DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY

Background: Preeclampsia is a hypertensive disease in pregnancy, in which a placental factor triggers systemic endothelial cell dysfunction. In all pregnancies cellular trophoblast debris is extruded from placenta into the maternal blood. It is hypothesized that in preeclampsia the debris is produced by a more necrotic process, which may contribute to this disease. Endothelial cells can phagocytose both apoptotic and necrotic trophoblast debris (NTD), but only phagocytosis of NTD induces endothelial cell activation. Recently, the NALP-3 inflammasome was found to be a potentially important pathway of recognising and responding to necrotic cellular material in macrophages.

Objectives: To investigate whether endothelial cells respond to NTD via NALP-3 inflammasome.

Methods: Placental explants were obtained from first trimester placentae (n=12), and cultured overnight. Trophoblast debris was harvested and rendered necrotic by a freeze-thaw cycle. Apoptotic/necrotic debris was added to monolayers of HMEC-1 endothelial cells for 24 hours. Expression of the NALP-3 inflammasome in HMEC-1 was examined by qRT-PCR, immunocytochemistry, and western blotting.

Results: In untreated HMEC-1 cells, all three components of NALP-3 inflammasome (NALP3, ASC, and caspase-1) are expressed. mRNAs for both NALP3 and caspase-1 were increased in HMEC-1 in response to NTD.

Discussion: These results indicate that the NALP3 inflammasome complex might be the mechanism by which endothelial cells recognize and respond to NTD, leading to endothelial cell activation. The identification of the response of the NALP-3 inflammasome in maternal endothelial cells to NTD may provide further insight into the pathogenesis of preeclampsia.

A SINGLE NUCLEOTIDE POLYMORPHISM (SNP) BASED APPROACH TO DETERMINING OVARIAN RESERVE
Pavani Wijewardene
DEPARTMENT OF OBSTETRICS & GYNAECOLOGY, & LIGGINS INSTITUTE

Background: Ovarian reserve is the number of primordial follicles within the ovary. The size of the primordial follicle pool reflects the reproductive potential of a woman. A genetic predisposition for early follicle reduction or a small primordial follicle pool exists. This can increase the risk of infertility by the time a woman decides to start a family, thus a genetic screen for ovarian reserve is desirable. Objectives: To...
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determine whether single nucleotide polymorphisms (SNPs) in genes associated with ovarian reserve can be used to predict a woman’s risk for premature ovarian ageing.

Methods: SNPs on genes associated with ovarian reserve were selected using a PubMed literature search and Ensembl and HapMap databases. Linkage disequilibrium (LD) was analysed for SNPs on the same gene using Haploview to eliminate SNPs that would be inherited together. DNA extracted from the blood of infertile (n=94) and fertile (n=95) women of reproductive age was genotyped using the Sequenom iPLEX assay (18 SNPs) and the TaqMan probe assay (2 SNPs).

Results: Of the twenty SNPs identified, eighteen could be multiplexed for Sequenom. Two SNPs were at risk of disrupting the multiplex and were analysed using TaqMan. Results from the assays are yet to be received. Discussion: investigation of the association of these twenty SNPs may provide us with a better understanding of ovarian reserve markers. This may lead to the development of a genetic test for identifying women at high risk of premature ovarian ageing, enabling them to plan their families accordingly.

GLOBAL MOTION DETECTION IS RELATED TO MOTOR AND COGNITIVE DEVELOPMENT AT TWO-YEARS-OF-AGE
Tzu-Ying Yu
DEPARTMENT OF OPTOMETRY AND VISION SCIENCE ON BEHALF OF THE CHYLD STUDY GROUP, LIGGINS INSTITUTE

Background: Specific deficits in global motion perception, a function of the dorsal extrastriate visual cortex, have been reported in groups of children with, or at risk of, abnormal neurodevelopment.

Objective: To assess the relationship between global motion perception and cognitive, language, and motor function in a group of two-year-old children born at risk of abnormal neurodevelopment.

Methods: Children born with risk factors for neonatal hypoglycaemia (n=367) were assessed at 24±1 months corrected age. Global motion coherence thresholds (MCTs) were measured using the method of constant stimuli whilst recording the optokinetic reflex (OKR) and behavioural responses. Neurodevelopment was assessed using the Bayley Scales of Infant Development III (BSID-III).

Results: MCTs were measured successfully using the OKR technique in 334 children (91.0%). Behavioural MCTs were successfully measured for 33 children (9.0%). OKR MCTs correlated with BSID-III cognitive (r=-0.19, p=0.001), language (r=0.47, p<0.001), composite motor (r=0.18, p=0.001), and fine motor (r=0.26, p<0.001) scores, whereby a lower number of behavioural responses was associated with lower BSID-III scores.

Discussion: Global motion perception, measured using reflex eye movements, is related to cognitive, language, and motor function in two-year-old children. This suggests that assessment of dorsal stream function may provide an additional marker for neurodevelopment in children.

NATIONAL INSTITUTE OF CREATIVE ARTS AND INDUSTRIES (NICAI)
GREEN ELECTRICITY FOR THE POOR: EMPOWERING SOLAR PHOTOVOLTAIC SYSTEMS FOR LOW-INCOME PEOPLE IN SOUTH EAST ASIA
Nur Azfahani Ahmad
SCHOOL OF ARCHITECTURE AND PLANNING

Power scarcity due to the depletion of fossil fuels could cause frequent power interruptions and lead to a disruption of a nation’s social structure and economy. The most vulnerable group is the low-income people, who have limited access to generate their own power supplies. Due to this situation, it is necessary to introduce sustainable power supply for the low-income groups, by deploying green technology through distributed generation of electricity which is based from roof-mounted solar PVs. Using solar as green electricity resources leads the way for low-income people to have sustainable electricity for the future and at the same time, help them generate additional income for the family. The lesson learnt from many countries proved that, with suitable strategies, solar energy can provide benefits for low-income people in South East Asia. Strategies such as a community-based approach and innovative financing schemes are ideal key components in developing a suitable energy policy that can help promote solar electricity for low-income communities in the future.

HOME, SMART HOME
Abdul Razak Ahmad Haqqi Nazali
SCHOOL OF ARCHITECTURE AND PLANNING

As Malaysia approaches a high income economy, rapid development activities encompassing economic and population growth have resulted in an adverse effect on local energy security and environmental preservation. Based on lessons learnt from the developed nations, the continuous increases in energy demands require scrutiny and a relook at the ways this energy is being consumed and produced. In the Malaysian context, electricity is the main source of...
energy being used and it is being produced from fossil fuel sources which are unsustainable, environmentally unfriendly, and fragile to market forces. Studies show that similarly around the globe, residential sectors account for a substantial share in the demand for energy. Given this, massive studies have been initiated to address this issue from the perspective of the residential sector. Solutions derived from these studies denoted that significant reduction in the demand for energy can be achieved by reducing energy use for comfort; i.e. adopt passive strategies in contrast to mechanical cooling, careful design of the dwelling, and energy efficiency practices. Accordingly, other studies have indicated that due to changes of context i.e. urbanisation activity, microclimatic changes, pollution, global warming, lifestyle changes, and increased level of comfort expectations have led to the declining benefits of passive design performance. Thus, some scholars discussed the potential use of active systems to overcome the problems of passive strategies but raised several challenges to implement it in the local environment including public acceptance and investment cost. Acknowledging this challenge, this study shall focus on the potential use of smart technologies in dwellings and investigate the advantages associated to its use like smart grid deployment, declining cost of PV panels, and the introduction of various policies and incentives in Malaysia.

RESILIENT ARCHITECTURE: RESPONSE TO BUSH FIRE PHENOMENA IN KINGLAKE COMMUNITY
Thomas Denhardt
SCHOOL OF ARCHITECTURE AND PLANNING

For centuries bush fires have been a natural part of the Australian environment, existing among Aboriginal times of establishment for a variety of community utilities such as cooking, building, hunting, and heating. Fueled by an array of contributors such as vegetation, weather, topography and people, bush fires have become a household name in Australian lifestyles today, illustrating this interconnected thriving phenomenon between people, their developments, their surroundings, their consumptions, and the local unpredictable climate. Whether anthropogenic or naturogenic climate change is to blame for these ecological disasters that have affected Australia is ambiguous, with both sides of the case being arguably corroborated. What is evident however is the amount of havoc and decimation bushfire occurrences have impelled upon the Australian environment and its’ people. For instance, the 15th February 2009 Black Saturday bushfire was the most catastrophic bushfire recorded in history, killing 173 people and destroying 2,530 buildings, marking significant amendments to the Australian Building code and other building practitioner’s protocols. For these reasons this particular firestorm was chosen as the sole focus and attention of this research and design based architectural thesis exploration. Al Gore is renowned for once saying ‘Old habits plus old technology results in predictable consequences’ – this thesis will attempt to address new habits plus new technology in order for Australians to create unpredictable consequences, allowing the role of architecture to prevail in the chance of a future bushfire event. The practice of architecture production plays a pivotal role in this matter of affairs since it is the interface between the outside environment and the inside occupation, allowing us to re-question and respond to whether humanity’s approach to housing and systems of communal civilization can be re-designed towards better methodologies with the understanding of the current situation of bush fires in mind. The direction in which this research-design based thesis will lead will be dictated by how architecture can lend itself to improving the principal situation of bush fires; how design can begin to alleviate the mayhem on Australian townships through responsive, resilient, performative, experimental and communal design outcomes, creating new concrete foundations upon which architecture can be erected.

TOURISM AND COASTAL MANAGEMENT IN NEW ZEALAND: INTEGRATION CHALLENGES / OPPORTUNITIES IN AN ERA OF CLIMATE CHANGE
Kareem Ismail
SCHOOL OF ARCHITECTURE AND PLANNING

Environment and Economy, the relationship between these two Es has always been an evolving research issue. Tourism as an activity resembles the dilemma of the missing balance between a community’s need for economic revenues, and concerns about sustainability of environmental resources. This study continues researching on this ongoing argument, investigating ways to convert tourism and development overall into an addition for the environment through improving ecological conditions rather than being considered as an environmental curse. Therefore, this thesis is concerned with investigating the relationship between Integrated Coastal Zone Management (ICZM) practice and the tourism activity in selected coastal areas within the New Zealand context. New Zealand coasts are under major threats, in part due to inefficient management of the coastal resources, rapid coastal urbanization, and the negative effects of climate change (Ministry for Environment, 2007). Five case studies are selected within the country based on the following factors: a) importance to the New Zealand economy, b) abilities to be a major coastal tourism destination, and c) sensitivity to future risks caused by climate change phenomena. However, due to the multidisciplinary character of tourism activity and its complex relationship with ICZM, research will focus on assessing the decision making
process in regards to tourism in coastal areas, also reviewing the current spatial coastal development pattern, and investigating the possibilities of increasing coastal resource resilience through implementing positive tourism development. Site visits, observation, and interviews supported by other secondary resources will be used to form a database for this research using mixed research methods to analyze current conditions to improve the reliability of results. These study outcomes will be proposing an interactive map of identified sustainable tourism coastal sites and a code of practice on development of these areas, connected with a well-established theoretical framework.

**NON-TOXIC PRINTMAKING AND ECOLOGICALLY ENGAGED BUDDHISM**
Irena Keckes
ELAM SCHOOL OF FINE ARTS

By integrating theory and practice, my creative practice PhD research investigates links between Buddhism, ecology, and printmaking. In particular, it looks into Japanese water-based woodblock printmaking as a non-toxic method and as a process that grew from earlier Buddhist tradition. I use this method to create large-scale woodcut print installations. The poster will try to explain how the idea of green Buddhism resonates within the field of printmaking, or may transform printmaking practices. It will discuss the implications of eco-Buddhist concepts to the eco-friendly print technologies, and analyse if and how printmaking as a contemporary art practice may re-interpret ecological Buddhist doctrines. It will in fact propose that Buddhist environmental ethics, which promote acting in harmony with nature, could positively influence those print technologies that commonly use poisonous substances. The photographs of the methods and processes I use – carving the large wooden plates and printing them in black sumi ink by hand pressure – will present my creative practice. Some of the vital Buddhist conceptions such as interdependence, imperfection, emptiness, and the notion of repetition will be represented through the selected works. By exploring these concepts in my print-based practice, I wish to discuss how this nearly meditative quality of printmaking process can contribute towards developing ecological mindfulness and so extend a position of printmaking. Alongside non-toxicity and woodcut printmaking methods, the poster will briefly reflect on the main philosophical points that underpin this research, and the phenomenological, embodied way of knowing - an approach that combines intellectual and physical action that are constitutive to printmaking practice.

**SUBCONNECTION COMPLEX**
WooMin Lee
SCHOOL OF ARCHITECTURE AND PLANNING

Auckland faces two parallel realities in the near future: rising housing prices and the worsening environmental impact due to suburban sprawl. Intensification and compaction of our cities seem to suggest the way forward; but this challenges Aucklanders’ age-old ‘quarter-acre’ dream home. For the majority, detached suburban houses will not be an affordable option. To fill the current vacuum of alternative ‘ideals’ the subconnection complex is the design arising from research into new ideals and new ways of living. Central to the debate of the compact city, as in the Auckland Plan, is the notion of density. Rather than subdividing our land into smaller and smaller fragments to achieve greater density, we could obtain more through sharing our spaces. The design of the subconnection complex tries to further this notion of sharing for the opportunities it can provide: greater vibrancy due to greater intensity of activity and people in the space and a greater ‘social’ landscape of meeting and connecting with your neighbours whilst maintaining high-quality private spaces. That is, the subconnection complex addresses density by not only increasing the number of inhabitants on the land, but utilizes this opportunity to create greater collective spaces. The design contains four houses placed along the edges of the site such that the ‘textured’ courtyard emerges in the centre; with the textures aiding in function, along with creating threshold spaces and aesthetically pleasing and environmentally friendly planting. Each house faces this courtyard and is able to open up to it on the ground floor from the living room. This makes the shared courtyard an extension to the living rooms of each house; reinforcing the sense of belonging in the neighbourhood. Above this shared courtyard is a circulation loop with more ‘room’ oriented shared spaces designed specifically for the collective needs of the houses: laundry room, the reading room and the daycare centre. The new ideal home of the future is not the all-exclusive and separating designs of subdivided housing but houses which have both the option for private living along with quality shared design to cater for different needs. The new ideal comprises of a social landscape which ties the four houses into one ‘big’ house.

**THE AGENCY OF SPACE IN RELATIONSHIP TO CULTURAL PROTOCOL AND HISTORICAL FABRIC**
Jordan Leota
SCHOOL OF ARCHITECTURE AND PLANNING

My project is sited on Puketutu Island, Mangere, a site rich in culture and history engrained into the fabric. My architectural proposition attempts to tease out the concept of tension at many levels all running parallel with each other starting with the splitting the two gods,
Ranginui and Papatuanuku, the tension within the history of the site and an image of Faailo, the birthing of a new being. Mau Dance Company, our clients for this project are masterful activators of Va and contribute an evocative aesthetic which regularly bring powerful images of solid and void tensions. The strength of Mau is interpreted within this monument to the Taniwha and the culture at Puketutu Island and engages space within this architecture with similar aim. Puketutu home previously to the Puriri tree, a place of ritual for Maori and the Taniwha, offers an opportunity to pay homage to the local people and their beliefs, and investigate the relationship between Maori and their Taniwha and the tension caused between people and the spiritual realm. My architecture attempts to bring to surface the historical and mythological context engrained in the fabric of Puketutu. The site offers an opportunity to pray. In interrogating this tension through drawings and modelling I have come to a stage of design where the dominating image is the tension between Rangi and Papa and the moment of the split.

EISENMAN’S GUARDIOLA HOUSE: TRACING BETWEEN FACT AND FICTION
Adrian Lo
SCHOOL OF ARCHITECTURE AND PLANNING

In architecture, how does the design process matter to the resulting building? Ever since American architect and educator, Peter Eisenman, whose work and writing (spanning more than 50 years) emphasized design as a potential narrative, that is, a series of steps or ‘traces’, architectural students nowadays justify their work based on the story of their design processes. In Eisenman’s analyses of significant architects and their work in his PhD dissertation, he sought to reveal and discover the latent invisible systems underlying the work, revealing architecture as a series of traces or stages. Eisenman subsequently employs this analytical technique in his own work as traces susceptible for ‘reading’ a building, thereby treating architecture as a form of text. These latent systems inform Eisenman’s notion of the trace, and its related concepts of the index, marking, notation, imprint, interstitial, chora, etc. as an analytical-formal device for his designs. The analyses of the works suggests a project results from a process of generative formal transformations based on a set of rules and geometries. The distinction between process and result, or between the object and its making, becomes a critical issue in Eisenman’s Guardiola House, in Cadiz, Spain, which is an overlooked unbuilt project of 1988. The question is: what bearing does the Guardiola House have on the discipline of architecture? And how does it challenge traditional design in terms of methodology and conventionality? What this research does is demonstrate that the Eisenman-process as not just one design towards a single house, but in fact an interweaving and inter-narrative between two simultaneous processes.

IN SERVICE OF IMAGES
Sorawit Songsataya
ELAM SCHOOL OF FINE ARTS

Digital technology develops new products and (re)creates their many versions every hour. The expansion within the field of cyber-anthropology is growing fast and there is a need for filtering system as online data is overflowed and production has become overproduction. Digital artifacts quickly become obsolete and forsaken as cultures that consume them move on. My current research investigates the merging fields between archaeology, cultural anthropology, digital technology, and fine arts. With the expansion of cultural amalgamation that occurs as a by-product of digital and online invention, it is possible and necessary to converge fields of study to present new forms concerning how knowledge can be acquired. Working with 3D modeling software and 3D printing processes, my research project aims to create a series of digital potteries which references long lost cultures whilst combining the influences of the current time. It is important to emphasize the notion of time here because we live in an age where things are produced and quickly erased by their own reproductions. Can digital production gain the characteristic of authenticity and the aura? One of the results that my project wishes to arrive at is to also create a software application for educational purposes that operates like an encyclopedia of pottery and archaeology according to certain geographic locations, with design samples and accurate data. The emergence of online culture requires the access of knowledge in certain fields to be upgraded. The existence of 3D modeling, printing, scanning, and Oculus VR means that potentially people could experience the virtual reality of, for example, the ruins of Rome without having to be in Rome, shorten some learning processes and equip those who may not be able to afford or be capable of such field trips.

FACULTY OF SCIENCE

INVESTIGATING THE ROOTS OF GROUP INFLUENCE: DO 18-TO-19-MONTH OLDS FOLLOW THE HERD?
Sweta Anantharaman
PSYCHOLOGY

Groups are integral to surviving and thriving in human societies. Since groups have evolutionary significance, are important mechanisms of learning, and promote transmission of cultural knowledge (Henrich & Henrich, 2007), it is reasonable to suspect that an appreciation of the importance of information gleaned from groups emerges early in development. Indeed, evidence
suggests that preschool children conform to information provided by adults and peers when they form a consensus (Corriveau, Fusaro, & Harris, 2009; Haun & Tomasello, 2012). There is some evidence that suggest infants are sensitive to immediate socio-cultural factors (e.g., prefer native speakers to foreign language speakers) and the relevance of group characteristics (e.g., prefer same-gender individuals) in some learning contexts (Kinzler, & Spelke, 2011). But little is known about the developmental origins of group influence and conformity. The two eye-tracking studies reported here are parts of a series of studies designed to examine the extent to which infants prioritize and evaluate information provided by groups as opposed to an individual. Results indicate that infants’ attention is biased toward information provided by the group. These studies contribute to our understanding of the socio-cognitive processes and mechanisms that underlie infants’ interactions with their social world by providing insight into factors that may drive infants’ tendency to learn from other individuals within their social group. Assuming a limited and unstructured social environment during the first two years of life, the studies also examine the role that infants’ social perceptions plays in development prior to the age at which they are introduced to formal agents of socialization (e.g. school). 

Supervisor: Dr Annette M.E. Henderson

FEMTOSECOND LASER PARAMETERS REQUIRED FOR OPTIMAL BONE LASER ABLATION
Simon Ashforth
CHEMICAL SCIENCES

Femtosecond lasers, which emit high peak intensity laser pulses in the femtosecond range, are currently utilised in industries from cataract surgery to optical technologies. Our research investigates the optimum laser parameters required for laser ablation of bone. Using a femtosecond laser (pulse width = 100 fs, repetition rate = 1 kHz, λ = 800 nm), a series of linear cuts and craters were machined in freshly harvested bone. By changing the peak pulse power applied to the bone sample, we determined the single pulse ablation threshold and related the diameter of an ablated spot to the Gaussian spatial distribution of energy. The ablation threshold was found to be 11.21 ± 0.11 Jcm⁻² in both ovine and bovine bone tissue indicating that laser ablation of bone tissue is independent of target species. Further experiments were conducted to determine the relationship between cortical bone removal and the number of incident pulses applied. By altering the laser spot translation rate, we varied the number of pulses at each point along the scribed linear cut. Optical coherence tomography (OCT) and image analysis showed that feature depth is linearly related to the number of pulses applied, irrespective of donor species. Through analysis of these trends, we determined that the current minimum cut depth of a single pulse is 0.54 μm at a peak pulse fluence of 7.81 Jcm⁻², reaching a maximum cut depth of a single pulse of 3.47 μm at a peak pulse fluence of 59.79 Jcm⁻². Structural analysis of the ablation features using environmental scanning electron microscopy was performed to assess damage to the surrounding structure. Femtosecond laser irradiation of bone tissue under our experimental conditions leads to no signs of thermal shockwave cracking, molten debris deposition or charring of the osseous tissue whilst leaving the hydroxyapatite crystal structure intact.

Supervisor: Associate Professor Cather Simpson

THE KERERŪ CONNECTION - DO KERERŪ MOVEMENTS MAINTAIN CONNECTIVITY ACROSS FRAGMENTED URBANISED LANDSCAPES?
Alice Baranyovits
BIOLOGICAL SCIENCES

Long distance seed dispersal is essential to maintain connectivity between plant populations within fragmented landscapes. The amount of gene flow between fragments is determined by the frequency of dispersal events; low frequency can lead to a reduction in genetic diversity. Seed dispersal also largely determines the extent of range expansion, so can have important implications for the management of introduced plant species. Many fleshy fruited plants rely on vertebrate frugivores to disperse their seeds. Therefore, in order to accurately estimate the extent of dispersal, it is necessary to understand the movements of the frugivore. In New Zealand, the kererū (Hemiphaga novaeseelandiae), a large (c.650 g) endemic fruit pigeon, is a key disperser of large-fruit plants. Kererū are mobile, widespread, and known to consume the fruits of over 70 native plant species and several introduced ones. Although their daily movements can be fairly limited, they are capable of flights of several kilometres. Little is known about the frequency of such flights within fragmented urbanised landscapes. We present data from 13 birds fitted with satellite transmitters (PPTs: platform transmitter terminals) in the wider Auckland region. Movements were monitored over the breeding and peak fruiting seasons. These data provide insights into the connectivity and potential range expansion of plant populations.

IMPROVED DRY ADHESION THROUGH POLYMER BRUSH GRAFTING
Omer Javed Chaudhary
CHEMICAL SCIENCES

The structure of Gecko’s feet is extensively structured at the micro and nano scale, enabling Geckos to adhere strongly to most surfaces and perform various manoeuvres, even upside down. Inspired by the structure of Gecko’s feet, a large number of biomimetic dry adhesives have been reported. Biomimetic
polymer-brush modified surfaces can offer a large number of attachment points to the surfaces and this could result in an improvement in adhesion. Atom Transfer Radical Polymerization (ATRP) is a convenient tool for producing well-defined biomimetic dry adhesive surfaces. The ease of the polymerization procedure, ability to process large surface areas, a large choice of monomers, and control over the polymerization allow the production of modified surfaces on a large scale with properties tailored to target applications. To study the effect of polymer brushes on adhesion, ATRP was used to graft polymer brushes on a poly(dimethylsiloxane) (PDMS) surface. Poly(butyl acrylate) and poly(2-ethylhexyla acrylate) chains were grafted. PDMS samples with grafted polymer chains were obtained with varying degrees of polymerization. Growth of polymer chains was verified by ATR-FTIR spectroscopy, ellipsometric measurements, and gel permeation chromatography (GPC). PDMS samples were tested for pull off adhesion and a notable increase in adhesion after grafting of polymer chains was seen than those of unmodified PDMS samples. In the future, such modification of biomimetic structure by polymer chains can offer a low-cost solution for improvement of adhesion in such systems, by avoiding the use of highly expensive nano-fabrication techniques.

“WHY IS MY HEART SO BIG?” - ECHOCARDIOGRAPHIC LEFT VENTRICULAR MASS INDEX
Yeun-Hyang (Catherine) Choi
BIOLOGICAL SCIENCES

Objectives: This study was designed to investigate the distribution of left ventricular (LV) mass across ethnic groups, and compare different methods for standardizing left ventricular mass. Background: Heart size varies with body size, and therefore LV mass must be adjusted for body size. This relationship varies between different genders and ethnicities. Methods: Data was available from 16,940 healthy subjects aged ≥ 18 years (50% women) from 35 independent studies. Log-linear regression was used to derive sex- and ethnic-specific formulae for body surface area (BSA). The new BSA formula was applied to ratiometric indexation and compared to the most widely used current method, that of Dubois and Dubois. Regression modelling of LV mass against BSA was also used to derive the allometric powers of BSA that optimise model fit. The fit of the regression model will be assessed by the coefficients of Pearson linear correlation. Results: Among the newly created ethnic-specific formulae, only the Asian BSA was close to the Dubois and Dubois formula. Indexation of LV mass by BSA, using the Dubois and Dubois formula, overestimates LV mass in South Asian female subjects, and underestimates LV mass index in European male and female subjects. Use of allometric exponents of 1.3 in women subjects reduced correlation between LV mass index and BSA. Allometric (unlike ratiometric) normalization of LV mass for BSA eliminated sex-independent relations of indexed LV mass to ethnic-specific BSA (P > 0.05). Conclusions: Despite the allometric modelling process being theoretically and statistically superior to the ratiometric method, both indexing methods had similar explanatory points in both healthy European and South Asian subjects.

COFFEE: MORE THAN MEETS THE EYE
CAFFEINE INCREASES EYE MOVEMENT SPEED AND REVERSES BRAIN FATIGUE
Charlotte Connell
SPORT AND EXERCISE SCIENCE

Background: Muscles fatigue during exercise, and so does the brain. Scientists know very little about ‘brain fatigue’, but it is thought to potentially impair key brain functions. In a recent study our lab has shown for the first time that strenuous exercise fatigues the brain and influences the visual system by slowing the speed of eye movements. This is a concern because our eyes need to move quickly and accurately to focus on important aspects of our ever-changing environment. Caffeine is a widely used drug with known fatigue-reversing properties. Thus, caffeine may reverse ‘brain fatigue’ and keep the eyes moving optimally during fatiguing activities.

Purpose: This study examined the effects of a moderate dose of caffeine (equivalent to 2 strong cups of coffee) on eye-movements after strenuous, brain-fatiguing exercise.

Method: 12 healthy people participated in 2 experimental sessions separated by 1 week. During each session they exercised on a stationary cycle for 3 hours and consumed either a caffeinated or decaffeinated taste-matched placebo drink. Before and after exercise the movements of the eyes were tracked using specialised infrared cameras during a set of visual tests. Results: A 10% increase in eye movement speed was observed after participants consumed a caffeinated drink during exercise while a 5% decrease in eye movement speed was observed when participants had the decaffeinated drink during exercise (P< 0.05).

Discussion: This is the first demonstration that caffeine can prevent the slowing of eye movements that occurs during exercise. Slow eye movements can restrict the brain’s ability to recognise important changes in our surroundings. A moderate dose of caffeine prevents this and could enhance human performance by increasing the speed that the visual system operates.
CUO/TiO₂ - LOW COST SEMICONDUCTOR PHOTOCATALYSTS FOR SOLAR HYDROGEN PRODUCTION
Wan-Ting Chen
CHEMICAL SCIENCE

CuO/TiO₂ photocatalysts (CuO loadings 0-15 wt.%) were prepared, characterized and evaluated for H₂ production from ethanol-water mixtures (80 vol.% ethanol, 20 vol.% H₂O) under UV excitation. Degussa P25 TiO₂ (85 wt.% Anatase, 15 wt.% Rutile) was used as the support phase. XRF, EDAX, EPR, Raman, and TGA measurements showed that the CuO content in the samples increased linearly with nominal CuO loading. XPS and Cu L-edge NEXAFS analyses verified that Cu(II) was the dominant copper species in the near surface region of the photocatalysts. At CuO loadings < 5 wt.%, no CuO crystallites were seen by TEM, indicating that the CuO was highly dispersed over the TiO₂ support, possibly as a monolayer dispersion. At CuO loadings > 5 wt.%, CuO crystallites of diameter 1-2 nm were identified. Photoluminescence studies established that CuO deposition strongly suppresses electron-hole pair recombination in TiO₂. The photocatalytic activity of CuO/TiO₂ photocatalysts was highly dependent on the CuO loading, with 1.25 wt.% CuO being optimal (H₂ production rate = 21 mmol g⁻¹ h⁻¹). Above 1.25 wt.% CuO, the H₂ production activity of the CuO/TiO₂ photocatalysts decreased sharply with increasing CuO loading. The decrease in activity at higher CuO loadings coincided with the onset of CuO nanoparticle formation, which is postulated to alter electronic properties at the CuO/TiO₂ interface in a manner detrimental to H₂ production. CuO itself was inactive as a photocatalyst under the applied testing conditions. Results suggest that sub-monomolecular coverages of CuO on TiO₂ are highly beneficial for H₂ generation, and support the development of a sustainable H₂ economy.

T-POINTS: THE END OF CHAOS?
Jennifer Creaser
MATHEMATICS

The famous Lorenz system is a simplified model of thermal convection introduced by Edward Lorenz in 1963. It is a system of three ordinary differential equations that depend on parameters ρ, σ and β. Warwick Tucker proved in 1999 that chaos exists in the system, in the form of a chaotic attractor, for the classical parameter values ρ = 28, σ = 10 and β = 8/3 used by Lorenz. However, the idea behind the proof only works for values of ρ up to about 30. From that point on the attractor changes and traditional analytic techniques cannot be used. We use advanced numerical methods to investigate the one-dimensional manifolds (which are curves) associated with the three fixed points, 0, p⁺ and p⁻, for values of ρ above 28. In particular, we have found and characterised a phenomenon, which we call an α-flip, where the one-dimensional manifolds of p⁺ and p⁻ very suddenly flip from one side to the other. This poster discusses the connection between α-flips and terminal points, or T-points, where there is a connection from p⁺ and p⁻ to 0 and the chaos disappears.

Supervisors: Professor Bernd Krauskopf and Professor Hinke Osinga

MEMORY SCRAMBLE: FACTORS INFLUENCING THE FORMATION OF AUTOBIOGRAPHICAL MEMORY CONJUNCTION ERRORS
Alea Devitt
PSYCHOLOGY

Remembering our past is like assembling a jigsaw puzzle: all the memory details (people, places, objects, etc.) must be located and combined in the correct way. Sometimes this process can go wrong, and a detail from one memory is incorporated into another memory, forming a memory conjunction error. In this study, the influence of plausibility, imagery vividness, and degree of recombination on acceptance of autobiographical conjunction errors was explored. Conjunction errors in autobiographical memory were elicited using a novel autobiographical recombination paradigm. Novel past events were imagined for recombined detail sets comprised of details taken from veridical memories. On a subsequent source monitoring test, conjunction errors occurred when imagined sets were incorrectly judged as depicting real memories. Imagined events with higher plausibility ratings had subsequently greater false acceptance rates. Interestingly, event vividness was unrelated to conjunction error formation. Detail sets where only a single detail had been altered were falsely accepted twice as often as detail sets where all details originate from separate memories. Memory conjunction research is relevant in situations where memory accuracy is of high importance, as precision is required for both the individual details of a memory, and the combination of those details. Furthermore, conjunction error research is valuable in elucidating cognitive mechanisms of memory construction and authentication.

A FRACTAL’S TALE: A JOURNEY FROM COMPLEX DYNAMICS TO REAL-WORLD PHENOMENA
Stefanie Hittmeyer
MATHEMATICS

Some of the most famous examples arising in chaos theory are fractals, which are complicated objects that look similar on all scales. The famous Julia set fractal first arose in the study of the quadratic map on the complex plane. The dynamics of this map are organised by points that attract or repel all nearby points under iteration of this map. Most mathematical
models of chaotic systems in real-world applications exhibit additional points, called saddle points, which are connected to the appearance of chaotic attractors. We study the transition of a more general map, when it is changed from the quadratic map to a map that exhibits saddle points and chaotic attractors. In this transition, we find three mechanisms that create or destroy saddle points and one that leads to a drastic change of the Julia set. Our results show that Julia sets, which are tools from complex dynamics, also arise in the study of saddle points and chaotic attractors, which are phenomena that appear in real-world applications.

**FINDING MISSING DARK GALAXIES**
David Huijser
STATISTICS

According to the theory of hierarchical galaxy formation, mergers play an important role in the evolution of galaxies. This theory predicts a vast amount of small satellites consisting mostly of dark matter around massive galaxies, but so far only a few have been observed. However, the discoveries of satellite galaxies around our closest neighboring galaxy, Andromeda, give us reason to believe this is also possible for distant galaxies. Observation of these satellite galaxies is difficult, because they can only be detected indirectly (e.g. by gravitational lensing). Because light is bent by the gravitational field of a galaxy, a matter distribution can be deduced from the lensed image. Deducing a dark matter distribution in and around a galaxy requires fitting a model with a vast amount of parameters to the image, which has until now required a lot of simplifying assumptions. Because it is not possible to evaluate the model for all possible parameter values we propose to apply MCMC methods to find good fitting models. The method which would be most appropriate for this problem is reversible jump MCMC. The virtue of this method is that the number of parameters is not fixed, and since the number of satellite galaxies is unknown this would be the most appropriate method for this problem.

**ANALYSIS OF BEVERAGE ANTIOXIDANTS USING A PEDOT-BASED SENSOR**
Hande Karaosmanoglu
CHEMICAL SCIENCES

Antioxidants are important both in terms of human health and for food quality. The most commonly used antioxidant determination methods are the Folin-Ciocalteu assay and HPLC analyses. However, these methods have various disadvantages such as long time requirements, low sensitivity, interfering agents etc. Recently, there has been an increase in research using cyclic voltammetry (CV) in antioxidant determinations. In addition to glassy carbon electrodes (GCE), conducting polymers such as polypyrrole, poly(3,4-ethylene dioxothiophene) (PEDOT) and polyaniline have been used in order to improve sensitivity and specificity. The aim of this study was the development of a new sensor system using PEDOT for rapid and selective analysis of the antioxidants in beverages. Electrochemically polymerized PEDOT-covered 1 mm diameter GCEs were used for rapid and selective antioxidant analyses of tea and coffee samples. After identifying and quantifying the antioxidant content of samples by HPLC, the major compounds were tested using the electrochemical sensor. The CVs of tea and coffee resembled that of epigallocatechin gallate and chlorogenic acid, respectively, which are the main phenolic compounds present in these beverages. The integral of the current vs. time to 500 mV (Q500) from the CV scans was used as a measure of the total antioxidant content. The Q500 was converted to gallic acid equivalent values, using the Q500 values obtained for the CVs of gallic acid standard solutions. The total phenolic content and antioxidant activities were also determined by spectrophotometric methods namely the Folin-Ciocalteu, ABTS, and DPPH radical scavenging assays. Great correlations ($R^2 > 0.8$) values were obtained between methods. The findings show that the electrochemical sensor is easy to handle and gives rapid results. In the future, a device can be designed that will be useful for industrial applications.

**ARTIFICIAL MOLECULES FOR SOLAR ENERGY HARVESTING: UNDERSTANDING THE DYNAMIC PROCESSES WITH LASERS**
Julie Kho
CHEMICAL SCIENCES

Porphyrin-fullerene assemblies have been discovered over decades ago as potential artificial photosynthetic mimics due to their unique characteristics exhibiting photoinduced multistep electron transfer. A new class of calix[4]arene-linked bisporphyrin (“jaws” porphyrin) has been constructed to bind with fullerene $C_{60}$ with high affinity. Understanding of the photophysics of these self-assembly complexes, in particular the charge-separated state (CS) lifetime is the focus of this study. For this purpose, state-of-the-art transient absorption spectroscopy (TrA) has been utilized to measure the excited state lifetime of fulleride $C_{60}$ . When photoinduced, the porphyrin is excited to the first singlet excited state, subsequently donating an electron to the fullerene acceptor. This charge separation step, forming the porphyrin cation and fullerene anion, occurs within the first tens of picoseconds. The charge recombination process is then monitored by measuring the decay profile of $C_{60}$ . In this report, we showed results of two different sets of bisporphyrin-fullerene constructs comprising of dyads and triads systems. The first set being a complete self-assemble system where the ferrocene secondary donor is coordinated to the center Zn-
porphyrin. The latter consists of self-assembly porphyrin-fullerene systems with varying distances of the covalently bounded secondary donor. A relationship was established between measured electronic couplings and the charge-separated lifetimes of the complexes, based on results from the first set. In the second set, the CS lifetimes increased as the distance between porphyrin center and ferrocene increases. However, no significant difference in lifetimes was observed between the self-assembled and covalently bounded sets. These results gave insights into how structural modifications affect the electron transfer process. Hence, further optimization of the molecular structure can be made to enhance the CS lifetimes of the complexes.

ANTENATAL MATERNAL STRESS AND THE CATECHOL-O-METHYLTRANSFERASE (COMT) RS165599 POLYMORPHISM INTERACT TO INFLUENCE CHILDHOOD IQ
Yvette Lamb
PSYCHOLOGY

While antenatal maternal stress has been associated with a range of adverse outcomes in offspring, there is considerable individual variation in the presence and severity of these. The Catechol-O-Methyltransferase (COMT) gene has been linked to differential susceptibility to the consequences of antenatal stress. This study examined a functional polymorphism of the COMT gene (Rs165599) in relation to maternal perceived stress and childhood cognitive performance, using data from 471 child participants of the longitudinal Auckland Birthweight Collaborative (ABC) study. At age 11, DNA samples were collected from the children. The main independent variable was maternal perceived stress over the prior month, measured via self-report at birth. Full-Scale IQ, the outcome, was measured at ages 7 and 11. The analysis revealed a significant main effect of antenatal maternal stress on offspring IQ. A significant interaction also showed that children exposed to high maternal antenatal stress had significantly lower IQ scores at both 7 and 11 years of age when compared to those exposed to low stress, only when they had at least one copy of the Rs165599 G allele. At each age, this difference was of approximately five IQ points. The G allele of the Rs165599 polymorphism may confer genetic susceptibility to negative cognitive outcomes arising from exposure to antenatal stress. This finding highlights the need to consider gene-environment interactions when investigating the outcomes of antenatal stress exposure.

A PATTERN LANGUAGE FOR SHARING LABORATORY SCIENCE PRACTICE
Cameron McLean
COMPUTER SCIENCES

Laboratory science practice relies heavily on procedural knowledge and know-how for successful research, however, its tacit nature defies efficient codification and we lack good tools to conceptualize and represent such knowledge. This research adopts Christopher Alexander’s design patterns as a way to capture and codify some of the implicit knowledge of laboratory practice for the purpose of making such knowledge more widely sharable – enabling both deeper human understanding and further opportunities for higher abstraction and machine processing. Laboratory design patterns present knowledge that is missing from current laboratory representations and formalisms, and we propose to extend their utility into computable formats using semantic web languages and through visual abstractions to aid cognitive aspects of communicating complex experimental design. Laboratory design patterns ultimately aim to support experimental design reuse and improve the reproducibility of experiments, and we envision they will be a valuable addition to our scientific record.

CYSTIC FIBROSIS: THE MATHEMATICS OF FLUID RECYCLING
Katie Sharp
MATHEMATICS

The genetic disease cystic fibrosis (CF) is currently incurable and affects one in 3,200 Caucasians, with typical symptoms including a build-up of mucus in the lungs, which is predominantly fatal. CF causes the failure of a specific chloride ion channel (CFTR), and subsequent depletion of serous fluid located beneath the mucus layer. Due to the non-uniform nature of the lungs, analysed samples have provided conflicting information as to the reason why this occurs. One theory is that the submucosal glands, which are known to secrete a mix of serosal and mucosal fluid, secrete much less serous fluid in lungs affected by CF. Another theory is that functioning CFTR inhibits a sodium channel (ENaC), and that with CFTR malfunction, ENaC activity increases, which results in excess fluid absorption. The mathematical model is constructed as a time-independent boundary value problem, with ionic concentrations and volumetric water fluxes from submucosal gland secretions as boundary conditions. The equations are derived using a reaction-diffusion system to govern concentrations of particular ion species and fluid flow. Specific ion channels known to be important in the dynamics of fluid flow are included, with parameters that have been verified experimentally. The model predicts an optimum height of the fluid above epithelial cells in the lungs by satisfying the boundary conditions. Through
simulations, we demonstrate that the cells in close proximity to the glands work the hardest at maintaining the fine balance between ionic and water fluxes. The height of the fluid decreases for both theories under CF conditions; however, a combination of both hypotheses predicts a more accurate height value that is seen experimentally in human airways. Therefore we conclude that in human bronchial epithelia, it is likely that a reduction in gland flux combined with an over-active sodium channel results in the depletion of serous fluid.

THE ROLE OF FOOD AVAILABILITY AND PREDATOR PRESSURE ON A SEA URCHIN'S SHELTERING BEHAVIOUR UNDER LABORATORY CONDITIONS  
Arie Spyksma  
MARINE SCIENCES

The sea urchin, *Evechinus chloroticus*, is one of the most dominant grazers in sub-tidal reef ecosystems around New Zealand. Aggregations of these echinoderms have the ability to completely strip away dense kelp forest leaving behind urchin barrens devoid of any standing algae. This deforestation only occurs when urchins are out in the open (exposed) and are actively feeding on live kelp. This research investigates how food availability and predator pressure (not direct predation) affect an urchin's sheltering behaviour. Determining what causes an urchin to come out from shelter into the open will help us understand how urchin barrens form and why some areas and not others have constant barrens or constant kelp forests even if they are geographically similar. Two separate experiments conducted in outdoor mesocosm tanks were used to test how subsidies of drift algae (high food availability) and injured conspecifics (predator pressure) influenced urchin sheltering behaviour. Results from the food availability experiment showed no significant differences between overall behaviour in urchins in the control and treatment tanks with both having very low sheltering rates throughout the day. In contrast, urchins subjected to the scent of an injured conspecific showed significantly high levels of cryptic behaviour compared to control tanks where urchins remained highly exposed. These results suggest that urchins will respond strongly to injured conspecifics and will remain highly cryptic to avoid predation. This suggests that the presence of predators in marine reserve sites may facilitate trophic cascade effects by altering sea urchin behaviour rather than through direct predation alone.

AUTOFLUORESCENCE: FRIEND OR FOE?  
Amber Williams  
FORENSIC SCIENCES

Research is currently being done to allow the identification of the origin of epithelial cell samples. Fluorescent in situ hybridisation (FISH) is a possible technique with which to do this. It produces fluorescent signals when the probes bind to mRNA transcripts which are used to produce proteins within cells. It is important to be able to distinguish vaginal epithelial cells from buccal (mouth) epithelial cells in sexual assault cases, as they share many of the same characteristics in microscopic appearance. FISH aims to do this. A natural phenomenon called autofluorescence, the emission of light by molecules found in the cell, has the potential to mask FISH signals. This project is looking at naturally occurring autofluorescence, reducing autofluorescence using a range of chemical treatments, and the effect of outside influences such as caffeinated drinks and smoking. The reduction methods used have been adapted from previously published papers on the use of sodium dithionite and copper sulphate. Samples were collected from volunteers and the cells were isolated and treated with sodium dithionite or copper sulphate, both with and without undergoing the FISH protocol. The results showed that sodium dithionite was the most promising reagent for reducing autofluorescence without affecting FISH signals, and that copper sulphate, while not as effective, also gave positive results. Sodium dithionite could therefore prove to be a useful tool in future FISH work in forensic science. In addition it was found that the consumption of diet coke before sampling increases the autofluorescence of buccal cells, although tea and coffee do not have the same effect. Scientists should, therefore, bear in mind that diet coke could be a potential confounding factor in the analysis process.

FISHING FOR CELLS  
Eletra Williams  
CHEMICAL SCIENCES

Every touch leaves a trace, and most criminals leave far more than just a trace behind. The presence of saliva and vaginal fluid at a crime scene can be importance evidence, and although many techniques have been developed to identify these, there is no confirmatory test for vaginal fluid. There has been a shift to using genetics based methods, with a focus on messenger ribose nucleic acid (mRNA). Messenger RNA is an intermediary molecule, translating DNA's instructions into protein products, and different cells may contain messenger RNA molecules specific to that cell type. This concept is currently used in forensic science, but the methods used become complicated when mixed body fluids and multiple DNA profiles are present. This project aims to overcome this by taking
the identification to the single cell level. A method has been developed for labelling oral cells from saliva and vaginal epithelial cells using fluorescence in situ hybridisation (FISH). FISH targets mRNA molecules, attaching a fluorescent probe that can be viewed using fluorescence microscopy. The keratin 10 mRNA is targeted with a fluorescent probe, causing these cells to fluoresce red. DNA profiling has been successfully performed on these RNA FISH labelled cells, showing that the technique is compatible with current forensic casework protocols. With the method optimised, the search for specific markers to identify these cell types can now begin, allowing for the different cells to be identified, separated and undergo DNA profiling, resolving previously problematic mixed samples.

TANGEO: DRAWING GEOMETRY INTUITIVELY, BY BRIDGING THE GAP BETWEEN PHYSICAL AND DIGITAL WORLDS
Shunjie Jacky Zhen
COMPUTER SCIENCES

Constructing geometry by drawing is a vital part of both professional design and geometry education. However, there is a lack of computer support for geometric drawing that is natural and intuitive. Geometric drawing on computers is often constrained to abstracted widget tools and metaphoric, indirect input methods such as mouse and keyboard. Research and technologies in the area of Tangible User Interfaces (TUIs) offer potential solutions to this problem. By coupling virtual data with familiar physical objects in a direct and natural manner, TUIs provide intuitive interaction with digital applications. We introduce Tangeo, a drawing system that combines tangible drawing tools, such as rulers, protractors, and set squares with an interactive table-top environment. Tangeo allows users to construct geometric drawings in a more direct manner by manipulating virtual data with familiar physical objects. The drawing experience is additionally enhanced by intelligent visual guides supported by a computing environment. User evaluations on Tangeo yielded a high rate of user satisfaction and indicated that the system is effective at enhancing geometric drawing.

Variety Showcase Abstracts
FACULTY OF ARTS

WRITING BIOENGINEERING: LABORATORIES VS. ALLEGORIES
Anaíse Irvine
DEPARTMENT OF ENGLISH

When we tell stories about bioengineering, we tend to see engineered organisms as pieces of meat. Speculative fiction paints pictures of monsters stitched from corpses in Frankenstein, animals sewn together in The Island of Dr Moreau, and babies grown in jars in Brave New World. When we talk about bioengineering today, in 2013, we are talking about a much less maniacal field than these stories would suggest. Modern bioengineering holds amazing promise for advances in medical science. And yet, public discourse around the ethics of bioengineering often uses these book titles as a kind of scaremongering shorthand for the dangers of ‘playing God.’ This demonstration shows how bioengineering narratives talk about the body, compared to how bioengineering science treats the body. It asks: are we right to use fictional stories to discuss real-world research? And how are recent narratives like Cloud Atlas and Never Let Me Go acting to update our old familiar biotech stories? Are scientists really mad, or just misunderstood?

“I AM THE PLAY”: THE DRAMA OF AUTHENTICITY IN JOHN KNEUBUHL’S MELE KANIKAU
Michelle Johnsson
DEPARTMENT OF ENGLISH (DRAMA)

My PhD (Creative Practice) interrogates the themes of afakasi hybridity, cultural authenticity, and Pasifika identity in the dramatic works of John Kneubuhl through a pan-Pasifika production of his Hawaiian play Mele Kaniku: A Pageant. Kneubuhl’s theatre blends Modernist theatrical practices with the performance traditions of the Pacific. The production of Mele Kaniku was cast with actors and dancers who identified variously as Fijian, Niuean, Tongan, Samoan, Rarotongan, Tuvaluan, and Māori. It included two full hula halau and story-telling through Hawaiian hula. Tamaki Makaurau is likely to be the only place in the world where an afakasi Tongan director could work with such a diverse pan-Pasifika cast to produce this Hawaiian play, written by a Samoan playwright. One of the areas that the critical component of my research addresses is the function of meta-drama within the play. Kneubuhl was a pupil of drama at Yale and made dramatic use of the staging of theatre production roles within the staged fiction. Another area is the way in which the play can be considered in terms of theories of inter-culturalism. Like meta-drama, inter-
cultural performance is now a vast field in Performance Studies. Mele Kanikau enacts a drama about the life and death of ‘culture’ and of ‘a culture’. Cultural hybridity and diasporic heritage and the application of these frames to both the play and the production is one of the important focuses of my research. The third area of critical focus is the place of Mele Kanikau and the significance of its representation of Pasifika identity both in the context of the time in which it was written and from the position of my production of Mele Kanikau in Aotearoa in 2013. This presentation will showcase some of the action of Mele Kanikau in order to facilitate discussion of Kneubuhl’s afakasi theatre.

UNIVERSALITY AND THE UNCONSCIOUS: A PHILOSOPHER-POET SLAMS KANT’S THEORY OF FINE ART
Sarah Kieman
DEPARTMENT OF PHILOSOPHY

Immanuel Kant’s Critique of Judgment (1790) is classically interpreted as an attempt to locate aesthetic judgments within a formalist framework. This formalism is taken to construe judgments of beauty as possessing a subjective universal validity. However, Kant’s theory of fine art, wherein artistic beauty is characterized as ‘adherent’ and aesthetic ideas are expressed through the genius of the artist, does not immediately appear to be consistent with the absolute formalism that renders judgments of taste as inter-subjectively valid. Recent commentators have attempted to integrate Kant’s theory of fine art with his broader formalism. Nevertheless, these attempts fail to overcome hermeneutical considerations that threaten the supposed ahistorical universal communicability of judgments of taste. Despite the failure of these previous analyses to contend with cultural and personal relativism, it is possible to maintain Kant’s account of universal artistic beauty while recognising that philosophical hermeneutics have significant consequences for the personal experience of art. In an expression of the sentiment that artistic form should follow content and that the two are inextricably intertwined, I intend to communicate my research through what Kant considered to be the highest and most beautiful of the art forms – poetry.

FACULTY OF EDUCATION

EMBODIED REFLECTIONS ON THE BATTLES AND BARRICADES IN DRAMA EDUCATION
Jane Luton
SCHOOL OF CRITICAL STUDIES

As teachers recount stories of frustration and disillusionment in the classroom, certain pedagogies can bring with them specific disappointments. This arts based research asks the question: what inspires and sustains drama education practitioners in times of melancholia, when their passion for this pedagogy of hope is dimmed? As a practitioner experiencing my own melancholia, I asked key international theorist-practitioners within the field to share their tacit knowledge of frustration and inspiration. As an aesthetic state - could melancholia make us alive to the issues finding a way to express them creatively? This act of sharing provided an opportunity to use performative inquiry, viewed by some as the third paradigm of research. Employing the tools of drama I devised a new method: embodied reflections. This dyadic process was inspired by Peter Brook’s theory that all that is required for an act of theatre to take place is one actor, one space and one person to observe. The process was framed through the context of an imaginary Museum of Educational Drama and Applied Theatre. Responding to the images, artefacts, texts and props provided, each practitioner entered the imaginary world using the ‘magic if’. They embodied their stories using the metaphors of battles and barricades drawn from the sometimes vociferous discourses surrounding drama education. I facilitated the reflections in role as the archivist’s representative. In this bordered space, stories became interactive exhibits in the museum, enabling reflection through a process of metaxis. In this presentation I will share some golden moments from the generation and mediation of the data through a juxtaposition of scenes and narratives. Using multiple role playing I embody my own tensions inherent in praxis as I seek to find what inspires drama education practitioners.

FACULTY OF MEDICAL AND HEALTH SCIENCES (FMHS)

MACULAR DEGENERATION: THE BLUR IN YOUR VISION
Prachi Didmishe
DEPARTMENT OF OPHTHALMOLOGY

Deterioration of vision with advancement of age is a common observation. Often, people assume that old age is the primary reason for reduced visual acuity.
However, this is not always true. The eye is primarily affected due to the presence of cellular debris and if not addressed in time, it may lead to blindness. Age-related Macular Degeneration (AMD) is a degenerative disease of the macular which affects more than 50% of the elderly worldwide. Macula is the region of the eye responsible for fine and central vision. The conventional understanding is that AMD is a multifactorial disease resulting from complex interactions between age, genetics, and a host of environmental components such as smoking. It is quite unsettling to know that AMD does not have a cure. Furthermore, evidence shows that if one eye is affected, it is very likely that the other eye will also develop symptoms leading to the disease. The reason AMD is so debilitating is because an early diagnosis is very hard to make. In such a scenario, awareness is the best approach. My research investigates the degenerative mechanism and how the immune system is involved. This would aid in identifying the precursors which are responsible for the onset of this disorder, and maybe even slow it down. I will elaborate on the various changes associated with the aging eye and what we can do to ensure that the gift of sight is preserved.

NATIONAL INSTITUTE OF CREATIVE ARTS AND INDUSTRIES (NICAI)

CIRCLE IN BOX: SUMMONING THE GHOSTS OF DANCE SPECTATORSHIP, in situ.
Val Smith
DANCE STUDIES PROGRAMME

How to interrogate the spatio-temporal constitution of ephemerality that has haunted the fields of dance and performance in recent years. This practice-led choreographic research contributes to a discussion by theorist-practitioners, which moves dance beyond a mournful association with its disappearance (Phelan, 1993) to foreground the rich potentiality of kinesthetic materiality (Gray, 2012, Reynold & Reason, 2012, Gardner, 2008, Lepecki, 2006, 1999). Through reductive practices, Circle in Box focuses the corporeal sensing of microperceptual exchange between performer, audience, and environment to explore how ‘presence’ operates through affective modes. More specifically, ‘being here together’, is utilized as a processual state within which the effects of micropolitical rhythms and textures are mapped interrelationally through a passage of time. A choreographic methodology of post-minimalist experimentation is employed, aiming to shift attention and value within the performance environment from the spectacular and kinetic to a sensibility of the subtle and sensate. In a quest to open up future possibilities for theory and practice, a hauntological perspective from performance studies (Powell & Shaffer, 2009) contextualizes this study, to address questions of what this practice does. I ask - what ‘being here together’ does spatio-temporally? Further questions include: What effect does a reduction of kinetics and theatricals have on inter-relations operating within the performance environment? And, how do micropolitics and certain conventions of spectatorship interact? Knowledge is produced by and in the body drawing on key theoretical markers of the affective (Manning, 2013, Massumi, 2010, 2009) and Andre Lepecki’s discussions of reductive choreography (2007, 2006, 1999). The significance of this research is in its contribution towards new modes of being in and watching performance. Conclusions drawn include how spectators are made aware of their quality of presence becoming visible and known, and, how layers of expectation, attention and memories are active and contributing in the work.

IN SERVICE OF IMAGES
Sorawit Songsataya
ELAM SCHOOL OF FINE ARTS

Digital technology develops new products and (re)creates their many versions every hour. The expansion within the field of cyber-anthropology is growing fast and there is a need for a filtering system as online data is overflowed, and production has become overproduction. Digital artifacts quickly become obsolete and forsaken as cultures that consume them move on. My current research investigates the merging fields between archaeology, cultural anthropology, digital technology, and fine arts. With the expansion of cultural amalgamation that occurs as a by-product of digital and online invention, it is possible and necessary to converge these fields of study to present new forms concerning how knowledge can be acquired. Working with 3D modeling software and 3D printing processes, my research project aims to create a series of digital potteries which references long lost cultures whilst being combined with the influences of the current time. It is important to emphasize the notion of time here because we live in an age where things are produced and quickly erased by their own reproductions. Can digital production gain the characteristic of authenticity and the aura? One of the results that my project wishes to arrive at is to also create a software application for educational purposes, that operates like an encyclopedia of pottery and archaeology according to certain geographic locations, with design samples and accurate data. The emergence of online culture requires for the access of knowledge in certain fields to be upgraded. The existence of 3D modeling, printing, scanning, and Oculus VR means that potentially, people could experience the virtual reality of, for example, the ruins
experience the virtual reality of, for example, the ruins of Rome without having to be in Rome. This would shorten some learning processes and equip those who may not able to afford or be capable of such field trips.

**EMODYING IHI**
Sophie Williams
DANCE STUDIES PROGRAMME

This research has potential benefits for dance and Māori scholars, art critics, dancers, and contemporary choreographers in Aotearoa. It provides an opportunity to better understand and be more informed about the cultural specificity, ethical considerations, and implications of drawing on Māori cultural dynamics and practices within the contemporary performing arts in Aotearoa. I was interested in how we might sustain indigenous knowledge, by exploring Māori concepts of performance in contemporary urban dance practices. This emerged during a Maori cultural inspired performance I performed as part of the Taiwan international dance summit. I did this through participating in two separate performances called 1000 Lovers and the Te Matatini National Kapahaka festival. This research employed a kaupapa Maori whakawhanaungatanga method of inquiry (Bishop, 1995) as the overarching philosophy, investigating the creative potential of indigenous knowledge and how I, as a performer, could integrate a Māori performance concept 'ihi' into a contemporary setting. Ihi is a Maori term used for a performance quality, Matthews (2011) defined the notion that “ihi is a psychic power that elicits a positive psychic and emotional response from the audience” (p.10). Furthermore, key literature informed this study by eliciting understandings around cross-cultural dance in New Zealand, is not only about culture and power (Foster, 1996), but sensitive to authenticity and the cultural memory of dance (Buckland, 2001; Ness, 1996). Through research into the embodiment, performance, spiritual values, and techniques of ihi as a performance trait (Ness, 2004) and, a specifically Māori kaupapa, this research has had the opportunity to challenge perceptions of ihi; when are performers consciously thinking in an ihi state? Do all performers possess ihi? And can it be taught? Translating the concept of ihi into an urban contemporary context, demanded that I gather the insights from my iwi and translate them through my own experience of performing in 1000 Lovers, with an intergenerational cast of both Māori and non-Māori performers (Ponifasio, 2002). My honours research investigates the practices and tasks that foster ihi within contemporary performance, through a duet performance as part of Tempo dance festival - how are they explored, found, and practiced? This allows the research to reach its potential through cultivating and sustaining creative indigenous concepts and knowledge.

**DO WE SEE IN ALGORITHMS? ART IN NEGOTIATION WITH AUGMENTED REALITY**
Rewa Wright
ELAM SCHOOL OF FINE ARTS

Human life is increasingly mediated by the virtual. As our online lives interact with our real lives in new and unforeseen ways, the path is open for art to negotiate this emergent terrain. Technical advances in our ubiquitous portable media devices- typified by the smartphone- have propelled the concept of augmented reality out of the lab and into our pockets. No longer is donning an unwieldy headset the precursor to an augmented experience: we can all partake in this novel adventure at will. So how might we augment our lives using the smartphone, and can augmented reality create new paradigms in art? This presentation will focus on recent practice-led research by the author, where the notion of the ‘software assemblage’ is investigated as a line of flight connecting Modernism with 21st century, technology-driven art. ‘Software assemblage’ is a term I personally use in relation to my hybridized practice: crucially, it is post-gallery, co-opting urban space to investigate the role of art in life. If it’s normal to pull out a smartphone and capture an image of a compelling scene, then this convention provides an opportunity for the artist to design experimental artwork that operates alongside and against what N. Katherine Hayles has described as ‘hyper-attentive’ behaviour. Hayles notes: “To a greater or lesser extent, we are all moving toward the hyper attention end of the spectrum, some faster than others” (Hayles, 2012:105). Situated at the precarious edge of self-design, performative architecture, and experimental art practice, this research explores the shift currently taking place in our haptic consciousness, altering our perceptions of the ‘real’ world. Connecting the fields of neuroscience, critical theory, and human-computer interaction via a trans-disciplinary art practice, Do We See In Algorithms? demonstrates a lively engagement with current aesthetics through a radical remediation of our everyday topology.

**THERAPUTIC TANGO: PRACTICING THE ARGENTINE TANGO WITH PEOPLE WITH PARKINSON’S DISEASE**
Kimberly Young
DANCE STUDIES PROGRAMME

During my undergraduate studies, I participated in a general education paper where I was encouraged to research within the course I was studying (dance), through a scientific lens. As a result, I became interested in how different forms of exercise influenced the symptoms that people with Parkinson’s disease had. Across many studies, Argentine Tango was found to be very influential in decreasing these impairments.
This presentation will introduce how this is made possible, along with the definition of Argentine Tango and the definition Parkinson’s disease. Interestingly, much of the research I found was based on qualitative research. However, I became curious in how I could further these findings through a qualitative framework. Therefore, in July this year, I enrolled in Argentine Tango lessons and have started to teach Argentine Tango to someone who has Parkinson’s disease. Consequently, this presentation aims to share the process, encompassing the benefits and challenges I have had in these experiences. I also strive to expose and encourage a better understanding of how dance may provide a therapeutic vehicle through my curiosity-led research. This presentation reveals the beginnings of my personal inquiry regarding how the Argentine Tango impacts people with Parkinson’s disease.

**FACULTY OF SCIENCE**

**PHOSPHORYLATED LACTOSE MILK PROTEIN FOR A BETTER DIGESTIVE SYSTEM**
Norliza Julmohammad
DEPARTMENT OF FOOD SCIENCE

Phosphorylation is the addition of the negatively charge phosphate group through covalent bonding with the amino acid in the case of a protein, or via other organic linkages such as the OH group in the case of lactose. The main aim of this work is the preparation and characterisation of phosphorylated lactose using two methods. In the first method, regiospecific modification of lactose is being attempted. Lactose was first reacted with 2,2-dimethoxypropane and the products were purified on a silica gel column. The presence of 2,3:5,6:3’,4’-tri-O-isopropylidene lactose dimethyl acetal was confirmed by TLC, FTIR, ESI-MS and NMR. This compound will be reacted with sodium hexametaphosphate, to phosphorylate the unprotected -OH groups, followed by a deprotection step to give the phosphorylated lactose. The second method is based on the reaction of lactose and sodium at pH 5.5. The phosphorylated lactose is then purified on an anion resin column. Fractions collected were monitored with a reducing sugar test (PAHBAH assay), total phosphorus test, and 31P NMR. The phosphorylated samples were further analysed by 1D NMR (1H, 13C, 31P and DEPT-135), 2D NMR (COSY, HMBC, and HSQC) and LC-MS. After further purification to obtain specific lactose-6’-phosphate, conjugation of the phosphorylated lactose to milk proteins through their lysine residues. It is expected that these conjugates will enhance the milk protein functionalities, such as stability under heating and better digestive properties. The project is directly related to the development of ‘value-added’ dairy products.

**POETRY OFF THE PAGE**
Jacob Martin
DEPARTMENT OF CHEMISTRY AND ENGLISH

Poetry off the Page is a collaborative venture by the Photon Factory in the Faculty of Science and the English Department at the University of Auckland. Students of poetry chose objects on which to engrave their allocated stanzas, from the poem ‘Shadow Stands Up’ by New Zealand Poet Laureate Ian Wedde. The Photon Factory’s high tech lasers were used to engrave each verse onto its corresponding object. The stanzas vary in size from 3 mm wide on the coal down to 0.6 mm wide on a metallic key. They were imaged using optical microscope and scanning electron microscopy. A website was designed in order to present the science to the public in a dynamic zooming interface. The materials that we were provided with were incredibly diverse, and challenged us both scientifically and creatively while leading to a greater understanding of the capabilities of our equipment. This project showed that by using state of the art lasers in the Photon Factory we are able to machine anything that industry or science can throw at us.
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<th>Event</th>
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<td>Fisher &amp; Paykel Healthcare Oral Prelims</td>
<td>14 Oct</td>
<td>1-11 Short Street</td>
<td>9am – 5.30pm</td>
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<tr>
<td>The University of Auckland Society Poster Display</td>
<td>14 – 16 Oct</td>
<td>Engineering Neon Foyer</td>
<td>8.30am – 5pm</td>
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<td>Fisher &amp; Paykel Healthcare Oral Finals</td>
<td>15 Oct</td>
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<td>Variety Showcase</td>
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<td>Exposure Prize Giving</td>
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<td>Old Government House</td>
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