EXPOSURE

POSTGRADUATE RESEARCH EXPOSITION

PROGRAMME

2-5 OCTOBER 2017

auckland.ac.nz/exposure

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

ACHIEVE THE AMAZING

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 Sutdies

The School of Graduate Sutdies is located at the Graduate Centre in the East Wing of the ClockTower 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 Sutdies also produces regular e-newsletters to both postgraduate students and staff, and runs the annual 3 Minute Thesis competition.

Contents

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.

Welcome Letter

Dear postgrad friends

I would like to take the opportunity to welcome you all to Exposure 2017. Exposure as you all know is the only student-led research exhibition in collaboration with the school of graduate studies (SGS) through which, our highly talented and competent postgraduate students could present their work and celebrate their successful academic career. Exposure is an opportunity for all postgraduate students at the University of Auckland to promote their research, get acknowledged, and win great prizes! Whether it is an oral presentation, poster or variety showcase, your amazing work is always appreciated.

Exposure is also a place for you to mingle, make new friends, learn about their work, and have fun. It is an event that gives you the true feeling of belonging to a student community, where all of you can have your part in its greatness. Over the course of our studies, we all have big challenges in front of us and Exposure can motivate you to “achieve the amazing”.

It would not be possible to run such a great event without support and sponsorship. I would like to thank our sponsors for all their great monetary support which helped us run the event for you smoothly. I hereby would like to thank UniServices, Business School, Faculty of Creative Arts and Industries and Velocity for their financial support. Special thanks also to UniServices again for sending in their judges and having an eye on the research topics for any potential commercial value.

It was also impossible without our amazing student volunteers to even start Exposure. However, the organizing team was absolutely determined that they could deliver the best experience for their fellow postgrads. Chenmu Wang, our Exposure head, managed and organized the event most successfully through his great leadership. I would also like to thank the rest of the wonderful Exposure committee members as their help and support have been the driving force for running the event.

Last but not the least, I thank you all, my lovely postgraduate friends, whether registered for the competition or just attending the sessions as a guest. Without you, Exposure did not exist and your support for Exposure and PGSA has been always substantial and remarkable. I can’t thank you enough for this and wish you fun and great time in Exposure.

Looking forward to seeing you all in the next Exposure again.

Yours sincerely,

Amir Rastar
President, Postgraduate Students’ Association (PGSA)

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 2017. 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 2017 will be a huge success.

Associate Professor Caroline Daley
Dean of Graduate Studies

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Our sincerest thanks to the faculties who were willing to support and sponsor Exposure 2017:

Business School
Faculty of Education and Social Work
Faculty of Science
Creative Arts & Industries

2017 Exposure Committee

Exposure Chair	Chenmu Wang
PGSA Vice President	Zac Roberts
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Communication Team	Jen Wang, Weiyi (Thomas) Zhang, Pafoualee Leechuefoung
Event Team	Genevieve Groult, Jessica Crewe-Brown, Man Lu, Ripi Kaur
Registration Team	Marilyn Chetty, Weiyi (Thomas) Zhang, Tayaza Fadason, Saima Tariq Khan, Chenmu Wang
School of Graduate Studies	Charlene Nunes
PGSA Administrator	Jo Malone

2017 Exposure Judges

Mr Tim Mackrell
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Dr Alistair Kwan
Dr Kim Dirks
Mrs Margaret Crannigan Allen
Dr Ian Brailsford
Ms Derryl Hayman
Dr Brett Heagren
Dr Jennifer Jones
Dr Jenny Mendieta
Dr Julia Gatley
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Ms Kate Louise Backler
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Dr Philip Turnbull
Professor Trevor Sherwin
Dr Justin Fernandez
Dr Dion O'Neale
Ms Megan Clark
Ms Will Charles
Mr Kent Lee

Exposure Calendar Of Events 2017

Event	Date	Venue	Time
Oral Prelims	2 Oct	206-302 (Arts 1) 206-314 (Art 1)	8:30 - 12:30 13:30 - 17:30
Poster Exhibition	2 – 4 Oct	Engineering 401 Atrium Level 4 Foyer	8.30 – 17:30
Oral Finals	3 Oct	206-220	18:00 - 20:00
Variety Showcase	4 Oct	Fale Pasifika	18:00 - 20:00
Prize Giving	5 Oct	Neon Foyer in Engineering	17:30 - 20:00

The University of Auckland Inventors' Fund

Open to both students and researchers to assist in the successful transformation of good research into good businesses and exciting new products. This early investment is the riskiest stage of the venture process and typically no other sources of risk capital are available.

PROOF OF CONCEPT AND SEED FUNDS

Auckland UniServices Limited brings to you the University of Auckland Inventors Fund (UoAIF), an "evergreen" open-ended $20m investment fund accessible to University researchers and students for the development of technologies for commercialisation.

For over 10 years UniServices has been providing early proof of concept and pre-seed investment to support the University's research discoveries, ensuring that they reach a point where commercial usefulness can be demonstrated and the first steps are taken to ensure commercial viability.

The availability of seed funds is critical to the commercialisation process in a number of ways – financing access to managerial skills; securing or enhancing intellectual property; supporting additional R&D; construction of prototype; preparation of business plan; covering legal costs and so forth.

In 2015, the University of Auckland made considerable funds available to expand UniServices investment activity.

This has meant that UniServices is now able to provide significant commercialisation support to student entrepreneurship.

FOR MORE INFORMATION, REFER TO:

http://tiny.cc/UOAIF

and to the University of Auckland IP policy at

http://tiny.cc/uoaip

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Timetable
Oral Presentations

Stream A: Monday 02 October 2017
Venue: 206-302 (Arts 1)

Session 1: 8:30am – 12:30pm		
Judging Panel	**Faculty/Department**	
Dr Brett Heagren Dr Marion Blumenstein Dr Susan Carter	Graduate Centre Education and Social Work/Biology Sciences Centre for Learning and Research in Higher Education	
Researcher	**Topic**	**Faculty**
Sunny Li	Corneal remodelling following cataract surgery: Effect of incision size on wound architecture three months	FHMS
Judit McPherson	Communicative teaching materials in a traditional educational environment: a case study of two EFL classes in Hungary	Arts
Melanie MacFarlane	Māori Sudden Unexpected Death in Infancy	FMHS
Break 1		
Farzad Zamani Gharaghooshi	Rethinking Public Space: A Critical Analysis of Urban Movements in Age of Digital Technologies	Creative Arts and Industries
Renita Martis	The role of cystine/glutamate antiporter in maintaining redox balance in the eye	FMHS
James Hope	Tapping into the nerves for mind-control of robotic prosthetic limbs	Engineering
Break 2		
Shayal Chand	Iron: A strong element in the pathogenesis of chronic hyperglycaemia after acute pancreatitis	FMHS
Alika Wells	Criminology, Bees, and Everyday-Poisoning	Arts
Samuel Blanchett	PilVax: a novel peptide carrier for the development of vaccines against tuberculosis	FMHS

Session 2: 1:30pm – 5:30pm		
Judging Panel	**Faculty/Department**	
Dr Brett Heagren Dr Ian Brailsford Professor Susan Kemp Mrs Denise Lazelle	Graduate Centre Student Learning Services Faculty of Education and Social Work Student Advice Hub	
Mrs Nina Stroeven	**Topic**	**Faculty**
Joey Feld	The Socialite Copper, the Cautious Phosphorus and the Timid Nitrogen	Science
Henry Appleyard	Sexual Alias: Mediatisation of Desire in Social Network Services	Arts
Jeremy Raynes	Using structural biology to inform the design of T-antigen based vaccines for Group A Streptococcus	FMHS
Break 1		
Tepora Pukepuke	The Unstoppable Student Self	Education and Social Work
Alex Chan	Varying rates of dairy protein stimulated aminoacidemia does not modulate post exercise downstream mTOR signalling?	FMHS
Aimee Humphries	The Effect Of Position On Maternal Haemodynamics In Late Pregnancy: an MRI study	FMHS
Break 2		
Stephen Ashley	Characterisation of extracellular vesicles from the enteric pathogen Citrobacter rodentium	FMHS
Nikolas Rusten	Thinking every n**ga be selling narcotics: The role of respect in minority distrust in police	Arts

Stream B: Monday 02 October 2017
Venue: 206-314 (Art 1)

Session 1: 8:30am – 12:30pm		
Judging Panel	**Faculty/Department**	
Mrs Helen Borne Mr Nathan Petitti Associate Professor Linda Tyler Ms Evelien van Vliet	Alumni Relations & Development First Year Transition Administrator Faculty of Arts Student Development & Engagement	
Researcher	**Topic**	**Faculty**
Hiu Ching Au	Ending Modern-day Slavery (MDS): A study of the services provided by pro-foreign domestic helpers (FDHs), local non-profit organizations (NGOs) and charities attempting to empower FDHs from Indonesia and the Philippines working in Hong Kong	Arts
Robin Cronin	Maternal sleep position in late pregnancy: a survey in a New Zealand multi-ethnic community	FMHS
Samin Aref	Taming Computational Complexity	Science
Break 1		
Wendy Choo	Exploring the influence of hybridity on state-youth relations in Myanmar	Education and Social Work
Maia van Kan	Establishing an assay to detect TP53 DNA adducts following cyclophosphamide bioactivation in patients	FMHS
Mujaddad Afzal	Urban Transportation Network Resilience	Engineering
Break 2		
Eleanor Bloomfield	Medieval Mysteries and Modern Stages	Arts
Sarah Qubisi	A novel zebrafish model of kidney disease	FMHS

Session 2: 1.30pm – 5:30pm		
Judging Panel	**Faculty/Department**	
Ms Kate Louise Backler Dr Philip Turnbull Dr Nichola Shackleton Ms Megan Clark	Faculty of Education and Social Work Optometry and Vision Science Faculty of Arts Library Manager	
Dr Kim Dirks	**Topic**	**Faculty**
Austin Tseng	The SS Ventnor: Implications for Race Relations in New Zealand	Arts
Frazer Coutinho	XG19, an intracellularly acting connexin hemichannel modulating peptide in the treatment of ocular disease	FMHS
Callum Chalmers	PilVax, a novel peptide carrier for the development of an effective vaccine against Streptococcus pneumoniae	FMHS
Break 1		
Cameron Wells	Non-invasive measurement of colonic activity using high-resolution electrocolonography	FMHS
Chen (Peter) Qiu	Optical Changes in the Lens under Perturbation using Ray Tracing and Magnetic Resonance Imaging	FMHS
Kate Riegle van West	Poi For Your Health: Spin Your Life Around	Creative Arts and Industries
Break 2		
Henry Wallace	Biometry prediction error associated with the Hill-RBF, Barrett Universal II, and SRK/T formulae.	FMHS
Hamid Abbasi	A specialty signal processing technique diagnoses brain injury at birth	Engineering

Oral Abstracts

ARTS

Criminology, Bees, and Everyday-Poisoning

Alika Wells

We are witnessing a potential turning point in the ecological history of our planet. While human society continues to use the environment to preserve itself, corporations, states and citizens alike subscribe to values and social systems that both exonerate any moral obligation we have to the planet and justify our unsustainable lifestyles. Neonicotinoids are one of the most widely used insecticides globally, generally as a seed coating to protect crops against sucking insects. While most critical work has focused on their threat to bee colonies, research has also suggested neonicotinoids pose a threat to birdlife, and human health. In 2013 the EU began restricting the use of three neonicotinoid-based pesticides, with a focus on saving the bee population. Since then, much work and research as been completed to support the restriction (and ban) of neonicotinoids. However, little work has been done on the effects of neonicotinoids within New Zealand. My work not only examines the EU case, but works with the toolset of Environmental Criminology to apply my findings to the New Zealand case: showing that with the help of criminology we can work to save our pollinators, and bring back our clean green image.

Communicative teaching materials in a traditional educational environment: a case study of two EFL classes in Hungary

Judit McPherson

Communicative Language Teaching promotes authentic-like, inductive tasks in the development of communicative competence. This is often perceived unsuitable for traditional educational contexts that focus mainly on syntax and lexis. An example of this is the foreign language curriculum in Hungary, where students commonly develop an explicit knowledge of grammar and vocabulary, often to a high intermediate or advanced proficiency level; communicative competence, however, typically remains underdeveloped. Consequently, many students feel that the state school curriculum does not prepare them for study and work opportunities in Europe. This study examines the integration of communicative tasks into traditional teaching contexts. The project developed a series of communicative lessons, which were trialled in two Hungarian high school EFL classes. A retrospective macro-evaluation system was designed to record feedback from the students and their teachers who rated the level of usefulness of the materials as very high. However, both teachers commented on the need to include additional scaffolding for creative and inductive tasks. I conclude that the rote-learning based education system might inhibit creativity and discovery learning skills. However, a well-designed context-specific communicative lesson can prepare learners for form-focused assessments while facilitating the acquisition of communicative competence.

Ending Modern-day Slavery: A study of the services provided by pro-foreign domestic helpers, local non-profit organizations and charities attempting to empower FDHs from Indonesia and the Philippines working in Hong Kong

Hiu Ching Au

Although slavery has been abolished since the nineteenth century, and the International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families (ICRMW) and the International Labour Organization Convention No. 189 on Decent Work for Domestic Workers (C189) protect the rights of migrant workers and domestic workers, modern-day slavery (MDS) still exists in the contemporary world. According to The Global Slavery Index (GSI) (2017), as of 2016, there are 45.8 million modern-day slaves in 167 countries across the globe, of which 29,500 reside in Hong Kong. In this dissertation, I argue that the abuse and exploitation experienced by foreign domestic helpers (FDHs) at the hands of the governments from sending and receiving countries, recruitment

agencies (RAs) and/or employers in Hong Kong is a form of MDS. First, the Indonesian and the Philippines governments force their nationals to leave home and work abroad to solve the problem of unemployment and repay foreign debts. The Philippines government even forces their nationals to remit large remittances. Second, the HKG has implemented policies and laws to protect the rights of employers more than employees, including a live-in requirement, Minimum Allowable Wage (MAW), no fix work hours, 'two-week rule', and the right of abode. Third, RAs have turned FDHs into 'commodities' and forced them to pay excessive fees. Fourth, some employers forced their FDHs to work overtime, are denied rest days, are underpaid, suffered from starvation, physical, psychological and/or sexual abuse.

Moreover, I argue that to a certain extent, the services provided by pro-FDHs local non-profit organizations (NGOs) and charities empower FDHs and attempt to end MDS in Hong Kong. Help for Domestic Workers (HELP), Mission for Migrant Workers (MFMW), Bethune House Migrant Women's Refuge (BHMWR), The Association Concerning Sexual Violence Against Women (ACSBAW) and the PathFinders provide free services including legal advice, counselling, medical services, sharing groups, trainings, activities to temporary shelters for FDHs. There is not only a rise in the usage of their services over time, but the ecological model, 'distraction', 'sharing' and 'support' strategies used in their program help to empower FDHs and attempt to end MDS. Unfortunately, these interventions fail to make changes at the macro societal level.

Sexual Alias: Mediatisation of Desire in Social Network Services

Henry Appleyard

The relationship between sexuality and communication technologies is changing. In social media life, people are increasingly seeing themselves and others through the social network service (SNS). Social media users 'sign up' their name, age, and sex before they have access. Once attained, the user is afforded a 'configurable networked self'™ (Cohen, 2015:69) that is voluntarily serviced with and within the social network. With growing aspects of use, especially in younger people to 'communicate their own life story' (Larsen, 2016:24), the SNS poses and imposes differential user-experiences rooted in media and computational logics. The paper investigates this phenomenon, specifically how age, location and/or sex effects the Facebook SNS user experience to explore the relatively uncharted territory of how new media logics and algorthyms symbiotically service people's desires as a form of media-embedded life practices.

The SS Ventnor: Implications for Race Relations in New Zealand

Austin Tseng

In 1902, the SS Ventnor, carrying hundreds of Chinese corpses back to their homeland for burial, sank off the coast of New Zealand's North Island. Some of the cadavers were recovered and buried by local Māori. More than a century later, these events emerged from obscurity, bringing together Māori and Chinese in a shared endeavour. This dissertation investigates the meaning and relevance these events have for race relations in modern New Zealand society. To approach this, I undertake a thematic analysis of related media coverage and cultural productions. Also, I assess the applicability of certain theories of race relations in this context. This paper argues that the Ventnor story has produced a historical legacy of particular importance for Chinese Maori relations in New Zealand, and offers a useful framework for promoting racial harmony and cooperation.

Medieval Mysteries and Modern Stages

Eleanor Bloomfield

The annual performance of the medieval York mystery play cycle was throughout the late Middle Ages one of the most significant events in the city's calendar. A series of forty-seven short, interconnected pageants dramatising the span of Biblical salvation history from the Fall of the Angels to the Last Judgement, the cycle was performed by the York guildsmen on waggons travelling through the city streets. Banned at the Reformation for being too Catholic, the plays were re-staged in the twentieth century and are still regularly performed today, both in York and elsewhere. My research focuses on these modern revivals, reinventions and re-imaginings of the medieval plays, examining the modern cultural need that has looked to sustain the plays in and for current and future generations. Looking both backwards to the Middle Ages and forward to the plays' continuing lifespan, I explore how the cycle has adapted to huge changes in time, language, culture and religious belief; how its role today compares to, and differs from, its medieval function; and what the plays have to offer modern audiences.

Thinking every n**ga be sellin' narcotics: The role of respect in minority distrust in police

Nikolas Rusten

Although ethnic minorities consistently report lower levels of trust in the police than ethnic majorities, the underlying reason for these ethnic group differences is unknown. We address this oversight by arguing that ethnic minorities trust the police less than ethnic majorities because they experience lower levels of subgroup respect (SGR), a concept reflecting the perceived levels of acceptance, value, and recognition that one's subgroup receives from wider society. As expected, results from a national probability sample of New Zealanders (n = 10,606) showed that minorities trust police less than New Zealand Europeans, and this relationship was partially mediated by SGR. Also as predicted, subgroup respect was a stronger predictor of trust for minority group members than it was for majority group members. These results demonstrate the significance of wider societal inequality and discrimination in affecting the trust that marginalised groups place in police.

CREATIVE ARTS AND INDUSTRIES

Poi For Your Health: Spin Your Life Around

Kate Riegle van West

Can spinning a weight on the end of a cord in circles be good for your health? A new scientific study investigated the effects of International Poi, a style of poi that is practiced all over the world, on physical and cognitive function in healthy older adults. It found after one month of poi practice, participants improved their balance, grip strength, attention, and memory. These results are particularly exciting when thinking about poi as a tool for maintaining or improving quality of life in old age, as they cover some of the hallmarks of frailty. The first in the world to systematically evaluate the potential health benefits of poi, this study is an exciting stepping stone toward future research on one of New Zealand's own taonga.

Rethinking Public Space: A Critical Analysis of Urban Movements in Age of Digital Technologies

Farzad Zamani Gharaghooshi

Refugee crisis, the civil war, the massacre, the washed-up children on the Greek shores; all are part of the accidental geography, possibly. But, without the teargas, water cannon, riot police, homogenised city and oppressed architect, things could have been different. This is a personal inquiry, for another form of democracy, for the people of the ancient cities of passion, discontent and love: Resistance to urban change is becoming commonplace. The public space as the space of resistance and the platform for expression of discontent is swallowed by the private interests, market logic and abstract regulations. However, the will of the urban elite in mastering the city fully is being challenged by its alienated urban dwellers. They resist the process of oppression, through emerging social networks, using chaotic network of digital devices and production of spaces of resistance.

The spatial and temporal context of this study centres on a series of events occurred Istanbul. Recently in central Istanbul a protest was triggered by a plan for appropriation of an urban park for a shopping mall. Unlike other social movements, the focus of this struggle was urban space itself - its survival, its meaning and its value to the people. This research specifically looks at the Gezi Park Movement in Turkey; a movement at the nexus of new digitally sponsored geo-political activity.

Using Lefebvre's conceptual triad of spatial practice, representation of space and representational spaces, the study analyses further the relationship between the urban, the movement and the digital layers of Istanbul. Of particular interest is the digital 'information fabric' as it is present in many contemporary geo-political events: complicit in how space is represented, occupied and enacted. This leads us to the possibilities, of the other city, the other politics and the other life.

EDUCATION AND SOCIAL WORK

Exploring the influence of hybridity on state-youth relations in Myanmar

Wendy Choo

This presentation argues that understanding the nature of, and ways in which citizenship is produced in Myanmar is necessary to for better state building. International development agencies tend to rectify conditions of fragility in the Global South by creating the same type of liberal democratic institutions found in Western European states. However, liberal state building has not only failed to bring peace and development in these 'fragile' states, it has also created a state that is detached from the local communities that it was intended to serve. This presentation argues for the conceptualization of 'fragile' states as hybrid political orders, where the international and local, formal and informal, liberal and illiberal forms of governance intertwine. This conceptualization allows for an exploration of citizenship as indigenized forms of statehood, constructed by both the logic of the 'formal' state and that of the 'informal' societal order. By focusing on state building as locally embedded legitimacy, the ethnocentrism and state-centricity in scholarship on state building can also be better addressed.

The Unstoppable Student Self

Tepora Pukepuke

An unexpected traumatic event in a student's life can compromise their ability to study well. This presentation weaves together a personal narrative of loss, with the complex elements that give Māori students' the abilty to flourish in all aspects of their lives. Central to a robust Māori lifestyle is success in education, as a qualification is linked to options that improve health and wealth. While universities have some clear directives that inform the range of Maori student support services in their institutions, more must be done to ensure innovation to improve the student completion rates. This presentation explores the interplay between a student, their whanau (family) and their extended university connections that will maximise their ability to be unstoppable in their studies.

ENGINEERING

Tapping into the nerves for mind-control of robotic prosthetic limbs

James Hope

Developments in miniaturised electronics and robotics in the last two decades have produced robotic prosthetic limbs which can mimic most actions of its biological counterpart. With such a large number of joints in the human hand and upper limb, the new problem is how to control such a complex robotic system. Ideally the user should only need their thoughts alone to command the prosthetic, and indeed their brains and nerves provide a system which is already programmed to perform the combinations of synchronised movements involved in everyday tasks.

So how do we tap into this system?

One option is to use the nerve's signals. The main challenges in this area are how to decipher useful information from the background activity, separating the useful information into different channels – e.g. one channel for each joint, and designing a system which is safe for long-term use.

A nerve contains thousands of nerve fibres, each relaying information between the spinal cord and the limb. Looking at a nerve cross section, the fibres are grouped together based on what part of the limb they're destined for; they can also be arranged into groups based on what their function is

– e.g. touch, temperature or muscle control. If a system can identify which groups of fibres are active it can be used to control a prosthetic limb.

This project will develop a technique which can identify activity in several different groups of fibres simultaneously and in real-time. We will use an established, safe technology called a nerve cuff, which wraps electrodes around the outside of the nerve. Imaging theory similar to that used in CT scans will be applied, which constructs the internal features of a sample by examining it from different angles. In our case we will use an electric current to examine the sample.

Urban Transportation Network Resilience

Mujaddad Afzal

Auckland is situated on a volcanic field containing more than 50 eruption vents, mostly monogenetic type, which means that the next vent will erupt from a new location. This paper reports on planning and modelling of mass evacuation of Auckland city in the event of volcanic eruption. A scenario based study was conducted using AIMSUN microsimulation software as conducting large-scale evacuation drills are expensive and impractical. Evacuation scenarios were developed for a worst hit situation that is eruption centred at 1km South-West of Mt Eden, which is surrounded by high density land use. A 5km radial zone from the centre of volcanic eruption is considered as evacuation zone, which encompasses both the primary and secondary volcanic hazard zones. Three different scenarios were investigated including two night time scenarios and one day time scenario. The road network performance, bottle-neck locations and total network clearance time during evacuation were investigated. A total network clearance time of 10 to 14 hours was estimated, which exceeds the likely warning time. This will act as a baseline for modelling of network improvements and other interventions designed to reduce evacuation time. The results from this research is useful for Auckland Civil Defence and Emergency Management to improve and update their mass evacuation planning for the city.

MEDICAL AND HEALTH SCIENCE

The Effect Of Position On Maternal Haemodynamics In Late Pregnancy: an MRI study

Aimee Humphries

Background: Recent studies have demonstrated an increased risk of late pregnancy stillbirth with maternal supine sleep position. In this position the gravid uterus almost completely obstructs the inferior vena cava (IVC). While this occurs in the majority of women, only a small number experience supine hypotension. Objectives: To investigate the role of collateral venous drainage in different positions during late pregnancy. Methods: After obtaining ethics approval, ten healthy pregnant women without supine hypotension between 35–38 weeks gestation underwent magnetic resonance imaging (MRI) in the supine and left lateral decubitus positions. Phase contrast images were evaluated to measure the calibre and blood flow of the aorta, IVC and azygos vein. Intra and inter observer comparisons were made to evaluate variation. Results: Preliminary data has shown that, compared to the left lateral decubitus position, supine positioning was associated with a reduction in cardiac output (5.61 L/min vs 4.67 L/min, p= 0.006). Blood flow through the azygos vein increased in the supine position compared to the left lateral decubitus position (13.70 mL/sec vs 5.32 mL/sec p= 0.0003) and decreased through the IVC (2.95 mL/sec vs 17.90 mL/sec p = 0.0004). Discussion: This study shows for the first time that healthy pregnant women experience an increase in collateral venous blood flow in the supine position, likely as a response to marked compression of the IVC in this position. It is postulated that anatomical abnormalities of the collateral venous system may be associated with supine hypotension and increase the risk of stillbirth in late pregnancy.

Non-invasive measurement of colonic activity using high-resolution electrocolonography

Cameron Wells

Background: Altered colonic motility underpins many functional gastrointestinal diseases, including post-operative ileus, a transient impairment of transit following abdominal surgery. Assessment of colonic motility has traditionally relied on intraluminal manometry probes. High-resolution (HR) cutaneous recordings of electrical activity have allowed non-invasive measurement of cardiac, neural, and gastric activity, though this technology has never been applied to the colon. Objectives: To investigate HR electrocolonography (EColG) as a non-invasive strategy for pre- and post-operative measurement of colonic activity. Methods: Participants in HR colonic manometry studies gave informed consent and were recruited. Simultaneous recordings of both HR colonic manometry and EColG were obtained using a 36-sensor manometry catheter, and a 32- or 64-channel array of cutaneous electrodes. A custom printed circuit board electrode array was also designed and used. Cutaneous electrical signals were filtered and analysed using custom-developed automated algorithms to track dominant frequencies over time. Colonic motor patterns in manometry data were manually identified and analysed using custom software. Results: Four participants were recruited in pilot trials (3 pre- and post-right hemicolectomy, 1 control) who underwent a cumulative total of 8.8 hours of recordings. Dominant frequency components were closely matched between manometry and HR EColG at three cycles per minute. Further analyses are now being undertaken to compare spatiotemporal organisation, propagation distance and velocity. Recruitment for this study is ongoing. Discussion: Initial results show that HR EColG provides a novel non-invasive measure of colonic activity. Future work will validate this method and its application to other surgical procedures and colonic disease states.

Māori Sudden Unexpected Death in Infancy

Melanie MacFarlane

Background: Sudden Unexpected Death in Infancy (SUDI) is the leading cause of infant mortality in New Zealand and affects 35-50 babies each year. More than half are Māori. An analysis in the 1990's found the difference was due to higher exposure among Māori infants to maternal smoking and bed- sharing. Objective: To analyse data from the SUDI Nationwide Study (2012-2015) about the exposure of infants in the cases and control groups to antenatal smoking and bed-sharing to examine the risks for SUDI and explain why the disparity in Māori SUDI persists. Methods: A nationwide, prospective case-control study was implemented between March 2012 and February 2015. SUDI deaths referred to the coroner during this period were enrolled as Cases. Control participants were parents/caregivers of infants selected by DHBs based on sampling data reflecting the characteristics of previous SUDI deaths, including hospital of birth, age, gender and ethnicity. Data was collected during face-to- face interviews with parents/caregivers by specially-trained personnel using detailed health-focused questionnaires. Results: The study enrolled 133 cases and 258 controls. The Māori SUDI rate was 1.46/1000 live births compared to 0.76/1000 overall. Antenatal smoking increased SUDI risk relatively equally for Māori and non-Māori, as did bed- sharing. Although the prevalence of bed-sharing was similar, more Māori smoked during pregnancy than non-Māori. Both behaviours combined increased the risk of SUDI immensely. Discussion: The risk of SUDI from bed sharing or antenatal smoking or both is the same regardless of ethnicity. Māori infants are exposed more frequently to the dangerous combination of both behaviours.

Maternal sleep position in late pregnancy: a survey in a New Zealand multi-ethnic community

Robin Cronin

Background: An Auckland study was the first to demonstrate that pregnant women who settled to sleep on their left side had a lower risk of stillbirth.

The greatest risk was for women who reported a supine (back) going-to-sleep position. Three subsequent studies have confirmed an increased risk of stillbirth with supine going-to- sleep position in late pregnancy. Objectives: To investigate self- reported late pregnancy going-to- sleep position and women's views about changing position, in order to generate information for future public health messages on optimal pregnancy going-to-sleep position for fetal wellbeing. Methods: A random sample of ethnically-representative women (n=377), 28-42 weeks' gestation, were surveyed in South Auckland, New Zealand; a multi-ethnic and predominantly low socio-economic population with an increased risk of stillbirth. Factors independently associated with non-left side going-to-sleep position in late pregnancy were identified using multivariable logistic regression. Results: Reported going-to- sleep position in the last week was left (30%), right (22%), supine (3%), either side (39%) and other (6%). A non-left position was associated with women of Maori (aOR2.6495% CI 1.23-5.66) or Pacific (aOR2.91 95% CI 1.46-5.78) ethnicity, and those did not sleep on the left-hand side of the bed (aOR3.29 95% CI 2.03-5.32). Most (87%) non-left sleepers reported that they would have minimal difficulty changing to their left side if this was recommended as being better for their baby. Discussion: Going-to- sleep position in late pregnancy appeared to be readily modifiable in this multi-ethnic sample, suggesting a public health intervention about optimal pregnancy going-to- sleep position is likely to be feasible in similar communities.

Establishing an assay to detect TP53 DNA adducts following cyclophosphamide bioactivation in patients

Maia van Kan

Background: Cyclophosphamide, an anti-cancer prodrug, has large variability in bioactivation and outcome. Identification of responders and non-responders by pharmacogenetic assessment has had limited success. Since cyclophosphamide is an alkylating agent, quantification of DNA inter-strand crosslink (ICL) adducts may be a more accurate predictive biomarker for dose individualisation. Cyclophosphamide preferentially forms adducts across exon 5-7 of the TP53 gene. Measurement of adduct formation by quantifying the extent of blockage of PCR amplification across this genomic region has been previously reported with another alkylating agent. Objectives: To optimise the previously published PCR-block assay to quantify ICL adducts in TP53. Method: Long-range PCR of TP53 (6.8 kb) was undertaken using pooled gDNA from six consented donors, and the published primer sequences. Amplification of a short fragment (0.5 kb) of the IFNβ1 gene was included as an internal control. Four DNA polymerase enzymes were assessed. Results: Amplification of IFNβ1 was successful with all of the polymerases tested. Long-range PCR of TP53 resulted in non-specific products. Phusion Hot Start II High-Fidelity DNA Polymerase produced a predominant 6.8 kb amplicon, with some lower sized products. SequalPrep Long Polymerase produced an incorrect predominant product (7.4 kb) with inconsistent amplification. TaKaRa LA Taq DNA Polymerase led to numerous products and TaKaRa Ex Taq Hot Start did not amplify TP53. Discussion: The published TP53 primers are 20 bp long and do not contain a 3' end CG clamp (characteristics of which are not always optimal for long-range PCR). Redesigned TP53 primers will now be assessed using these polymerases.

Using structural biology to inform the design of T-antigen based vaccines for Group A Streptococcus

Jeremy Raynes

Background: Group A Streptococcus (GAS) is a globally important pathogen causing a broad range of human disease and significant morbidity and mortality. There are no vaccines for GAS currently available but candidates based on the T-antigen are in pre-clinical development. T-antigens have previously been shown to have protective properties in mice and relatively low antigenic variation. Objectives: To investigate antibody-T-antigen interactions and provide 3-dimensional structural data of T-antigens to inform structure-led, vaccine design. Methods: FVB/n Mice and a NZ white rabbit were vaccinated with recombinant T18. Sera from these animals were screened by ELISA using an array of T-antigens that covers all major tee-types to elucidate cross-reactivity patterns. To visualise antibody cross-reactivity at a molecular level the structures of three T-antigens were solved using X- ray crystallography. Results: The dominant antibody cross-reactivity observed was between T18, T3.2 and T13. These three T-antigens feature two immunoglobulin-like domains and, despite low overall sequence identity, show significant structural homology with the previously published T1 antigen. Structural overlays reveal that T-antigens share a highly conserved core decorated with variable loop regions. Purification of T-antigen specific IgG from the animal sera, together with isolation of high affinity (<50 nanomolar) monoclonal antibodies from the same animals, has enabled patterns of antibody specificity to be mapped onto T-antigen structures. Discussion: The presence of cross-reactive epitopes on T-antigens from different strains suggests that a small number of antigens could be used to design a broad coverage vaccine. The structural maps of antibody-T-antigen interactions will inform the development of these.

XG19, an intracellularly acting connexin hemichannel modulating peptide in the treatment of ocular disease

Frazer Coutinho

Background: Age-related macular degeneration (AMD) is a leading cause of vision loss, affecting 170 million people worldwide. The disease is a result of inflammatory and ischaemic conditions in the posterior eye, causing cell death and vision loss. The gap junction protein Connexin43 (Cx43) is overexpressed in AMD and pathological Cx43 hemichannel mediated inflammation is linked to perpetuation of the disease. XG19 is a hemichannel specific, intracellular acting mimetic peptide linked to a proprietary cell penetrating peptide. Objectives: Observe the inhibition of pathological Cx43 hemichannel opening by delivering the intracellularly acting connexin hemichannel modulating peptide, XG19. Methods: Cellular uptake of XG19 was carried out in the retinal pigment epithelium cell line, ARPE-19. Functional assays were carried out to measure hemichannel mediated inhibition of EthD-1 dye uptake into cells as well as luminescence of adenosine triphosphate (ATP) released into the environment via open hemichannels post-treatment with XG19. Results: XG19 peptide was detectable in ARPE-19 cells when applying 10 μM concentrations while native Gap19 was undetectable up to 100 μM. Furthermore, XG19 showed efficient Cx43 hemichannel inhibition in EthD-1 dye uptake studies as well as in ATP release assays at concentrations as low as 5 μM. Moreover, XG19 uptake was increased in hypoxic cells and therefore has the therapeutic potential to shut down the inflammatory cycle and repair vascular damage that occurs during AMD. Discussion: XG19 has the therapeutic potential to protect cells from hemichannel mediated cell death which occurs in AMD as well as other inflammatory and hypoxic-ischaemic diseases of the body.

The role of cystine/glutamate antiporter in maintaining redox balance in the eye

Renita Martis

Background: Age-related eye disease such as cataracts and macular degeneration causes loss of vision. Oxidative stress plays a major role in the pathogenesis; however, the exact mechanisms are unknown. A gap in our knowledge is the role of the cystine/glutamate antiporter (CGAP) in maintaining extracellular redox balance and providing cysteine for the synthesis of the antioxidant glutathione (GSH). Objectives: It is our hypothesis that CGAP plays a role in minimising oxidative stress in the eye. Therefore, in this study, we determined if loss of CGAP function results in oxidative stress and the early onset of age related eye disease. Methods: Plasma and aqueous humour cystine and cysteine concentrations and GSH levels in the different ocular tissues were measured in wild type and CGAP knockout mouse using mass spectrometry. Ocular structures of mice were examined in vivo using a biomicroscope. Results: Plasma and aqueous humour cystine concentrations were higher in the knockout mouse relative to the wild type mouse. GSH levels were similar in the cornea, lens

and retina and 4-hydroxynonenal intensity increased in the cornea of the knockout mouse compared to the wild type mouse. Pathological changes were observed in the lens and retina of the knockout mouse at earlier ages than wild type mice. Discussion: Increased cystine levels in the knockout mouse results in an oxidative shift in the ocular environment and the appearance of ocular pathologies in the knockout mice. This suggests that cystine/cysteine redox imbalance triggers signaling pathways that result in the pathogenesis of age-related eye disease.

Varying rates of dairy protein stimulated aminoacidemia does not modulate post exercise downstream mTOR signalling?

Alex Chan

Background: Resistance exercise is a potent stimulator of the mTOR pathway which contributes to net muscle protein accretion by activating muscle protein synthesis (MPS). Dietary protein ingestion following exercise enhances MPS via mTOR signalling. Dairy protein fractions elicit varying rates of plasma aminoacidemia, more rapid aminoacidemia may illicit a greater post exercise mTOR signalling. Objective: To investigate how different milk protein fractions evoking varying rate of aminoacidemia affect mTOR signalling following a bout of resistance exercise in young men. Methods: 30 healthy males (22.6±3.0 years, BMI: 23.8±2.7 kg/m2) completed 3 sets of both leg press and leg extension at 80% of 1RM until the point of fatigue. Immediately afterwards, participants consumed 25g of either milk protein concentrate (MPC), casein or a propitiatory MPC evoking a rapid aminoacidemia in a double-blind manner. Vastus lateralis biopsies were collected before, 2 and 4hr after exercise and supplement ingestion. Immunoblotting analyses of downstream mTOR protein phosphorylation were conducted to identify differences in supplement performance. Results: p-P70S6K (Thr389, Ser421-424) increased at 2 and 4 hours following exercise with no difference between groups ($p<0.05$). p-ERK1/2 was increased from rest in at 4 hours in only one group. The authors are still blinded to group assignment. Discussion: In young men, resistance exercise causes an increase in phosphorylation of mTOR pathway downstream kinase P70S6K, irrespective of protein type. The rate of aminoacidemia evoked by post exercise dairy protein ingestions may modulate the myocellular stress response via ERK.

PilVax, a novel peptide carrier for the development of an effective vaccine against Streptococcus pneumoniae

Callum Chalmers

Background: Streptococcus pneumoniae is a human nasopharyngeal pathogen which is the leading cause of the severe infections pneumonia, meningitis and sepsis. Mortality due to these infections remains high despite available vaccines. Current polysaccharide-based vaccines suffer poor immunogenicity, limited serotype coverage and serotype replacement meaning vaccines against conserved protein targets, such as Pneumococcal Surface Protein A (PspA), are needed. A novel protein vaccine technology suitable for such a vaccine is the PilVax expression platform. This platform incorporates peptide epitopes into the polymeric backbone of the Group A Streptococcus M1 pilus, amplifying them and improving their immunogenicity. This recombinant pilus is then expressed on the surface of the food-grade bacterium Lactococcus lactis to generate a safe, effective vaccine. Objectives: To immunise mice with L. lactis expressing PilVax containing PspA epitopes and to analyse the epitope-specific immune response. Methods: Selected PspA B cell epitopes were cloned into the M1 pilus monomer gene. The complete pilus operon was then heterologously expressed in L. lactis. Western blotting and flow cytometry were used to analyse pilus expression. After intranasal immunisation of mice with the recombinant L. lactis, the IgG and IgA responses against PspA will be analysed using ELISA. Results: Both Western blotting and flow cytometry showed that incorporation of the peptides did not interfere with pilus expression and assembly. Discussion: Initial results suggest that the PspA epitopes do not disrupt pilus formation and are therefore suitable for immunisation using the PilVax platform. Further experiments are needed to evaluate whether this vaccine is immunogenic and protective.

Iron: A strong element in the pathogenesis of chronic hyperglycaemia after acute pancreatitis

Shayal Chand

Background: Evidence shows an association between markers of iron metabolism and glucose metabolism in type 2 diabetes mellitus. Acute pancreatitis (AP) is the largest contributor to diabetes of the exocrine pancreas. However, the pathogenesis of new-onset pre-diabetes or diabetes after AP (NODAP) remains unclear. Objectives: To investigate associations between markers of iron metabolism and glucose metabolism following AP. Methods: Fasting blood samples were collected to analyse markers of glucose metabolism (haemoglobin A1c), and iron metabolism (hepcidin, ferritin, and soluble transferrin receptor). Participants were categorized into two groups: normoglycaemia after AP and chronic hyperglycaemia after AP (CHAP). Binary logistic and linear regression analyses were conducted, and potential confounders were adjusted for in multivariate analyses. Results: A total of 83 patients with AP were included, of whom 19 developed CHAP. Hepcidin was significantly associated with CHAP in two adjusted models ($p=0.045$ and $p=0.048$). Ferritin was significantly associated with CHAP in three adjusted models ($p=0.009$, $p=0.0011$ and $p=0.016$). Soluble transferrin receptor was not significantly associated with CHAP. Discussion: Hepcidin and ferritin appear to be implicated in the development of CHAP. These findings suggest that markers of iron metabolism are involved in NODAP. Iron depletion therapy through blood donation, and pharmacotherapy through iron-chelation and hepcidin-modulating drugs may be potential treatment options.

Characterisation of extracellular vesicles from the enteric pathogen Citrobacter rodentium

Stephen Ashley

Background: Pathogenic strains of Escherichia coli remain a global health issue, with enteropathogenic E.coli (EPEC) causing high mortality in the developing world and enterohaemorrhagic E.coli (EHEC) causing sporadic outbreaks in the developed world. Citrobacter rodentium is a murine enteropathogen with a 'modus operandi' analogous to EPEC and EHEC, allowing many aspects of pathogenesis to be explored. An emerging field in microbiology is the study of Extracellular Vesicles (EVs), which are suggested to play a role in survival and pathogenesis of bacteria, including E. coli. Objectives: I aim to examine the production of EVs by C. rodentium throughout growth to determine when EVs might be most beneficial to the bacteria. EV composition will also be analysed to assess function. Methods: Samples will be taken during growth and vesicles will be purified. Vesicle numbers and size will be analysed using Nanosight, protein concentration will be analysed via BCA assay and nucleic acids will be examined using Qubit. EVs will be analysed in two types of growth media, using two strains of C. rodentium, one of which is 'evolved' via passage through mice. Results: Preliminary data indicates that C. rodentium produces a high concentration of vesicles per cell, and that the 'evolved' C. rodentium produces vesicles with a higher DNA content than the ancestor. Further studies will investigate the composition of vesicles produced by ancestral and 'evolved' C. rodentium. Discussion: These results will give us a greater insight into the evolution of bacteria, showing how changes in EVs may contribute to bacterial pathogenesis.

PilVax: a novel peptide carrier for the development of vaccines against tuberculosis

Samuel Blanchett

Background: PilVax is a novel peptide vaccine delivery strategy for the generation of highly specific mucosal immune responses. The food-grade bacterium Lactococcus lactis is used to express selected peptides

engineered within the group A streptococcal pilus, thereby allowing for peptide amplification, stabilization, and enhanced immunogenicity. A pilot study showed that mice immunised with PilVax containing the model peptide from the ovalbumin protein, Ova324-337 presented strong IgG and IgA responses to ovalbumin. Tuberculosis is a global health issue with no suitable vaccine with research ongoing to find a solution. Objectives: The present study aims to demonstrate the suitability of PilVax for the generation of novel peptide vaccines against tuberculosis. Methods: Selected peptides (B cell and T cell epitopes), derived from tuberculosis vaccine targets, were genetically engineered into loop regions of the pilus backbone subunit and expressed in L. lactis. Results: Western blots confirmed pilus formation on L. lactis. ELISAs detected antibody responses in the serum from mice immunised intranasally with recombinant L. lactis which were strong against the pilus backbone, but weak against the target peptide. Discussion: The poor antibody responses to the two peptides tested thus far were expected, due to being primarily T cell epitopes. We are currently also testing PilVax expressing selected B cell epitopes, and analysing the T cell responses of all constructs.

A novel zebrafish model of kidney disease

Sarah Qubisi

Background: Kidney disease is a major healthcare burden in New Zealand and globally. Podocytes are an essential cellular component of the kidney filtration barrier because of its characteristic structure of interdigitating extensions called foot-processes. Foot-processes are linked together via a bridge of transmembrane proteins called slit-diaphragm. Podocytes injury contributes to the onset and progression of kidney disease and is associated with a retraction of podocyte foot-processes (effacement), a down-regulation of slit-diaphragm components, and loss of blood filter integrity. Objectives: To develop an inducible model of podocyte effacement and recovery in zebrafish using protamine sulphate (Pt.SO) to understand the molecular mechanisms governing the maintenance and establishment of foot-processes. Methods: Transgenic zebrafish larvae with fluorescently tagged podocytes were injected with Pt.SO4 or water (vehicle control) or combined with a large fluorescent dextran. Fixed or live larvae were processed at different time points post injection using confocal microscopy, TEM and qPCR to assess the integrity of the blood filtration barrier. Results: Pt.SO4 induced podocytes to undergo dramatic 'rounding-up' and effacement within 24 hours post injection. This was associated with a leaky filtration and down-regulation of slit-diaphragm genes. These defects were reversible with the morphology and integrity of the blood filter recovering 5 days later. Discussion: These data show that podocytes exhibits morphological changes (effacement), decrease of slit-diaphragm components, and loss of blood filter integrity upon Pt.SO4 administration specifically 24 hours post injection. Recovery data of induced injured podocytes suggest further transcriptional analysis by RNA-Seq as a future approach for potential therapeutic targets.

Optical Changes in the Lens under Perturbation using Ray Tracing and Magnetic Resonance Imaging

Chen (Peter) Qiu

Background: To gain a comprehensive understanding of how changes in ocular lens cellularphysiology affects the optical properties, the gradient of refractive index (GRIN) profile and surface curvatures need to be obtained under physiologically normal and perturbed conditions. Objectives: To use a newly developed laser ray tracing (LRT) system to examine how changes in the cellular physiology of bovine lenses alters the GRIN and lens shape, and compare the optical changes to a previous MRI study. Methods: Bovine lenses were cultured in chambers that contained AAH (Artificial aqueous humour)+high-K+, AAH+Ouabain and AAH+low pH (connexin 46 decoupling). LRT was performed, and the optics were analysed. Changes to the overall power of the lens and the contribution of both the GRIN and lens geometry to the overall power was analysed independently and compared to MRI. Results: Preliminary results showed that the lenses incubated in AAH+high K+ had decreased refractive index in the outer cortex (~1.36 to ~1.34) and AAH+Ouabain observed no changes, while at the core AAH+Ouabain increased (~1.45 to ~1.46) and AAH+high-K+ decreased (~1.45 to ~1.44). These shifts are consistent with MRI, and the independent GRIN/shape contributions to power were also similar. AAH+low pH observed an overall decrease in refractive index of ~0.01. Discussion: Perturbations to the cellular physiology of the ocular lens changes the overall optics of the lens and also the contribution of power from the GRIN and lens geometry. Lens depolarization, blocking of Na + /K + ATPase, and blocking of lens water channels have differing implications on the overall optics.

Biometry prediction error associated with the Hill-RBF, Barrett Universal II, and SRK/T formulae.

Henry Wallace

Background: Cataract removal is one of the most common operations performed in New Zealand today. Refractive outcomes are critical to patient satisfaction. Objective: To determine the accuracy of intraocular lens (IOL) power prediction using three formulae, Hill-RBF(RBF), Barrett Universal II(BU), and SRK/T. Methods: One-hundred- and-thirteen eyes of 94 prospectively enrolled patients listed for cataract surgery were recruited once formal ethics approval was obtained. All the patients underwent preoperative IOLMaster-500 biometry. Optimal IOL power and predicted refractive outcomes were calculated by entering these data into the IOL power calculation formulae. Predicted refraction was compared with actual refractive outcomes measured at 1-week and 1-month follow- up. Statistical analysis was completed using R software. Results: Mean axial length was 23.4±1.0mm (min=21.1, max=27.9). Mean keratometry was 44.0±1.6 Dioptres(D) (min=38.8D, max=48.7D). The mean absolute prediction errors (APE) at 1-month were: RBF; 0.49±0.38D, BU; 0.50 ±0.40D, and SRK/T; 0.48±0.35D. There were no significant differences in APE between any of the formulae at 1-week (X2 (2)=2.22, p =0.33) and 1-month (X 2 (2) =1.00, p=0.61). The BU formula had the highest proportion of eyes within ±0.25D(34%) and ±0.5D(62%) of predicted at 1-month. The SRK/T formula had the highest proportion of eyes within ±1D(91%) of predicted at 1-month. Discussion: There are no significant differences between the three formulae and they can be used interchangeably for medium-length eyes (22-24.5mm). SRK/T is less accurate at IOL power prediction for eyes outside the medium range of axial length. IOL power prediction was equally accurate for eyes outside of the medium range using the BU and RBF formulae.

Corneal remodelling following cataract surgery: Effect of incision size on wound architecture three months postoperatively

Sunny Li

Background: Phacoemulsification using a clear-corneal incision is the preferred technique of cataract removal, and the postoperative structural integrity of these wounds is important for corneal wound healing. Purpose: To characterise wound healing and corneal incision architecture with different incision sizes in the three months following cataract surgery. Methods: A prospective randomised study of 95 patients undergoing cataract surgery assigned to uniplanar clear-corneal temporal incision sizes of 2.20mm or 2.85mm was completed. Incision position, length, angle, and leakage were recorded, alongside total ultrasound energy and corneal thickness. Corneal topography and incision imaging using optical coherence tomography was completed at one day, one week, one month and three months, postoperatively. Statistical analysis was completed using R. Results: Endothelial wound gaping was observed in 63% (2.2mm) and 45% (2.85mm), p=0.03. Descemet's membrane detachments (DMD) were observed in 57% (2.2mm) and 40% (2.85mm), p=0.01. Increasing phacoemulsification time was associated with DMD (p =0.02), endothelial wound gaping (p=0.03) and increased wound thickness (p =0.02). Endothelial wound gaping improved within the first month and wound retraction progressed from one to three months post-operatively. Wound leakage was noted in one case (incision angle=35.0o), overall mean incision angle was 25.1±4.6o . Conclusions: Increasing ultrasound energy and smaller

incisions are associated with wound gaping

and retraction that demonstrate corneal remodelling over three months following cataract surgery. Smaller incisions are associated with increased rates of DMD and increased localised corneal thickness in the postoperative period. Uniplanar incisions of 2.2mm and 2.85mm can be consistently constructed, do not leak and do not require hydration.

Neuroprotective effects of the TLR7 agonist Gardiquimod in preterm fetal sheep model of asphyxial injury

Hyeon Tae (Kenta) Cho

Background: Perinatal asphyxia is associated with lasting developmental deficits in myelination of the white matter in preterm infants. While there is a growing appreciation that signalling through Toll-like receptors (TLRs), and activation of downstream inflammatory cascades may play a prominent role in white matter injury, our recent studies suggest that activation of the TLR7 pathway may afford protection. Objectives: In the present study, we examined the therapeutic potential of the synthetic TLR7 agonist, Gardiquimod (GDQ), after acute profound asphyxial injury in preterm fetal sheep. Methods: Fetal sheep at 0.7 gestation (day 103-104; term ~145 days) received a continuous intracerebroventricular (ICV) infusion of GDQ (GDQ-asphyxia, n=5) at a rate of 18.56ug/minute for 3 hours or saline endotoxin-free vehicle (asphyxia, n=9; sham-asphyxia, n=9) commencing 1 hour following a 25 minute umbilical cord occlusion. After 3 days recovery in utero, fetal sheep were killed and brains fixed for later histopathological evaluation. Results: GDQ administration improved survival of immature and mature oligodendrocytes in association with reduced apoptosis and astrogliosis ($p<0.05$ vs. asphyxia). Delineation of microglial polarisation by double-labelling immunofluorescence for the M2 marker CD163 with Iba-1 revealed an increase in the number of M2 microglia with GDQ ($p<0.05$). Finally, GDQ administration was associated with more rapid early recovery of electroencephalogram power and spectral edge frequency. Discussion: Our studies provide the first evidence that in preterm fetal sheep therapeutic manipulation through TLR7 signalling following asphyxia can reduce white matter injury and improve electrophysiological recovery, offering the potential to preserve myelination in a physiological manner.

SCIENCE

Taming Computational Complexity

Samin Aref

Is the enemy of an enemy necessarily a friend? If not, to what extent does this tend to hold? These seemingly easy questions are fundamental in active areas of research. Such questions were formulated in terms of signed networks and necessary and sufficient conditions for a network to be “balanced" were obtained around 1960. Since then the idea that signed networks are close to total balance or they tend over time to become more balanced has been widely used in biology, finance, mathematics, material science, international relations, nano-materials, organic chemistry, electronics, and sociology. However, investigation of this hypothesis has been complicated by the complexity involved in computing a numerical measure. The enumeration required for analysing such networks takes hundreds of years on the world’s most advanced supercomputers. Our main achievement is that using a standard university-issued computer, our algorithm can analyse very large networks in a few minutes. Besides making new computations possible, our algorithm is the only one that comes with a guarantee of solution quality. This is equivalent to building a machine that checks and verifies something much greater than the number of atoms in the universe.

The novelty of our models makes several new approaches possible in analysing essential concepts in several fields of research including (1) optimal decomposition of biological networks into monotone subsystems, (2) predictability of a portfolio of securities in finance, (3) the minimum energy state of magnetic materials in material science, (4) bi-polarisation of countries in international relations, (5) the stability of a carbon allotrope in nano-materials, (6) the number of out-of-phase overlaps of a recently synthesised hydrocarbon in organic chemistry, (7) the minimal set of phase conflicts of an integrated circuit design in electronics, and (8) a macro-scale structural phenomenon observed in communities of friends and enemies in sociology.

The Socialite Copper, the Cautious Phosphorus and the Timid Nitrogen

Joey Feld

Whether it be oil, plastic, dye or medicine, many industrial processes utilise a catalyst to increase the efficiency and rate of production. In this day and age where we are highly aware of energy consumption, waste disposal and environmental impact, the best catalytic reactions lower energy cost, increase efficiency and avoid undesired side products. Copper salts have been reported to catalyse the formation of nitrogen-phosphorus bonds in the presence of air. Nitrogen and phosphorus are abundant in biological systems and have many potential applications in medicine, DNA design, and biocompatible materials. This reaction features one-step synthesis, cheap starting materials and is reported to produce water as the only waste. These conditions make this reaction a promising candidate for large scale production. However, the reaction is slow compared to industrial standards and can form many unwanted side products. In order to optimise conditions and develop new catalysts to improve efficiency and selectivity, we need to understand how the reaction works. My project focuses on investigating the mechanism of the reaction through using a variety of additives along with the copper salts. To learn more about the interactions between the different species in solution, we use a variety of analytical tools and our problem solving skills to piece together the bigger picture. Ultimately, we aim to find solid evidence such as isolated intermediates.

Poster Abstracts

ARTS

Thinking every n**ga be sellin' narcotics: The role of respect in minority distrust in police

Nikolas Rusten

Although ethnic minorities consistently report lower levels of trust in the police than ethnic majorities, the underlying reason for these ethnic group differences is unknown. We address this oversight by arguing that ethnic minorities trust the police less than ethnic majorities because they experience lower levels of subgroup respect (SGR), a concept reflecting the perceived levels of acceptance, value, and recognition that one's subgroup receives from wider society. As expected, results from a national probability sample of New Zealanders (n = 10,606) showed that minorities trust police less than New Zealand Europeans, and this relationship was partially mediated by SGR. Also as predicted, subgroup respect was a stronger predictor of trust for minority group members than it was for majority group members. These results demonstrate the significance of wider societal inequality and discrimination in affecting the trust that marginalised groups place in police.

The Cultural Policy of Galicia in the Digital Age

Ekaterina Volkova

Cultural policy is a constantly changing concept. Traditionally concerned with providing support for arts and cultural heritage institutions, it has expanded and now includes areas such as cultural industries, urban development, tourism, and cultural diversity. In its turn, the concept of cultural heritage has also evolved and now covers a very wide range of tangible and intangible categories. Additionally, information and communication technologies have become a vital instrument in the preservation and dissemination of cultural heritage. The intersection of cultural policies and digital advances has become the matter of fact and has entered legislation at world, European and national levels.

This paper studies the ways digital technologies are embedded into the cultural policy of Galicia, an autonomous community in North-western Spain, with historical claims of separate political and cultural identity. The cultural policy of Galicia is a recent phenomenon. The consolidation of Galician cultural policy occurred only in 1981, after the establishment of the Statue of Galician Autonomy. Since that time, the Galician government has had almost exclusive competencies in the area of culture, including the contemporary digitisation of Galician culture. This poster presents the current global trends of digital cultural policies with the examples taken from a Galician context.

The resolution of anaphoric null subjects in Chinese narrative discourse

Shuangshuang Chen

The absence of a grammatical subject is commonplace in Chinese. Following Barbosa (2011), we use the term 'null subject' (hereafter referred to as NS) to describe the phonetically null, though syntactically present, element. While a large amount of previous literature has focused on NSs in isolated sentences (C. T. J. Huang 1984, 1989; Hu 1997; Y. Huang 1994, 2000 etc.), this study is concerned with NSs in Chinese narrative discourse, particularly the resolution of anaphoric NSs within the framework of Centering Theory (Grosz, Joshi and Weinstein 1983, 1995, henceforth GJW).

Centering Theory is proposed to model the local component of attentional state and examine interactions between local coherence and choice of referring expressions within discourse segment (GJW 1995). There are three constraints and two rules in Centering model. On the basis of revised notions and rules in this model, we tentatively design an Algorithm to resolve anaphoric NSs in a newswire text. The algorithm includes inter-

utterance resolution procedure and long distance resolution procedure. The results show that 95.8% anaphoric NSs are correctly resolved."

Spatial Interactions and Communications: A Geochemical analysis of Obsidian from the Auckland Region

Brendan Kneebone

This research used portable X-Ray Fluorescence (pXRF) to geochemically assign an archaeological obsidian assemblage from Elletts Mountain in the Auckland (Tamaki) region of New Zealand to source. Provenance studies are an important aspect of archaeological research, and the precise results of a modern XRF analysis mean that archaeologists are now capable of separating rocks that appear very similar into distinct source groups rapidly, inexpensively, and in a way which is non-destructive. For this study, 316 flakes of obsidian were geochemically sourced and the results show that over 90% originate from either Mayor Island or Great Barrier Island. These results fit an emerging pattern of obsidian use in the Auckland region whereby an emphasis on Mayor Island material during the Early Period of occupation is replaced by the growing importance of Great Barrier Island obsidian during the Late Period. This potentially indicates a shift in spatial interactions and communication networks among pre-European Maori. This research adds to the existing body of knowledge regarding obsidian use in the wider Auckland region.

ENGINEERING

Modelling and identifying how New Zealand can maximize the diffusion of electric vehicles through governmental policy.

Kym Harper

Electric vehicles (EV's) have a pivotal role to play in the fight against climate change, and New Zealand has a responsibility to meet the targets it agreed to meet in the newly ratified Paris agreement.

In this paper we start by identifying the key aspects of consumer decision making when purchasing a vehicle and the major criteria involved. I analyse EV growth trends worldwide and the effects of different governmental policy approaches around the world have on this growth.

The key governmental policy that would maximize diffusion of EV's in NZ suggested by the author is a Feebate system, which provides an elegant (revenue-neutral) solution in the form of a fee or rebate on initial vehicle cost based on a predetermined scale of CO2 emissions emitted by the vehicle. A higher emission vehicle would be charged a 'fee', thus driving the purchase cost up. A lower emission vehicle (EV) would receive a rebate, bringing the initial cost down. This would dramatically reduce the price differential between EV's and conventional vehicles, and encourage car manufacturers to produce more environmentally friendly vehicles.

The results of the effect of an introduction of a Feebate system will be forecasted using a Bass method based model. Which will be altered slightly using multi-criteria analysis (MCA) to account for the effects of consumer psychology on the diffusion of a new product (EV's) into the NZ marketplace.

Cytotoxic study of polystyrene-block-polyethylene oxide for long term stem cell culture

Isabela Monteiro

How cells interact with and respond to biomaterials is highly influenced by a number of cues presented at the material surface. A better understanding of how surface cues can regulate stem cells in vitro is vital to exploit the potential of stem cells in regenerative medicine applications. Block copolymer thin films are interesting due to their ability to self-assemble into ordered nanostructures, showing great potential for space-controlled functionalization. Polystyrene-block-polyethylene oxide (PS-b-PEO) coated surfaces have been explored as cell culture substrates and protein adsorption and cell attachment has been studied. However, in order to use this material as a platform for stem cell differentiation, any long-term cytotoxic effects of this polymer must be established. The aim of this experimental investigation was to evaluate the in vitro biocompatibility of PS-b-PEO using murine chondrocytes. The study was undertaken with thin PS-b-PEO films with cylindrical hexagonal phase on silicon wafers. Cells were observed after 4 hours, 1 day, 3 days and 5 days after seeding to analyse cellular adhesion, growth, morphology, viability and metabolic activity. Preliminary results show viability of 99%, cell proliferation and strong adhesion confirmed by the presence of prominent F-actin stress fibres. Cells cultured over the polymer film presented an area almost 30% larger than those grown on glass coverslips, due most likely to difference of hydrophobicity. The findings suggest that PS-b-PEO is not cytotoxic and may be biocompatible for long term stem cell studies.

Honey Dataset Standard Using Hyperspectral Imaging for Machine Learning Problems

Ary Noviyanto

Hyperspectral imaging has been rarely investigated for honey analyses, on the contrary to the optical spectroscopy which is widely investigated. The essential missing component to kick start this research is a standard honey hyperspectral images, called hypercubes, dataset. This paper proposes a systematic procedure for the preparation of the first honey hypercube dataset using hyperspectral imaging. Moreover, a scalable and flexible dataset module is introduced to ease the interaction between raw hypercube data and machine learning software. The developed dataset greatly benefits researchers to progress on the research of honey analysis including constituents prediction and types classification using hyperspectral imaging and machine learning.

Crime Scene Investigation in Engineering

Eryn Kwon

When a bullet passes through an object, the majority of fragments and debris flow in the direction of the bullet from the exit site. These are called a forward spatter. However, there are a small amount of fragments ejected back towards the shooter from the entry site. These are called the backspatter. This project aims to prepare the foundations to research backspatter, and increase the understanding in its mechanism from an engineering aspect.

Backspatter research is important as it may provide additional information such as proximity of the shot or types of weapon used. This information can be used to strengthen and help crime scene reconstruction. Despite the valuable information that may be extracted from backspatter, it is relatively poorly researched and lacks understanding of its mechanisms.

Making a realistic physical and computational model that mimics the ballistic response of the human head will allow easy access to samples that is of low cost and free of ethical concerns compared to animals or other biological samples.

A patient-specific, anatomical geometry physical and computational model was created. The computational model was validated to behave in a similar manner to the physical model, both chronologically and morphologically. The models illustrated different mechanisms at work to generate the backspatter very well. With further analysis, major factors affecting the ballistic response of the system may be identified to help explain the mechanisms of the backspatter phenomenon more clearly.

Is the robot sounding right? An analysis of a social robot's empathetic emotions in speech

Jesin James

Empathy is the behaviour that enables one human to experience what another human feels and behave as a response to it. It is a character that is truly human, and very much required when interacting with people in care facilities. Nowadays, due to the advancement in Human Computer Interactive technology, robots are also designed to interact with humans. Most of the current robots perform high-end artificial intelligence tasks, but they are not designed to portray empathy. Analogous to the empathy exhibited by humans in human-human interaction, an empathetic behaviour is desired by humans from the robots interacting to them (suggested from literature.) But there is no definition in literature about what can be defined as empathy when it comes to robots. For the purpose of this research, empathy for Human Computer Interaction is defined as the affective response of the robot to the behaviour of the human that it can sense according to the technology embedded in it. The focus of this research is to identify what an empathetic voice for a Healthcare Robot should sound like. Empathetic speech for the humans include a careful choice of words that are spoken, along with an emotional span that portrays empathy. But such a definition does not exist for robotic interaction. As the involvement of robotic companions are high in human life nowadays, this research focuses on defining what an empathetic voice should sound like for a Healthcare robot. The results can be extended to all social robots. The choice of the emotional levels that will be considered as empathetic when it comes from a robotic companion is the main question answered in this research work. The findings about the emotional levels for an acceptable empathetic voice is a pre-requisite for actually synthesising an empathetic voice for robots.

An Investigation of the Herniation Path

Vonne van Heeswijk

INTRODUCTION: Flexion in combination with compression will induce disc herniations in healthy motion segments (i.e., part of the spine consisting of a disc with its two adjacent vertebrae) in vitro. While the posterior and posterolateral regions are the generally acknowledged primary herniation sites, the question remains as to whether there are other regions that are implicated in the initiation of disc disruption and herniation. Hence, the aim of this study.

METHODS: Fourteen healthy sheep lumbar motion segments were flexed 10° and compressed at a rate of 40 mm/min up to failure. Then the entire volume of the discs were macroscopically analysed by progressive transverse sectioning in order to obtain a more global picture of internal disc disruption and herniation.

RESULTS: Very often disruption in the lateral annulus was found associated with circumferential tracking of nucleus between the annular layers towards the posterolateral and posterior regions. In all tests this lateral disruption did not cause any discernible external change in the lateral disc periphery following the removal of load.

CONCLUSION: The present study revealed an additional herniation path that clearly commences in the lateral annulus and which via circumferential nuclear tracking can become externally evident in the more generally accepted herniation regions, the posterolateral and posterior aspects. This new found nuclear migration path highlights the complexity of the herniation event.

MEDICAL AND HEALTH SCIENCE

Uptake of 5-Fluorouracil into primary buccal mucosal cells

Daniel Neuberger

Background: 5-Fluorouracil (5-FU) is an important cancer treatment. Unfortunately, its use is often complicated by severe mucosal toxicity, the mechanisms of which are poorly understood. We hypothesise that catastrophically high cellular uptake of the drug in certain individuals may be a predisposing factor. Objectives: To investigate inter-individual variability in the uptake of radiolabelled 5-FU into buccal mucosal cells. Methods: Two cohorts of participants were recruited: 1) healthy individuals and 2) patients undergoing treatment with 5-FU for gastrointestinal or breast cancer. Primary buccal mucosal cells were collected by cytobrush and incubated in uptake buffer with radiolabelled 5-FU (5 µM) for 5 min, at either 37 °C or 0 °C. Healthy participants are also re-tested, either weekly or monthly, over 3 months. Results: 5-FU uptake ranged from 0.11 to 23.1 pmol. min-1 .10 5 live cells-1 across 11 healthy participants. There was also a similar range of uptake values across the 5 cancer patients tested (0.12 to 10.9 pmol.min -1 .10 5 live cells-1). Initial data from retesting healthy participants indicates that these values are very reproducible, except in young (<40y) females. Discussion: The initial data suggests that there is more than 90 fold variation in 5-FU mucosal uptake between individuals. We are continuing to recruit participants to confirm this in a larger cohort. Assessment of the pattern of changes over time in young females is ongoing. Studies to determine whether "high uptake" individuals are at risk of 5-FU induced mucositis are planned.

NMR metabolomics analysis of urine from elderly men fed a high protein diet

Aahana Shrestha

Background: Higher protein diets have been promoted as beneficial for maintaining muscle mass in the elderly. However, the metabolic consequences of such diets are poorly understood and there are limited insights into the metabolic adaptation to a higher protein diet. Objectives: To evaluate the urinary metabolome of elderly men following a high protein diet compared to standard protein diet using 1 H Nuclear Magnetic Resonance (NMR) spectroscopy. Methods: 30 healthy men (74.2 ± 3.6 years) were randomised to consume either a high protein (1.6 g protein/kg body weight/day) or standard protein diet (0.8 g protein/kg body weight/day) for 10 weeks. 24 hour urine was collected before and immediately following the intervention. Using untargeted NMR metabolomics, urine samples were analysed to investigate changes in urinary metabolites pre and post dietary intervention. The discriminant metabolites from multivariate regression analysis were further analysed using 2 factor repeated measures ANOVA. Results: The urinary metabolic profile showed clear separation between two groups post intervention which were driven mainly by trimethylamine N-oxide (TMAO), creatine and carnitine. There was a significant interaction between diets over time for TMAO and creatine ($p<0.05$) and trend for carnitine. TMAO and creatine levels were increased significantly after the high protein diet. Discussion: NMR metabolomics showed significant changes in urinary metabolic patterns following a standard protein diet compared to a high protein diet. The increased level of TMAO following high protein diet was triggered either by high fish intake or carnitine abundant in red meat which was converted to TMAO by gut microbiome.

The impact of ageing on supplemental mineral bioavailability

Soo Min Han

Background: Minerals are essential for metabolic processes and inadequate

intakes may lead to increased risks for chronic diseases. Eating behaviours, along with physiological changes associated with ageing, may impact mineral intakes in elderly adults, increasing the risk for deficiencies. Dietary supplements may aid in reaching adequate mineral levels in adults. Yet, supplemental mineral bioavailability and their metabolic effects have not been clearly identified in the elderly. Objectives: To examine the bioavailability of minerals following consumption of a multivitamin and mineral supplement. Furthermore, to describe the metabolic impacts of multivitamin and mineral supplements in blood and urine. Methods: In an acute, non-randomised, parallel trial, healthy young (19-30 years) and elderly (65-76 years) participants will consume 1 tablet of commercially available multivitamin and mineral supplement. Fasting and postprandial plasma and urine samples will be collected to analyse changes in circulating minerals and metabolites. Metabolomic techniques by inductively coupled mass spectrometry and proton nuclear magnetic resonance will be used alongside standard clinical analyses using enzymatic colorimetric assays. Results: We hypothesise that the elderly adults will have different circulating mineral bioavailability following multivitamin and mineral supplement ingestion compared to young adults. As minerals are involved in various biological processes, this may further alter postprandial plasma and urine metabolites, and be different between elderly and young adults. Discussion: This research may provide insights to mechanisms of multivitamin and mineral supplement digestion and metabolism. Moreover, it may provide information on health outcomes of supplement use which may inform supplement use in the elderly.

Investigating the performance of isolated perfused rat hearts with right ventricular hypertrophy

Anna Krstic

Background: Heart disease is a global burden, responsible for 31% of all mortalities worldwide. Recently, the contribution of the right ventricle (RV) to the heart disease burden has become increasingly of interest. Most often, right heart disease arises as a result of increased RV afterload from pulmonary arterial hypertension (PAH). PAH is a slow, progressive disease with no cure. Over time, increased workload leads to adaptive hypertrophy of the RV wall, which later progresses into RV failure and eventual death. Objectives: To investigate the functional response of the heart to pulmonary hypertension, prior to end stage heart failure. Methods: Pulmonary hypertension was induced in 300 g male rats by injection of 60 mg Kg-1 of monocrotaline (MCT). Control (CON) rats were injected with sterile saline. Rats were euthanized 4 weeks post injection following in vivo electrocardiogram recordings. Measurement of left ventricular (LV) pressure and the electrocardiogram were carried out in un-paced, Langendorff-perfused, isolated hearts. Each heart was subjected to various pharmacological treatments. Results: Thus far, LV pressure in CON (n=4) was not different to MCT (n=3). However, 2/3 of the MCT hearts displayed persistent arrhythmias. Discussion: The results to date suggest that isolated MCT rat hearts are susceptible to arrhythmias. To further investigate these findings, I will complete isolated heart experiments over the coming weeks (n=10/group). If my results are confirmed, then the MCT model will be considered suitable for studying the cellular mechanisms that cause sudden cardiac death.

Semifluorinated alkanes for topical delivery of cyclosporine A

Priyanka Agarwal

Background: Cyclosporine A (CsA) is an anti-inflammatory agent frequently used in the management of dry eye disease. However, the poor water solubility of CsA makes it difficult to formulate it as aqueous eye drops. Semifluorinated alkanes (SFAs) are a novel class of inert, non-toxic and amphiphilic liquids that form clear solutions with CsA. Objectives: To compare the corneal bioavailability of SFA-based CsA solutions with currently marketed formulations. Methods: An ex vivo porcine eye model was developed to study the penetration of a) Restasis® (0.05% CsA ophthalmic emulsion), b) Ikervis® (0.1% CsA ophthalmic emulsion), and c) 0.05% or 0.1% CsA in SFAs, over 4 hours. Drug distribution in different layers of the cornea was also visualized by substituting CsA with a hydrophobic fluorescent dye and viewing corneal sections under a confocal microscope. Results: The corneal CsA concentration 1 hour (C1hour) after application of 0.05% CsA in SFAs was 5968.30 ± 631.12 ng/g) with the area under curve (AUC) being 8-folds greater than Restasis (C1hour = 867.81 ± 93.53 ng/g). Also, the AUC of 0.1% CsA in SFAs (C1hour = 12321.08 ± 1105.38 ng/g) was 5-folds greater than Ikervis (C1hour = 1890.06 ± 91.79 ng/g). Microscopic examinations revealed that the dye incorporated into SFAs tended to accumulate in the corneal epithelium. Discussion: SFAs significantly improve the corneal bioavailability of hydrophobic drugs, such as CsA, by increasing drug penetration and distribution in corneal layers. Therefore, they could be a promising platform for topical drug delivery to the eye.

Obstetricians' Prescribing Practices do not Match Current Guidelines for Antenatal Corticosteroids

Jeremy Tuohy

Background: Antenatal corticosteroids (ANC) reduce mortality and serious morbidity in preterm neonates. Published guidelines provide the best available evidence for how ANC should be prescribed, but are not always followed in practice. Objectives: To compare how obstetricians say they prescribe ANC to the guideline recommendations. Methods: An anonymous online questionnaire using clinical scenarios was distributed to practising Obstetricians in Australasia. Adherence to guidelines was compared by practitioner demographics. Results: The response rate was 20% (429/2101). The guidelines recommend ANC are administered to women <35 weeks' gestation who are at risk of preterm birth within 7 days. All practitioners reported prescribing ANC in accordance with the guidelines if preterm birth was expected within 24 or 72 hours at 28 weeks. However, 85/383 (22%) reported doing so even if birth was not expected within 7 days. This was more common in more experienced practitioners (65/227 (29%) if >10 years' practice vs. 20/156 (13%) if ≤10 years, p=0.001). ANC were prescribed at 35 weeks' by 178/357 (50%) of respondents, but this rate did not vary by duration of practice (128/357 (50%) if >10 years' practice vs. 72/143 (50%) if ≤10 years, p=1.0). Discussion: These data suggest that many obstetricians, particularly if they are more experienced, prescribe ANC outside the gestational age and time frame recommended in the current guidelines. Some fetuses are being exposed to ANC where the benefit is unproven and there may be risk of harm.

Increased protein consumption raises plasma TMAO concentrations in healthy older males: a 10 week RCT

Sarah Mitchell

Background: Diet exerts a major influence on the composition and metabolic output of the distal gut microbiota. Compared to an adequate protein diet (APD), high protein diets (HPD) are enriched in choline and L-carnitine, precursors to the gut metabolite trimethylamine-N-oxide (TMAO), which has been positively associated with increased risk for cardiovascular disease. However, HPDs are increasingly recommended to maintain physical function in the elderly. Objectives: To identify changes in TMAO production and faecal microbial composition in health elderly males after a HPD compared to an APD. Methods: Twenty-nine healthy men (74.2 ± 3.6 years) were randomised to consume a controlled HPD (1.6g/kg/day) or APD (0.8g/kg/day) for 10 weeks. Faecal and fasting blood samples were collected at baseline and week 10. Quantification of plasma TMAO and creatinine was performed using liquid chromatography-stable isotope dilution-multiple reaction monitoring mass spectrometry. The faecal microbiota was characterised by 16S rDNA gene sequencing and preliminary results are available. Results: Plasma concentration of TMAO increased only in the HPD group (8.3 ± 4.8 μM to 29.1 ± 31.5 μM, p=0.008). Creatinine decreased in the APD group (86.5 ± 20.4 μM to 78.2 ± 16.6 μM, p=0.002). Gene sequencing has thus far shown no significant differences in faecal microbial alpha-diversity (Chao1) within or between groups. Discussion: HPD can substantially increase circulatory TMAO in healthy older men,

and this should be considered when making recommendations for protein intake for the elderly. Further analysis of faecal microbial composition may establish correlations between TMAO production and gut microbial taxa.

The TWIST algorithm predicts Time to Walk Independently after STroke

Marie-Claire Smith

Background: The likelihood of regaining independent walking after stroke is of concern to patients and their families and influences hospital discharge planning. Objectives: The objective of this study was to explore factors that could be combined in an algorithm for predicting whether and when a patient will walk independently after stroke. Methods: Adults with new lower limb weakness were recruited within three days of having a stroke. Clinical assessment, transcranial magnetic stimulation and magnetic resonance imaging were completed 1-2 weeks post-stroke. Classification and regression tree (CART) analysis was used to identify factors that predicted whether a patient achieved independent walking by 6 or 12 weeks, or remained dependent at 12 weeks. Results: We recruited 41 patients (24 women; median age 72 years, range 43-96 years). The CART analysis results were used to create the Time to Walk Independently after STroke (TWIST) algorithm, which made accurate predictions for 95% of patients. Patients with a trunk control test score > 40 at one week walked independently within six weeks. Patients with a trunk control test score < 40 only achieved independent walking by 12 weeks if they also had hip extension strength of Medical Research Council grade 3 or more. Neurophysiological and neuroimaging measures did not predict independent walking after stroke. Discussion: In this exploratory study, the TWIST algorithm accurately predicted whether and when an individual patient walked independently after stroke using simple bedside measures one week post-stroke. Further work is required to develop and validate this algorithm in a larger study.

Characterising the neurovascular unit and Alzheimer's disease in the middle temporal gyrus using tissue microarrays

Micah Daniel Austria

Background: Alzheimer's disease (AD) is the most common neurodegenerative disorder. Increasing evidence implicates the involvement of non-neuronal cells in the pathogenesis of AD, with current studies focusing on the different components of the neurovascular unit. Objectives: Characterise neurovascular disruption in the AD human brain by examining non-neuronal cells involved in the neurovascular unit in the temporal cortex using post-mortem human brain tissue. Methods: Immunohistochemistry was carried out on human brain tissue microarrays (TMAs) from the temporal cortex. Each TMA consisted of at least 21 control and 21 AD cases from the human brain bank. Antibodies to Alpha-smooth muscle actin (α-SMA) and platelet-derived growth factor receptor-beta (PDGFRβ) were used to investigate perivascular cells (smooth muscle cells and pericytes, respectively) of the neurovascular unit. The immunolabelled TMAs were imaged using the V-slide scanner automated imaging system. Densitometric analysis for staining intensity and load was carried out on the acquired images using Metamorph. Parametric methods were used to compare the mean intensity and load of each marker for the AD and control cohorts. Results: Preliminary findings showed that, in AD, there was a significant increase in α-SMA expression in pericytes surrounding arterioles, which is not attributable to a change in arteriole number. There was a significant reduction of PDGFRβ intensity and load in pericytes surrounding capillaries in AD. Discussion: These findings suggest that separate populations of perivascular cells are differentially compromised in the temporal cortex in AD, as evidenced by differences in the expression patterns for pericytes lining capillaries, and pericytes lining arterioles.

Outcome Reporting after Laparoscopic Cholecystectomy: A Systematic Review

Harry Alexander

Background: Consistent reporting of well-defined outcome measures is important to compare centres and surgeons, to appraise new surgical techniques, and for the public release of surgical outcomes data. Heterogeneity in outcome measurement and reporting may limit the ability to draw appropriate conclusions from the surgical literature. The current standards of outcome reporting for laparoscopic cholecystectomy have not been evaluated. Objectives: To evaluate the current standards of outcome reporting for laparoscopic cholecystectomy (LC). Methods: MEDLINE, EMBASE and the Cochrane Central Register of Controlled Trials were searched for prospective studies reporting clinical outcomes of LC, between 2013 and 2016. Data on the reporting of clinical outcomes were extracted. Results: In total 233 studies were included, reporting 967 complications, of which 204 (20.9%) were defined. One hundred and twenty-two studies (52.4%) did not provide definitions for any of the complications they reported. Conversion to open cholecystectomy was the most commonly reported complication, reported in 135 (57.9%) studies. Mortality was reported in 89 studies (38.2%) but explicitly defined in only four (1.7%). In 26 studies (11.2%), complications were graded using formal severity rating scales. There was a positive relationship between the proportion of measures defined (number defined/total reported) and study size ($p<0.001$) and journal impact factor ($p<0.001$). Discussion: We found considerable variation in definitions of and measures used to evaluate the outcomes of LC. Measures were more likely to be defined in larger studies and in studies published in journals with a high impact factor.

Fungi: Key to solving the antibiotic crisis?

Tze How Tan

Background: Antibiotic have been one of the most successful medical treatments in the history of medicine. Constant overuse of antibiotics such as use in agriculture has placed selective pressure on bacteria leading to the development of antibiotic resistance. Unlike other bacteria, Pseudomonas aeruginosa is naturally more resistant to many antibiotics. As New Zealand has been geographically isolated from the rest of the world, the native flora and fauna are unique. It is possible that some New Zealand fungi may produce novel antibiotics. Objectives: To screen New Zealand fungi for metabolites with antibacterial properties. This can then be extracted for use against Pseudomonas aeruginosa. Methods: Fungi obtained from Landcare Research are grown in potato dextrose agar plates. Reservoirs are made in the fungi using punch biopsies. Bioluminescent strains of bacteria are then placed in the holes. Light production of the bacteria is measured at time 0, 6, and 24 hours. Fungal biopsies are used for a zone of inhibition screen. Results: Light from Pseudomonas aeruginosa can be seen to have diminished after 24 hours by a few fungi. Several other fungi have also shown to be able to produce a zone of inhibition against Pseudomonas aeruginosa. Discussion: Initial results have shown that a few fungi may be producing antibacterial compounds which are capable of inhibiting Pseudomonas aeruginosa. These fungi will then be brought to chemistry for extraction of active compounds.

Differential regulation of cerebral and renal blood flow by the carotid body

Joshua Chang

Background: The carotid bodies (CBs) are a pair of chemoreceptor organs located at the bifurcation of the common carotid arteries. Activation of the CB (via hypoxaemia, hypercapnia, and/or hypoperfusion) causes a reflex increase in sympathetic nerve activity and total vascular resistance. However, it is unclear if CB activation causes vasoconstriction (and reduced blood flow) in organs such as the brain and kidney. Objectives: To determine the cerebral and renal haemodynamic response to CB stimulation. Methods: Experiments were conducted in conscious sheep. Blood pressure (BP),

blood flow, and calculated vascular conductance in the common carotid and renal arteries were recorded following CB stimulation with intracarotid potassium cyanide (KCN; 20 µg/kg) before and during parasympathetic blockade with intravenous atropine infusion (8 mg bolus followed by 0.8 mg/min for 30 minutes). Results: Preliminary results demonstrate increased carotid blood flow (27.7±6.8%, n=6), BP, and carotid vascular conductance (21.4±5.8%, n=6) following KCN. In contrast, renal blood flow was unaltered despite decreased renal vascular conductance (-14.2±2.7%, n=4). Following atropine, the carotid blood flow (37.5±4.3%, n=5) and carotid vascular conductance (34.8±3.0%, n=5) responses to KCN were augmented whilst renal blood flow and renal vascular conductance remained unchanged. Discussion: These results suggest that CB activation causes increased cerebral blood flow that is primarily driven by sympathetically-mediated vasodilation of the common carotid artery. In comparison, CB activation causes renal vasoconstriction with preserved renal perfusion due to the concomitant rise in BP. Overall, it appears that the CB has a protective role in maintaining perfusion to the brain.

Aortic chemoreceptor stimulation increases coronary blood flow in the conscious sheep

Dylan Pen

Background: Peripheral chemoreceptors (aortic and carotid bodies) are oxygen sensors that detect and respond to changes in arterial oxygen. Hypoxic reflex responses by carotid bodies have been well characterised but the exact role of aortic bodies is unclear. We hypothesized that selective aortic body stimulation will increase coronary blood flow (CoBF) and coronary vascular conductance in the conscious sheep. Objectives: To determine whether aortic body stimulation using potassium cyanide (KCN 20µg/kg) into the left ventricle increases CoBF in the conscious sheep. Methods: Adult sheep were instrumented with flow probes around the left circumflex artery and aorta, and diaphragmatic electromyography electrodes under general anaesthesia. Aortic bodies were stimulated and changes in CoBF, cardiac output, diaphragmatic electromyography signal, and blood pressure were measured in the resting conscious state. Aortic body stimulation was repeated during atropine (32mg/30min) to determine whether the response was parasympathetic-mediated. Results: Aortic body stimulation produced a dose-dependent increase in peak CoBF (158 ± 13%; n=5) associated with increased blood pressure and diaphragmatic electromyography signal. Coronary vascular conductance was also elevated (153 ± 7%; n=5) despite the increase in blood pressure. Both CoBF and conductance responses were attenuated by atropine (141 ± 10%; n=5 , 139 ± 9%; n=5 respectively). Discussion: Our novel results suggest that aortic bodies respond to hypoxia by increasing CoBF and conductance at least in part, via parasympathetic-mediated coronary vasodilation. The anatomical location of aortic bodies immediately upstream to the coronary vasculature suggests a specialised role in maintaining adequate oxygen supply to the heart.

Is treating the transient post-stroke hypertension after ischemic stroke beneficial?A Wistar rat model study

Pratik Thakkar

Background: Over 80% of patients show a transient post-stroke hypertension, however whether this pressure increase is necessary to enhance tissue perfusion remains uncertain. Here, we determine a strategy to control blood pressure (BP) in a rat model of ischemic stroke, using the clinically-indicated calcium channel blocker, nifedipine. Objectives: To characterize the cardiovascular response to stroke, and determine the impact of preventing post-stroke hypertension. Methods: Male Wistar rats (411±10g) were instrumented for the long-term recording of BP, intracranial pressure (ICP) and brain oxygen (pO2) via telemetry. After baseline was recorded, on Day 0 an ischemic stroke (or Sham: n=5) was induced in Untreated (n=6) and Treated groups (nifedipine 1.5mg/kg/hr sc, n=8) via a two hour middle cerebral artery occlusion. Behavioural testing was performed on Days 1, 3,7 and 10. Results: After stroke, BP increased rapidly in Untreated rats, reaching a peak of 37±4mmHg vs 14±5 mmHg in Treated above baseline at 12±6 hours ($p<0.05$). Cerebral perfusion was significantly elevated on Day 0 in Untreated, and Days 0 and 1 in Treated rats. The increase in p02 observed in penumbra for several days after stroke was not significantly different between the treated and untreated rats. Functional recovery after stroke not significantly different between groups, despite the infarct volume appeared larger in Treated animals (248±23mm3 vs Untreated 147±28mm3 ; $p<0.05$). Discussion: Treating post-stroke hypertension does not appear with major impact on functional recovery in young normotensive rats. Future studies will examine the impact of factors such as chronic high blood pressure or old age.

The effect of isoflurane on the Drosophila circadian clock

Dongni Li

Background: Studies on the circadian clock indicate that an organism's rhythmic day-time or night-time activities are driven by endogenous timekeepers. These timekeepers are critical for daily behaviors such as locomotor activity. Isoflurane is commonly used for general anaesthesia during operations. Objectives: In this study, Drosophila were employed to investigate the effect of isoflurane treatment on the circadian clock. Methods: Using Aschoff's Type I protocol, Drosophila locomotor activity was recorded using the Drosophila activity monitoring system (DAM system, TriKinetics). Period gene expression was monitored using the transgenic luciferase reporter line 8.0-luc. Results: We measured the phase response caused by different durations of isoflurane treatments at circadian time 4 (CT4) and once optimized obtained a phase response curve (PRC) over the circadian cycle. This revealed that isoflurane causes a phase advance during day-time treatment and a phase delay was associated with night-time treatment. Our preliminary data of the transcription of the clock gene period was also delayed or advanced depending on when isoflurane was administered, and these shifts occurred ~2h before locomotor activity phase shifts. When flies were treated with light and isoflurane alone or in combination, we found that isoflurane combined with light caused a larger phase shift than each factor independently. Discussion: These results propose that isoflurane-induced circadian clock phase shifts are duration- and time-dependent. The effect of isoflurane combined with light suggests that light and isoflurane target either different factors of the circadian oscillator, or that they function synergistically on the same factor.

Analysis of metabolomic responses to high protein meals in women at increased metabolic disease risk

Brenan Durainayagam

Background: Metabolic syndrome (MetS) is a cluster of risk factors for diabetes and cardiovascular disease. Metabolomics has been applied to gain insights into complex metabolic changes associated with MetS. These analyses are commonly undertaken on bloods from the fasted state, thus failing to capture the dynamic metabolic responses to food. Current evidence suggests a low glycaemic index (GI) and higher protein diet may improve metabolic control in MetS. Objectives: This study aimed to comprehensively analyse the metabolic trajectories differentiating the dynamic responses of MetS from healthy women to high protein meals that included either low or high glycaemic index (GI) carbohydrates. Methods: Post-menopausal women (20 MetS, 20 healthy) consumed test meals on two separate mornings; the meals were high protein (30g whey), containing either high or low GI carbohydrates. Fasted and postprandial (to 5 hours) blood samples were collected and analysed using non-targeted metabolomics by liquid chromatography mass spectrometry (LC-MS). Results: As expected, fasting metabolic profiles of MetS women differed from that of healthy women; furthermore, postprandial trajectories of many metabolites differed. A subset of metabolites including uric acid and tryptophan increased more post-ingestion in healthy women compared MetS, independent of GI. Further, the GI of meals impacted postprandial dynamics of other metabolites. Carnitine, uridine, and threonine were more elevated with a lower GI meal, with the MetS and healthy women

responding similarly. Discussion: These analyses can therefore distinguish metabolic pathways that are altered or preserved in MetS, further elucidating the complexities of the metabolic dysfunction evident in women with compromised metabolic health.

Establishing a model for secretome analysis of intervertebral disc cell sub-populations

Reece Joseph

Background: Intervertebral disc (IVD) degeneration accounts for approximately 40% of chronic lower back pain. The central portion of the disc, the nucleus pulposus, consists of two cell types: notochordal (NC) and mature nucleus pulposus (MNP) cells. Lower mammals retain NC cells throughout life and are resistant to disc degeneration, whereas gradual loss of NC cells in both humans and cows correlates with the onset of disc degeneration. However, the role of NC cells in maintaining a healthy disc is poorly understood. Objectives: To establish a model to assess the secretome of NC cells. Methods: IVDs were removed from bovine tails (2 discs per tail; n = 20 tails). NC cell clusters and MNP cells were isolated from each disc using mechanical and enzymatic digestion and seeded in alginate beads. Beads were cultured in serum-free medium in either normoxia or hypoxia for 96h. Cell viability was assessed every 24h using a live/dead kit. Media was also collected and assessed for total protein. Controls comprised cell-free alginate beads in media. Results: We found that both NC and MNP cell-rich fractions maintained >85% viability over 96h. Sufficient protein (>µ2g/ml) was detected for proteomic analysis, and NC cells clusters secreted greater amounts of total protein compared to MNPs cells. Discussion: We have established that both cell types survive in serum-free media for 96 h and we are now well placed to move to the next stage by preparing media samples for mass spectrometry to determine the anabolic properties of the NC cell secretome.

Changes in dairy intake do not alter circulating BCAA in healthy adults

Utpal Prodhan

Background: Dairy food is a rich source of branched chain amino acids (BCAA). Evidence suggests that about 80% of the dietary BCAA ingested reach the circulation and are reflected as increased plasma BCAA concentrations. Elevated BCAA are also found in insulin resistant states and are novel biomarkers for type 2 diabetes mellitus. However, whether increased BCAA concentrations are a consequence of disturbed metabolic homeostasis or are reflective of dietary intake is unknown. Objectives: To understand the impact of changes in dairy intake on plasma free amino acids (AA) and insulin sensitivity. Methods: Healthy individuals (n=102) were randomised to reduce, maintain habitual or increase dairy food intake for one month; dairy intake was measured by self-reported food frequency questionnaires. Overnight fasted plasma free AA and insulin sensitivity as the homeostatic model assessment-insulin resistance (HOMA-IR) were measured at baseline and intervention completion. Results: Dairy intake was increased by 120% (+2.26±0.80 serves/day, $p<0.001$) and decreased to 57% (-1.55±0.39 serves/day, $p<0.001$) for the increased and reduced intake groups respectively, whereas it remained unchanged in the maintained group. In response to modified dairy intake, there was no significant change in total free AA, BCAA, essential AA, and HOMA-IR ($p>0.05$ for all). Discussion: These findings suggest that altered dairy intake has no impact on fasting free AA, including BCAA, or insulin sensitivity in healthy individuals. Dietary recommendations may need to focus on total food patterns instead of independent food groups to meaningfully influence plasma amino acid levels in free-living individuals.

SCIENCE

Simulating Bronchoconstriction of an Airway during Asthma

Anand Rampadarath

Abstract Asthma is fundamentally a disease of airway constriction. Due to a variety of experimental challenges, the dynamics of airways are poorly understood. Of specific interest is the narrowing of the airway due to forces produced by the airway smooth muscle wrapped around each airway. The interaction between the muscle and the airway wall is crucial for the airway constriction which occurs during an asthma attack. While crossbridge theory is a well-studied representation of complex smooth muscle dynamics, and these dynamics can be coupled to the airway wall, this comes at significant computational cost -- even for isolated airways. Because many phenomena of interest in pulmonary physiology cannot be adequately understood by studying isolated airways, this presents a significant limitation. We present results associated with an alternative method which provides a viable option for an orders of magnitude reduction in computational cost, whilst retaining qualitative and quantitative behaviour.

The Beauty of Coupling Characterization Techniques

Andrew Chan

Resonant Soft X-ray Scattering (RSoXS) is a new characterisation technique that combines small angle X-ray scattering (SAXS) and X-ray absorption spectroscopy (XAS). RSoXS provides both structural and chemical compositional information about a sample, and therefore affords a wealth of information compared to most other characterization techniques. Here, we successfully applied RSoXS to study a structurally coloured TiO 2 inverse opal thin film consisting of an ordered array of macropores of diameter ~200 nm in a TiO 2 matrix. RSoXS analysis revealed distinct structural features over several length scales (micrometer to nanometers) that corresponded to features seen by scanning electron microscopy (SEM) for the same sample. RSoXS also provided a chemical fingerprint of the TiO 2 inverse opal, confirming the presence of the anatase TiO 2 polymorph. Results confirm that RSoXS is a very powerful new technique for the non-destructive characterisation of complex 3D architectures, including structurally coloured materials.

The Lighthouse of the South Pacific: Drivers of Variation in Eruptive and Magmatic Processes of Yasur Volcano, Vanuatu.

Benjamin Simons

Yasur is a globally rare, persistently active volcano that has existed for at least 800 years. It produces sustained, small Strombolian eruptions (ejection of ash, lapilli and lava to heights of tens to hundreds of metres) from several summit vents. The processes that sustain such consistent activity over such long timescales are currently poorly understood. While small on a global scale, the regularity of such eruptive activity often leads to a false sense of safety for the tourists and guides that visit the summit daily. Sudden changes, even minor ones, may send explosive ballistics farther than their normal range. It is these, often small-scale variations from the regular eruption behaviour that are deadly. Characterising and understanding the processes that precede these periods, so that they can be better predicted, is the focus of this research. The most effective approach to understanding the dynamics of explosive volcanoes, and the nature of their feeder systems is through synergy of multiple datasets, with each dataset providing different pieces of information about the physical processes that drive the activity. In bringing together these diverse sets of data, it is possible to build a unified model of the factors that control explosive vigour and consequent hazard.

Observations were carried out during September to November 2016. A multi-component dataset has been produced using a variety of

instrumentation and analytical methods including; seismometers, infrared thermal cameras, UV gas spectrometers, visual/statistical observations, meteorological observations, as well as ash and plume-rain- fallout sampling.

Preliminary results presented include selected datasets that describe the relationships between both short and long term activity, in order to gain a greater understanding of the drivers and controls of eruptive behaviour.

Fuzzy face feathers: A guide to sniffin' out the babes

Cassandra Mark

Male magpie moths (Nyctemera annulata), like many male humans, spend most of their adult life looking for someone to mate with. Unfortunately, magpie moths have not gotten the hang of dating apps yet, so must locate potential mates through other means. In the insect world, this is commonly done through the use of chemical signals in the form of sex pheromones. The detection of pheromones is facilitated by micro-sensory structures, called sensilla, located on the antennae. Antennae shape, along with sensilla type and function, can vary greatly between sexes and across different species, providing important information about their ability to detect and process external stimuli. Male N. annulata have plumose bipectinate antennae (a.k.a. fuzzy face feathers), a feature often found in moth species that utilise sex pheromones in mate location. We investigated whether male N. annulata can indeed use their fuzzy face feathers to 'sniff out the babes'. We carried out behavioural experiments using Y-maze olfactometer choice assays to test if males could locate females using only pheromones (i.e with visual cues excluded). We then used scanning electron microscopy to examine whether males are equipped with the necessary micro-sensory structures to enable detection of these chemical signals. Males were highly responsive and attracted to the females during the olfactometer trials, indicating that they do use chemical signals to locate mates. Furthermore, scanning electron microscopy revealed that males have a suite of different olfactory (smell) sensilla specific for the detection of sex pheromones and plant odours. The behavioural results coupled with the morphological data indicate that males can use their fuzzy face feathers to sniff out the babes.

Synthesis of Biodegradable Antimicrobial Polymers with High Selectivity

Chloe Cho

Natural antimicrobial peptide mimicking cationic polymers were designed and synthesised in order to overcome the number of limitations of a host defence peptides such as chemically instability, high cytotoxicity and high manufacturing cost on a large scale. Our approach is to produce antimicrobial polymers with high broad-spectrum antimicrobial activity with low toxicity. A biodegradable aliphatic polycarbonate was synthesised via ring-opening polymerisation of six- membered cyclic carbonate monomer with terminal alkyne side chain. The positively charged guanidine group was attached to the polymer backbone via the Cu (I)-catalysed alkyne-azide cycloaddition click reaction. Guanidine polycarbonates with three different molecular weights were synthesised to investigate the molecular weight effect of these polymers on antimicrobial activity and toxicity.

As a result, antimicrobial inhibition assays of different molecular weight guanidine polycarbonates killed a broad spectrum of microbes (E.coli, P.aeruginosa, S.aureus, and C.albicans) with low toxicity. The lowest molecular weight polymer showed stronger activity against E.coli with the minimum inhibitory concentration (MIC) of 40 µg/mL than previously reported guanidine functionalised polymethacrylates (MIC > 1500 µg/mL). This was an interesting finding because traditionally, inhibition of Gram-negative bacteria is more difficult than that of Gram-positive bacteria due to the more complex cell wall membrane structure. The lytic activity of the polymers was examined against mammalian red blood cells and all polymers showed low toxicity (hemolysis % < 20%) at high concentration (HC50 >;1280 µg/mL). Membrane disruption of bacterial cell membranes was identified through field emission scanning electron microscopy (FE-SEM) and further study on the antimicrobial action of these cationic polymers will be reported in due time.

A Framework for Long-Term Learning Systems

Diana Benavides-Prado

Increasing amounts of data have made the use of machine learning techniques much more widespread. A lot of research in machine learning has been dedicated to the design and application of effective and efficient algorithms to explain or predict facts. The development of intelligent machines that can learn over extended periods of time, and that improve their abilities as they execute more tasks, is still a pending contribution from computer science to the world. This weakness has been recognised for some decades, and an interest to solve it seems to be increasing, as demonstrated by recent leading work and broader discussions at main events in the field. Our research is intended to help fill that gap. As part of our research, we have proposed a method that operates on the basis of transferring information from previous hypotheses or models to a new learning task. Our method answers the common questions of what, when and how to transfer, in new ways. For what to transfer, we propose to transfer coefficients from hypotheses learned with Support Vector Machines. These coefficients are potentially useful for our new task, as explained later. We propose to base the decision of when to transfer on a twostep evaluation of the similarity between previous hypotheses and their elements, and target data: first, similarity of their distributions as a whole, using a metric like KL-divergence and, second, similarity of source support vectors with target data points. Regarding how to transfer, we propose to treat previously learned coefficients as additional information that is available for a new task at training time. It serves as upper-bounds on coefficients to be learned on the new task, to reinforce target data points similar to previously learned ones. Our method leads to faster learning on a new task, whilst maintaining similar accuracy levels.

New Zealand mānuka honey: how do we know they are genuine?

Jessie Bong Nee Jan

Background: New Zealand mānuka (Leptospermum scoparium) honey is a valuable product traded internationally at a premium due to its unique non-peroxide antibacterial activity (UMF®). Common with exclusivity, mānuka honey is becoming increasingly prone to fraud risks. Consumer expectation for true-to- label-honey and concerns over the authenticity for this premium product has identified the need for a reliable authentication method. Objectives: This study investigates the feasibility of a chemical fingerprinting approach based on selection of unique chemical markers as an alternative method to define NZ mānuka honey. Methods: The chemical components commonly reported in NZ honeys were examined. The compounds' concentrations were quantified by high-performance liquid chromatography. Principal component analysis (PCA) was used to identify a combination of chemical markers With greatest discriminatory power. These compounds were analysed for presence in nectars, chemical stability over prolonged storage in honey, and unique characteristics such as fluorescence. Results: PCA analysis demonstrated grouping of honey types by their chemical composition. Nectar analysis of potentially discriminatory compounds confirmed that certain compounds Are unique to nectar produced by a particular species whereas others are shared between species. Four mānuka-specific compounds were identified: leptosperin, lepteridine, 2- methoxybenzoic acid, and 2'-methoxyacetophenone. Leptosperin and lepteridine were chemically stable in honey with no significant change in concentration over prolonged storage at 37 °C. 2-methoxybenzoic acid and 2'-methoxyacetophenone concentrations in honey altered significantly following storage. The use of leptosperin and lepteridine as chemical markers was reinforced by their unique fluorescence characteristics which are readily detectable in honeys, and may be commercially viable as a rapid screening technique.

Conclusion: Leptosperin and lepteridine provide an alternative method of mānuka honey authentication. These compounds deserve further consideration as chemical markers for mānuka honey in the ongoing efforts of the NZ Ministry for Primary Industries to establish a robust and reliable method for classifying mānuka honey.

How does an innocent example become a sticky prototype?

John Griffith Moala

Abstract: Prototypes--examples of a particular concept that are said to be typical or popular--play a significant part in learning mathematical concepts (Hershkowitz, 1989). But prototypes can also become obstacles to concept formation. Studies show that: objects that are "closer"(e.g., in terms of visual properties) to the prototype(s) are more likely to be classified, by students, as examples of the concept, than objects further away from the prototype (e.g.Presmeg, 1992). Many researchers argue that the formation of prototypes is inevitable––students will, or perhaps must, develop prototypes in the process of learning a new concept (e.g. Hershkowitz, 1989; Tall & Bakar, 1992). So how do we deal with the fact that prototypes are essential to learning, but (inevitably) problematic? Tall and Bakar (1992) suggest that educators must help students to develop appropriate prototypes. However, little is known about how prototypes come to be appropriate or appropriate. As such, we look further back, aiming to explore how prototypes are created in the first place, as a necessary first step towards understanding what makes prototypes appropriate or inappropriate. The overarching question is: how does an example become a prototype? Whereas past research has typically studied prototypes of precisely defined mathematical concepts, such as functions (Tall and Bakar, 1992) and geometrical figures (Hershkowitz, 1989), we explore prototypes of a concept of 'algorithms' that emerge when a group of three students work on a messy, open-ended graph theory task. Our analysis of the group's work has so far revealed two potentially influential factors in the process of how an example becomes a prototype: (i) popularization via opposing a non-example; and (ii) preservation of non-significant features via a patching (fix-only- what-needs-to-be-fixed) procedure.

Are These Populations Connected? An Asymmetric Measure of Genetic Differentiation

Louise McMillan

In the field of population genetics there are many measures of genetic diversity and population differentiation, which are often used to assess the structure of animal populations, and determine which populations are isolated and which are connected by dispersal. The most commonly used measure is Fst, initially proposed by Wright and then extended by Cockerham and Weir, and which is very widely used as a measure of separation between populations. More recently a multitude of other measures have been developed, from Gst to Jost's D, all with different features and disadvantages. One thing these measures all have in common is that they are symmetric, which is to say that the Fst between population A and population B is the same as that between population B and population A. Following my work on GenePlot, a visualization tool for genetic assignment, I am now proposing a new, asymmetric measure, where the fit of A into B may not be the same as the fit of B into A. This measure will enable the detection of scenarios such as "subsetting", the relationship between a large, diverse population A and a smaller population B that has experienced genetic drift since being separated from A. This measure, along with the GenePlot and overlap area graphs, provides more complex information about population structure than existing measures of diversity.

Sniffing out the meth using capillary microextraction

Mansa Vijayanunni Nair

Methamphetamine is a drug that is synthesised quite commonly in New Zealand, due to its popularity, easy manufacturing and abundance of raw material. This has resulted in the contamination of a number of homes, motels and other buildings around the country. While the extent of damage caused by living in a former meth lab remains unclear, the need for a lasting solution is evident. Currently, houses are tested using wipe-sampling, where surfaces are wiped down and tested to determine if the methamphetamine concentration is below the maximum permissible limit of 1.5µg/100 cm2. This method has some limitations, mainly due to the variability between different types of surfaces, and areas of restricted access. This research project looked at developing a method to sample and detect airborne methamphetamine at these former clandestine laboratory sites.

The new sampling technique called capillary microextraction could be used to sample air inside a suspected lab, and test it for methamphetamine. These devices consist of polymer coated filters housed in a glass tube, which can be coupled to an air sampling pump. The samples can then be analysed using traditional gas chromatography-mass spectrometry. The devices were very sensitive- capable of detecting nanogram quantities of methamphetamine in a cubic metre of air. They could retain the methamphetamine for up to five days post-sampling, and could be pre-loaded with an internal standard for quality control. Overall, capillary microextraction devices easy to use, sensitive, and at less than $4 each, these devices could well be used alongside traditional sampling methods to sample methamphetamine at former clandestine laboratories.

Intrinsically Adhesive and Conducting Graft Copolymers

Min Wang

Conjugated Conducting polymers (CP)s have attracted great attention due to their advantages such as various structural design, solution-processability, good film-forming property and flexibility. However, the poorer intrinsic mechanical property is still one of the factors that limit their large scale applications. Here we developed a series of intrinsically adhesive and conducting graft copolymers with activators regenerated by electron transfer atom transfer radical polymerization (ARGET ATRP). The strategy of our work is to graft low glass transition n-butyl acrylate side chains from Poly(thiophene phenylene) macroinitiator which serves as the conducting backbone. Polymer structure and conformation was characterized with 1H nuclear magnetic resonances (1H NMR), gel permeation chromatography (GPC) and Fourier transform-infrared (FT-IR) spectroscopy. Spectroscopic and electrochemical properties were investigated through UV- Vis spectroscopy, photoluminescence, cyclic voltammetry and spectroelectrochemistry. Atomic force microscopy (AFM) was utilized to study their topological morphology in solid films. Graft copolymers with various side chain lengths showed different electrochemical properties and different aggregation levels. The optimal graft copolymer PThP-g-PnBA17 retained excellent electroactivity and electronic conductivity as well as inherent elastomeric and adhesive property. To graft low glass transition acrylate side chains from conducting polymer chain has been demonstrated a good way to produce intrinsically adhesive and conducting polymers for applications in the fields of flexible electronics.

What are the advantages of mating once, many times or not at all? Facultative parthenogenesis in the common New Zealand stick insect

Morgane Merien

Parthenogenetic reproduction occurs when offspring develop from unfertilised eggs and is widespread, especially among insects. Parthenogenesis can be facultative, whereby females can produce offspring via sexual reproduction or parthenogenesis. Sexual and asexual reproduction can incur both relative costs and benefits. Moreover, sexually reproducing females can be monogamous or polyandrous. Polyandry can have direct benefits for females and indirect benefits for the offspring. However, costs can be associated with multiple mates, such as increased predation and disease exposure. Therefore, among facultative parthenogens, females exhibit a spectrum of reproductive strategies

by mating many times, once or not at all. We present an experimental approach to investigate the adaptive significance of both facultative parthenogenesis and polyandry in the New Zealand stick insect Clitarchus hookeri. The aims of this study are to examine the costs and benefits of asexual versus sexual reproduction, and monogamy versus polyandry in females. To examine these reproductive modes, virgin females were separated into three mating treatments: parthenogenetic, monogamous and polyandrous, and the survival and lifetime reproductive output of each group was compared. This will provide insight into the advantages and disadvantages of these different reproductive modes for females, for the first time using a single study organism. We are still in the process of analysing the data. However, preliminary results have demonstrated a pattern of higher mortality among females which undertook the one of the two sexual mating treatments.

Phototherapy: Using light to treat cancer

Nina Novikova

The idea to harness the interaction of light with molecules has been around for centuries, from the first use of plant extracts and sunlight to treat skin lesions in ancient Egypt to the first modern application of phototherapy in 1903. In more recent time the main drive behind research in the area of phototherapy has been in treatment of cancers through photodynamic therapy (PDT). PDT is a type of phototherapy where cell death is selectively induced by generation of reactive oxygen species (ROS) with light and a photosensitiser. Reactive oxygen species are highly reactive, oxygen containing compounds that are damaging to many vital molecular processes, and in high concentrations, very often overwhelm antioxidantive defences and prove fatal for tissue cells and microorganisms. Controlled generation and delivery of ROS to specific targets is the main principle in PDT and allows the reactivity and destructive effects of those compounds to be harnessed for beneficial applications. This is achieved using photosensitizers that are generally harmless compounds but can be activated to generate ROS by irradiation with a specific wavelength of light. This process has been implemented in a diverse range of areas such as photodynamic therapy, in treatment of cancers and skin conditions, or as antiseptics and even as potential antimicrobial agents as well as in polymer chemistry, organic chemistry and food science. The focus of my research is to look at a promising new library of compounds that are part of a very famous family, called porphyrins, with the aim to understand their photophysical properties and determine their applicability as photosensitisers in PDT. To achieve this, ultrafast laser spectroscopy tools are used to monitor molecular processes in real time.

Kuiper Belt Objects: Are they a threat to Earth

Nur Atiqah Dinon

The Kuiper Belt (KB) is a region that lies outside Neptune's orbit. This region is made of possibly millions of small icy bodies known as Kuiper Belt Objects (KBOs) that orbit the Sun. The first KBO was discovered in 1992 and over 1800 are now known. Some KBOs are comparable to Pluto in size, the rest are smaller than Pluto. Given that the KB is located so far away and extremely difficult to observe, the dynamics of the KB is still poorly understood. Several studies have been done to explain the formation of the KB and its structure. There has been little work on the long-term evolution of the KB. Of particular interest in the long-term evolution is the percentage of KBOs transported into the inner Solar System which is the region inside Jupiter's orbit. KBOs in the inner Solar System have the potential to hit Earth. This poster will present the results of numerical simulations of the KB. The aim of the simulations was to investigate how many KBOs enter the inner Solar System.

Optimisation of the eco-friendly extraction of bioactive monomeric phenolics and useful flavour precursors from grape waste

Rebecca Jelley

Grape marc is an underutilised bio-waste comprising predominantly grape skin and seeds. It is produced as a waste product of winemaking on the million-tonne scale annually. The most important high-value current use of grape marc is in the production of oenological tannins - widely-used additives in the food and beverage industry. More commonly, grape marc is simply either disposed of, or used as feed or fertiliser. With recent evidence showing that extracts enriched in grape tannins contain significant amounts of the thiol precursors 3-S-cysteinylhexan-1-ol and 3-S-glutathionylhexan-1-ol, and the possibility that these could influence food and beverage aroma, it was decided to investigate grape marc extraction procedures, in order to try to define extraction protocols that could maximise the recovery of these compounds.

Two thiol precursors and eight monomeric phenolics were identified and simultaneously extracted from Sauvignon Blanc grape marc using solid-liquid extractions. The optimal solvent ratio of acetone:water:ethanol was explored across 66 different solvent combinations. Effective extraction of thiol precursors required a high water content, which is an advantage from an economic and environmental perspective, while for the most abundant phenolic, quercetin 3-O-glucoside, optimal extraction levels were achieved using a 40:50:10 solvent mixture. In addition, this is the first identification of thiol precursors in grape marc, which adds a significant potential commercial value to this underutilised waste product.

How can we find out: How animals navigate such long distances?

Rebecca Turner

Animals, such as homing pigeons, turtles and migrating birds, are capable of navigating very long distances towards targets, even in the absence of familiar landmarks. Two alternative navigation mechanisms are the Correct Bicoordinate and the Approximate Bicoordinate mechanism. In these hypotheses animals use two coordinates to position themselves relative to their target. Then they set their bearing with a compass. Possible coordinate fields are based on two predictably varying environmental fields such as atmospheric chemical gradients and the earth's geomagnetic field.

Using stochastic navigation models I am developing methods to distinguish between the navigation mechanisms by analysis of animal tracks, using homing pigeons as a case study. The poster presents a classification method that can objectively assign a navigation mechanism to a track, or group of tracks, that takes into account multiple sources of variation. The method can be adapted to include sources of variation relevant to the study animal such as compass accuracy, wind, or currents. The method can also be used for comparing other

navigation mechanisms such as great circle or loxodromic routes.

Encrypted Content Delivery Network

Shujie Cui

Background: A Content Delivery Network (CDN) is a distributed system composed of a large number of edge servers (i.e. CDN nodes) that are spread over the globe. The edge servers cache the most recently accessed objects, such as web pages, movies, files and etc., and allow users to request them again from the nearest one, rather than the remote original servers. CDN not only reduces the end-to- end latency on the user side but also offloads Content Providers (CPs). Due to its benefits, CDN is widely used by Google, YouTube, Facebook and many other CPs. However, by caching objects and processing users' requests, CDN providers could learn the content of cached objects and requests, and infer user preferences and object popularities. Such information leakage may result in compromising users' privacy and reveal business specific information to untrusted or potentially malicious CDN providers.

Objective: We aim to present a privacy-preserving encrypted CDN system that could hide not only the content of objects and users' requests, but also protect users' preferences and the popularity of objects from untrusted CDN providers.

Method: Our basic idea is to combine searchable encryption (SE) with multi-CDN systems. Specifically, the CPs and users encrypt the objects and requests with SE before sending them to the CDN. Furthermore, the objects will be updated and migrated among the nodes owned by different CDN providers after each access.

Result and discussion: As a result, the content of objects and user requests are unrevealed due to the encryption. Second, the migration in multi-CDN ensures each provider could only see a one-time access over each object, such the user preferences and object popularities are also protected from CDN providers. We have implemented a prototype of the system and show its practical efficiency.

Ultrafast pulsed Bessel beams for enhanced laser ablation of bone tissue for applications in orthopedic surgery

Simon A. Ashforth

Using a femtosecond pulsed laser system (pulse width 100 fs, repetition rate 500 Hz,Λ 800 nm), a zero-order Bessel beam was generated using a LCOS-Spatial light modulator (LCOS-SLM) with an effective cone angle of 4.56o. Ablation threshold studies of fresh bovine and ovine load bearing cortical bone was identified using the method of least damage and found to be identical at Φth 0.15 ± 0.03 J cm-2 , irrespective of the target species. The ablation threshold is significantly reduced compared to the ablation threshold determined for Gaussian beams in bovine and ovine cortical bone (load bearing: Φth 0.91 ± 0.03 J cm-2 , skull: Φth = 1.19 ± 0.06 J cm-2). Incubation effects were investigated and the incubation coefficient was determined to be ζ 0.93 ± 0.06, indicating no incubation effects are present.The relationship between tissue removal and the number of pulses applied was explored. By altering the translation rate of the sample under the Bessel region of the incident laser, the number of pulses applied at each point along the linear ablation features was varied. Cross sections of ablation features were measured using scanning electron microscopy (SEM) and maximum depths of the ablation features measured. The ablation rate of bovine and ovine cortical was found to be 2.69 – 13.21 ± 0.05 µm pulse-1 and 2.49 – 12.79 ± 0.03 µm pulse-1 espectively for fluence values ranging from 25.0 – 2.5 Jcm-2 , significantly higher than thoseof Gaussian beams. Structural analysis of the ablation features using SEM and optical microscopy show no signs of heat affected zone in the form of thermal cracking, molten debris deposition or charring of the tissue.

Just one more bite: how the hormone amylin alters appetite and susceptibility to type 2 diabetes

Tina Nie

Background: Type 2 diabetes (T2D), a disorder of high blood glucose (hyperglycaemia), is recognised as being a major health issue. Normally, hormones such as amylin, insulin and leptin work together to maintain blood glucose levels and body weight. However, T2D patients are resistant. Insulin resistance is a hallmark of early T2D. But the molecular cause is unknown. Amylin overexpression is hypothesized to contribute, as aggregations are found in diabetic pancreases. As mouse amylin doesn't aggregate, human amylin transgenic mice have been developed. However, amylin oligomers cause β-cell death, thus you can't examine early T2D when insulin is high. Our group has developed a model which overexpresses human amylin with three proline substitutions. This is non-aggregating, allowing us to study the effect of amylin overexpression without the effects of β-cell death. Objectives: To characterise this model by measuring serum concentrations of amylin, insulin and leptin; and examine changes in gene and protein expression of components in these hormone pathways in the brain at different disease stages. We hope to elucidate how amylin overexpression alters these pathways leading to T2D. Methods: We took serum and brain samples from transgenic mice at prediabetic and diabetic time points, with nontransgenic mice as controls. Hormone concentration was analysed with the MILLIPLEX MAP Magnetic Bead Panel and gene expression was examined with the NanoString nCounter ® system. Protein expression will be examined by Western Blot. Results and Discussion: Mice develop high levels of each hormone, but also obesity and hyperglycaemia, indicating resistance. Several genes are differentially expressed which could explain hormone resistance, however the location of these changes is sometimes unexpected. Protein expression work is needed to confirm the biological significance of these findings.

 # A real-time public transport model for improved arrival time predictions

Tom Elliott

Over recent years, there have been great advances in availability of real-time information. Bus tracking applications are widely available, allowing passengers to see on a map where their bus is. Determining how long until that bus will arrive (its ETA), however, requires more information. Auckland Transport currently uses real-time arrival/departure delays, which not only assume an accurate schedule, but also that the bus wont catch up or fall behind in the meantime: intermediate stops, traffic lights, and traffic congestion all contribute to prediction inaccuracy. We describe an approach to modelling buses in real-time in order to estimate traffic conditions along roads within the transport network. Vehicle state - how far along the route the bus has travelled, its speed, and travel time along individual roads - is estimated using a particle filter model, or "a fleet of imaginary buses". This, in turn, is used to update our knowledge of traffic conditions along roads in the network (i.e., how long it takes a bus to travel along the road) using a Kalman filter model. We can then predict arrival time using the most up-to- date information available, and provide this to passengers in a useful way: for example, using prediction intervals (ETA: 10-13 minutes), which convey not only expected waiting time, but also the inevitable uncertainty around it.

Variety Showcase Abstracts

ARTS

Healing Herbs: Plants and People in the Herbarium
Jessica Thomas

This thesis analyses agency in medieval healing. The Herbarium of Pseudo-Apuleius exists in a number of copies, the most intriguing of which is the Cotton Vitellius C. iii, held in the British library. As a Latin translation a compilation of a variety of Greek remedies, the text gathers together the philosophies of Greek and Christian Europe from the 4th century to the 12th century, and as such offers a complex but enlightening window into the range of attitudes to healing in the Middle Ages. Overall, my thesis argues that healing was an exchange of agency- a transaction in which the patient, healer and plant each received something which they could not achieve on their own. Healing, therefore, is shown to be a reciprocal relationship between humankind and nature, and embodies the complex interrelation of people and plants. There are three different types of agency in the Herbarium, each of which give insight into medieval society as a whole. Patients, healers and plants all had a distinct type of authority over illness, though each type of agency was expressed in different ways.

EDUCATION AND SOCIAL WORK

What Does "Success" Mean in Korea and New Zealand?
Joohyun Park

A 'successful life' is a common expression that often refers to material affluence, social recognition, or academic achievement. However, like all definitions of success, this emphasis is a product of cultural and personal priorities. In the last 20 years, there has been considerable migration of Korean families and students to New Zealand. It would seem popular perceptions of success in New Zealand are somewhat different to Korean emphases. It seems logical, under assumptions of environmental acculturation processes, that Koreans living in New Zealand may have less stereotypical Korean approaches to success. However, no specific comparative research has been undertaken about conceptions of success across these two cultures. This study presents the findings of a qualitative semi-structured interview study concerning cultural and personal conceptions of success between Korea and New Zealand. Thematic analyses found that Koreans' cultural views of success were primarily comprised of extrinsic attainments; whereas, Kiwis' cultural views of success consisted of a mixture of intrinsic and extrinsic factors. Under the different influence of cultural ideas of success, the scope of Koreans' personal conceptions of success was narrower compared to Kiwis' broad and balanced personal views of success.

CREATIVE ARTS AND INDUSTRIES

The Absentia: a choreographic exploration of absence through presence
Xiaofeng Hu

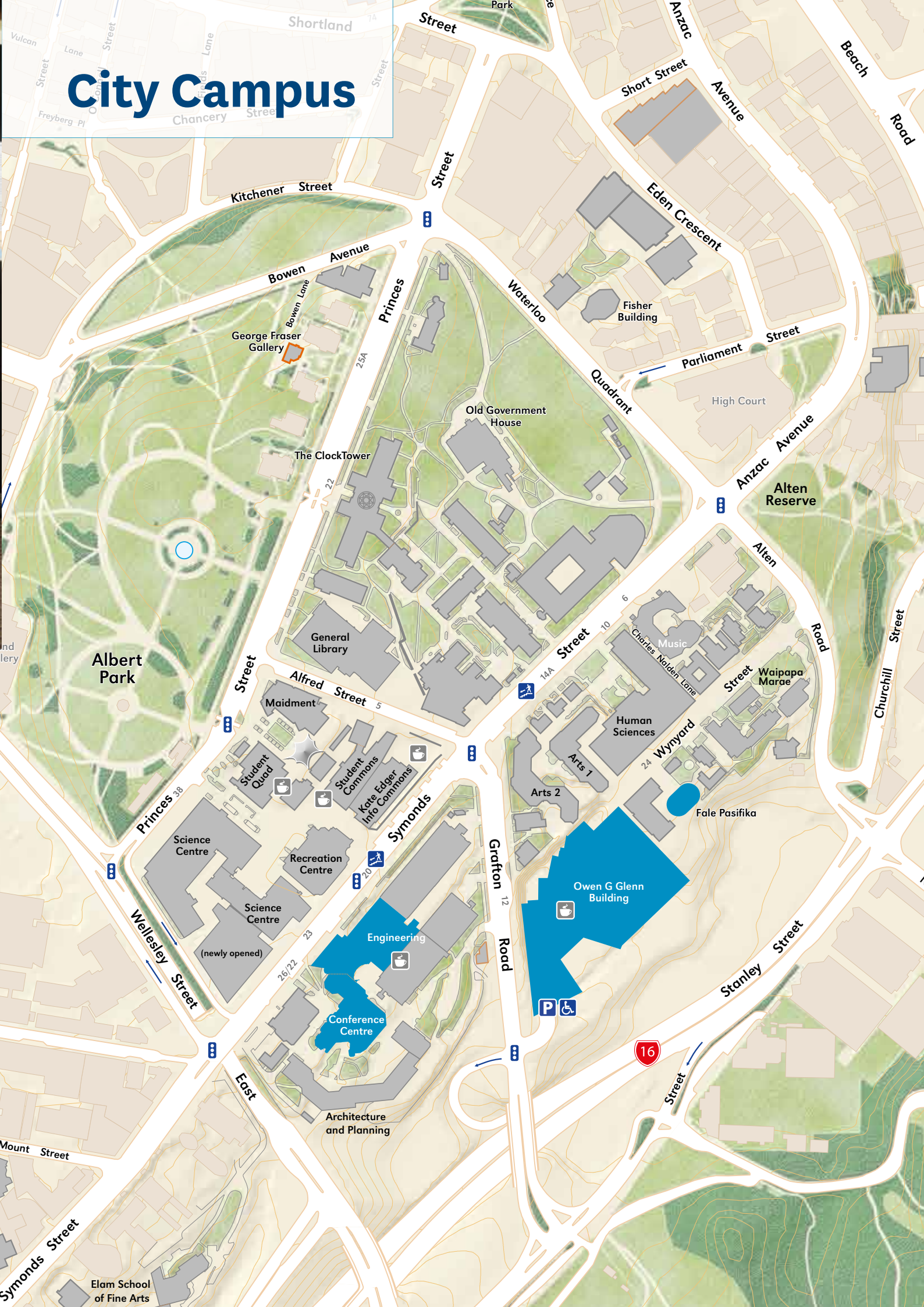
'The Absentia' is a Master of Dance Studies project conducted by the student researcher under the supervision of the principal investigator/ supervisor. This research concentrates on a choreographic exploration of absence through presence.'The Absentia' is a creative and choreographic project, which includes a choreographic/dance-making process to explore the meaning of absence through specific participants engaged in this project. The dance-making process is creative by the nature that

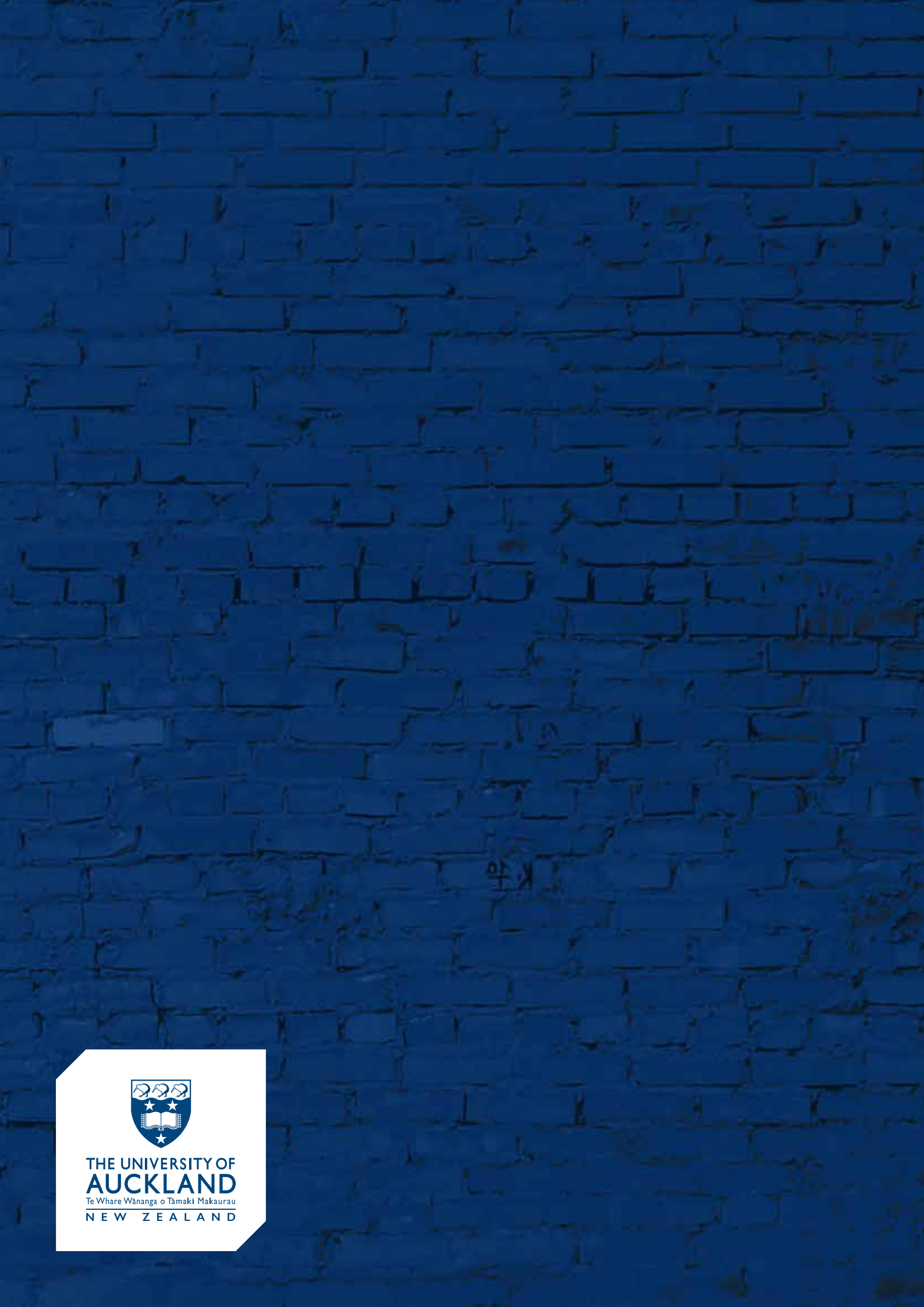
dance-making is a creative act. It aims to uncover new understandings, meanings, perceptions of absence and then utilized those uncovered into choreography through dancers. The research participant will be dancers who have a tertiary educational qualification of dance and are considering themselves as a creative and collaborative partitioner. They can be either students at the University of Auckland or freelance dance artists. The research process will culminate in one public performance of the dance work created and a written master thesis, both for the purpose of examination. The research seeks to change and bring some new understandings, perceptions, meanings to the concept of absence, and how this changing concept can potentially influence dancers' thoughts of absence through the way they move. This creative and collaborative relationship between choreographer and dancers is valued as this new conceptualisation may be relevant to dance scholarship.

Finding Mobility in Origami Bodies
Kisha September

My research is based upon a choreography named Soma where I enquire about objects, environments and relationships in dance. Soma is a piece that folds paper together to find the mobility in origami bodies. My creative practice is based on a series of artist books reflecting on the creative documentation of my choreography.

City Campus


Kitchener Street
Bowen Avenue
Bowen Lane
George Fraser Gallery
Princes Street
Waterloo Quadrant
Eden Crescent
Fisher Building
Parliament Street
High Court
Old Government House
The ClockTower
Anzac Avenue
Alten Reserve
Albert Park
General Library
Alfred Street
Maidment
Student Quad
Student Commons
Kate Edger Info Commons
Science Centre
Recreation Centre
Science Centre (newly opened)
Wellesley Street
Symonds Street
Engineering
Conference Centre
Architecture and Planning
Grafton Road
Owen G Glenn Building
Arts 1
Arts 2
Human Sciences
Charles Nalden Lane
Music
Waipapa Marae
Wynyard Street
Fale Pasifika
Alten Road
Churchill Street
Stanley Street
Beach Road
Short Street
Shortland Street
Chancery Street
Vulcan Lane
Freyberg Pl
Park
East Street
Mount Street
Elam School of Fine Arts
16



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