



Undergraduate Research Conference 2011

September 13 - September 14



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA

The Office of Undergraduate Education

CONFERENCE PROGRAM

TUESDAY SEPTEMBER 13, 2011

8.30 Registration

9.00 Welcome and Opening Address

SESSION 1

9.15 Angus Fisk, Faculty of Science
Searching for Stem Cells in the Ageing Brain

9.30 Timothy Phillips, Faculty of Engineering, Architecture and Information Technology
Modelling Particle Deagglomeration In Dry Powder Inhalers

9.45 Justine Townsend, Faculty of Social and Behavioural Sciences
The Language of Asylum: The Limitations to, and Possibilities for, a Progressive Asylum Discourse under the Rudd/Gillard Labor Government

10.00 Geoffrey White, Faculty of Arts
The Weapons of the Prophet: Abdul Ghaffar Khan and the Complex Relationship between Islam, Violence and Active Nonviolence

10.15 Liam Irvine, Faculty of Engineering, Architecture and Information Technology
The Modelling and Enhancement of Air Cooled Condenser Performance at Millmerran Power

10.30 Sarah Leahy, Faculty of Science
Excessive Non-Essential Consumption, Environmental Impacts and Young Adults

10.45 Morning tea at Innes Room Foyer

SESSION 2

11.00 Beth Brittain, Faculty of Science
*Ecological speciation in *senecio pinatifolius**

11.15 Annabel Farr, Faculty of Engineering, Architecture and Information Technology
Flood Mitigation Feasibility – A Case Study in the Oxley Creek Catchment

11.30 Katherine Storrs, Faculty of Social and Behavioural Sciences
Cattle, Fruit, Cutlery & Face Aftereffects

11.45 Wesley Theobald, Faculty of Arts
Restoration of the Romans

12.00 Sally Street, Faculty of Health Sciences
A chart review on the use of intra-nasal fentanyl in a Paediatric Emergency Department

12.15 Wei Chuan Lee, Faculty of Health Sciences
The assessment of PMCA2 expression in lactating breast and breast cancer

12:30 Presentation by Graduate School

12:45 Lunch at Innes Room Foyer

TUESDAY SEPTEMBER 13, 2011 - CONTINUED

SESSION 3

- 1.30 Ann Bui**, Faculty of Science
Shedding light on optical lattices
- 1.45 Peter Blyton**, Faculty Engineering, Architecture and Information Technology
Development of Computational Fluid Dynamics Capability for the Optimisation of Turbomachine Geometry
- 2.00 Charlotte Nolan**, Faculty of Social and Behavioural Sciences
Alcohol, Youth and Social Media
- 2.15 Alan Tse**, Faculty of Business, Economics and Law
Understanding decision-making in superannuation: An experimental approach
- 2.30 Edward Bürstinghaus**, Faculty of Science
Comparison of Sloan Digital Sky Survey Photo-metric Redshift Calculations with Spectral Redshift Measurements taken in the Wigglez Survey
- 2.45 Scott Allison**, Faculty of Health Sciences
Use of periosteal flap for soft tissue reconstruction in compound tibial fracture
- 3.00 Afternoon tea at Innes Room Foyer**
- 3.15 Poster Session 1**
- 4.15 Close of Day 1 Presentations / Judging**

8:30 Registration

8:45 Welcome and Opening Address

SESSION 4

9.00 Jemima Cowderoy, Faculty of Arts

Rape, Disconnection and Reconnection in Post-1970 Women's Fiction

9.15 Laurelie Wall, Faculty of Health Sciences

Evaluation of a Tracheostomy Simulation Training Program for Speech Pathologists

9.30 Alexander Mack, Faculty of Social and Behavioural Sciences

Ideas and Actions: Explaining China's claims to the South China Sea

9.45 Mengya (Lavender) Shu, Faculty of Business, Economics and Law

How social media influence Chinese students to choose study destination – an Elaboration Likelihood Model and Information Adoption Model perspective

10.00 Annika Nichols, Faculty of Science

The Wld^s mutation: a major clue towards understanding neurodegenerative diseases

10.15 Claire Monsour, Faculty of Arts

Adult fairytale film adaptations

10:30 Morning tea at Innes Room Foyer

SESSION 5

10.45 Melanie Piper, Faculty of Arts

Backstage TV: Understanding Television's Self-Reflexive Representations

11.00 Rebecca Runting, Faculty of Science

Oil vulnerability: the effect of non-metropolitan areas and master planned estates in South East Queensland 2001-2006

11.15 Helena Radke, Faculty of Social and Behavioural Sciences

Off-colour jokes: The impact of racial humour on intergroup emotions and attitudes

11.30 Matthew Richardson, Faculty of Engineering, Architecture & Information Technology

Rocket-Assisted Turbo-Ramjet Feasibility Study

11.45 Elizabeth Forbes, Faculty of Health Sciences

A mathematical model of the role of calcium and cAMP in axon guidance

12.00 Eric Staykov, Faculty of Science

Development of a Motor Learning Assay in Larval Zebrafish

12:15 Presentation by Australian Institute for Bioengineering and Nanotechnology

12:30 Lunch

SESSION 6

- 1.15 Carolina Caliaba Crespo**, Faculty of Arts
Contemporary Trends in Australian Publishing: Anthologies 2000-2010
- 1.30 Jayalakshmi Perumal**, Faculty of Engineering, Architecture and Information Technology
The Investigation and development of flexible and Maintainable loosely coupled Manufacturing and Order Tracking Processes for Custom Door Manufacture and Order
- 1.45 Nathan Wolff**, Faculty of Social and Behavioural Sciences
Progression of Drug and Alcohol Treatment
- 2.00 Ruiqi Deng**, Faculty of Business, Economics and Law
Understanding international university student's travel risk perceptions and the influencing factors of traveller and trip characteristics
- 2.15 Tom Partridge**, Faculty of Science
Investigating a role for SerpinB2 in HIV-1 infection using the mouse EcoHIV model
- 2.30 Shane Johnston**, Faculty of Health Sciences
Acceleration, Maximum Speed and Peak Leg Power in Top-Level Amateur Soccer Players with Respect to their Playing Position
- 2:45 Afternoon Tea**
- 3:00 Poster Session 2**
- 4:00 Close of Day 2 Presentations / Judging**

ABSTRACTS FOR ORAL PRESENTATIONS

SESSION 1

FISK, ANGUS: SEARCHING FOR STEM CELLS IN THE AGEING BRAIN

Faculty of Science

Supervisor: Dr Daniel Blackmore

Neurogenesis, the formation of new neurons, occurs in both the developing and adult brain. In the adult it occurs in two regions, the hippocampus and sub-ventricular zone, and is reliant on a population of precursor cells. These precursors consist of both neural stem cells and more restricted progenitor cells, which, when activated, divide before eventually differentiating into mature neurons. These then integrate into normal brain structures, and assist in new memory formation and olfaction. Ageing is often accompanied by a decline in cognitive function, possibly associated with decreased neurogenesis. However, the effect of ageing on neural precursor populations is unknown. Therefore I investigated the precursor cell population during ageing in mice, and its potential activators, particularly physical exercise. My findings show that this population is larger than previously reported, and that the effect of exercise remained in aged animals. This informs the development of future therapeutic manipulations/treatments to combat neurodegenerative diseases and normal age-related cognitive decline.

PHILLIPS, TIMOTHY: MODELLING PARTICLE DEAGGLOMERATION IN DRY POWDER INHALERS

Faculty of EAIT

Supervisor: Dr Matthew Cleary

Dry Powder Inhalers, or DPIs, are a method of drug delivery that holds promise to improve the treatment of many diseases. Possible improvements include needle-free insulin delivery and rapidly acting analgesics. While promising, DPIs are held back by low fractions of the administered medication arriving at the target area and high dosage variability. These problems are caused by the attractive intermolecular forces that dominate interactions between the micron-sized drug particles required in a DPI. Due to these attractive forces the drug particles agglomerate into clusters larger than the range of effective particle sizes. Breakage of the drug agglomerates (deagglomeration) is known to occur in airflows produced by DPIs. To improve DPI efficiency, deagglomeration is required to be maximised. The exact mechanisms responsible for deagglomeration are contested. Theories include deagglomeration by mechanical impaction and turbulent shear forces. This thesis is using a Monte Carlo simulation to predict the drug particle size distribution produced by injecting a common drug powder into a simple turbulent flow and evaluating the shear forces acting on the agglomerates. This prediction will then be compared to experimental results to examine the dominance of turbulent shear as a deagglomeration mechanism.

TOWNSEND, JUSTINE: THE LANGUAGE OF ASYLUM: THE LIMITATIONS TO, AND POSSIBILITIES FOR, A PROGRESSIVE ASYLUM DISCOURSE UNDER THE RUDD/GILLARD LABOR GOVERNMENT

Faculty of SBS

Supervisor: Dr Matt McDonald

This project examines the role of discourse in shaping, enabling and constraining asylum policy under the Rudd/Gillard Labor Government. Acknowledging that public debate around any policy issue acts to shape the sorts of policy responses that are seen as appropriate and even possible, it seeks to understand why, after coming to power in 2007 on a policy platform that included a commitment to implement a 'more humane and compassionate' asylum policy, the Rudd/Gillard Labor Government has failed to successfully reorient the asylum debate. Despite initially maintaining the impetus towards a progressive asylum discourse, Labor asylum rhetoric and policy has regressed towards the hardline, exclusionary language and practices employed by the Howard Coalition Government, of which the ALP were heavily critical whilst in opposition. By analysing the discourse used by the current Government, the key limitations to, and possibilities for, advancing a progressive asylum discourse are identified in order to infer ways of reorienting the debate in a way that acknowledges a) the rights and needs of asylum seekers, and b) Australia's obligations under the international refugee protection regime.

WHITE, GEOFFREY: THE WEAPONS OF THE PROPHET: ABDUL GHAFFAR KHAN AND THE COMPLEX RELATIONSHIP BETWEEN ISLAM, VIOLENCE AND ACTIVE NONVIOLENCE

Faculty of Arts

Supervisor: Prof Philip Almond

Abdul Ghaffar Khan was a nonviolent activist and leader in what is now the Pakistan-Afghanistan border region, from the early 1900's until his death in 1988. In Ghaffar's time, his people and region were near-universally stereotyped as irredeemably violent. Today these stereotypes, along with widespread stereotyping of Islam as inherently violent, continue and are perhaps more potent than ever. Therefore, Ghaffar's leading the Pashtun in a grassroots, extraordinarily effective nonviolent movement, based on Islamic principles and specifically Qur'anic doctrine, is highly pertinent to our times. I set out to study Ghaffar's life, context, and nonviolent movement; particularly his theology and Qur'anic interpretation as they relate to his nonviolence, with a view to positing how such nonviolent, social-service based interpretation of Islamic scripture and doctrine might positively inform contemporary peace and conflict issues. Along the way, using Ghaffar Khan as an entry point and lens, I analysed and critiqued existing literature and discourse on Islam as it relates to violence, peace, and active nonviolence.

IRVINE, LIAM: THE MODELLING AND ENHANCEMENT OF AIR COOLED CONDENSER

Faculty of EAIT

Supervisors: Dr Matthew Cleary

This is an industry based thesis conducted for the coal fired, 850MW Millmerran Power Plant. The plant's two separate units are cooled by two Air Cooled Condensers (ACC's). The ACC's have a performance which is affected by local cross wind conditions. This thesis is primarily concerned with rectifying the performance decrease of the ACC's stemming from the local cross wind conditions. Crosswinds cause recirculation of heated exhaust air back into the cold intakes of the ACC's thereby reducing the performance of the heat transfer. This reduction in ACC performance leads to an increase in turbine back pressure and a decrease in plant efficiency. The air-flow field surrounding the two ACC's has been modeled using the Computational Fluid Dynamics (CFD) software ANSYS CFX. After the verification and validation of the model it was used to identify and quantify the levels of recirculation occurring at Millmerran. The CFD model will now be used to evaluate a number of retrofittable solutions such as baffles and wind walls. The main deliverable of this thesis is a practical and effective solution which when implemented, will improve ACC performance at the Millmerran Power Plant.

LEAHY, SARAH: EXCESSIVE NON-ESSENTIAL CONSUMPTION, ENVIRONMENTAL IMPACTS AND YOUNG ADULTS

Faculty of Science

Supervisor: Dr Kelly Fielding

Excessive non-essential consumption is a topic which has had little research in Australia. Whilst consumption is necessary for everyday living, excessive consumption of non-essential items has become common-place in western societies. Each stage of a product's lifecycle such as production, transport, use and disposal can have a negative impact on the environment. I began researching this topic in the 2010/2011 Summer Semester, as I wanted to know what influenced young adults to consume non-essential items. I am pursuing this topic for my honours thesis, to understand what could be done to raise awareness about environmental impacts which will encourage 18 to 24 year olds to develop more sustainable consumption habits. As part of my thesis, I have commenced a survey and experiment to: a) investigate the current levels of awareness about environmental impacts associated with excessive non-essential consumption; and b) test whether providing information which promotes sustainable consumption is effective at increasing the levels of awareness in this age group. This research should provide a better understanding of how to increase the environmental awareness of non-essential consumption for this age group, to contribute to a more sustainable future.

SESSION 2

BRITTAİN, BETH: ECOLOGICAL SPECIATION IN SENEĆIO PINATIFOLIÖUS

Faculty of Science

Supervisor: Dr Daniel Ortiz-Barriento

The *Senecio pinnatifolius* species complex (the Australia daisy) consist of many parapatric pairs of populations which are diverging phenotypically as each population adapts to its local conditions. We believe that reproductive isolation is currently evolving as a side effect of these local adaptations. This allows an opportunity to understand the genetic and ecological basis of speciation. I investigated immigrant inviability and hybrid breakdown (two processes by which natural selection can maintain divergence in the face of gene flow) by comparing selection against a sand dune population (DUNES) a headland population (HEADS) and three successive generations of hybrids between the two populations, in both environments. I found that during germination and establishment the strength of selection against both hybrids and immigrants differed between the two environments with selection being the strongest in the headland environment. Additionally increased selection against later generation hybrids was observed only in the headland environment. The results support a role for natural selection in maintaining divergence between ecotypes.

FARR, ANNABEL: FLOOD MITIGATION FEASIBILITY – A CASE STUDY IN THE OXLEY CREEK CATCHMENT

Faculty of EAIT

Supervisor: Dr David Callaghan

During the January 2011 flood event in Brisbane, Australia, the Oxley Creek floodplain experienced devastating flooding, causing extensive damage to residential and commercial properties. The flooding was caused when the Brisbane River backwater entered the catchment through the mouth of Oxley Creek and over approximately 300m of river frontage along Nadine St in Graceville. A structural flood mitigation scheme has been proposed that outlines the installation of an earthen levee along the parkland between Nadine St and the Brisbane River, combined with a floodgate system under Pamphlet Bridge. A feasibility study of the catchment and proposed structural flood mitigation solution was undertaken, encompassing an analysis of design events and historical data. An economic analysis was also undertaken. The results of these analyses indicated that constructing levee banks to protect the Oxley Creek catchment area from disastrous riverine flooding is viable and cost-effective, and should continue to be investigated and implemented.

STORRS, KATHERINE: CATTLE, FRUIT, CUTLERY & FACE AFTEREFFECTS

Faculty of SBS

Supervisor: Dr Derek Arnold

Seeing one face can change the appearance of subsequent faces. For example, seeing a female face can make subsequent androgynous faces look male. Face aftereffects (AEs) are thought to occur because face recognition involves a norm-based opponent code, the mid-point of which is shifted by adaptation. Here we explore another possibility – that people judge inputs relative to recently seen exemplars. Thus an androgynous face might appear unlike the female face, and therefore male. This suggests that AEs could be induced between arbitrary categories, so we had people adapt to images of cows/horses, apples/oranges, knives/spoons, and rocks/cookies. In all cases exposure to one exemplar (e.g. horse) resulted in a bias to report that test images (morphs between the two endpoints) looked more like the other exemplar (e.g. cow). The AEs persisted when adaptors and tests differed in size, ruling out explanations involving simple spatial AEs. Simultaneous opposite AEs could be induced in different locations, and adapting to an ambiguous image at the mid-point of a category produced no AE, replicating effects characteristic of face AEs. Our data are consistent with a bias caused by a perceptual contrast between images, rather than norm-based opponent coding.

THEOBALD, WESLEY: RESTORATION OF THE ROMANS

Faculty of Arts

Supervisor: Dr Janette McWilliam

In AD 286, Carausius, a military commander accused of treason, 'assumed the Imperial purple' and took control of Britannia and Northern Gaul rather than submit to trial by Maximian. Sometimes referred to as the first British Emperor, the period that followed saw a concentrated campaign by Carausius to legitimise his rule over this territory. Rather than seeking to break with the Roman world, his cause was to restore the golden age of the Romans, as advertised by his prolific coin minting program. As part of his plan to establish legitimacy of his rule, he revived ancient Roman character qualities, and associated himself with a 'prophecy' from the classical poet Virgil and a 'lineage' from revered emperor Marcus Aurelius. His currency production caused an economic stir due to the use of real silver and gold to some of his issues, when the Emperors in Rome were unable to produce coinage of real value. His claims of restoration and legitimacy were not shared by the co-emperors, however, and the death of Carausius and his reform ideas in 293 may have assisted a quickening of the economic crisis faced later by Diocletian.

STREET, SALLY: A CHART REVIEW ON THE USE OF INTRA-NASAL FENTANYL IN A PAEDIATRIC EMERGENCY DEPARTMENT

Faculty of Health Sciences

Supervisor: Dr David Herd

Fentanyl is a powerful opioid analgesic agent that is known to be safe and efficacious in children. It is particularly useful because it can be administered via intra-nasal route, saving the child from having to have a needle to allow intravenous administration. Despite these advantages, it is not as widely used clinically, I have done a chart review (including over 300 children) to identify the way in which it is currently used in the Paediatric Emergency Department. We have identified some interesting results from this review, and plan to use these results in an application for funding for further research.

LEE, WEI CHUAN: THE ASSESSMENT OF PMCA2 EXPRESSION IN LACTATING BREAST AND BREAST CANCER

Faculty of Health Sciences

Supervisor: A/Prof Gregory Monteith

Plasma membrane Ca²⁺ ATPases (PMCA_s) actively extrude Ca²⁺ from cells. The PMCA₂ isoform is important for Ca²⁺ transport into milk in mice; however, the expression of PMCA₂ has not been assessed during human lactation. The deregulation of calcium signalling can contribute to breast cancer progression by increasing proliferation and apoptotic resistance. Previous studies have shown that PMCA₂ promotes apoptotic resistance when overexpressed in breast cancer cell lines. In this study, we used immunohistochemistry (IHC) to assess PMCA₂ expression and localisation in normal human breast exhibiting pregnancy-induced lactational change and found a distinct membranous and mostly apical localisation of PMCA₂ in luminal epithelium. To determine if the overexpression of PMCA₂ is a distinctive feature of some breast cancer cell lines and breast cancer subtypes, we screened breast cancer cell-line and tumour microarrays by IHC. Eight of 27 cell lines and 9.4% of 96 tumour samples assessed showed membranous PMCA₂ expression. There was no significant correlation with oestrogen, progesterone or HER-2 receptor status. In conclusion, some human breast cancers show positive PMCA₂ expression. Further studies are now required to determine the relationship between PMCA₂ and prognosis and responsiveness to specific therapies.

SESSION 3

BUI, ANN: SHEDDING LIGHT ON OPTICAL LATTICES

Faculty of Science

Supervisor: Dr Joel Corney

Two laser beams shining towards each other create interference fringes of bright and dark stripes. These stripes correspond to regions of high and low potential. Carefully arranged laser beams can form a lattice of potential wells, known as an optical lattice. These potential wells can trap atoms, replicating the behaviour of crystals. Real crystals are complex and computationally difficult to predict due to the nature of interactions within the crystal. Here we demonstrate the semi-classical approach where we consider the behaviour of a large number of atoms trapped in an optical lattice with five potential wells. Anticipated atom behaviours include trapping within the well and tunnelling through the walls of the wells. Models such as the optical lattice provide a method to further investigate properties of materials such as high-temperature superconductivity, but also carry applications in quantum information processing.

BLYTON, PETER: DEVELOPMENT OF COMPUTATIONAL FLUID DYNAMICS CAPABILITY FOR THE OPTIMISATION OF TURBOMACHINE GEOMETRY

Faculty of EAIT

Supervisor: Dr Peter Jacobs

The current energy landscape is demanding renewable and sustainable alternatives to the world's dependence on fossil fuels. The use of Enhanced Geothermal Systems (EGS) is a promising technology due to the vast hot rock resource in Australia. However, the efficiencies of the EGS technologies are much lower than their theoretical Carnot efficiencies, indicating that there is scope for development of this technology. The Queensland Geothermal Energy Centre of Excellence (QGECE) at the University of Queensland has identified supercritical CO₂ as a suitable working fluid for the temperatures of interest to the geothermal industry in Australia. However, this high density working fluid requires new turbomachinery designs. This research project is focused on developing the understanding, expertise and tools to perform this turbomachinery design and optimisation. The project has currently achieved various verification and validation test cases of a computational fluid dynamics software package in turbomachinery applications. Further, the geometry specification and parameterisation has been defined for radial inflow turbomachines. The remaining tasks in this project are to implement this geometry specification, and extend the tool to perform analysis and optimisation of turbomachinery.

NOLAN, CHARLOTTE: ALCOHOL, YOUTH AND SOCIAL MEDIA

Faculty of SBS

Supervisor: Dr Nicholas Carah

This research project looked into Australia's youth drinking culture. By conducting interviews the research investigated not only the drinking behaviours of a range of young people aged 18 - 30, but how they constructed these behaviours. The views of the individuals were accumulated and analysed to determine common themes towards drinking behaviours and how these behaviours and attitudes appear in their social networks, both online and offline. This varied greatly between social networks. Youth perspectives towards responsible drinking were also considered by questioning interviewees on what they considered to be effective responsible drinking campaigns and how they thought they could be improved and better directed to their audience. While most interviewees could not suggest improvements, many acknowledged the advertisements had little to no effect on their personal drinking behaviours.

TSE, ALAN: UNDERSTANDING DECISION-MAKING IN SUPERANNUATION: AN EXPERIMENTAL APPROACH

Faculty of BEL

Supervisors: Dr Lana Friesen and Mr Kenan Kalayci

People continuously enter into transactions and markets in which products and services are complex in nature. Superannuation is an example of this and the welfare implication it entails deserves empirical research to examine why people behave the way they do in these markets. Instead of using a mathematical and econometric model, we aim to investigate these decision fundamentals using economic experiments with people participating and making decisions under a stylised superannuation decision-making setting. The first research question is how people react when they are faced with complex versus simple information environment. The second research question is to examine whether the source of the money (employee or employer contributing into superannuation) affects decision qualities and risk preferences. Neither of these questions has been previously examined in a superannuation context using economics experiments and we hope to contribute to experimental literature. We also aim to shed onto what potential policies can help create the strongest incentives for more savings to occur, while reducing the scope for people to make more decision errors.

BÜRSTINGHAUS, EDWARD: COMPARISON OF SLOAN DIGITAL SKY SURVEY PHOTO-METRIC REDSHIFT CALCULATIONS WITH SPECTRAL REDSHIFT MEASUREMENTS TAKEN IN THE WIGGLEZ SURVEY

Faculty of Science

Supervisor: Dr Tamara Davis

In modern Cosmology, measuring the redshift of distant galaxies is a highly useful tool for, among other things, investigating the rate at which the Universe is expanding. The Sloan Digital Sky Survey (SDSS) is one of the largest surveys measuring galactic redshifts ever conducted. The majority of the galaxies measured in this survey were measured using photometry. The recently completed WiggleZ Dark Energy Survey measured the redshifts of approximately 240 000 galaxies spectroscopically. Spectroscopic measurement of redshift for distant galaxies is highly accurate, but photometric redshift measurements are cheaper, much faster and can measure more distant galaxies. The level of accuracy of photometric redshift measurement is not generally confirmed however. The aim of this research project is to investigate the level of correlation between photometrically calculated redshifts for galaxies observed in the SDSS and spectroscopically calculated redshifts for the same galaxies in the WiggleZ survey. The level of agreement found between the two methods for a large number of galaxies may help to verify the reliability of photometric redshift calculation. A good agreement would also add some support to the SDSS data in general and the results which have been deduced from it.

ALLISON, SCOTT: USE OF PERIOSTEAL FLAP FOR SOFT TISSUE RECONSTRUCTION IN COMPOUND TIBIAL FRACTURE

Faculty of Health Sciences

Supervisor: Dr Michael Wagels

Introduction Infection and non-union are significant complications of compound tibial injuries. Use of a corticoperiosteal descending genicular artery free flap to treat established tibial non-union has previously been described with periosteum. The ability of a formal periosteal reconstruction to prevent non-union has never been investigated. The first stage in pursuing this is to accurately estimate the area of periosteum required. **Methods** Length and girth at five points on the tibia were measured in five human cadaveric skeletons. This data was analysed (Geogebra 3.2.0, 2009) to create a three-dimensional mathematically modelled tibia from which the relationship between length and circumferential surface area were extracted and represented graphically. **Results** A case report is presented to demonstrate the utility of the model in estimating the area of periosteum required to cover a given defect in a leg of any size. **Conclusion** Large amounts of periosteum are required if a formal periosteal reconstruction is to become part of primary lower limb reconstruction after trauma. Realising this is important in designing a suitable periosteum-containing flap and studies that compare its effect on non-union rates with conventional soft tissue reconstructions.

SESSION 4

COWDEROY, JEMIMA: RAPE, DISCONNECTION AND RECONNECTION IN POST-1970 WOMEN'S FICTION

Faculty of Arts

Supervisor: Dr Bronwen Levy

This body of fiction attaching the reader to the raped woman is usually discussed using an understanding of rape as silencing expression, shattering subjectivity and problematising memory. My research project, currently entitled 'Rape and Reconnection in Women's Fiction post-1970', proposes an alternate model drawn from the field of psychology and centred on interpersonal disconnection. I use this model to describe representations of rape in four vastly different novels written by North American women in the past four decades: Alice Walker's 'The Color Purple', Dorothy Allison's 'Bastard Out of Carolina', Sandra Cisneros' 'The House on Mango Street' and Robin Hobb's 'Ship of Destiny'. I then compare depictions of reconnection in the novels, investigating the ways in which each imagines life after rape and the significance that each gives to interpersonal reconnection. Additionally, I use Raymond Williams' theory of 'structures of feeling' to examine the potential for these novels to articulate and in doing so actualise a structure of feeling that connects characters, authors and readers. I conclude that female-authored fictional rape narratives post-1970 employ more complex representations of rape than has been widely acknowledged in criticism.

WALL, LAURELIE: EVALUATION OF A TRACHEOSTOMY SIMULATION TRAINING PROGRAM FOR SPEECH PATHOLOGISTS

Faculty of Health Sciences

Supervisor: Dr Liz Ward

Speech Pathologists play a significant role in the management of tracheostomised patients. However, skilled management of this population is not an expected area of graduate competency, leaving advanced skills training to be achieved in the workplace. Currently, this training is undertaken on an ad-hoc basis, with the propensity for inconsistent management and ultimately compromised patient care. Human mannequin-based simulations provide an alternate training method in a risk-free learning environment, offering unique opportunities to mimic real-time physiological patient responses and allow clinicians to practice procedures. The present investigation aimed to (1) evaluate the development of clinicians' tracheostomy management skills when undertaking a one-day training workshop utilising human simulation mannequins and (2) appraise their clinical perceptions of the simulated learning environment. Participants completed questionnaires regarding their personal and clinical perceptions of the workshop pre-, post- and four months post-training. Preliminary findings demonstrated significant increases in participants' self-confidence towards tracheostomy management including performing manual tasks, completing assessments and making clinical decisions, as well as positive affirmations of the simulated case scenarios as a valid medium for clinical learning ($p < 0.05$). Findings support the validity of mannequin-based simulation training for Speech Pathologists in tracheostomy management.

MACK, ALEXANDER: IDEAS AND ACTIONS: EXPLAINING CHINA'S CLAIMS TO THE SOUTH CHINA SEA.

Faculty of SBS

Supervisor: Dr Matt McDonald

In 2002, China's signing of the ASEAN Declaration for Peaceful Conduct in the South China Sea was seen as a key moment in Beijing's relations with Southeast Asia. It was seen as an example of China making key compromises in the pursuit of positive relations in the region. In contrast, the past two years has witnessed an escalation which has shown glimpses of an assertive self-assured Chinese foreign policy. Thus this study intends to answer the question 'how do we explain China's foreign policy towards the South China Sea since 2001'. I will argue that Beijing is driven by ideational factors through its rhetoric invoking a sense of historical identity. It is also driven by material motivations such as the need for energy security and control of sea lines of communication. For Australia it is imperative to gain an understanding of this issue since we are now living in a contested regional environment with several competing powers each vying for influence

SHU, MENGYA (LAVENDER): HOW SOCIAL MEDIA INFLUENCE CHINESE STUDENTS TO CHOOSE STUDY DESTINATION – AN ELABORATION LIKELIHOOD MODEL AND INFORMATION ADOPTION MODEL PERSPECTIVE

Faculty of BEL

Supervisor: Dr Noel Scott

Social media is a type of third party marketing persuasion technique and is becoming increasingly popular with savvy marketers. It influences customer's purchasing decisions and can impact on user's perceived destination attractiveness. As a type of persuasion, it may be studied using the Information Adoption Model (IAM) to determine the effectiveness of social media. In this study the effectiveness of stimulus material used to attract Chinese students to Australian Universities is examined. An experimental design exposing respondents to different social media stimulus material is used to explore the main factors that influence Chinese outbound students' perceptions of educational tourism destination attractiveness. Argument quality and source credibility serve as two independent variables. A convenience sample of 400 Chinese students at Queensland Universities has been collected. Preliminary analysis of results will be available by the time of presenting. Contributions

1. First study using IAM to determine the effectiveness of social media stimulus material on education tourism students from China.
2. Provides theoretically grounded results for Australian Universities to better understand the effectiveness of social media stimulus material targeting education tourism students from China.

NICHOLS, ANNIKA: THE Wlds MUTATION: A MAJOR CLUE TOWARDS UNDERSTANDING NEURODEGENERATIVE DISEASES

Faculty of Science

Supervisor: Dr Massimo Hilliard

Neurons are excitable cells that form the basic units of the nervous system. In order to transmit signals around the body, they have an axon, the neuron's longest processing element. Degeneration of this axon causes neuronal dysfunction and is a hallmark of many neurodegenerative conditions including Alzheimer's, Parkinson's, and motor neuron diseases. In order to develop effective therapeutic treatments to tackle these and other human neurodegenerative conditions, it is imperative that we understand the basic molecular mechanisms underlying axonal degeneration. A mutant mouse gene (Wlds) is able to delay axonal degeneration following physical injury, chemical insult and also in several animal models of neurodegenerative diseases. Several research groups have used Wlds in mice, rats, fruit flies and zebrafish to better understand how Wlds confers protection from axonal degeneration and as a tool for discovering the molecular mechanisms behind axonal degeneration. A precocious model for studying neurons is the 1mm long nematode worm, *C. elegans*. In my presentation, I will talk about how I have introduced the Wlds gene into *C. elegans* and how I am now using these worms to further characterise how Wlds affects both axonal degeneration and regeneration.

MONSOUR CLAIRE: ADULT FAIRYTALE FILM ADAPTATIONS

Faculty of Arts

Supervisor: Dr Diana Looser

In recent years we have seen a surge in film adaptations of traditional fairytales being "revamped" for a modern, adult audience. Hollywood has rediscovered these tales as ideal hypotexts for revision, resulting in new versions characterized by a post-feminist, sexualized and supernatural slant. This presentation explores the rationale for, and effects of, such adaptations, through a close reading of Hardwicke's *Red Riding Hood* (2011). Applying film and industry theory and critical cultural studies frameworks, I examine the often confrontational content of the original stories together with the trend of fairytales being repositioned in the film medium to reflect contemporary views and values; the importance of the majority female audience for fairytales (especially in film); the role of the film medium as 'spectacle' entertainment in the securing of box-office success; and the restructuring of the "first-encounter" (Bonner 2011) to alter audiences' expectations of these popular tales as more provocative forms of entertainment. Subsequently, I argue that fairytales are undergoing another stage in the creation cycle; the most recent films draw on material from the original texts and reframe them for a contemporary social climate to present these new adult versions as substitutes for our original childhood encounters.

SESSION 5

PIPER MELANIE: BACKSTAGE TV: UNDERSTANDING TELEVISION'S SELF-REFLEXIVE REPRESENTATIONS

Faculty of Arts

Supervisor: Dr Lisa Bode

Television has the ability to shape our perceptions of cultural institutions. So how does TV inform our understanding of the TV business? My honours project investigates this question by studying television narratives about television production. John Ellis has argued that television's cultural function is to process reality into narrative forms that provide audiences with ways of understanding the world. Different genres and forms of television approach the process in different ways. I adapt Ellis's argument in order to investigate how the reality of television production is processed into narrative by television drama, comedy, and parody. Studio 60 on the Sunset Strip, The Larry Sanders Show, and 30 Rock are all TV programs set backstage at a late night variety show. All three have storylines informed by real events experienced by the creators, published in memoirs, or found in entertainment news, but each show presents these realities differently. My comparative analysis foregrounds the importance of textual codes of realism, variations in the comedic mode, and degrees of self-reflexivity. By examining differences in these elements, it is possible to locate the contributions these programs make to popular discourses about the American network television industry.

RUNTING, REBECCA: OIL VULNERABILITY: THE EFFECT OF NON-METROPOLITAN AREAS AND MASTER PLANNED ESTATES IN SOUTH EAST QUEENSLAND 2001-2006

Faculty of Science

Supervisor: Mr Jonathan Corcoran

This study quantified and visualised oil vulnerability (OV) across Statistical Local Areas (SLAs) of South East Queensland (SEQ), and its changes between 2001 to 2006, with specific focus on Master Planned Estates (MPEs). A classification chart was developed to categorise different types of OV, and to identify SLAs that showed significant change in their level of OV over the period from 2001 to 2006. Our findings are that non-metropolitan SLAs exhibited significantly higher OV due to: (i) the lack of alternatives to private motor vehicle use; (ii) longer road network distances travelled on average; and (iii) a generally lower socioeconomic status associated with these areas. Metropolitan SLAs had consistently lower OV due to: (i) a shorter average commuting distance; (ii) more comprehensive non-motorised access to public transport; and (iii) a generally higher socioeconomic status. SLAs containing large MPEs also proved to be more vulnerable due to their relatively high automobile dependence, limited non-motorised access to public transportation, and longer average commuting distances.

RADKE, HELENA: OFF-COLOUR JOKES: THE IMPACT OF RACIAL HUMOUR ON INTERGROUP EMOTIONS AND ATTITUDES.

Faculty of SBS

Supervisor: Dr Fiona Barlow

Our research aims to examine the consequences of viewing controversial race-based humour on the internet. Many websites lampoon racism instead of racial minorities, however at present we do not know whether such websites increase or ameliorate racial animosity. In the present study participants from the United States viewed a satirical website in which a stereotypical White couple prided themselves on their many Black friends, or alternatively viewed a neutral control website. We further varied the website author's purpose for creating the website (to provoke thought, amuse, or reason undisclosed). Results indicated that when viewing the satirical website (as compared to the control website) participants felt more anxious, hostile and expressed more prejudice. However, they also thought more critically about the website's content. These results were qualified, such that when participants who viewed the satirical website were told that it was serious social commentary they expressed more anxiety and hostility than when they were told it was created as a joke. Future research directions include developing a model of intergroup humour and integrating our findings into prejudice-reduction interventions

RICHARDSON MATTHEW: ROCKET-ASSISTED TURBO-RAMJET FEASIBILITY STUDY

Faculty of EAIT

Supervisor: Mr Vincent Wheatley

Scramjet engines are reaching a high level of technological readiness. In anticipation of scramjet engines being utilised in practical applications, ancillary issues associated with their implementation must be considered. One such issue is a scramjet's inability to operate at speeds below approximately Mach 5.0. As such, a scramjet-powered vehicle will require a separate launch engine to propel it to a suitable velocity for operation. Currently, it is envisaged that rocket engines will be used in this application, as the velocity required is outside the operational envelope of conventional jet engines. However, rocket engines are inefficient in terms of payload capacity, as they carry large amounts of fuel and oxidiser. A hybrid rocket-jet engine may offer more efficient payload capacity while still being capable of hypersonic operation. With this in mind, the Rocket-Assisted Turbo-Ramjet (RATR) concept engine has been developed. The RATR concept engine functions as a gas turbine (turbojet) engine at lower speeds, transitioning into a ramjet engine at higher speeds, and finally into a rocket engine at hypersonic speeds, giving it the capability to reach scramjet operational velocity. This project focuses on development and analysis of this engine concept, in order to determine its feasibility.

FORBES, ELIZABETH: A MATHEMATICAL MODEL OF THE ROLE OF CALCIUM AND cAMP IN AXON GUIDANCE

Faculty of Health Sciences

Supervisor: Prof Geoff Goodhill

The ability for neurons to locate appropriate targets is an essential part in the formation of correct circuits during neural development. This is facilitated in part by gradients of molecules which act as 'guidance cues', either attracting or repelling the growing neuron. However attractive guidance cues can switch to promote repulsion and vice versa depending on levels of cAMP and calcium, which act as important second messengers inside the neuron. Previously the mechanisms involved in modulating this switch have only been discussed qualitatively, and the interacting roles of cAMP and calcium have been unclear. Here we provide a mathematical model which is able to quantify the relationship between cAMP, calcium and axon turning. The model's predictions are consistent with a large amount of the current experimental data. Novel predictions were verified experimentally, in particular that under certain calcium conditions a reduction in cAMP could promote attraction. Overall the mathematical model is able to help explain previously surprising experimental results and make predictions about axon turning under a wide range of conditions.

STAYKOV, ERIC: DEVELOPMENT OF A MOTOR LEARNING ASSAY IN LARVAL ZEBRAFISH

Faculty of Science

Supervisor: Dr Ethan Scott

A major aspect of motor learning is the ability to correct and refine movements that fail to reach expected outcomes. Our laboratory is interested in the use of optical and genetic techniques to elucidate the role of cerebellar circuits during motor learning. Zebrafish provide an appealing model system for these optogenetic techniques. However, it is unknown whether zebrafish are able to perform motor learning. I will present research that demonstrates that zebrafish are able to undergo motor learning to overcome changes in viscosity. In my experiment, zebrafish larvae were transferred to water of increased viscosity and filmed with a high-speed camera over a period of 15 minutes. The larvae initially struggled to maintain the swimming distances they were accustomed to. Motor learning ensued, allowing the larvae to meet their swimming goals in the new conditions. Further analysis has shown that the larvae achieve these goals by modifying the maximum bend amplitude of their tail and the number of tail beats they perform, but not the velocity of their tail. This assay, along with optical and genetic techniques, will enable me to determine whether the zebrafish cerebellum is involved in motor learning.

SESSION 6

CALIABA CRESPO, CAROLINA: CONTEMPORARY TRENDS IN AUSTRALIAN PUBLISHING: ANTHOLOGIES 2000-2010

Faculty of Arts

Supervisor: Prof David Carter

This project analyses the field of literary and academic Australian book publishing. It examines five anthologies published in the last ten years to explain the various ways in which editorial decisions such as title of the book or profile of the editors shapes appreciation and understanding of Australian literature. This project draws in equal parts from the fields of literary theory and personal interviewees I have conducted with fifteen editors and publishers. For this reason, the thesis affords insight both into how publishers perceive their mutual relations and its relation to its audience, and the kind of non-monetary rewards that drive publishing. The project engages classic debates in literary theory such as the question of literariness, canonicity, literary history, and authorship as a point of access to its five primary sources. Grounding my discussion of recently published books in such debates makes it possible to identify changing ideas about how to define literature and culture, how universities and other institutions shape those ideas, and how the world of Australian books relates to American and British publishing. I am completing this dissertation as part of my Bachelor of Arts (Honours).

PERUMAL, JAYALAKSHMI: THE INVESTIGATION AND DEVELOPMENT OF FLEXIBLE AND MAINTAINABLE LOOSELY COUPLED MANUFACTURING AND ORDER TRACKING PROCESSES FOR CUSTOM DOOR MANUFACTURE AND ORDER

Faculty of EAIT

Supervisor: A/Prof Heng Tao Shen

Early results from this beta testing have identified that the ordering and manufacturing processes, whilst needing to be integrated are too tightly coupled. This tight coupling has resulted in issues of security, lack of flexibility in being able to handle alternative manufacturing processes and a considerable issue in being able to maintain the code. Hence, this project mainly investigates on these issues and solves these technical challenges by developing a more loosely coupled solution with better flexibility and maintainability. This is an industrial software research and engineering project which is coordinated by the CEED program.

WOLF, NATHAN: PROGRESSION OF DRUG AND ALCOHOL TREATMENT

Faculty of SBS

Supervisor: Prof Bill Von Hippel

Substance abuse is a global issue and treatment program retention rates are generally poor. The goal of the current study was to assess whether implicit associations between self and drug use predict retention in drug treatment for legally coerced and voluntary clients. In service of this goal we designed and employed an Implicit Association Test (IAT) to examine the relationship between implicit associations and treatment progression. Participants were also administered a series of measures assessing confidence, explicit associations, and difficulty maintaining abstinence. Participants were 94 clients residing in drug and alcohol treatment programs at Salvation Army centres in Queensland, New South Wales and the Australian Capital Territory. Testing was conducted in two phases; during the first week of admission and then again 4 weeks later when participants progressed into the treatment phase of their rehabilitation. None of the explicit measures predicted treatment retention, but consistent with predictions, implicit associations between the self and drug use measured at the 4-week point of the study predicted treatment retention. Participants who implicitly associated the self more strongly with being clean were less likely to drop out of treatment. In addition, this relationship appeared to be stronger for those engaged in drug rather than alcohol treatment. The theoretical and practical implications of these findings will be discussed.

DENG, RUIQI: UNDERSTANDING INTERNATIONAL UNIVERSITY STUDENT'S TRAVEL RISK PERCEPTIONS AND THE INFLUENCING FACTORS OF TRAVELLER AND TRIP CHARACTERISTICS

Faculty of BEL

Supervisor: Dr Brent Ritchie

Everybody travels, but not everybody stays clear from various types of risks on vacation. Sometimes real risks cannot be perceived by student travellers, particularly for university students who study overseas and have a strong desire to explore the new country. The purpose of this study is to identify the perceived risks of international university students and the influence of traveller characteristics (such as socio-demographics and past experience) and trip characteristics (such as travel parties and locations) on their perceived travel risks. Fifteen semi-structured interviews were undertaken with international students and used to develop a questionnaire. 407 questionnaires were collected. The research will facilitate to understand the most critical travel risks perceived by international university students, find solutions to mitigate and adapt critical travel risks, and make suggestions to practitioners (such as tourism authorities, national and regional tourism associations, tourism and hospitality companies) in order to develop better tourism products, services and policies.

PARTRIDGE, TOM: INVESTIGATING A ROLE FOR SERPINB2 IN HIV-1 INFECTION USING THE MOUSE ECOHIV MODEL

Faculty of Science

Supervisor: Dr Andreas Suhrbier

Introduction: SerpinB2 is an ovalbumin-like serine protease inhibitor (ov-serpin), which is reported to enhance replication of HIV-1 in vitro (Darnell et al. 2006). Using EcoHIV and SerpinB2^{-/-} mice we sought to determine whether SerpinB2 modulates EcoHIV replication in vivo. EcoHIV is a virus where the HIV-1 gp120 has been replaced by the gp80 envelope protein from ecotropic murine leukemia virus. Methods: EcoHIV was injected i.p. into wild-type and SerpinB2^{-/-} mice and viral replication was measured by qRT-PCR from peritoneal macrophages and spleen. Results: Both strains were efficiently infected by EcoHIV with viral RNA peaking at day 7 and decreasing over time. Significantly higher levels of viral RNA were seen in SerpinB2^{-/-} peritoneal macrophages at day 21 and 41 compared with wild-type mice. Cytokine levels and immune responses are being analyzed. Discussion: SerpinB2 appears to suppress the replication of EcoHIV in vivo, in contrast to previous in vitro data. In addition, SerpinB2 deficiency is reported to enhance Th1 responses, which would be expected to reduce (not increase) EcoHIV replication. We are exploring whether SerpinB2 regulates the NFkappaB pathway, a key transcription factor for HIV/EcoHIV replication.

JOHNSTON, SHANE: ACCELERATION, MAXIMUM SPEED AND PEAK LEG POWER IN TOP-LEVEL AMATEUR SOCCER PLAYERS WITH RESPECT TO THEIR PLAYING POSITION

Faculty of Health Sciences

Supervisor: Dr David Jenkins

The purpose of this study was to investigate the effect playing position had on three components of fitness; acceleration, top-speed and peak leg power, in top level amateur players in the Brisbane Premier League (BPL). Acceleration was measured using a 10m standing start sprint, top speed with a 40m flying start sprint and peak leg power with a counter-movement vertical jump (CMJ). 80 male participants (age 22.0 ± 4.2 yrs, experience 15.5 ± 4.3 yrs, categorized by their regular playing position as a goalkeeper, defender, midfielder or forward) from three clubs in the BPL underwent multiple trials of each test during their respective training sessions. Differences between the mean scores according to playing position were not significant in any of the three tests (p = >0.05). In conclusion, top level amateur players in the BPL, regardless of playing position, have the same acceleration capabilities, maximal running speed and peak leg power. Team coaches at this level should consider a generalized team approach to training structure/content with minor positional adaptations in accordance with external factors such as strategy, opponent and team structure.

POSTER PRESENTATIONS

BENNETT, JAMES: WIGGLER-WAGGLER: OPTICAL MEASUREMENTS OF THE VISCOELASTIC MODULUS

Faculty of Science

Supervisor: Prof Halina Rubinsztein-Dunlop

Microrheology, the study of flow at the microscopic scale, has benefited immensely from a variety of optical micromanipulation techniques developed over the past two decades; however, no present procedure allows the rapid measurement of the viscoelastic properties of a small fluid sample over a wide frequency range. We detail preliminary analysis of an apparatus capable of performing active rotational microrheological measurements. Optically holding a birefringent probe particle in a linearly polarised dual-beam trap and rapidly displacing the stable equilibrium orientation through a fixed angle will provide measurements of the low-frequency fluid behaviour, whilst passive monitoring of thermal motion is used to determine high-frequency components. We aim to apply this technique to the study of physical phenomena in cell biology.

BIGOT, MARIE: IN-SITU REMEDIATION OF HIGHLY CONTAMINATED MINE WASTES USING NOVEL METAL-BINDING PARTICLES AND METAL-TOLERANT PLANTS (METALLOPHYTES)

Faculty of Science

Supervisor: Dr Laurence Rossato

Toxic soil contaminants are a major threat to human health and sustainable food and energy production where mineral processing wastes are discharged into the environment. It is rarely possible to totally stabilize, render harmless or remove toxic metals from these wastes and metallophytes had to evolve mechanisms to survive in many natural metal-rich soils as well as these wastes. However, in extreme conditions, metal concentrations often exceed even the metal-tolerance thresholds of metallophytes and the sites remain barren with high risks for contaminant dispersion via erosion. A novel soil amendment has been developed recently to enable plant growth on these extremely contaminated soils and reduce erosion risks. It involves micron-sized metal-binding particles (X3) able to bind toxic plant-bioavailable metals irreversibly and significantly reduce their concentrations in the soil below the phytotoxicity thresholds. Germination and healthy establishment of the native metallophyte grass *Astrelba lappacea* was achieved on two contrasting (metalliferous highly acidic and highly saline) mine waste materials using X3. This remediation technique promises to be very robust and applicable to a wide range of situations where decades of attempted plant establishment had previously been unsuccessful.

DELAY, CHRISTINA: EVOLUTIONARY ORIGIN OF A UNIQUE CASE OF PROTEIN HIJACK DISCOVERED IN SUNFLOWER.

Faculty of Science

Supervisor: Dr Joshua Mylne

Recently, a small, circular peptide (SFTI-1) was found “buried” within the precursor of a larger, unrelated seed storage protein in sunflower (PawS1). This ultra-stable peptide has promise as a drug lead, with native and modified forms being able to block enzymes associated with breast and prostate cancer. Interestingly, the peptide has “hijacked” the processing machinery of the seed storage protein for cyclisation and liberation.

Similar *PawS* genes were subsequently found in species related to sunflower. It appears that they arose from an ancient genetic event dating back at least 26 million years. My project aimed to understand how and when these peptides came about and to look at the variation between them and the reason for the variation.

By screening 150 species from the daisy family, a range of new *PawS* genes have been found. Additionally, I found that the most divergent *PawS* gene does produce a mature seed storage protein, but does not produce a cyclic peptide. Finally, I propose that the cyclic-peptide containing *PawS* genes evolved through a two-step mechanism. This work contributes to our understanding of protein evolution, while providing insights into the significance of the biological role of this novel, bioactive protein class.

GAN, WAN JUN: CONTRIBUTION OF RECEPTOR OF ADVANCED GLYCATION END PRODUCTS (RAGE) AND HIGH-MOBILITY GROUP BOX 1 (HMGB1) TO THE REGULATION OF HOST DEFENCES DURING ACUTE PNEUMOVIRUS INFECTION

Faculty of Science

Supervisor: Dr Simon Phipps

Human respiratory syncytial virus (hRSV) is the leading cause of infantile bronchiolitis and may cause up to 200,000 deaths per year worldwide. Using pneumonia virus of mice (PVM), a rodent-specific pneumovirus from the same genus as hRSV, we have shown that innate immune recognition is mediated through toll-like receptor (TLR)7. TLR-mediated detection of pathogenic nucleic acids is dependent on HMGB1, a ligand of RAGE. Here, we investigate whether the absence of RAGE would affect development of antiviral host defence and promote virus-associated lethality. RAGE-deficient and wild-type neonatal mice were inoculated with 100 or 1000PFU PVM and immunopathology assessed by flow cytometry, histology, and ELISA. In the absence of RAGE, presentation of clinical symptoms was delayed. Virus-induced cytokine and inflammatory cell infiltrates to lungs was attenuated in the absence of RAGE in response to 100 but not 1000PFU PVM. The absence of RAGE led to increased mortality and was associated with elevated cytosolic HMGB1. Our data suggest that the RAGE-HMGB1 axis may contribute to pneumovirus recognition and induction of antiviral defense, and protect against pneumovirus-induced mortality.

GODDARD, JOHN: ACUTE EXACERBATIONS OF COPD: GUIDELINE ADHERENCE AND DISSEMINATION STRATEGIES

Faculty of Health Sciences

Supervisor: Dr Ian Yang

Background Audits of acute exacerbations of chronic obstructive pulmonary disease (AECOPD) care have revealed suboptimal concordance with guideline recommendations, prompting research into guideline adherence and dissemination strategies. **Objective** To perform an audit of the management of AECOPD at The Prince Charles Hospital (TPCH), and evaluate a guideline-based AECOPD checklist. **Methods** An AECOPD Inpatient Checklist was developed and trialed at TPCH. Data relating to demographics, process-of-care and patient outcomes for eligible AECOPD admissions were extracted via chart audit for pre-checklist and checklist stages. T-tests, ANOVA and chi-squared analysis were used to compare phases. **Results** Adherence to guidelines was high for aspects of assessment (Chest x-ray 100%, arterial blood gas (ABG) analysis 75.5%) and initial treatment (short-acting bronchodilator 97.3%, antibiotics 90.9%). Rates were lower for considerations such as pulmonary rehabilitation referral (35.5%). For most variables, checklist use was not associated with notable differences, however there was significant improvement for elements including ABG analysis, sputum culture and vaccination assessment. **Conclusion** This study provides an audit of current practice managing AECOPD at TPCH and evaluates a checklist promoting evidence-based care. There is opportunity for improvement in aspects of patient care and methods of guideline implementation.

GOLDINGER, ANITA: EXPRESSION QUANTITATIVE TRAIT LOCI (EQTL) ANALYSIS ON TWO DIFFERENT CELL POPULATIONS: PILOT STUDY OF 50 INDIVIDUALS

Faculty of Science

Supervisor: Dr Joseph Powell

Expression Quantitative trait loci (eQTL) association mapping is a method of determining the underlying genetic basis behind variation in gene expression. Unravelling the genomic architecture involved can give biological insight into gene regulation that modulates phenotypic variation and complex disease. In this study of 50 twins, data collected of gene expression and single nucleotide polymorphisms (SNPs) present across the whole genome were analysed. This data was collected from two different cell populations: transformed lymphoblastoid cells and isolated heterogeneous blood cells to observe any differential effects. The changes in expression levels were used as the phenotypic quantitative traits that were mapped to SNPs using traditional association analysis. This was performed by multiple linear regressions on each gene and false discovery was corrected by permutation analysis. Despite the low sample size, the resulting analysis demonstrated that from 3500 tested genes approximately 4% of had an association to a SNP, with some genes having multiple associated loci. These eQTLs were predominantly located proximal to the gene itself and distinct variation could be noted between the cells studied, indicating that cell identity plays a role in regulation differences.

IMPEY, EMILY: EXPRESSION OF HUMAN GENES IN THE PATHOGEN CRYPTOCOCCUS NEOFORMANS: TOOLS IN DRUG DEVELOPMENT

Faculty of Science

Supervisor: Dr James Fraser

Cryptococcus neoformans is a basidiomycetic fungus which, while typically remaining dormant in healthy individuals, can result in cryptococcal meningitis in the immunocompromised. The worldwide mortality rate is estimated at approximately 624,700 per year, with a large proportion being in Africa where HIV is endemic. To date we have shown that the human pathogen Cryptococcus is sensitive to the antibiotic mycophenolic acid. However, due to similar molecular machinery, so is the human host. To enable the use of this drug as a treatment for Cryptococcus infection we are investigating the suitability of the GTP de novo biosynthetic enzyme IMP dehydrogenase as an antifungal target. Using RT-PCR and transformation with a biolistic particle delivery system, we created a C. neoformans strain in which the native IMPDH-encoding gene IMD1 has been replaced with the human orthologues. The human IMPDH2 gene was shown to be incorporated into the fungal genome at the native fungal gene site using G418 resistance screening. These transformants can be used to identify fungal specific IMPDH inhibitors that are not toxic to the human proteins and can be used for treatment of C. neoformans infection.

JOHNSON, NIGEL: THE UTILISATION OF A PREOPERATIVE BIOPSY BEFORE SURGICAL MANAGEMENT OF SPECIFIC INTRABONY LESIONS – A SURVEY OF ANZAOMS MEMBERS

Faculty of Health Sciences

Supervisor: A/Prof Martin Batstone

The aim of this study was to investigate whether or not maxillofacial surgeons utilised a preoperative biopsy technique before undertaking definitive surgical management in treating specific intrabony lesions such as the dentigerous cyst, keratocystic odontogenic tumour and ameloblastoma. A survey was conducted of all members of the Australian and New Zealand Association of Oral and Maxillofacial Surgeons (ANZAOMS). The survey was mailed to all full/associate members of ANZAOMS. The survey was split into three parts. The first part asked for some basic demographic data. The second part asked members to consider two different lesions and whether they would undertake a preoperative biopsy of the lesion along with conducting any other investigations. The third part of the survey asked members about their specific management choice for particular intrabony lesions of the jaws. Preliminary data has demonstrated that some members utilise a preoperative biopsy technique whereas others do not, proceeding directly to definitive management. Some members conduct further investigations before treating whereas others do not. Several surgical options were chosen in the management of these lesions ranging from enucleation, marsupialisation and resection.

LIU, JIA: HYPOXIA RELATED GENES REGULATION IN PERIPHERAL BLOOD AFTER HUMAN ISCHEMIC STROKE

Faculty of Health Sciences

Supervisor: A/Prof Pamela McCombe

Ischemic stroke is the second major cause of disability and death worldwide. Diagnosis of this disease is dependent upon detection of neuropathological changes through magnetic resonance imaging (MRI), computed tomography (CT) scans or protein expression level of certain biomarkers. Previous studies from the current laboratory has shown increased T cell activation and decreased T regulatory cell (Treg) function in the development of this disease. To understand the mechanisms involved in the cellular responses to the disease, we aim to investigate hypoxia signal transduction pathways using RT-PCR array. In the primary screening, 84 hypoxia related genes were examined in three biological samples from each disease and control group. The levels of gene expression have been compared between patients and healthy subjects, and with disease controls (Motor neuron disease). There were 20 genes showed increased or decreased expression levels in primary screening. Currently, these genes are under investigating in large sample size of stroke patients and controls. The results of this study will provide further insights into the nature of neurological diseases, and may contribute to the development of novel gene markers for more efficient and accurate diagnostic and therapeutic outcomes.

LOH, ZHIXUAN: THE ABSENCE OF IRF3 AND IRF7 MODULATES THE EXPRESSION OF THE IL-1B IN RESPONSE TO ACUTE PNEUMOVIRUS INFECTION.

Faculty of Science

Supervisor: Dr Simon Phipps

Respiratory syncytial virus is the leading cause of lower respiratory tract infection in infants and young children. Using the rodent-specific pneumovirus, pneumonia virus of mice (PVM), we have previously demonstrated that the activation of toll-like receptor (TLR)7 is necessary for the induction of immediate antiviral host defence. Here we sought to determine the role of the transcription factor interferon regulatory factor (IRF)7, activated downstream of TLR7, and IRF3 employed by other innate receptors in the development of PVM-induced immunopathology. In wild-type mice, PVM induced a marked increase in IL-6 production in the lung at 7 days post infection. This response was markedly attenuated in IRF3- and IRF7-deficient mice by 91% and 98% respectively, but only reduced by 57% in double IRF3/7-deficient mice. Of note, virus infection of double IRF3/7-deficient mice led to the hyper-production of IL-1b, a known inducer of IL-6. Neutralisation of IL-1b in double IRF3/IRF7-deficient mice with IL-1 receptor antagonist reduced clinical symptoms but increased mortality. Our findings suggest that the absence of both IRF3 and IRF7 signalling is required to promote a protective IL-1b response.

MACKINTOSH, JOHN: TELEDERMATOLOGY IN PHARMACY: A FEASIBILITY STUDY

Faculty of Health Sciences

Supervisor: Dr Kwun Fong

There has been a recent emphasis on the importance of a thorough understanding of the behaviour of lung cancers. Objective To calculate the volume doubling times (VDT) of non-small cell lung cancers (NSCLC) and to examine a number of patient and tumour characteristics related to this growth. Methods Surgically-resected NSCLCs which had undergone similar CT scans were included. Manual and volumetric measurements were performed and VDTs were calculated. The inverse of VDT was used for analysis (GR). Results 46 NSCLCs were eligible. The median VDT was 191 days (-9435 – 2256 days). The median GR was 0.0038 (-0.0086 – 0.0186). Adenocarcinomas had longer GRs than squamous cell carcinomas. Nine adenocarcinomas had VDTs greater than 400 days. Four cancers demonstrated negative growth. GRs in smokers were significantly faster than in never-smokers. The presence of symptoms was not related to GR. There was a trend to faster GRs with larger cancer sizes. The majority of cancers demonstrated an increase in mean density. Conclusion A number of factors are related to the growth of NSCLCs and this may be useful in the management of indeterminate pulmonary nodules.

NICHOLS, LISEL: UNDERSTANDING SUPPRESSIVE DENDRITIC CELL ACCUMULATION IN PRECANCEROUS, HPVE7-EXPRESSING SKIN

Faculty of Science

Supervisor: Miss Michelle Yong

Human papilloma virus (HPV) is the cause of 99.7% of cervical cancers with no current therapeutic vaccine. HPV expresses the cancer protein E7-which leads to hyper-proliferation and suppression of the immune response in the outer layer of the skin. The suppression of the local immune response is possibly via activation of dendritic cells (DCs). DCs are the key antigen presenting cells involved in immune response. They are responsible for the differentiation of naive T cells into effector T cells which destroy foreign cells, including HPV infected cells. However, in HPVE7 skin, DCs are likely immunosuppressive thereby suppressing the effector T cells. This allows the proliferation of the epithelium and potential for cancer formation. In HPVE7 skin, the density of DCs increases significantly, however the mechanism behind their migration is unknown. I hypothesise that DCs migrate to HPVE7 skin due to chemokines released from the hyper-proliferative skin. If the mechanisms of DC trafficking can be conclusively described, this would allow research into a method to block the trafficking, thus preventing the immunosuppression of T cells. This could lead to the restoration of effector T cells, and the destruction of hyper-proliferative epithelial cells.

O'MARA JULIAN: INTERTIDAL WETLANDS AND THE IMPACT OF SEA LEVEL RISE: MODELLING TO DEFINE THE SPECIFIC IMPACTS.

Faculty of Science

Supervisor: A/Prof Catherine Lovelock

This research is investigating the likely changes in South East Queensland's coastal wetlands with future projected sea level rise in order to devise adaptation strategies. The issues of climate change, and more particularly, that of projected rises in sea level are forecast to have profound effects on the environment. Coastal wetlands are at the forefront of ecosystems to be affected, with studies indicating coastal wetlands are strongly influenced by sea level rise, which can change their distribution and composition. Commercial and recreational fish species are highly dependent on coastal wetlands with fish catches correlated with the areas of mangroves and saltmarsh over a wide range of locations, including South East Queensland. Changes in intertidal wetland extent may influence the future commercial and recreational fishing industry through changes in available species and catches. Through identifying the potential impacts of SLR on wetlands it will be possible to contribute to the development of adaptation strategies for this industry. This study is being funded by the National Climate Change Adaptation Facility, Queensland Fisheries, the Goodman Foundation and the Wildlife Preservation Society of Queensland.

POTTER, FRANCES: COLOURING THE PLANE

Faculty of Science

Supervisor: A/Prof Joseph Grotowski

A graph is a representation of a set of objects, called vertices, connected by links, called edges. Colouring a graph refers to labelling the vertices, traditionally with colours, subject to constraints. The Hadwiger-Nelson problem asks what the minimum number of colours is necessary to colour the plane, such that two points unit distance apart have different colours. In graph theoretic terms, it asks what is the chromatic number of the infinite graph whose vertex set is the set of points in \mathbb{R}^2 with an edge between two vertices if and only if they are unit distance apart. This research involved examining problems arising from the study of the Hadwiger-Nelson problem. Associated problems are proving useful in research relating to colouring the plane. Research is ongoing; no conclusive answer to the Hadwiger-Nelson problem has been found.

SPIERINGS, ANNETTE: DESIGNING HIGH THROUGHPUT ASSAYS ON THE FLEX STATION 3 MULTI-PLATE READER TO STUDY IN VITRO PHARMACOKINETICS

Faculty of Science

Supervisor: Dr Mary Louise Manchadi

Measuring cellular responses to experimental drugs is the first stage in the process of developing novel therapeutical drugs. The Woodruff/Taylor group recently acquired a Flex Station 3 multi-plate reader that can perform high sensitivity calcium traces on cells. The ultimate goal of my honours project is to investigate the parameters for designing a highly sensitive cellular assay to extend upon existing pharmacokinetics data. The Woodruff/Taylor lab at SBMS is using the flex station to investigate the pharmacological properties of their new CD88 antagonists, PMX53 and PMX205. With this new equipment, novel compounds (both CD88 agonists and antagonists) can be screened in a timely and effective manner in varying conditions and on various kinds of cells. (Both primary cell lines and isolated tissue samples.)

SUPPIAH, HARESH T: PREDICTIVE VALIDITY OF LABORATORY-BASED PHYSIOLOGICAL VARIABLES FOR RUNNING AND CYCLING TIME-TRIAL PERFORMANCES IN MALE SUB-ELITE TRIATHLETES

Faculty of Health Sciences

Supervisor: Dr Samantha Fisher

Purpose: To compare and evaluate which laboratory-tested physiological variables best predict 10km running and 40km cycling time-trial(TT) performances in male triathletes. Methods: Seven sub-elite male triathletes performed incremental tests to exhaustion for cycling and running where lactate and ventilatory threshold(LT and VT) variables, with maximal oxygen uptake(VO_{2max}), were ascertained. The V-Slope method was used for VT determination while the D-max method was used for LT determination. Subjects completed a TT in both disciplines based on the distance of an Olympic distance triathlon(40km cycle and 10km run) to obtain performance time. Results: Pearson product-moment correlations measured between LTRun($r=-0.92$; $p<0.01$) and VTRun($r=-0.92$; $p<0.01$) were highly inversely correlated with 10km TT time. The correlation between

VTCycle and 40kmTTT($r=-0.89$; $p<0.05$) indicated a high degree of relationship between the two variables. No significant correlation was yielded between 40kmTTT and LTCycle($r=-0.67$; $p=0.14$). Conclusion: VT was better able to predict 10km running and 40km cycling performance. Although LT was equally accurate in predicting running performance, the insensitivity of LT to hydrogen ion accumulation, and methodological difficulties, make it a complex alternative to predicting cycling performance as compared to VT.

WONG, YEW MUN: CONTROLLED DELIVERY OF ANTIVIRALS FOR PREVENTION OF SEXUALLY TRANSMITTED INFECTIONS

Faculty of Health Sciences

Supervisor: A/Prof Allan Coombes

This experiment investigated the properties of matrix-type drug delivery devices and the correlative release behaviour of acyclovir to evaluate their potential for local delivery of antivirals to the female genital tract. Microporous polymer matrices with different drug loading (10, 15 and 20% w/w) consisting of a continuous phase of poly(ϵ -caprolactone) (PCL) and a dispersed phase of acyclovir were produced by rapidly cooling suspensions of drug powder at -80°C followed by solvent extraction from the hardened materials. Cylindrical samples were placed into simulated vaginal fluid (SVF) at 37°C and the amount of acyclovir release was measured at designated time intervals over 28 days using UV spectrophotometry at 255nm. Matrices loaded with 10% acyclovir displayed a total cumulative drug release of 33% in 28 days, resulting in a concentration of antiviral in SVF in excess of the IC50 value of $\geq 2 \mu\text{g/mL}$ for inactivating herpes simplex virus (HSV). These findings recommend further investigations of PCL matrices in the form of intravaginal ring inserts (IVRs) for delivery agents for prevention of sexually transmitted infections such as AIDS.

XIE, TERESA: CHARACTERISING THE IMPACT OF HIGH FAT DIETS ON THE ENDOCRINE PROFILE OF C57BL MICE DURING THE DEVELOPMENT OF OBESITY

Faculty of Science

Supervisor: Dr Frederik Steyn

The endocrine system is central to regulation of appetite as well as the overall maintenance of body composition and energy homeostasis. Accelerated weight gain and obesity is associated with multiple disruptions in the normal endocrine profile. In this study, we assessed the effectiveness of three commercial diets (sourced from Specialty Feeds, Western Australia) in inducing obesity. Four-week old male C57BL mice were fed on either diet for a period of 12 weeks, and analysis of weight gain and consequential effects on endocrine function were assessed at 4, 8 and 12 weeks of feeding. Results suggest that the secretion of ghrelin, growth hormone and adiponectin all decline with increased adiposity, whereas excess adiposity is associated with prolonged elevation of leptin. While a characteristic shift in the endocrine profile was observed in all animals maintained on a high fat diet, animals maintained on the diet comprises of 60% kcal contribution from fat did not result in significant weight gain. It could be an indication physiological changes vary according to the composition of the diet.

ZHANG, TIAN YU: SELF-MIXING LASER DOPPLER VELOCIMETRY INSIDE A CUSTOM FLOW CHANNEL

Faculty of EAIT

Supervisor: A/Prof Aleksandar Rakic

The use of optical feedback in semiconductor lasers allows non-intrusive measurements, at high precision and high frequency. This can be very useful in biomedical applications such as arterial blood flow measurements. The principle behind the Self Mixing Laser Doppler Velocimetry (SMLDV) relies on the reflection of the laser beam back into the laser. This creates a fluctuation in the laser junction voltage signal. After applying Fourier transform, by measuring the power spectrum of the Doppler frequency of this signal, the target velocity component projected along the optical axis of the laser beam can be calculated. The prototype will be able to measure velocity distribution of fluid in a custom-built flow channel. In particular, the effect of using different optics on the location and the size of the sensing volume in the channel. Three different calculation methods, thin lens approximation, ABCD matrix method, and Code V were used in modeling the sensing volume of the optical system. The velocity profiles for various sensing volume were compared against each other as well as to the simulated profile using fluid dynamic package in order to determine the relationship between sensing volume and velocity distribution.