

# 2009

## SPHPM Honours Projects



*L-R: Anna Kourbasis, Ryan Hiller and Stephanie Tanamas, 2008 SPHPM Honours students*



**MONASH** University  
Medicine, Nursing and Health Sciences

School of Public Health and Preventive Medicine

SPHPM

Monash University

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## Overview

### School of Public Health and Preventive Medicine Honours Projects 2009

Our Honours program offers a career path into many areas of public health and clinical research. The opportunities have been increased from 2008 by the creation of the School of Public Health and Preventive Medicine, which now combines the Department of Epidemiology and Preventive Medicine, the Centre for Obesity Research and Education, the Monash Institute of Health Services Research and the Department of Forensic Medicine.



Our Honours program coordinator is Dr Anna Peeters (pictured left).

Email: [anna.peeters@med.monash.edu.au](mailto:anna.peeters@med.monash.edu.au)

We offer students the opportunity to follow a career into many areas of public health and clinical research including:

Cardiovascular medicine	Clinical epidemiology	Clinical pharmacology
Clinical registries	Clinical trials	Emergency medicine
Environmental health	Epidemiological modelling	Health policy development
Health economics	Health promotion	Health risk assessment
Health services management	Human rights & bioethics	Infectious diseases
Intensive care research	International public health	Occupational health
Patient safety	Pre-hospital care	Preventive medicine
Primary health care in developing countries	Respiratory epidemiology	Rheumatology

## SCHOOL OF PUBLIC HEALTH AND PREVENTIVE MEDICINE

### Department of Epidemiology & Preventive Medicine [\[top\]](#)

Contact person: Dr Anna Peeters (*School Honours coordinator*)

+61 3 9903 0177 Fax. 9903 0556

Email. [anna.peeters@med.monash.edu.au](mailto:anna.peeters@med.monash.edu.au)

Mail. Alfred Hospital, Commercial Rd, Prahran 3181

Courier. 3<sup>rd</sup> Floor, 553 St. Kilda Rd, Melbourne



#### **Description of key research areas:**

##### Cardiovascular epidemiology

- Cost effectiveness of health services for cardiovascular disease (CVD) and heart failure (HF).
- Primary prevention model of CVD

##### *Preventive Medicine*

- Chronic disease and ageing
- Overweight and obesity in Australia

##### *Clinical pharmacology*

- Clinical and basic studies of new drug therapies for HF
- Effect of drugs on autonomic and endothelial parameters in HF

##### *Occupational and environmental health*

- Environmental arsenic exposure health effects
- Gulf War veterans' health
- Cellphone health effects

##### *Health services research*

- Cost-effectiveness and development of discharge performance indicators

##### *Occupational Health*

- Occupational exposures and workers' health
- Surveillance of workplace-based adverse events

##### *Respiratory epidemiology*

- Diet, pollution and chronic lung disease

##### Rheumatology

- Lifestyle factors and MRI evaluation of osteoarthritis
- Preventing disability from back pain

##### Sports injury prevention

##### *Trauma epidemiology*

- Emergency medicine
- Ambulance Service delivery

##### Bioethics and Human Rights

- Public health law and human rights
- International research ethics

## Department of Forensic Medicine, in Victorian Institute of Forensic Medicine

Contact person: Professor Olaf Drummer [\[top\]](#)

phone 9684 4334; facsimile 9682 7353  
e-mail [olaf.drummer@med.monash.edu.au](mailto:olaf.drummer@med.monash.edu.au) or [olaf@vifm.org](mailto:olaf@vifm.org)  
Department of Forensic Medicine  
57-83 Kavanagh St, Southbank 3006



### Description of key research areas :

Research projects are focused on improving our understanding of medical, scientific and legal issues associated with the practice and applications of forensic medicine. Topics include

- adverse medical treatment related events,
- development of improved methods for DNA testing,
- new applications drug detection methods in forensic toxicology,
- traffic medicine (effect of drugs on driving skills, hemianopia and driving skills, ageing drivers),
- sexual assault (drug facilitated assault, outcomes of paediatric and adult cases, injury patterns),
- wound (injury) interpretation,
- Use of imaging technology in forensic medicine (CT scans)
- development of new tissue products, research into reconstructed matrices (biological and non biological materials, combinations of isolated cells and scaffolds, dedicated scaffolds for homing of circulating autologous stem cells).

Any students interested in one or more projects please contact Professor Olaf Drummer. See also web page at [www.vifm.org](http://www.vifm.org)

## Centre for Obesity Research and Education (CORE) [\[top\]](#)

Contact person: Dr Anna Peeters

Tel. 9903 0177 Fax. 9903 0556  
Email. [anna.peeters@med.monash.edu.au](mailto:anna.peeters@med.monash.edu.au)  
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Courier. 3<sup>rd</sup> Floor, 553 St. Kilda Rd, Melbourne

### Description of key research areas :

Management and treatment of obesity, severe obesity and related co-morbidities such as diabetes. The mission of CORE is to understand the disease of obesity, to identify optimal methods for its long-term management that are safe and cost effective, and to determine preventive strategies that can be implemented. Key studies include randomised clinical trials of laparoscopic adjustable gastric band surgery, evaluation of changes in physical and mental health following surgery, and the mechanisms of action of weight loss.

## Monash Institute for Health Services Research [\[top\]](#)

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Mail. Alfred Hospital, Commercial Rd, Prahran 3181

Courier. 3<sup>rd</sup> Floor, 553 St. Kilda Rd, Melbourne

### **Description of key research areas :**

MIHSR was established in 1999 as a conjoint entity of Southern Health and Monash University in response to the challenge of ensuring people have a safe and effective encounter with the healthcare system. We improve healthcare outcomes through applied research, education, advocacy and innovation in the areas of clinical management, service delivery and health policy. The Institute incorporates a multidisciplinary team with expertise in the synthesis of evidence, implementation of best practice and evaluation of change. It includes the following centres: the Australasian Cochrane Centre, Turning Point Drug and Alcohol Centre and the Jean Hailes Foundation Research Centre, [Monash Ageing Research Centre](#), and the [Centre for Clinical Effectiveness](#). We work together with clinicians, consumers, managers and policy makers to provide an independent perspective. Key topic areas include healthy ageing, evidence based medicine, health informatics, drug and alcohol research and women's health.

### **Australasian Cochrane Centre (ACC) - a participating Centre within MIHSR**

The ACC provides training in systematic review methods which underpin and promote good research practice, and provides international links of strategic importance to Monash University. The ACC aims to promote the equitable provision of effective health care in Australasia by facilitating the preparation and maintenance of systematic reviews and their dissemination and application to influence service provision and clinical practice.

The ACC has a program of research exploring effective ways to inform healthcare decisions through the uptake of evidence. This includes projects investigating the synthesis, interpretation, dissemination and implementation of research evidence for clinical practice and policy.

To date, our research has been nested in a variety of clinical areas, with a focus on chronic conditions where the healthcare burden is large. We have completed or are undertaking projects in men's health, musculoskeletal health, diabetes and maternal and child health.

We hope the output from our research will result in:

- a contribution to reliable methods for conducting systematic reviews;
- a contribution to informing researchers and disseminators of evidence about framing their research in ways which increases relevance to those making decisions about health care (consumers, practitioners and policy makers);
- a contribution to effective methods of bringing about improved clinical practice and health policy through interventions to increase the uptake of evidence; and
- the production of tools to promote global access to reliable health care information.

Further information and contact details are available at [www.cochrane.org.au](http://www.cochrane.org.au)



The Centre for Population Health at the Burnet Institute conducts research and implements public health programs in Australia and developing countries. Key health issues that we focus on include HIV, hepatitis, chlamydia and other STIs, and illicit drug and alcohol use. Our methods include health promotion, epidemiology, surveillance, behavioural research, outreach to at risk populations, monitoring, and evaluation. Our work focuses on at risk populations including young people, gay men, homeless people, drug users, prisoners, pregnant women, and culturally and linguistically diverse communities.

2009 Honours projects offered by the Centre include;

- Overview of Khat use in Melbourne, supervisor Paul Dietze and Margaret Hellard
- Using Communication Technologies to Reach Young People for Sexual Health Promotion, supervisor Margaret Hellard and Campbell Aitken
- Hepatitis C Surveillance around the World, supervisor Campbell Aitken
- Illicit Drug Reporting System in Rural Towns, supervisor Paul Dietze

For more information please refer to the Burnet Institute Honours 2009 booklet which will be available at the AMREP Information Night 26 August 2008.

## **AMREP Honours Scholarships 2009**



### ***Location***

Honours programs located at AMREP, Alfred campus, Commercial Rd, Melbourne:

- The Alfred hospital
- Baker IDI Heart and Diabetes Institute
- Burnet Institute
- Monash University – Australian Centre for Blood Diseases, Departments of Epidemiology and Preventive Medicine, Immunology, Medicine, and Surgery

### ***Eligibility***

- To be eligible, you must be an Australian or New Zealand citizen or holder of an Australian permanent resident visa or humanitarian visa, or an international student.
- Applicants should be completing a Bachelor of Science or Bachelor of Biomedical Science degree at the end of 2008, having achieved a minimum grade average of 80% across their three years of undergraduate study.
- Applicants must be intending to enrol in a full-time Honours program at AMREP through Monash University in 2009.
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### ***Details***

- Each scholarship is valued at \$6,000 for one year of full-time study.
- This scholarship cannot be deferred.
- Applicants cannot hold this scholarship and another Monash Honours scholarship at the same time.

### ***Retention***

Recipients of the AMREP Honours Scholarship must maintain full-time enrolment and demonstrate that satisfactory progress is being achieved.

### ***2009 Applications***

Applications open 1 August 2008 and close 31 October 2008. When completing the [2009 Coursework Scholarships Application Form](#), tick the Honours Scholarships (various) box. A text box to provide further information will appear.

**The first item to be entered should be a statement of your intention to apply for an AMREP Honours Scholarship.**

<http://www.adm.monash.edu/scholarships/opportunities/amrep-honours-scholarship.html>

## Honours Projects

### Centre for Research Excellence Patient Safety (CRE-PS)

#### Frontline perceptions of competency in the ED [\[top\]](#)

Dr Shelly Jeffcott & Dr Sue Evans

(03) 9903 0248 [shelly.jeffcott@med.monash.edu.au](mailto:shelly.jeffcott@med.monash.edu.au)

Traditionally medical competence within the emergency department (ED) focuses on clinical expertise and technical skills while non-technical skills such as communication, teamwork, leadership and decision-making receive less focus. It is difficult for traditional examinations to assess how well the candidate would interact with the rest of the clinical team and also how they would actually react in a critical event. There is a shift to trying to incorporate more non-technical, team-based competency building into medical education. Frontline perceptions have been neglected within this process. Exploring current views of frontline ED staff on the assessment of their competence can provide recommendations to help re-design present education programmes. Questionnaire and follow-up interviews will be employed.

#### Analysing fatigue using the ANZICS registry [\[top\]](#)

Dr Shelly Jeffcott & Dr Sue Evans

(03) 9903 0248 [shelly.jeffcott@med.monash.edu.au](mailto:shelly.jeffcott@med.monash.edu.au)

The Australian and New Zealand Intensive Care (ANZICS) registry was established as a major initiative in quality assurance within intensive care communities. It enables us to measure process and outcome measures against variables such as staffing levels. For example, roster systems for key professional groups in the intensive care unit can be matched to outcomes. Aside from interrogation of the registry data this project may also include a qualitative element to assist in explaining potential performance impairment associated with fatigue, as linked to outcome data, by interviewing key ICU stakeholders.

#### Mapping medication across healthcare [\[top\]](#)

Dr Shelly Jeffcott & Dr Sue Evans

(03) 9903 0248 [shelly.jeffcott@med.monash.edu.au](mailto:shelly.jeffcott@med.monash.edu.au)

Many medication errors occur surrounding patient transfer between the acute and community settings. For instance, on discharge, GPs frequently fail to receive timely medication information from the hospital and discharge summaries are reported to contain errors in 75% of the cases. This is in spite of standardised medication reconciliation forms which nurses review to identify discrepancies. Consultation with key stakeholders will allow the building of process maps which will show main tasks and sub-tasks and can be subjected to risk assessment to identify key risks. This research seeks to get a better understanding into discontinuities, inaccuracies and incompleteness relating to medication provision across healthcare settings in order to pave the way for the development of streamlined methods of medication reconciliation, which may include electronic formats.

#### Communication during ward handovers [\[top\]](#)

Dr Shelly Jeffcott & Dr Sue Evans

(03) 9903 0248 [shelly.jeffcott@med.monash.edu.au](mailto:shelly.jeffcott@med.monash.edu.au)

Ineffective communication between professionals at the point of clinical handover can lead to increased errors and compromised patient safety. One of the key issues is the impact of power differentials within and between different disciplines on patterns of communication and the quality of information transfer. For instance, this project will focus on how junior nurses adapt their commu-

nication style when transferring handover-relevant information to their direct counterparts versus more senior nurses. Similar investigation throughout the hierarchy of medical staff will take place. The existence of power differentials have the potential to impede vital information transfer and, as such, are an important pre-determinant of overall effectiveness of handover communication. This project will involve ethnographic investigation of medical and nursing professional's communication during ward handovers. Multiple data collection methods will be used including participant observation, in-depth interviewing and document analysis in order to triangulate findings. This exploratory study in general medical wards will enable recommendations to be made for future work in this and other healthcare settings.

### **Nurse workload in the Emergency Department** [\[top\]](#)

Dr Shelly Jeffcott & Dr Sue Evans

(03) 9903 0248 [shelly.jeffcott@med.monash.edu.au](mailto:shelly.jeffcott@med.monash.edu.au)

Working overtime and/or extended shifts has been demonstrated to reduce nurses' vigilance and compromise patient safety. However, the nature of workload in 'normal' shifts, which is one of the most important job stressors amongst nurses, has not been explored. Workload measures developed by the human factors community are effective in assessing situation-level workload. For example, the subjective workload assessment technique (or SWAT) assists in the identification of those performance obstacles and facilitators that contribute to workload and can, subsequently, help guide re-design processes to improve patient care. This project will address the paucity of research on cognitive workload and stress and their impacts on patient safety by utilising the SWAT tool with nursing staff within the ED. It will help to familiarise you with human factors issues in healthcare.

### **Impact of age on outcomes and surgical complications for patients undergoing cardiac surgery in Victorian public hospitals** [\[top\]](#)

Dr Sue Evans & Associate Professor Chris Reid

[Sue.evans@med.monash.edu.au](mailto:Sue.evans@med.monash.edu.au) 9903 0017

Improvements in the Australian health care services have led to an increased number of people aged more than 80 years. According to the Australian Bureau of Statistics, in the year 2001 there were 18 972 350 citizens in Australia with 586 054 aged 80 years and over. It is predicted that by the year 2011 the proportion of people aged more than 80 years will be increased by 26%. Cardiovascular disease is known to be the leading cause of morbidity and mortality in older people. As a result, the ageing of the Australian population has led to an increased number of elderly patients with symptomatic coronary artery disease being considered for coronary artery bypass surgery (CABG).

#### **Project aim:**

The purpose of the proposed study is to compare the cost and outcomes of patient 80 years of age and older undergoing CABG in Victorian Public hospital with those of younger patients (those aged less than 80 years).

#### **Methods:**

Data for this study will be sourced from two databases

1. The Australian Society for Cardiac Surgery database, a well-established large cardiac surgery registry that has been in operation for more than 5 years. This registry contains outcomes and numerous risk factors for all patients undergoing cardiac surgery in six Victorian public hospitals
2. The Victorian Admitted Episode Database. This database comprises demographic, clinical and administrative details for every admitted episode of care occurring in Victorian acute hospitals.

#### **Significance:**

Potential benefits of the study include:

- i. By identifying unfavourable outcomes associated with older age, if any, medical personnel will be able to anticipate and implement preventive measures.

Identifying reasons for disparities, if any, between the cost of treating older versus younger patient will lead to a better understanding in resource allocation and cost effectiveness of different cardiac surgery units in different hospitals across Victoria.

### **Inter-professional communication and team climate in the Operating Room** [\[top\]](#)

Monash University: Department of Epidemiology and Preventive Medicine, Deakin University, Epworth Private Hospital, Richmond

Dr Bernice Redley, Dr Sue Evans & Dr Shelly Jeffcott

[Sue.evans@med.monash.edu.au](mailto:Sue.evans@med.monash.edu.au) 9903 0017

#### **Background**

The role of post anaesthesia care has evolved from one of passive observation to an important determinant of recovery and total length of stay in hospital. In addition, post anaesthesia care units (PACU) have been identified as care areas with the potential for serious adverse events. Previous studies have shown the overall incidence of adverse events occurring in PACU as 5 to 30%. In an analysis of data from the Australian Incident Monitoring Study (AIMS), communication failure was identified as the contributing factor for 14% of incidents that occurred in the recovery room.

#### **Aims**

The overall aim of this project is to explore the specific, complex relationships involved in inter professional communication and team climate in 2 PACU, one in a large tertiary referral hospital and one in a not-for-profit private hospital in metropolitan Melbourne. The specific aims are to:

- 1) Explore communication processes between team members during patient handover,
- 2) Identify the contexts within which communication between team members takes place,
- 3) Analyse communication processes and strategies and decision outcomes for the management to postoperative patients,

#### **Methods**

A naturalistic design using field observations and semi-structured interviews is proposed. This study is designed to investigate specific unique characteristics of team communication in PACU. We will use non participant observation of interactions between PACU team members within the postoperative environment in combination with an immediate, comprehensive semi structured, follow-up interview. The desirability of conducting research under natural conditions has been the basis for many discussions on research design. In his seminal works Brunswik concluded that a representative design needs representative and realistic tasks in order to generalise findings in human judgement tasks to judgement in real life.

#### **Significance**

The overall objective is to inform an intervention study to improve communication and improve patient safety in PACU.

#### **Australia and New Zealand Intensive Care Research Centre (ANZIC-RC)**

### **Optimal ventilation strategy of critically ill patients with lung damage** [\[top\]](#)

Prof Jamie Cooper, Dr Alistair Nichol

Phone: 03 099030513 Email: [Alistair.Nichol@med.monash.edu.au](mailto:Alistair.Nichol@med.monash.edu.au)

**Description:**

The Australian New Zealand Intensive Care–Research Centre organises and manages clinical trials which aim to improve the management of patients who are critically ill. We require an Honours student to assist us with the literature review, data collection and interpretation of a sub-study of a new trial designed to improve outcome of patients with lung damage in the intensive care unit of the Alfred hospital.

***Brief summary of background***

While mechanical ventilators provide life-saving respiratory support for critically ill patients, they can also cause lung injury or further worsen pre-existing acute lung injury. Acute lung injury and the more severe acute respiratory distress syndrome are inflammatory conditions of the lung which complicate many critical illnesses including trauma, burns, and infection and results in a mortality of 40-70%. Patients with acute lung injury are at high risk for ventilator-associated lung injury which, in turn, contributes to the high mortality of patients with acute lung injury.

***Brief summary of intervention***

What we are aiming to do in this study is to find out whether patients who have developed lung injury are better off when we further reduce the size of each ventilator breath, receive a sustained deep breath (recruitment manoeuvre) from time to time and permit elevated levels carbon dioxide.

***Brief summary of outcome measures***

We think that these three measures which have all been independently been shown to be beneficial to patients, will when packaged together will confer additional protection and benefit.

We therefore propose to conduct a randomized, controlled, trial examining the impact of this ventilation strategy versus best practice pressure and volume limited ventilation, alone, on systemic mediators of inflammation (blood test), organ dysfunction, duration of mechanical ventilation and mortality in patients with acute lung injury.

There are a number of substudies attached to this project which assess oxidation, response to the recruitment manoeuvre and physiological determinates of response to recruitment manoeuvre. These substudy projects would allow a student to develop skills in scientific writing, data collection, handling and an introduction to the critical care environment.

**Investigating risk factors for illness in Australian Gulf War veterans** [\[top\]](#)

Dr Helen Kelsall and Mr Dean McKenzie

9635 5164 [helen.kelsall@med.monash.edu.au](mailto:helen.kelsall@med.monash.edu.au)

**Description:**

During the 1990/1991 Gulf War, Australia deployed 1871 Defence Force personnel to the Gulf region as part of a multinational response to the invasion of Kuwait by Iraq. The possible health effects of this deployment have created scientific and public interest internationally. In a recent cross-sectional study, the Australian Gulf War Veterans' Health Study, we compared the physical and psychological health of Australian Gulf War veterans with a military comparison group. Gulf War veterans had poorer psychological health, increased prevalence of fatigue related outcomes, higher number and more severe health symptoms but no unique pattern, and increased prevalence of many self-reported health indices but little difference on objective health measures, compared with the comparison group. Since the original study we have used the dataset to investigate further research questions of interest including the relationship between psychological health and attrition from the Australian Defence Force, the development of psychological disorders over time, and vaccinations and deployment comparing reported and recorded vaccination data.

A student could choose from several projects to investigate further the risk factors for illness in Gulf War veterans. These would involve undertaking further analysis of the existing dataset to investigate health outcomes of interest to the student and the study; including health outcomes or symptom patterns relevant to specific systems, e.g. dermatological, gastrointestinal, musculoskeletal, alcohol use or psychiatric disorders, body mass index, and laboratory investigations. Training in epidemiology, biostatistics and appropriate research supervision will be available. This project will have important implications for the health of Gulf War veterans and health policy development in the Australian Defence Force, and is an opportunity to develop new skills in epidemiological research in a very active Department.

#### **Musculoskeletal Unit** [\[top\]](#)

##### **How does weight loss affect change in knee cartilage volume?** [\[top\]](#)

Professor Flavia Cicuttini and Dr Anita Wluka

9903-0553 [Flavia.Cicuttini@med.monash.edu.au](mailto:Flavia.Cicuttini@med.monash.edu.au)

Osteoarthritis is the most common form of arthritis. Little is known about risk factors for this disease because we have been unable to study the pre-disease state due to limitations of technology. Perhaps because of this, the only factor which has been shown to alter the risk of getting this disease, that we have the power to change, is obesity. Yet little is known about how changes in weight affect the risk of osteoarthritis. Using new Magnetic Resonance Imaging technology, we are able to study the effect of proposed risk factors before disease is established. We propose to study the effect of obesity and significant weight loss on knee cartilage and other structures around the knee affected by knee osteoarthritis to fill this gap in knowledge.

##### **Identification of factors effecting progression of knee osteoarthritis as measured by a novel magnetic resonance imaging based technique** [\[top\]](#)

Professor Flavia Cicuttini and Dr Anita Wluka

9903-0553 [Flavia.Cicuttini@med.monash.edu.au](mailto:Flavia.Cicuttini@med.monash.edu.au)

Osteoarthritis (OA) is the single biggest cause of disability in Western society. Little is known about the factors that effect disease progression. We have developed a novel MRI-based method for measuring joint cartilage in OA. We are following a cohort of people with early OA that were initially recruited in 997/8. We are using the novel MRI method to determine which factors effect disease progression in OA in this cohort.

##### **The effect of physical activity on knee cartilage in normal men and women** [\[top\]](#)

In evaluating the benefit of recreational physical activity as a major public health initiative to reduce cardiovascular disease and osteoporosis, the risks need to also be determined. There is much controversy as to whether physical activity will damage joints or whether it will improve the amount of knee cartilage and thus reduce the risk of developing knee osteoarthritis.

In this study we will examine the effect of physical activity of the amount of knee joint cartilage in healthy men and women. This will have important implications for public health recommendations regarding exercise.

##### **The association between severe obesity and morbidity** [\[top\]](#)

[Dr Anna Peeters](#)

9903-0177 [Anna.Peeters@med.monash.edu.au](mailto:Anna.Peeters@med.monash.edu.au)

The prevalence of overweight and obesity is increasing in Australia and world-wide. In Australia the prevalence of obesity has more than doubled in the last 20 years, with the prevalence of those with severe obesity increasing even more. Whilst it is known obesity is associated with increased risks of

diabetes, cardiovascular disease, cancer, and osteoarthritis, the burden of these diseases in the severely obese is not well described.

This project will analyse data from Australian population surveys and will analyse the differences in prevalence of the various diseases in different weight classes.

We are seeking students interested in undertaking honours projects to assist with this study. This project will involve working with large population data-sets and students will gain experience in analysis and research writing. Training in epidemiology, biostatistics and appropriate research supervision will be available. Students will be encouraged to write up a research publication from this project.

#### **Differences in trends in overweight and obesity according to socio-economic status [\[top\]](#)**

[Dr Anna Peeters](#)

9903-0177 [Anna.Peeters@med.monash.edu.au](mailto:Anna.Peeters@med.monash.edu.au)

The prevalence of overweight and obesity is increasing in Australia and world-wide. In Australia the prevalence of obesity has more than doubled in the last 20 years. Whilst it is known that those in lower socio-economic groups have a higher prevalence of obesity, it is not known whether the rate at which it is increasing is the same as in higher socio-economic groups or not. As obesity is associated with increased risks of morbidity and mortality, and we know that lower socio-economic groups already suffer high rates of morbidity and mortality it is important to know whether the trends in obesity will lead to further disadvantage for this group.

This project will analyse 5 cross-sectional studies in Australia between 1980 and 2000, in which weight and socio-economic status was recorded by the study investigators. We propose to analyse the trends in overweight and obesity over this time, comparing the trends in different socio-economic groups.

We are seeking students interested in undertaking honours projects to assist with this study. This project will mainly involve working with a large data-set and performing time-series analysis on the studies. Training in epidemiology, biostatistics and appropriate research supervision will be available. Students will be encouraged to write up a research publication from this project.

#### **Weight maintenance and mortality [\[top\]](#)**

[Dr Anna Peeters](#)

9903-0177 [Anna.Peeters@med.monash.edu.au](mailto:Anna.Peeters@med.monash.edu.au)

The prevalence of overweight and obesity is increasing in Australia and world-wide. Whilst it is known that they are associated with increased risks of morbidity and mortality, it is unclear how to reduce the harm associated with the epidemic. Weight loss has been shown to be effective in many settings but it is difficult to achieve and even more difficult to maintain. We hypothesise that weight maintenance in those already overweight or obese may also decrease the associated health risks.

This project will analyse 50 years of follow-up of the Framingham Heart Study, in which weight was recorded every two years and mortality was recorded for each of the 5000 participants. We propose to analyse those within the Framingham Heart Study who were overweight or obese and see whether those who did not put on weight had better survival than those who continued to put on weight throughout life.

#### **Preventive Medicine Unit**

#### **Investigating in-hospital fractures as markers of quality of care [\[top\]](#)**

Professor John McNeil and Dr Sue Evans

9903-0017 [Sue.Evans@med.monash.edu.au](mailto:Sue.Evans@med.monash.edu.au)

The incidence of hip fractures is increasing. The incidence of hip fractures is eleven-fold greater in hospitalised patients compared to non-hospitalised patients of comparable age. In-hospital fractures have been used to measure the quality of care provided by health services in the US. It has been proposed as a marker of quality of care in Australia.

The aim of this study is initially to identify the prevalence of hip fractures in hospitalised patients in Victoria using administrative data. This study will compare in-hospital fractures with other quality markers to see how well performance correlates.

We are seeking students interested in undertaking honours projects to assist with this study. This project will mainly involve working with a large data-set and performing epidemiological analyses. Training in epidemiology, biostatistics and appropriate research supervision will be available.

### **Medication Safety** [\[top\]](#)

Professor Paul Myles and Dr Sue Evans

9903-0017 [Sue.Evans@med.monash.edu.au](mailto:Sue.Evans@med.monash.edu.au)

Medication errors represent the largest subset of adverse events that occur in hospitals. It is estimated that nearly half of all medication errors are preventable. Distractions and interruptions affect the performance of work tasks; however their effect on medication errors requires further research. The Recovery Room is an ideal place to study medication errors because many events occur in a short time period in a confined area.

We are seeking students interested in undertaking honours projects to assist with this study. We are particularly interested in studying intravenous medication errors. Students will investigate previous research in this area. Interrogating incident reports, students will initially establish whether patterns seen in previous research are repeated locally, or whether new factors emerge. The major component of this study will involve observational study of nurses in the Recovery Room, particularly in relation to their management of intravenous medication. The impact of interruptions and distractions on an outcome of adverse events and near misses will be investigated. Workflow issues relating to the administration of intravenous medication will be investigated.

This project will assist in better identifying factors that affect patient safety in clinical situations. It will provide a better understanding of the role of human performance factors, organisational factors and system deficiencies in the generation of medication errors.

### **Musculoskeletal Unit**

#### **Excess cardiovascular risk mortality in patients with rheumatoid arthritis** [\[top\]](#)

Associate Profs F Cicuttini M de Courten D Liew and Dr A Peeters

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Patients with rheumatoid arthritis (RA) exhibit increased mortality. Only recently it is recognized that cardiovascular disease (CVD) accounts for a substantial part of this excess mortality, with cerebrovascular disease being the second leading cause of death in these patients. RA is associated with the presence of atherosclerosis and other traditional cardiovascular risk factors such as dyslipidaemia, glucose intolerance, hypertension and microalbuminuria. The chronic inflammation experienced by these patients might be a common cause underlying increased CVD risk.

This project seeks to estimate the CVD mortality risk in patients with RA and risk factor measurements applying risk calculation algorithms derived from large population-based studies such as the Framingham Heart Study.

The principal objective is to develop the best available evidence for CVD management into routine clinical practice of patients with RA should this project demonstrate a substantially increased CVD risk.

We are seeking students interested in undertaking honours projects to assist with this study. This project will mainly involve working with a in-house data-set on RA patients and performing risk analyses. Training in epidemiology, biostatistics and appropriate research supervision will be available.

### **The layperson's theories of causality in obesity [\[top\]](#)**

A/Prof Maximilian de Courten, Dr Samantha Thomas, Prof Paul Komesaroff

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It is widely recognized that some patients' responses to their maladies and disabilities are greatly influenced by their beliefs, attitudes, and experiences. Furthermore, their value systems can have a profound effect on the course and outcome of disease and can be used to justify decisions about subsequent behavior, which can vary from total indifference, to the use of home remedies, to the search for medical care.

Individuals who feel ill react to symptoms based not only on objective data but also, frequently, on their own theories and representations of illness, its causes, progression, and management. Hence a person's etiologic explanations shape his or her expressions and behaviors toward disease symptoms.

Beliefs, ideology, lay concepts, or cultural worldviews about certain conditions constitute not only valuable tools for understanding how individuals respond to disease but also methods for the improvement of health care systems. Comprehension of such concepts can enable researchers and health professionals to predict more accurately behaviors and practices of patients, and to collaborate in the development of effective policy and management programs.

Although laypeople's beliefs about chronic diseases have been the focus of many studies, relatively few researchers have explored the individual's explanation of the factors that give rise to obesity. Research on lay perspectives is relevant, not only because it will permit the understanding of how social and cultural elements shape chronic conditions, but also because it will permit the better understanding of the main health problems related to obesity. Research on this topic will also help to explain why a significant percentage of the population rejects the use of health services or abandons professional recommendations.

This study employs both quantitative and qualitative methods. It will involve a survey examining health professional's attitudes about the causes of obesity; the attributes of obese individuals; beliefs about the treatment and management of persons with obesity and the efficacy of treatment; and the referral of obese people for further care. Focus groups will also be used to examine beliefs and attitudes in more detail.

Students will receive excellent supervision from a multidisciplinary team. They will receive training in basic epidemiological analysis, qualitative methods and analysis, and critical reflection. Students will also be encouraged to prepare a paper for publication

### **Health Professionals Attitudes about Obesity [\[top\]](#)**

A/Prof Maximilian de Courten, Dr Samantha Thomas, Prof Paul Komesaroff

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Clinicians managing patients with obesity may tend to focus on the problem of obesity to the exclusion of other issues. As a result, obese people may be less likely than non-obese people to receive adequate care for health problems other than those relating to weight. Some international evidence suggests that primary care health professionals may feel negatively about their role in the management of obesity, and only small numbers would refer individuals for specialist care. If obese patients do not feel that services are supportive, or that they are discriminatory or stigmatising, they may be

reluctant to access services. There is even less evidence about the attitudes of allied health professionals involved in community weight loss programs (such as Weightwatchers) towards obesity.

An important initial step in understanding how health professionals can be better utilised in weight loss programs and the management of obesity, is to gain a better understanding of physicians' and allied health professionals current beliefs and practices toward obese people.

This study employs both quantitative and qualitative methods. It will involve a survey examining health professional's attitudes about the causes of obesity; the attributes of obese individuals; beliefs about the treatment and management of persons with obesity and the efficacy of treatment; and the referral of obese people for further care. Focus groups will also be used to examine beliefs and attitudes in more detail.

Students will receive excellent supervision from a multidisciplinary team. They will receive training in basic epidemiological analysis, qualitative methods and analysis, and critical reflection. Students will also be encouraged to prepare a paper for publication.

### **Photo elicitation of the obesogenic environment for adolescents** [\[top\]](#)

Associate Profs M de Courten and E Douglas

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The prevalence of overweight and obesity is increasing in Australia and most recently the increasing rates in children and young people have alarmed policy makers.

Overweight and obesity are the result of a positive energy balance – that is, a chronic excess of energy intake (food and beverage consumption) over energy expenditure (physical activity). Although some people are more genetically susceptible to weight gain than others, the rapid increase in the prevalence of obesity in recent years has occurred too quickly to be explained by genetic changes and most experts believe it is due to living in an increasingly 'obesogenic' environment – that is one that promotes overconsumption of food and drinks and limits opportunities for physical activity. The concept of the obesogenic environment offers new opportunities for health promotion however little is known if those particularly influenced by it – kids and adolescents – share this concept. Therefore this project seeks to elicit common understanding of this concept between researchers and adolescents by using a particular social research technique: photovoice.

Photovoice blends a grassroots approach to photography and social action. It provides cameras not to health specialists, policy makers, or professionals, but to people with least access to those who make decisions affecting their lives. It enables people to record and reflect their community's strengths and problems. It promotes dialogue about important issues through group discussion and photographs. Finally, it engages policymakers.

We are seeking students interested in undertaking honours projects to assist with this study. The fieldwork would be linked to the Obesity Prevention in Communities study with intervention areas in Geelong. This is an opportunity to develop new skills (qualitative and quantitative methods) in an applied field at the leading edge of contemporary obesity research in a very active Department.

### **Cardiovascular health predictors in children** [\[top\]](#)

Associate Profs de Courten and C Reid

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Cardiovascular disease is Australia's leading cause death and illness. It is a degenerative disease and, with the exception of congenital defects, rarely occurs in children and young adults. However, much of the burden of cardiovascular disease in later life is preventable through the control of major risk factors such as tobacco smoking, physical inactivity, over-weight, poor nutrition and high blood pressure. Many of these risk factors stem from behaviours and habits developed in the school years and

once established are difficult to alter. Much of the effort in community prevention of cardiovascular disease risk factors involves raising the awareness of risk factor levels and promoting risk factor control in adults. A complementary approach may be to parallel these community adult activities with one focussed on children and young adults.

In this project we propose to develop a cardiovascular health surveillance program in collaboration with a number of metropolitan and rural schools in the local communities surrounding the Alfred Hospital in Melbourne. A pilot study has been conducted with Wesley College, Prahran, in 2002. The aim is to monitor major cardiovascular risk factors amongst school children by;

- determining the level of risk factors in pupils attending Year 5 and Year , and
- monitoring the change in the extent of risk factor prevalence in each Year group annually.

There will be both cross-sectional and longitudinal aspects to the project. This information is needed in designing and planning of a series of intervention studies to address the question of progression of obesity and decreased physical activity in these populations. Studies will be designed in collaboration with school staff, facilities and current school curriculum.

We are seeking students interested in undertaking honours projects to assist with this study. Depending on background, an honours student can be involved in the testing and exposure assessment. Training in epidemiology, biostatistics and appropriate research supervision will be available. This is an opportunity to develop new skills in an applied field at the leading edge of contemporary epidemiological research in a very active Department.

### Clinical Epidemiology Unit

#### **The role of spirometry in managing chronic respiratory diseases in general practice (SPIRO-GP)** [\[top\]](#)

Professor Michael Abramson

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Most clinical practice guidelines stress the importance of spirometry (lung function testing) for diagnosis and evaluation of asthma and chronic obstructive pulmonary disease (COPD). The repeated measurement of the Forced Expiratory Volume in 1 second (FEV<sub>1</sub>) after the administration of a bronchodilator defines the rate of decline in lung function, helping to focus both treatment decisions and discussions regarding prognosis. However long-term studies to evaluate the benefit of regular spirometry in the management of COPD and asthma in general practice have not yet been conducted.

**Aim:** This study aims to trial spirometry as an intervention for management of asthma and chronic obstructive pulmonary disease (COPD) in a General Practice setting.

**Design:** The study is a masked RCT where practices are randomly allocated to one of three groups:

- Group A (Intervention) practices receive the full spirometry intervention and an interpretation of results is notified to the treating GP
- Group B practices receive spirometry before and after the trial, but no results are reported to the GP
- Group C (Control) practices provide usual medical care only, which may include peak flow monitoring, but not spirometry

**Outcomes:** The primary health outcomes, to be measured at baseline, at 3, 6, 9 and 12 months, are:

- Quality of life
- Asthma control

The secondary health outcomes, to be measured at baseline and 12 months, are:

- Frequency of symptoms, written management plans and medications
- Emergency presentations to GP or Emergency Department, Hospital admissions
- Change in FEV<sub>1</sub> (Groups A & B only)

General Practices are included if there is a commitment by the practice to participate, they agree to randomisation, are willing to recruit patients with asthma or COPD and are willing to search their medical records. Eligible patients attend a General Practice on the list of the Divisions of General Practice in Melbourne and surrounding regions, are aged 8 – 70 years, have doctor diagnosed asthma or COPD, are able to understand English and provide written consent to participate. We are recruiting 11 general practices per group, each of which recruits 22 patients with asthma or COPD, giving a total of 242 patients per group. This provides sufficient statistical power to detect an effect of spirometry on improving management to abolish wheeze and improve quality of life. This allows for 10% dropouts and clustering by practice.

An honours student working on this project would be part of a multidisciplinary team including respiratory physicians, general practitioners, paediatricians, respiratory scientists, social scientists and nurse educators. There would be an opportunity to learn interviewing and analytical skills and to perform some spirometry under supervision.

#### **A case-control study to investigate risk factors for myocarditis with clozapine** [\[top\]](#)

Dr Kathlyn Ronaldson & Prof John McNeil

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Clozapine is the most effective medication available for treatment-resistant schizophrenia, but its use is limited because of adverse effects including a drug hypersensitivity myocarditis. The incidence of myocarditis with clozapine is uncertain, but it may be as high as 1-5%. To date although risk factors have been proposed, no systematic studies have been conducted and there are no data in support of any factor. If risk factors are known it will be possible for clozapine to be made available to more patients who can benefit from it.

We have begun a case-control study aimed at identifying risk factors. The objective is to include around 200 cases and 800 matched controls from around Australia and New Zealand. The study involves data collection from patients' medical records, taking blood samples for genetic analysis and obtaining follow-up information on cardiac function and vital status. Information sought from patients' records includes date of birth, sex, ethnicity, laboratory parameters, cardiac reports, clozapine dose titration, concomitant medication, chronic diseases, smoking status and atopic disease.

An honours project could be shaped according to the interests of the individual student. There would be opportunity for data collection, data analysis, seeking information on vital status and experience with ethics committee applications. Training in the skills necessary for the chosen project will be provided.

#### **The role of the nurse in general practice** [\[top\]](#)

Dr Catherine Joyce [catherine.joyce@med.monash.edu.au](mailto:catherine.joyce@med.monash.edu.au)

The majority of general practices in Australia now employ at least one practice nurse. Despite recent growth and development in the practice nurse workforce, there is currently little data available describing the current functions and scope of practice for these nurses.

The Practice Nurse Work Survey aimed to describe the services provided and duties undertaken by practice nurses working in Australian general practice, including the patients seen, the types of clinical conditions treated, the services provided by nurses and the ways in which nurses work with doctors in their practice. The study also aimed to explore the relationship between practice profiles and nurse characteristics (such as qualifications and experience); and between practice profiles and practice characteristics (such as geographic location, practice size, multi-disciplinary teams).

The sample included 104 practice nurses nationally. Each nurse collected data about 50 encounters with patients, providing a database of over 5,000 nurse-patient encounters.

This Honours research project involves analysis of the encounter data set to investigate the aims indicated above. Statistical analyses of a clustered sample will be undertaken. The project also involves making interpretations from the findings with regard to policy relating to the practice nurse role.

### **Citizens' participation in health policy development** [\[top\]](#)

Dr Catherine Joyce & Professor Brian Oldenburg

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Currently there is a strong interest in broad health system reform, and in particular, orienting the health system more toward prevention of disease and promotion of health, rather than solely treatment of established or acute ill health. This is evident in national health policy developments such as the National Health and Hospitals Reform Commission and the National Prevention Taskforce. One important element of any major reform programs is the opportunity for citizens to participate meaningfully in this process and contribute to the development of new strategic policies.

The aims of this project are to review methods of community consultation or engagement being used in major health reform projects and to investigate community perceptions of their interest in, and capacity to contribute to major health reforms.

The project will involve a survey of a community sample of citizens. A random sample of people from the general public in Victoria will be recruited, and a short questionnaire administered to collect data on:

- Awareness of major national health reform agenda, e.g., National Health and Hospitals Reform Commission and National Prevention Taskforce, (e.g. terms of reference, membership etc)
- Awareness of opportunity to contribute to Commission or Taskforce (knowledge of consultation processes / strategies)
- Experience of/ participation in community consultation or engagement for health policy or other areas of public policy (e.g., attendance at consultation meetings, membership of consumer groups, participation in committees, submission to inquiries)
- Interest in community consultation or engagement
- Perceived capacity to participate in consultation or engagement
- Perceived value / importance / role of consultation or engagement.

### **Development of a risk prediction algorithm to predict Chronic Kidney Disease in Australians** [\[top\]](#)

Dr Dianna Magliano, Dr Jonathan Shaw, Prof Bob Atkins, Dr Kevan Polkinghorne and Dr Stephen Chadban

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Chronic kidney disease (CKD) is now recognised as a significant and rapidly growing health

burden in Australia and worldwide. In Australia, approximately 1 in 7 (almost 2 million) Australian adults have chronic kidney disease. CKD is commonly reported with cardiovascular disease and diabetes. CKD significantly increases a person's risk of suffering a heart attack, with people with CKD having at least a 40% increased risk of hospitalisation for a cardiovascular event. The most severe form of CKD is End-Stage Kidney Disease (ESKD) — when death will occur unless kidney functions, essential to life, are replaced by dialysis or by kidney transplantation. People with less severe CKD are still many times more likely to die prematurely, largely due to cardiovascular disease, than to

receive dialysis or a transplant and generally have a poor quality of life. Evidence supports an intervention strategy for the control of CKD through intensive management of risk factors for CKD. However, for any intervention program to work effectively, it must be appropriately targeted to those who are likely to benefit the most, that is, to those at high absolute risk of disease. Risk prediction models for kidney disease have been developed in overseas populations, but their use in Australians is questionable.

This project involves the development of a risk prediction algorithm to predict those at risk of chronic kidney disease using data from the Australian Diabetes, Obesity and Lifestyle (AusDiab) study. AusDiab is national, population-based study of 11,247 Australian adults recruited in 1999-2000 who have been followed up in 2004-2005. At baseline and follow-up, a large collection of demographic, biomedical and lifestyle data was collected including all the relevant measures of kidney function. This study provides an excellent platform to undertake this project. We are seeking a student interested in undertaking an honours project to assist with this study

The student will receive training in epidemiology and biostatistics, particularly in the development of statistical models, and thus will also gain experience in the use of several software packages, such as Stata and SPSS. Appropriate research supervision will be provided.

The project will be a joint project between Monash University and the Baker IDI Heart and Diabetes Institute. The Baker IDI is a non-government, not-for-profit organisation committed to providing services for people with diabetes and developing preventative programs and strategies. The Institute is a WHO Collaborating Centre for Diabetes Mellitus and Health Promotion for Non-Communicable Disease Control and has links with Deakin University.

### Pathways and Potential Therapies in Congestive Heart Failure [top]

Prof Henry Krum, Dr Bing Wang and Dr Andrew Kompa

Clinical Pharmacology Unit

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Heart disease is a major cause of mortality and morbidity in today's society. The main causes are triggered by events such as myocardial infarction or hypertension. Both causes initiate a number of responses that result in decreased cardiac output and activation of key neurohormonal vasoconstrictor systems. In the long term this results in cellular and molecular changes leading to ventricular dysfunction and remodelling. In addition to the neurohormonal response, activation of pro-inflammatory mediators contributes to the remodelling process, in particular the pathological accumulation of extracellular matrix material (fibrosis), hypertrophy and cardiac dysfunction. Key inflammatory mediators among others identified include TNF $\alpha$ , TGF $\beta$ , IL-6, IL-1 $\beta$ .

Our past efforts have identified a number of pathways activated by these mediators that are involved in the setting of heart failure, including p38MAPK, urotensin II, Rho kinase. More recently we have identified pathways and potential targets that have an important role cardiovascular pathology. The epoxyeicosatrienoic acids (EETs) derived from arachidonic acid are important in cardiovascular haemostasis. EETs are metabolised by the enzyme, soluble epoxide hydrolase (sEH), to form less active dihydroxyeicosatrienoic acids. In cell culture assays we have used inhibitors of sEH to examine their activity on hypertrophy and fibrosis. Further in vitro experiments are required to establish other beneficial actions of these compounds in the setting of heart disease, such as anti-inflammatory, anti-oxidant, anti-apoptotic effects, prior to use in an animal model of heart disease.

Other targets of interest include an enzyme downstream of p38MAPK namely MAPKAPK2. We have previously published on the strong anti-remodelling effect of p38MAPK inhibition in the setting of

myocardial infarction. However the clinical use of these inhibitors has resulted in severe side effects and a halt to their development. By inhibiting pathways downstream of p38, we may be able to realise a similar anti-remodelling effect without these side effects. Highly selective inhibitors have been developed, and are in the process of being evaluated in our existing cell culture assays as described above, with a view to be used in the animal model of myocardial infarction.

Skills that will be utilised in these projects in the first instance will involve developing aseptic primary cell culture technique isolating cells from neonatal hearts, as well as using cell lines. Cell based assays will involve measurement of <sup>3</sup>H-proline and <sup>3</sup>H-leucine incorporation for determining effects on fibrosis and hypertrophy respectively. Anti-inflammatory effects of agents on cytokine expression will be examined by real time PCR. Activation of signalling pathways will be determined by Western blot analysis. Anti-oxidant activity of compounds will be determined using existing assays in our laboratory for measuring reactive oxygen species. Selective compounds will be studied in vivo with animal models where cardiac function will be measured and tissues collected and assessed for histological, biochemical and molecular analyses.

### One year health effects of a pedometer-based workplace intervention [top]

Dr Anna Peeters & A/Prof Max de Courten

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To prevent the growing burden of diabetes and other obesity-related illnesses workplace-based interventions are being increasingly recommended by national and international bodies, such as the World Health Organisation. A recent meta-analysis has shown that there are significant improvements in cardiovascular risk factors, and weight perse, at the conclusion of pedometer-only interventions. However, there has been no evaluation to date of such interventions beyond the end of their program. We are currently evaluating one such intervention and in May 2009 we will be collecting the biomedical and questionnaire data at one year after the start of the 4 month long Global Corporate Challenge. The aims of this project will be to assist with data collection, and perform data analysis on one of the key outcomes, such as diabetes, weight, blood pressure and quality of life.

### Contributing to Australian recycled water guidelines: Developing Australian DALY values for waterborne pathogens [top]

Dr Karin Leder and Dr Martha Sinclair

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The concept of Disability Adjusted Life Years (DALYs) was developed as a measure of the disease burden caused by any type of illness. The DALY accounts for the range of impacts which may occur due to illness by estimating a population average impact for years lived with a disability plus years of life lost due to premature death due to the illness. For example with pathogens which cause gastroenteritis, health impacts may range from a few days with diarrhoea (a common outcome with low DALY impact) through severe illness lasting several weeks and requiring hospitalisation (a rare outcome with moderate DALY impact) to death (a very rare outcome with high DALY impact).

DALYs may be used to set health-based targets for “tolerable” risk levels when managing various kinds of hazards. In Australia, the DALY approach has been used to set treatment requirements for recycled water by considering the potential health impacts of microbial pathogens. However DALY values used in these calculations have been based on overseas data compiled by the World Health Organisation, and it is uncertain how closely this reflects the Australian situation. This project will involve critically assessing the data inputs for derivation of WHO DALY values for key waterborne pathogens, documenting whether equivalent Australian data sources already exist and identifying

information gaps and potential means to address them. In addition a preliminary estimate of Australian DALY values will be made for one or more pathogens.

**Prevalence and management of infectious diseases and nutritional disorders in refugees and immigrants living in Melbourne [top]**

Dr Karin Leder and A/Prof Beverley Biggs

Infectious Diseases and Epidemiology Unit

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Appropriate screening of recently arrived immigrants/refugees to Australia can be complex as there are multiple medical, social and psychological issues to consider. Additionally, there are knowledge gaps regarding the optimal approach to some diseases, especially for infections for which the prevalence in immigrants is unknown. A good example can be seen with *Helicobacter pylori* infections. Often the presence or absence of symptoms is used to determine whether screening for *H. pylori* is performed, and this is the approach recommended in the Guidelines for diagnosis and management of infections in recently arrived refugees recently released by the Australasian Society of Infectious Diseases. However, routine population-based screening and treatment for *H. pylori* in particularly high-risk population settings has recently been advocated. Many immigrants come from highly endemic countries for *H. pylori*, but few data exist regarding the prevalence of *H. pylori* among immigrants. Moreover, clearly establishing whether or not relevant symptoms are present can be difficult, especially in immigrants in whom multiple pathologies and language barriers are common.

The successful honours applicant would be involved in performing research to optimise immigrant screening protocols, including (but not necessarily limited to) establishing a prospective prevalence study of *H. pylori* among immigrant sub-groups seen at certain clinical sites in Melbourne.

# Victorian Institute of Forensic Medicine

## Forensic & Scientific Services

### Molecular Biology

#### Honours Projects Information 2009



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## MOLECULAR BIOLOGY

### Summary

The Victorian Institute of Forensic Medicine (VIFM) plays an important role within the coronial system, undertaking medico-legal death investigations at the request of the State Coroner, to:

- Where possible, provide a conclusion about the medical cause of death;
- Contribute to an understanding of the circumstances within which death occurred; and
- Provide information to determine the identity of the deceased

In this capacity, VIFM oversees approximately 4,000 cases per annum, performing a range of investigations including full autopsies, external inspections, and CT scans. The institute also providing ancillary forensic scientific and medical services in the form of forensic toxicology, histology microbiology, and forensic radiology, as well as identification services through DNA testing, forensic dentistry, and forensic anthropological services.

Within the Forensic and Scientific Services (FSS) Division the Molecular Biology Section aims to provide timely, high quality and value DNA services supporting the Institute's functions and objectives; whilst keeping abreast of developments in the field.

The core functions for the Molecular Biology Section are:

- **Coronial Identification**, which is an extremely important part of the coronial investigation process to ensure the correct identification of deceased persons - this occurs by either visual means or by the use of scientific tests such as DNA testing using nuclear (n) and mitochondrial (mit) DNA analysis;
- **Disaster Victim Identification**, to ensure a proper and scientifically sound identification procedure is conducted in all matters where two or more persons are killed in an event;
- **Missing Persons Investigations**, for example, through the reconciliation of unidentified human remains located in Victoria with long term missing persons; and
- **Paternity Testing**, a service to the wider community since 1990; with the service receiving NATA accreditation since 1991

In addition, there is an expectation that research projects will emanate from the work undertaken by the Molecular Biology section in the areas of forensic biology and medical genetics.

The research stream will be well suited to support postgraduate projects, where the Molecular Biology section would provide the technical training required to undertake the proposed research project(s), as well as an understanding of the principles guiding the research to ultimately provide a well rounded graduate and postgraduate training program.

The Molecular Biology team cover a range of disciplines, particularly in molecular biology, molecular genetics, biochemistry, and bioinformatics, which are applied to develop and query models for forensic application.

Expertise in the team is heavily molecular biology based, particularly in:

- DNA extraction from various forensic specimens;
- Short Tandem Repeat (STR) analysis of nuclear DNA (nDNA);
- Mitochondrial DNA (mitDNA) analysis; and
- LQT testing

## Staff

Molecular Biology has six staff, including a technical officer; scientists and senior scientists, and manager.

- Linda Benton, BSc
- Daya Eurell, BSc (Hons)
- Dadna Hartman, BSc (Hons), PhD, Grad Cert Pub
- Sec Man
- Leah Morenos, BSc(Hons)/BA
- Joy Russell, BSc (Hons)/BA
- April Stock, BSc (Hons)

## Publications by Staff (1990 – onwards)

Donald, D., Chen, Y., **Hartman, D.**, and Zawadzki, J.L. (2007). "Evaluation of two signal sequence trapping systems for detection of *Haemonchus contortus* secreted molecules." *Experimental Parasitology*, Accepted for publication.

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Hill, J.C. (1998). "Investigation of human DNA profiling using hybridisation of HLA DQ  $\alpha$  oligonucleotides." *Honours Thesis*, Deakin University.

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## **DNA ANALYSIS FOR THE IDENTIFICATION OF DECEASED PERSONS**

### **BACKGROUND**

Increasing demand for DNA identification of deceased individuals by the Coroner, as well as develop capabilities to handle Disaster Victim Identification (DVI) scenarios, require the team to continuously strive to improvement the methodologies used as well as evaluate new emerging capabilities for their application to forensics.

An area of interest is the DNA typing of skeletal remains that have originated from different geographical locations under different environmental conditions. It is the aim of the team to develop STR typing protocols, particularly the DNA extraction components, which will significantly improve the success and efficiency of forensic DNA testing. Our initial research activities will focus on bringing together the methodologies developed for the extraction of ancient DNA from skeletal remains, as well as recent success in the application of STR typing of skeletal remains (such as those in mass graves in the former Yugoslavia) and DVI victims (such as 9/11).

We also have the important function of assessing new capabilities and technical platforms to ensure we are able to meet the challenges of increased ID cases and expected turnaround time. This will initially focus on establishing DNA profiling capability that will add to the capacity of the Molecular Biology laboratory and allow DNA profiles to be matched with state and national DNA databases. In addition, as national leaders in mitDNA typing, the team aims to improve the current protocols and establish a capability that will place the Molecular Biology Team at the forefront of mitDNA analysis, providing expertise and services to other jurisdictions.

### **AIMS**

To improve the DNA identification protocols the Molecular Biology Section applies for the identification of deceased persons.

## PROJECT METHODOLOGIES

### DNA recovery

- Specimen Triage
- Conventional methodologies for the extraction of genomic DNA (chlex and/or phenol based)
- Other methods (commercially available kits)
- Quantification of DNA preparations

### Nuclear DNA analysis

- STR assays (STRs developed at VIFM; or commercially available kits such as profiler plus – the national standard)
- Analysis of STRs (polyacrylamide gel electrophoresis; or using an AB Genetic analyser)
- Statistical Analysis of data (software developed at VIFM, or using AB software)

### Mitochondrial DNA analysis

- Amplification of variable regions
- Cell based analysis of mitDNA
- Sequencing based analysis of mitDNA
- Validating the use of lab-on-a-chip (Bioanalyser) for mitDNA analysis

### VIFM Honours Projects

The approved applicant(s) would join the Molecular Biology Section based at the Victorian Institute of Forensic Medicine, Southbank, Department of Forensic Medicine, Monash University.

The research program has a forensic biology and medical genetics focus with the view to, in the short term, enable the Molecular Biology group meet the increasing demand for DNA identification of deceased individuals by the Coroner, as well as develop capabilities to handle Disaster Victim Identification (DVI) scenarios. Thus the proposed projects would fall within this scope, in particular, the evaluation of new methodologies and technologies for use in DNA typing will be required.

Students would be required to present their progress at laboratory meetings, as well as fulfil any University requirements (such as Departmental Seminars).

Any queries regarding Honours projects should be directed to:

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## **VIFM Project 1: Improving DNA typing of skeletal remains [top]**

### **Project Area (molecular biology, molecular genetics, biochemistry, bioinformatics, other)**

Molecular Biology (mainly) and Anthropology

#### **Brief Description of the Project**

There are many circumstances in which DNA extraction is required to identify skeletal remains, a process that is made challenging by sample conditions and often the high degree of DNA degradation. Contributing factors to DNA degradation include: time since death, the time the remains have been in the burial environment, and which bones in the skeleton are used (as different bones have different levels of DNA degradation as well as DNA content). In addition, the environmental condition in which the remains are harboured also play a major role in the ability to recover useful DNA. It is therefore not surprising that there are many published DNA extraction techniques aimed at improving the amount and quality of DNA that can be isolated from skeletal remains. Whilst some studies have compared various extraction techniques, to date, there is a lack of published studies that compare different extraction techniques on skeletal remains from a variety of environments or from various bones in the skeletal system.

The team would like to evaluate different extraction techniques that perform best in specific situations that have a particular application at VIFM. For this purpose, bones that have been exposed to different environmental conditions, which can be comprised of arid dry environments, wet environments, soil etc., will be processed using various techniques currently used and VIFM and described in the literature for comparison. This will also include a comparison of different skeletal elements (femur, tibia, radius, or ulna for example) for their amenity to DNA typing. The skills you will acquire during the project will include the examination of skeletal remains; DNA extraction techniques; nuclear DNA typing; statistical analysis; and if time permits mitochondrial DNA analysis.

#### **VIFM Supervisor**

Dr Dadna Hartman

Dr Soren Blau

#### **University Supervisor**

Unknown

## **VIFM Project 2: Mitochondrial DNA typing, a useful tool for identifying skeletal remains [top]**

### **Project Area (molecular biology, molecular genetics, biochemistry, bioinformatics, other)**

Molecular Biology, Bioinformatics (if time permits)

#### **Brief Description of the Project**

Unlike nDNA, mitDNA is located within mitochondrion, with as many as 1000 mitochondrion per cell each harbouring several copies of mitDNA. Importantly, mitDNA is inherited from the mother; as a result, all those in the maternal line all have the same mtDNA. In addition, mitDNA is considerably smaller in size compared to nDNA, having said that, although nDNA has many more bases than mitDNA, mitDNA is present in far greater copies than nDNA. For this reason, mitDNA is useful in situations where the amount of DNA sample is very limited, such as when dealing with skeletal remains or crime specimens (such as hair, saliva or blood). VIFM has developed a method using *Cel I* digestion to test mitDNA for the identification of deceased persons.

As the utility of mitDNA analysis gains momentum, improvements are sought to expedite the process of analysis, interpretation of data, and ultimately shorter reporting times. A number of laboratories, particularly in the US, are reviewing the application of Agilent's "lab-on-a chip" technologies to bring some of the improvements sought to fruition. Agilent's Bioanalyser platform enables the analysis of samples using disposable micro-fabricated glass chips and an electro driven flow to measure the molecular mass of a given specimen. The platform provides reproducibility, sensitivity and turnaround times under 40 minutes – which would signify a considerable improvement on current separation methodologies in practice in the Molecular Biology Laboratory.

The skills you will acquire during the project will include the examination of skeletal remains; DNA extraction techniques; mitDNA assay (*Cel I* digestion); mitDNA analysis (conventional polyacrylamide gel electrophoresis compared to Bioanalyser; and if time permits sequencing of mitochondrial DNA PCR products.

**VIFM Supervisor**

Dr Dadna Hartman

**University Supervisor**

Unknown