

DEAKIN UNIVERSITY



**SCHOOL OF EXERCISE AND
NUTRITION SCIENCES**

**Information for
prospective
2009 Honours students**

September 2008

Background

The Honours program in the School of Exercise and Nutrition Sciences builds on the foundations provided by a three year undergraduate degree. The aim of the program is to provide students with the necessary knowledge and skills to enable them to undertake higher degree studies and advance their professional training.

The School offers the following Type A Honours degrees:

Bachelor of Applied Science (Food Science and Nutrition) (Honours) H418
Bachelor of Applied Science (Exercise and Sport Science) (Honours) H442

All Honours programs in the School have common features, specifically:

- They comprise coursework units and a thesis
- They can be undertaken over one year full time
- Students are allocated a supervisor and a co-supervisor

Entrance requirements

- An undergraduate degree appropriate to the area of study
- At least a 65% average
- Availability of an appropriate supervisor and adequate resources to support the research project
- Students who have appropriate pre-requisites from other institutions may also apply for admission.

Course structure

The requirements include an independent research project worth four credit points conducted under the supervision of a member of the academic staff, a two credit point research methods (coursework) unit, and a two credit point (coursework) unit in research issues. Students will be required to attend lectures for 3-4 days a week for the first six weeks of trimester one. These will be held at the Burwood campus.

Developing Research Skills	(2 credit points)	Trimester 1
Research Methods	(2 credit points)	Trimester 1
Research Project	(4 credit points)	Trimester 2

The Honours year is a very exciting but a very challenging and demanding year. It requires **at least 35 hours per week of study** throughout the academic year.

Contact details

Associate Professor Jill Cook
Phone: (03) 9244 6040
Fax: (03) 9244 6017
Email: jill.cook@deakin.edu.au

How to apply

To apply for Honours in the School of Exercise and Nutrition Sciences there are three steps:

1. You should carefully examine the list of Honours research projects that the School is offering in 2009 (**listed on pages 12-118**). For those projects in which you are interested, it is very important that you personally contact the named supervisor (contact details are provided with each project) to discuss the proposed project. This will allow you to determine whether the project meets your career goals and allows the supervisor to determine whether you have the appropriate academic background to complete the research project.
2. You must **complete the preference form that appears on page 7 of this booklet** and return it to Joan Dooley in the School of Exercise and Nutrition Sciences (Building J3.03 or fax to 9244 6017) by 14 November 2008.
3. To apply for Honours you will need to submit an online application at www.deakin.edu.au, click on the 'Future students' section and follow the link to 'Postgraduate students', 'How to apply' and then 'submit an online application'. The closing date for timely applications is 8 December 2008. When applying online you will be required to upload all supporting documents at the last step of the application process. If you are unable to upload your documents, certified hard-copies must be submitted within five working days. Please note that if you completed your undergraduate studies at Deakin there is no need to provide an academic transcript. Students with degrees from an institution other than Deakin must attach a copy of their academic transcripts to their online application.

If you have any questions regarding the University application process, please telephone:

Customer Service

Geelong +61 3 5227 2333

Melbourne +61 3 9244 6333

Project Allocation

Projects are allocated based on a combination of student project preferences, supervisor's student preferences and WAM.

The list of available research projects reflects research being undertaken by Deakin staff and the availability of resources at the date of publication. It is the nature of research that projects acquire focus and direction over time and the final project may not be exactly as described.

In rare cases, research staff and resources may become unavailable during the period when the project is being undertaken. If this occurs, the Faculty of Health, Medicine, Nursing and Behavioural Sciences will offer the student the best available alternative which will provide the opportunity to satisfy course requirements.

Students are advised that allocation to research projects is a competitive process and a student cannot be assured of being assigned to their choice of research project.

Closing Dates

The closing date for timely applications is 8 December 2008. It is anticipated that successful candidates will be advised of their offer during December 2008.

Late applications will be considered depending on availability of appropriate supervisors, projects and places up until 22 February 2009.

Please refer to website for current projects on offer:

<http://www.deakin.edu.au/hmnbs/ens/prospectivestudents/index.php>

**School of Exercise and Nutrition Sciences
2009 Honours Project Preference Form**

Your name: _____

Address: _____

_____ P/C _____

Contact Phone Numbers: Mob _____

Home _____

Email: _____ Deakin student ID: _____

Applicants are advised that allocation to research projects is a competitive process and an applicant cannot be assured of being assigned to their choice of research projects.

Please nominate below three preferences, in order, for an Honours project (and supervisor) for 2009 from the list of projects on offer.

1st preference - Project number: _____

Project title: _____

Supervisor: _____

Have you personally spoken with the supervisor about the project? Yes No

2nd preference - Project number: _____

Project title: _____

Supervisor: _____

Have you personally spoken with the supervisor about the project? Yes No

3rd preference - Project number: _____

Project title: _____

Supervisor: _____

Have you personally spoken with the supervisor about the project? Yes No

If you are NOT offered one of the above projects would you consider an offer of an Honours project in a related area?

Yes No

Please return this form to Joan Dooley at the School of Exercise and Nutrition Sciences (J3.03; phone: 9244 6613) by 14 November 2008 or fax to 9244 6017 for timely applications. Late applications will be considered depending on availability of appropriate supervisors, projects and places up until 22 February 2009.

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CARDIOVASCULAR FITNESS AND HEALTH IN VICTORIAN RURAL FIREFIGHTERS

Supervisor: Dr Brad Aisbett

Supervisor's profile:

Dr Brad Aisbett undertakes research investigating the job-specific fitness, hydration, and nutrition needs of Australia's fire and emergency service workers. He consults regularly for emergency service agencies across Australia (including Victoria's Country Fire Authority and Department of Primary Industries). His research is supported by the Australasian Fire Authorities Council. Two recent publications include:

Aisbett B, Phillips M, Sargeant M, Gilbert B & Nichols D. Fighting with fire – How bushfire suppression can impact on firefighters health (Invited Review) *Australian Family Physician* 36(12) pp 994-7

Aisbett B & Nichols D (2007). 'Fighting fatigue whilst fighting bushfire' – an overview of factors contributing to firefighter fatigue during bushfire suppression. *Australian Journal of Emergency Management*, 22 (3), pp. 31-39.

Co-supervisor: Dr Kevin Netto

Contact details:

Dr Brad Aisbett

Ph:(03) 9244 6474

Email: brad.aisbett@deakin.edu.au

Project description:

The risk of injury, illness, or fatality on duty for United States (US) firefighters is inversely related to their health and fitness. The potential for Australian firefighter's health and fitness to mediate their risk of injury and fatality when on duty is unknown. It is possible that since Australian and US fire brigades share some common duties, Australian firefighter's health and fitness may also influence their safety when on duty. At present, there is no published data on the health and fitness profile of Australian firefighters. Unpublished observations of Queensland full-time firefighters showed they had higher body mass indexes (BMI), less lower back flexibility, and equivalent cardiovascular endurance and strength as the population norms for each age group. Without health and fitness profiles, Victoria's Country Fire Authority (CFA) is unable to identify whether there are firefighters with low health and fitness levels. These firefighters may be at increased risk of injury or cardiovascular episode whilst on duty. Identifying susceptible firefighters is paramount for CFA and Victoria as an injured or ill firefighter can also compromise the safety of their crew and the public.

Research Objective: Measure the health and cardiovascular fitness of CFA firefighters, including known risk factors for cardiovascular disease.

Methodological approach:

Volunteer CFA firefighters will report to the exercise physiology laboratory on two occasions. Firstly, they will be surveyed on their current lifestyle and any previously diagnosed medical ailments. Thereafter, a resting blood sample will be obtained to measure triglyceride, cholesterol, and glucose levels. The firefighter's resting heart rate, resting blood pressure, height, body mass, waist and hip circumference will also be measured. The results from the first laboratory visit will be stratified for the risk of cardiovascular disease. If an individual's results fall into the low risk category, they will be invited to attend a second laboratory session where they will perform a maximal oxygen uptake test on a motorized treadmill. If their health appraisals indicate that they are at a medium / high level of risk for cardiovascular disease, they will be invited to perform a sub-maximal treadmill test to predict maximal oxygen uptake. The health and fitness profile will be compared to Australian population normative values and other firefighting literature.

Necessary skills/knowledge:

Knowledge of testing for aerobic fitness and cardiovascular disease risk factors.
Good time management

DIETARY PATTERNS OF VICTORIAN VOLUNTEER FIREFIGHTERS

Supervisor: Dr Brad Aisbett

Supervisor's profile:

Dr Brad Aisbett undertakes research investigating the job-specific fitness, hydration, and nutrition needs of Australia's fire and emergency service workers. He consults regularly for emergency service agencies across Australia (including Victoria's Country Fire Authority and Department of Primary Industries). His research is supported by the Australasian Fire Authorities Council. Two recent publications include:

Aisbett B, Phillips M, Sargeant M, Gilbert B & Nichols D. Fighting with fire – How bushfire suppression can impact on firefighters health (Invited Review) Australian Family Physician 36(12) pp 994-7

Aisbett B & Nichols D (2007). 'Fighting fatigue whilst fighting bushfire' – an overview of factors contributing to firefighter fatigue during bushfire suppression. Australian Journal of Emergency Management, 22 (3), pp. 31-39.

Co-supervisor: Dr Lynn Riddell

Contact details:

Dr Brad Aisbett

Ph:(03) 9244 6474

Email: brad.aisbett@deakin.edu.au

Project description:

South eastern Australia is one of most bushfire prone areas in world. Managing and preventing the spread of these fires is the responsibility of a large body of community based volunteer firefighters. The overwhelming majority are men, generally in mid-life with a multitude of risk factors for dietary related chronic disease. In order to minimize risks associated with fighting fires, it is imperative that energy levels are maintained across the duration of a fire (~10 hours), hydration status is maintained and concentration levels are high. Dietary intake has the potential to significantly impact all of these factors. However, currently there is no available data describing food intakes of fire fighters during fire. These volunteers are often reliant on community helpers providing meals and snacks for them during the course of the day. Having an understanding of dietary intakes and food patterns could help to identify areas of intervention that could help to maintain the health of these volunteers primarily through the duration fire but also help to improve their longer term health.

Methodological approach:

A minimum of 50 volunteer firefighters from Victoria's Country Fire Authority (CFA) will be invited to complete a four-day food record during late summer, early autumn 2009 whilst on stand-by to fight bushfires. The food records will be analyzed and compared with recommended nutrient intakes (some understanding of nutrient needs for athletes will be required) as well as a detailed investigation into timing of meal, snack and beverage consumption. In addition to food records, basic demographic data (age, height, weight, occupation, and firefighting experience) will also be collected.

Research Objective: Quantify the dietary habits of Victoria's volunteer firefighters whilst on stand-by to fight summer bushfires.

Necessary skills/knowledge:

This project would suit someone with some knowledge of nutrient needs during physical exertion and a desire to improve occupational nutritional health. Experience in managing data bases and statistics is also desirable but not essential. Good time management.

STRATEGIES TO PROMOTE CHILDREN'S PHYSICAL ACTIVITY AND HEALTH

Supervisor: Helen Brown

Supervisor's profile:

My main interest is investigating influences on children's physical activity, particularly relating to mediators (eg. enjoyment, self-efficacy) of physical activity behaviour change in children. I am involved in several studies relating to this topic, with the main emphasis on the development of multi-setting strategies to promote physical activity in children.

I am a lecturer in the School of Exercise and Nutrition Sciences and I am currently completing my PhD after gaining first class honors for my honors study relating to teacher professional development in Sport and Physical Education.

Relevant Publications: (submitted, under review)

Brown H, Salmon J & Hume C. 2008 'A review of the efficacy of interventions that target potential mediators of physical activity in children' *Int. Journal of Pediatric Obesity*

Brown H, Hume C & Chin A Paw M 2008 'Validity and reliability of instruments to assess potential mediators of children's physical activity: a systematic review' *Journal of Science and Medicine in Sport (Special Issue)*.

Co-supervisor: Associate Professor Jo Salmon

Contact details:

Helen Brown

Ph: (03) 92446327

Email: hbrown@deakin.edu.au

Project description:

A key component in the development of children's health and wellbeing is physical activity. Regular physical activity assists in weight maintenance, development of peak bone mass, motor skill development, social skill development, cognitive function and wellness indices such as self esteem in children. With evidence of declining physical activity levels in children and rapid increases in the prevalence of overweight and obesity in children from developed countries over the last two decades, it is critical to develop strategies to prevent further declines in children's physical activity levels and thereby improve health outcomes.

Aim:

To explore strategies promoting physical activity among children in Victoria.

Methods:

This study will involve the piloting of various strategies to promote children's physical activity across a variety of settings (e.g. school, home, community). An example of such a strategy would involve testing the feasibility of implementing a school-based intervention, where a specific set of mediators (eg, self-efficacy, behavioural

capability) will be targeted with the ultimate aim of preventing declines in children's physical activity.

Methodological approach:

Qualitative and Quantitative methodologies

Necessary skills/knowledge:

Desirable: HSE203, HSE313

THE MOLECULAR RESPONSES TO FOOD

Supervisor: Associate Prof. David Cameron-Smith

Supervisor's profile:

David Cameron-Smith undertakes research investigating the actions of diet and exercise on cellular signaling responses. These signaling responses include those that are necessary for growth, adaptation and inflammation. David currently supervises 6 PhD students and has successfully supervised 15 Honours students (75% H1 grade). He has been the recipient of over \$2.5million dollars funding in the past 3 years and a collaborative author on more than 80 publications on PubMed.

Co-supervisor: Dr Elizabeth Manickam

Contact details:

Associate Prof David Cameron-Smith

Ph : 03 9244 6502.

Email (david.cameron-smith@deakin.edu.au),

Project description:

The digestion and release nutrients into the blood stream triggers many adaptive responses within white blood cells, adipose tissue (fat) and muscle. These adaptive responses include stress/inflammation, fat synthesis and storage and protein synthesis. At this time, very little is known about which signals are activated, the key regulators and the adaptive changes ion genes. Working within a successfully funded the Honours student (up to 2 for this project) will undertake new research in a team and supportive environment.

Methodological approach: Lean and obese subjects will ingest meals differing in fat and protein content. After the meal, blood, adipose and muscle biopsy samples will be taken by Dr Andrew Garnham (Medical Practitioner and Senior Lecturer). Analysis in these tissues of particular pathways, signaling proteins, DNA-binding activities and gene expression will be measured using state-of-the-art 'omics' technology. This project will break new ground in understanding the molecular responses to food and how food regulates disease risk.

Necessary skills/knowledge: A strong knowledge of nutrition.

SOCIAL AND PHYSICAL ENVIRONMENTAL INFLUENCES ON PHYSICAL ACTIVITY AMONG URBAN AND RURAL WOMEN

Supervisor: Dr Verity Cleland

Supervisor profile:

Verity is a postdoctoral research fellow interested in understanding the personal, social and environmental influences on physical activity and obesity among women and children, particularly those from socially and economically disadvantaged backgrounds. She has a PhD in epidemiology from the Menzies Research Institute in Tasmania where she examined relationships between physical activity, fitness and weight from childhood to adulthood as part of a 20-year prospective cohort study of 2,500 young Australians.

Cleland V, Dwyer T, Venn A. Physical activity & healthy weight maintenance from childhood to adulthood: a prospective cohort study. Obesity (Silver Spring) 2008; 16: 1427-33.

Cleland V, Crawford D, Timperio A. Are perceptions of the physical and social environment associated with mothers' walking for leisure and transport behaviours? A longitudinal study. *Preventive Medicine* 2008; 47: 188-193.

Co-supervisors: A/Prof Kylie Ball, Dr Clare Hume

Contact details:

Dr Verity Cleland

Ph: 03 9251 7244

Email: verity.cleland@deakin.edu.au

Project description:

Declines in physical activity over recent years are an important public health concern. Social-ecological models of health behaviour suggest that personal, social, structural and environmental influences should be considered when attempting to understand behaviours such as physical activity. Although much is known about personal influences on physical activity, we have a poorer understanding of social and environmental influences on women's physical activity. Our understanding of whether these influences differ according to area of residence is also limited. It is important to understand these relationships in order to develop interventions that specifically target key features of the social and physical environment that may be important for physical activity promotion and subsequent obesity prevention. The aim of this study will be to examine the relationship between social and physical environments and physical activity according to area of residence among women. Key research questions to be asked will include, do social factors and perceptions of the social and physical environment differ according to area of residence? Do relationships between the social or physical environment and physical activity differ according to area of residence?

Methodological approach:

This project will be nested within a larger project examining obesity-risk behaviours among women and children. Nearly 5,000 women from 40 urban and 40 rural areas of Victoria responded to a quantitative postal survey in 2007-8. This Honours project will involve analysis of quantitative data collected as part of this larger study.

Necessary skills/knowledge:

Familiarity with quantitative data analysis techniques and statistical software (such as SPSS or Stata) would be advantageous, but is not essential. An interest in women's health, physical activity behaviour, obesity prevention, or population health is desirable.

UNDERSTANDING COMMUNITY-LEVEL STRUCTURES AND POLICIES RELATED TO PREVENTING OBESITY

Supervisor: Dr Verity Cleland

Supervisor profile:

Verity is a postdoctoral research fellow interested in understanding the personal, social and environmental influences on physical activity and obesity among women and children, particularly those from socially and economically disadvantaged backgrounds. She has a PhD in epidemiology from the Menzies Research Institute in Tasmania where she examined relationships between physical activity, fitness and weight from childhood to adulthood as part of a 20-year prospective cohort study of 2,500 young Australians.

Cleland V, Dwyer T, Venn A. Physical activity & healthy weight maintenance from childhood to adulthood: a prospective cohort study. Obesity (Silver Spring) 2008; 16: 1427-33.

Cleland V, Crawford D, Timperio A. Are perceptions of the physical and social environment associated with mothers' walking for leisure and transport behaviours? A longitudinal study. *Preventive Medicine* 2008; 47: 188-193.

Co-supervisors: Dr Sarah McNaughton, A/Prof Kylie Ball

Contact details:

Dr Verity Cleland

Ph: 03 9251 7244

Email: verity.cleland@deakin.edu.au

Project description:

Increases in obesity over recent years are of important public health concern. Social-ecological models of health behaviour suggest that personal, social, structural and environmental influences should be considered when attempting to understand behaviours such as physical activity. Little research has attempted to understand the structures and policies in place within communities (i.e. local government) that aim to promote positive health behaviours such as physical activity and healthy eating, and whether policies/structures are related to these behaviours. The aim of this study will be to describe local government structures and policies that attempt to address rising concerns about obesity and obesity-risk behaviours (i.e. physical activity, eating). Key research questions to be asked will include, what structures/policies currently exist within local governments in relation to obesity-risk behaviours? How are these structures/policies implemented? Are they utilised? What are the barriers to their utilization? What other structures/policies might be feasible to implement? Are there differences in obesity levels across communities according to the presence or absence of structures/policies, the quality of structures/policies?

Methodological approach:

This mixed-methods project will be nested within a larger project examining obesity-risk behaviours among women and children. The student may be involved with conducting an audit of key policy documents, developing and administering surveys, and conducting semi-structured interviews with community stakeholders.

Necessary skills/knowledge:

Familiarity with both quantitative and qualitative data collection and analysis techniques would be advantageous, but is not essential. An interest in physical activity behaviour, eating behaviour, obesity prevention, policy, or population health is desirable.

THE ROLE OF RHOTEKIN 2 (RTKN2) IN HUMAN LYMPHOCYTES

Supervisor: Dr Fiona Collier

Supervisor's profile:

Dr Fiona Collier is a researcher at Barwon Biomedical Research based at the Geelong Hospital. We are a medium sized group of scientists and students working in a variety of areas including human stem cell expansion, lymphocyte signaling, human osteoclast generation, and integration of cells and tissues with biomaterials. We have collaborations and direct interaction with the MRU, School of Medicine and ITRI at Deakin University. My area of interest is the role of a particular signaling protein (RTKN2) that was identified by our group in 2003. We are still currently the only group working on it and so the research remains novel and publishable. I have worked as a scientist for over 3 decades, focusing more recently on apoptosis and RTKN2, and completed my PhD this year. I am still 'hands on' in the lab, passionate about my subject and have a wealth of experience!

1. Collier, FM, et al., *Identification and characterization of a lymphocytic Rho-GTPase effector: rhotekin-2*. *Biochem Biophys Res Commun*, 2004. **324**(4): p. 1360-9.
2. Collier, FM, et al., *A Rho-GTPase Effector, Rhotekin-2 (RTKN2) Is Associated with BMP8b and IL-16 Cytokine Expression and Knockdown Leads to Increased Sensitivity to Apoptosis in Lymphocytes*. *Blood*, ASH Annual Meeting Abstracts, 2007. **110**(11): p. 2293.
3. Collier, FM, Baker, AJ, Walder, K, and Kirkland, MA, *Overexpression and Silencing of Rhotekin 2: A GTPase Effector with a Role in Cell Survival*. *BMC Cell Biology*, 2008. (**Under review**)

Co-supervisors: Professor Alister Ward and Dr. Janet McLeod

Contact details:

Dr Fiona Collier

Ph: 03 5226 7027

Email: fionac@barwonhealth.org.au

Project description:

Rho/Rac GTPases are molecular switches controlling a broad range of cellular processes including gene expression, apoptosis and cell survival. They rapidly cycle between a guanosine diphosphate (GDP)-bound and guanosine triphosphate (GTP)-bound state, and the GTP-bound state is the active conformation that initiates downstream signalling pathways via effector proteins.

We have identified a novel GTPase effector, rhotekin 2 (RTKN2), which is highly expressed in lymphocytes, particularly freshly isolated CD4 helper T-cells and is regulated by activation of the T-cell receptor (TCR) [1]. When the gene was cloned, expression of the full length protein induced cell survival in both the mammalian cell lines tested, and knockdown of the gene in primary T-cells induced sensitivity to apoptosis, as well as regulation of a number of Bcl-2 family genes that induced the pro-apoptotic phenotype [2, 3]. This indicates that the gene is important in T-cell survival, and therefore may play roles in T-lymphopoiesis and the immune response. The aim of the project is to further investigate RTKN2 signaling in primary human T-cells collected from umbilical cord blood (UCB). Immunoprecipitation will be utilized

to investigate the GTPase members that interact with RTKN2, and expression of Bcl-2 family proteins will be assessed following regulation of RTKN2.

Methodological approach:

The techniques used in the project will include:

- 1) Ficoll Separation and Magnetic activated cell sorting (MACS)
- 2) Cell Culture
- 3) Flow Cytometry
- 4) Transfection with siRNA
- 5) Immunoprecipitation and Western Blot Analysis

Necessary skills/knowledge:

Good overall scores throughout your degree and an interest and understanding of cellular signaling.

EFFECT OF A SPECIALISED NUTRITIONAL SUPPLEMENT ON PRESSURE ULCER HEALING IN COMMUNITY SPINAL PATIENTS

Supervisor: Dr Tim Crowe

Supervisor's profile:

Dr Tim Crowe is a Senior Lecturer in Nutrition in the School of Exercise and Nutrition Sciences and is also an Accredited Practising Dietitian. He is actively involved in several areas of nutrition research including weight and muscle loss in advanced cancer; the use of specialised nutrition support in wound healing (particularly pressure ulcers), and the prevention of post-surgical complications in cancer patients using immuno-enhancing nutrients.

Recent Grants

1. **CSIRO Flagship Collaboration Fund 2007** Cameron-Smith D, Russel A, Crowe TC, Seymour R, De Silva K. Dermatan sulphate as a nutraceutical for application in the field of human muscle growth: the effect of dermatan sulphate on human muscle cells.
2. **Department of Human Services 2006** Crowe TC, Evans S, Pearce, L. Simmance, N. Implementation and evaluation of alternative clinical supervision models in dietetics undergraduate training. \$154,700
3. **Windermere Foundation 2004** Crowe TC, Desneves K. Assessment of the Effect on an Arginine-, Vitamin C- and Zinc-Enriched Nutritional Supplement on the Healing of Pressure Ulcers.

Recent Publications

1. Adams NE, Bowie AJ, Simmance N, Murray M, **Crowe TC**. Recognition by medical and nursing professionals of malnutrition and risk of malnutrition in elderly hospitalised patients. *Nutr Diet* 2008;65:144-50
2. Larsen AE, Cameron-Smith D, **Crowe TC**. Conjugated linoleic acid suppresses myogenic gene expression in a model of human muscle cell inflammation. *J Nutr* 2008;138:12-16
3. **Crowe TC**. Healthy Weight. Ways for you to Stay in Shape. Elsevier Australia. 2007
4. Sinclair S, **Crowe T**, Cameron-Smith D. What is all the fuss about *trans* fatty acids? *Chem Aust* 2006;Nov:13-15
5. Larsen AE, Tunstall RJ, Carey KA, Nicholas G, Kambadur R, **Crowe TC**, Cameron-Smith D. Actions of short-term fasting on human skeletal muscle myogenic and atrogenic gene expression. *Ann Nutr Metab* 2006;50:476-81

Co-supervisor: Ms Kate Desneves, Senior Clinical Dietitian, Austin Health

Contact details:

Dr. Tim Crowe

Ph: (03) 9251 7266

Email: tim.crowe@deakin.edu.au

Project description:

Pressure ulcers (PU) are well established as a serious secondary complication of spinal cord injury, with a reported lifetime likelihood of up to 85%. PU are a leading cause of unplanned hospital readmission in this patient group, contributing to increased length of stay and more expensive medical treatment than other conditions. Recent research has focussed on arginine and its role in wound healing. A trial of arginine-containing supplements in patients with PU at Austin Health in 2004 demonstrated a significant 2.5 fold greater rate of PU healing at three weeks. More recently, implementation of arginine-containing supplements in the spinal ward has found 59% of patients achieve complete healing with an average time to healing of 8.45 weeks. This is significantly less than the literature estimates of 18-20 weeks.

Prevention of admission for management of pressure ulcers is one of the aims of the Spinal Outreach Team at Austin Health. Due to this, studying the effect of an arginine-containing supplement in the community setting is paramount.

Aim:

To assess the healing time of pressure ulcers in community spinal patients receiving arginine-containing supplements and compare this data to the healing time of historical controls.

Methodological approach:

Fifteen patients will be selected for inclusion in the trial. Patients must have a spinal cord injury, reside in the Melbourne metropolitan area and have a stage 2, 3 or 4 pressure ulcer. These patients will consume their normal diet plus an arginine-containing supplement until full wound healing is demonstrated.

Before starting the study, and at regular intervals, patients will have measurements of the pressure ulcer size and severity taken by the Spinal Outreach Nurse to assess the rate of healing until the wound is fully healed. Non-nutrition pressure ulcer care will be kept constant during the study period according to standard nursing practice in the community. Historical data will be used to obtain healing times from 15 patients for comparative purposes.

A 3-day food and fluid record will be completed for all subjects at baseline and fortnightly thereafter until full pressure ulcer healing is demonstrated. Dietary analysis will enable quantification of the energy, protein, vitamin C, and arginine content of the diet and allow correlation with degree of wound healing. Compliance with consumption of the arginine-containing supplement will be monitored fortnightly.

Necessary skills/knowledge:

Dietary analysis, understanding of the role of nutrition in disease, as well as the ability to work in a hospital and community environment as part of a medical research team. This work will be predominantly based at the Austin Hospital and the student will work within the Nutrition and Dietetics Department with some travel required to patients living in the local community. The student must have a current drivers license as this project involves the student to going out in to the patient's home for data collection.

WHICH MEASURES OF HIP AND ANKLE RANGE OF MOVEMENT USED TO SCREEN AUSTRALIAN RULES FOOTBALL PLAYERS ARE RELIABLE?

Supervisor: Associate Professor Jill Cook

Supervisor's Profile:

Associate Prof. Jill Cook is interested in soft tissue injuries and sports injuries. This project forms part of a collaboration to examine the factors associated with groin injuries in young Australian Rules football players. Screening protocols that are valid and reliable are an essential part of any longitudinal investigation and this project will establish which tests will be used in future studies.

Co-supervisor: Dr Tania Pizzari, La Trobe University

Contact details:

A/Prof Jill Cook

Ph: 03 92446040

Email: jill.cook@deakin.edu.au

Project description:

Groin injuries are common in Australian Rules football and are often present in adolescence. These injuries can interfere with a player's career, on average a groin injury in AFL will keep a player out of games for 16 weeks. Range of movement in joints of the lower leg have been implicated in groin injuries. Valid and reliable measures of range of movement are needed before further studies can be undertaken.

There are several ways to examine range of movement in both the hip and ankle, some of these have utility in research, and some are used clinically. This project aims to document the tests of hip and ankle range of movement that have the best validity, reliability and clinical utility. These tests will be used in a cohort study to investigate risk factors for groin pain.

Methodological approach:

Several methods of measuring ankle and hip movement will be examined in a group of normal participants. Each test will be examined by one examiner several times (intra-tester reliability) and by several examiners (inter-tester reliability). Analysis of the relationship between tests as well as the intra- and inter-tester reliability will be made.

Necessary skills/knowledge:

An organised and motivated person is required to manage this project.

MAPPING THE WORK PRACTICES AND RETENTION OF AUSTRALIAN TRACK AND FIELD COACHES

Supervisor: Andrew Dawson

Supervisor's profile:

Andrew Dawson is coordinator of coach education in the School of Exercise and Nutrition Science. Andrew's research focuses on career and professional development in sport and teaches coaching and sport psychology. Andrew is a coach development consultant for Athletics Australia and the Australian Karate Federation and is an accredited Level 4 Track and Field coach.

Recent publications:

Dawson, A. (2008). Developing your coaching career: strategies for success. *Australian Track & Field Coaches Association News*. Ashmore, Qld: Australian Track & Field Coaches Association

Dawson, A. (2007). *Coach career transition and development: The nexus between policy and practice*. Published abstract for the ICCE Global Coach Conference: Beijing, China.

Co-supervisor: Dr Pamm Kellett (School of Management and Marketing)

Contact details:

Andrew Dawson
Ph: 03 9251 7309
Email: andrew.dawson@deakin.edu.au

Project description:

Issues related to coach employment and retention have become increasingly important for the long-term planning and development of sport in Australia. Of particular interest is the way Australian track and field coach's work. Typically track and field coaches are perceived as dedicated volunteers who can produce high performing athletes on limited resources and yet we know little about how they work and how they perceive their role as a coach. This investigation aims to map the work Australian track and field coaches do which builds on the recent knowledge about their careers.

Methodological approach:

A comprehensive work practice survey will be developed and administered on-line to registered Australian track and field coaches. Data from this survey will be used to provide Athletic Australia with policy and management guidance for the long-term sport development and professional development and retention of its coaches.

Necessary skills/knowledge:

An interest in exercise and sport science development and career/professional development is essential.

DEVELOPING AND VALIDATING A 360 DEGREE FEEDBACK AND EVALUATION TOOL FOR ENHANCING COACH PERFORMANCE

Supervisor: Andrew Dawson

Supervisor profile:

Andrew Dawson is coordinator of coach education in the School of Exercise and Nutrition Science. Andrew's research focuses on career and professional development in sport and teaches coaching and sport psychology. Andrew is a coach development consultant for Athletics Australia and the Australian Karate Federation and is an accredited Level 4 Track and Field coach.

Recent publications:

Dawson, A. (2008). Developing your coaching career: strategies for success. *Australian Track & Field Coaches Association News*. Ashmore, Qld: Australian Track & Field Coaches Association

Dawson, A. (2007). *Coach career transition and development: The nexus between policy and practice*. Published abstract for the ICCE Global Coach Conference: Beijing, China.

Co-supervisor: Dr Paul Gastin

Contact details:

Andrew Dawson

Ph: 03 9251 7309

Email: andrew.dawson@deakin.edu.au

Project description:

Multi-rater or 360 degree evaluation tools have been used to great effect in the field of business management for more than a decade and yet there is no evidence of their use in the sport and coaching literature. Coaches play a pivotal role in the success of both individual athletes and teams and yet they rarely get evaluated beyond the final results they produce. This project will present a conceptual advance in the professional development of Australian sports coaches.

This investigation aims to trial and develop a 360 degree evaluation tool that can be used by coaches and coach managers to enhance their professional and personal development.

Methodological approach:

Coaches in a variety of occupational settings (e.g., National, State, Club and Professional sporting organizations) will be asked to complete a 360 degree coach evaluation and then interviewed about the evaluation process. Multiple data gathering methods will be utilized. For example, prepared open-ended questions and key word or theme-based prompting will help the participant to discuss their experiences of their coaching performance being evaluated. The resulting data will be triangulated to provide a rich and in-depth representation of the process of evaluating coach performance.

Necessary skills/knowledge:

An interest in exercise and sport science development and career/professional development is essential.

ENERGY DEFICIENCY, MENSTRUAL DISTURBANCES AND LOW BONE MASS: WHAT DO FEMALE ATHLETES AND THEIR COACHES KNOW ABOUT THE FEMALE ATHLETE TRIAD?

Supervisor: Dr Gaelle Ducher

Supervisor's profile:

Dr Gaelle Ducher's research interest focuses on musculoskeletal health and how factors such as physical activity, nutrition and diseases, can affect it. She is especially interested in analyzing bone strength during growth in order to better prevent osteoporosis later in life.

Key Publications:

Ducher G, Bass SL and Karlsson MK. Growing a healthy skeleton: the importance of mechanical loading. In *Primer on the Metabolic Bone Diseases and Disorders of Mineral Metabolism*, 7th edition, American Society for Bone and Mineral Research (eds.), in press

Ducher G and Bass SL. Exercise during growth: Compelling evidence for the primary prevention of osteoporosis? *BoneKEy*. 2007; 4(6): 171-180

Co-supervisor: Dr Sonja Kukuljan

Contact details:

Gaelle Ducher PhD - Research Fellow
Ph 03 9244 6743
Email: gaele.ducher@deakin.edu.au

Project description:

The clinical co-presentation of disordered eating, menstrual disturbances and low bone density is referred to as the 'female athlete triad'. This condition can have direct consequences on bone health, fertility and cardiovascular health. The prevention, detection and management of the triad require an awareness of the condition amongst sportswomen and coaches.

Studies which have investigated both athletes' and coaches' knowledge of the female athlete triad are available, but they have all been conducted in the U.S. or Canada. These studies have shown that a large proportion of athletes and coaches are not aware of the long-term consequences of missing periods (amenorrhea) on bone health.

Currently, we do not know about the level of awareness nor how well informed Australian sportswomen are about this issue. Nor do we know what proportion would be able to detect the early signs of the condition, in order to seek assistance in a timely manner. Likewise, the coaches' knowledge and attitude about the female athlete triad remains unknown in Australia.

The present proposal aims to investigate the knowledge and awareness of young Australian female athletes and Australian coaches about the female athlete triad. It

will help to design an educational program for athletes and coaches in order to better prevent and detect this condition.

Methodological approach:

A survey will be conducted to determine the proportion of sportswomen and coaches who know the three components of the triad and who can identify the key signs that are classically associated with energy deficiency (weight loss, amenorrhea, stress fractures). In addition, investigations on how athletes and coaches communicate on the triad and how they respond to the presence of signs classically associated with energy deficiency will be conducted.

Necessary skills/knowledge:

- Strong interest in the effects of disordered eating on sportswomen's health
- Capacity to recruit subjects for the study by being involved in one or several sports clubs or fitness centres.
- Willingness to travel to these different sports centres to disseminate the survey
- Good organizational skills to manage the project

DISSECTION OF PROTEIN EXPORT IN MALARIA PARASITES

Supervisor: Dr. Tania de Koning-Ward

Supervisor's profile:

De Koning-Ward's research interests include the study of virulence mechanisms of human and animal model pathogens and the host immune response that is generated during infections, using molecular genetics as a core tool. During her career she has studied the molecular aspects of bacterial pathogenesis and has trained in two of the leading centres for malaria transgenesis and pathogenesis in the world. Her laboratory at Deakin is one of a few world-wide who have expertise in both human and malaria transgenesis systems and thus her lab has a rather unique capacity to combine the two technologies to gain an in-depth insight into the contribution of malaria proteins to parasite development, pathogenesis and survival. These systems also allow the creation of transgenic parasite lines to study the immune response directed against key antigens and to test the efficacy of potential malaria vaccines.

Dr. de Koning-Ward has authored 29 publications that consistently appear in leading journals. They have been cited over 600 times. She has received a Howard Florey Centenary Fellowship and currently holds an NHMRC project grant

de Koning-Ward TF, Janse CJ, Waters AP (2000). The development of genetic tools for dissecting the biology of malaria parasites. *Annu Rev Microbiol.* 54:157-185.

de Koning-Ward TF, O'Donnell RO, Drew DR, Thomson R, Speed TP and Crabb BS (2003). A new rodent model to assess blood stage immunity to the *Plasmodium falciparum* antigen Merozoite Surface Protein 1₉ reveals a protective role for invasion inhibitory antibodies. *J Exp Med.* 198:869-875.

Co-supervisor: Dr. Silvia Haase

Contact details:

Dr. Tania de Koning-Ward
School of Medicine, Waurn Ponds Campus
Email: taniad@deakin.edu.au
Ph: (03) 5227 2923

Project description:

Malaria remains one of the most important infectious diseases in the world and is responsible for the death of between 1-3 million people annually. Malaria parasites reside inside red blood cells and to thrive inside the blood-stream it exports ~ 300 proteins into the cytosol of its host red blood cell and beyond to the cell surface in some instances. Here, the exported proteins play an important role in virulence and in the acquisition of nutrients for the parasite. One of the key questions in the malaria field is the mechanism by which these proteins are trafficked from the parasite into the red blood cell as the export machinery will undoubtedly represent a key target for malaria chemotherapeutic intervention.

Recently, we have been involved in the exciting discovery of novel malaria proteins that we believe play a key role in the protein export process. The aim of this project

will therefore be to characterize these proteins with a view to understanding how these proteins interact with one another to facilitate protein export. This project will also focus on dissecting the functional role of these components in protein trafficking and how they contribute to malaria pathogenesis.

Methodological approach:

This project will involve the characterization of novel malaria proteins involved in protein export using a wide range of molecular (PCR, cloning, sequencing) and protein techniques (expression, protein-protein interaction) as well as fluorescence microscopy to study protein trafficking. Malaria parasite culturing and transfection methodologies will also be performed.

Necessary skills/knowledge:

The student would need a solid background of molecular and cell biology.

IMPROVING NUTRITIONAL QUALITY OF BERRY FRUITS BY HIGH PRESSURE PROCESSING

Supervisor: Dr. Shirani Gamlath

Supervisor's profile:

I have more than 10 years experience in Food Science & Nutrition areas with expertise in food processing and novel product development. My current research is based on use of emerging food processing technologies to maintain nutritional quality of foods and to develop products with health benefits. I have been working on collaborative projects with Food Science Australia and currently supervising a Ph D student on "Minimal Processing of fruits by high pressure processing". I have also conducted a study with Massey University, New Zealand on development of low glycaemic snack products by extrusion technology in 2007. I have made publications in relation to nutritional changes in food processing and the most recent publications are shown below.

- **Gamlath, S.**, Ganesharane, R., Extruded products with fenugreek (*Trigonella foenumgraecium*) chickpea and rice: Physical properties, Sensory acceptability and Glycaemic index, *Journal of Food Engineering* (2008), doi:10.1016/j.jfoodeng.2008.06.004
- Singh, S., **Gamlath, S.** and Wakeling, L. (2007) Nutritional aspects of food extrusion: a review, *International Journal of Food Science and Technology*, Vol. 42, pp. 916-929, Wiley-Blackwell Publishing Ltd, United Kingdom
- Singh, S., Wakeling, L. and **Gamlath, S.** (2007) Retention of Essential Amino Acids during Extrusion of Protein and Reducing Sugars, *Journal of Agricultural and Food Chemistry*, Vol. 55, pp. 8779-8786, American Chemical Society, United States

Co-supervisors: Dr. Mala Gamage, Innovative Food Centre, Food Science Australia, Werribee and Dr. Adel Yousif, Deakin University

Contact details:

Dr Shirani Gamlath

Ph: 03 92517267

Email: shirani.gamlath@deakin.edu.au

Project description:

Berry fruits are rich sources of micronutrients such as vitamin C and bioactive compounds including flavonoids (anthocyanins and anthocyanindins), flavonols, and phenolic acids (Puupponen-Pimia et al., 2004; Seeram, 2006).

Most berry fruits have extremely short shelf life. Therefore they are consumed fresh, rapidly processed into jams, juices and wines or frozen for use in desserts and yoghurts. Apart from microorganisms, enzymes such as polyphenol oxidase, peroxidase and β -glucosidase are involved in the deterioration of the quality of berry fruits. These enzymes cause the degradation of anthocyanins and other polyphenols leading to browning discoloration and loss of antioxidant activity. Thermal processing

causes loss of textural and nutritional quality of berry fruits. High pressure processing is an alternative technology for the processing of thermo sensitive products. High pressure processing utilizes ultra high pressures to bring about microbial destruction and significant reduction in enzyme activity with minimal effect on quality attributes. Since high pressure affects mainly non-covalent bonds, micronutrients, pigments and flavour compounds are not significantly affected by high pressure processing. In this study the effect of high pressure on nutritional and bio actives compounds in berry fruits will be studied.

This project is a collaboration research project with Food Science Australia. The high pressure processing facility at the Food Science Australia, Werribee will be used to process the samples. The student will be able to experience the application of one the emerging food processing facilities at the Innovative Food Centre, Food Science Australia Werribee in this project.

Methodological approach:

The overall objective of this study is to retain the nutritional quality and bioactive compounds in strawberries and blueberries using high pressure processing. The following activities will be conducted as part of the investigation.

1. Comparison of the effect of HPP on the physicochemical quality of different strawberry and blueberry cultivars so as to determine the most suitable cultivars for high pressure processing
2. Study on the effect of combined high pressure-mild temperature processing on the total polyphenol, total anthocyanin and antioxidant activity of berries following processing and during storage.
3. The effect of high pressure processing on the nutritional quality of berry fruits

Necessary skills/knowledge:

HSN306 Product development and processing

USE OF HERBS AND SPICES FOR THE PRODUCTION OF PROBIOTIC-BASED YOGHURTS

Supervisor: Dr Shirani Gamlath

Supervisor's profile:

Dr Shirani Gamlath has actively established a research program on emerging food processing technologies and product development with health benefits. This field encompasses expertise in a number of areas including product development, novel process technologies such as High Pressure and extrusion. Shirani has experience in relation to research with spices and also conducted a study with Massey University, New Zealand on development of low glycaemic snack products by extrusion technology in 2007. One of her publications in using spices in novel product development is as follows.

Gamlath, S., Ganesharane, R., Extruded products with fenugreek (*Trigonella foenumgraecium*) chickpea and rice: Physical properties, Sensory acceptability and Glycaemic index, *Journal of Food Engineering* (2008), doi:10.1016/j.jfoodeng.2008.06.004

Co-supervisor: Dr Stuart Smith

Contact details:

Dr Shirani Gamlath

Ph: 9251 7267

Email: shirani.gamlath@deakin.edu.au

Project description:

Research into the functionality of spices and herbs has shown that the properties of these ingredients include antimicrobial and antioxidant activity. However, activities such as antimicrobial activity have been investigated *in vitro* against specific enteric food-borne pathogens there is little information on their efficacy in foods regarding glycaemic behaviour as well as their influence as potential prebiotics. Low glycaemic index (GI) and prebiotic foods are good indicators of foods suitable for weight management and anti-diabetic properties.

As a starting point for this project, spices and herbs will be mixed with starter cultures of dairy-based yoghurts to determine their effect on formulation of dairy-based products. Different concentrations of the effective spice extractions will be used in developing yoghurt samples for examining the physicochemical properties and their ability to act as a low GI food.

AIMS:

To compare different spices or herbs suitable to used in developing novel dairy-based products

Hypothesis to be tested in healthy volunteers;

Those dairy-based foods containing spices and probiotics can be developed to provide enhanced health benefits including gut health (Prebiotic/probiotic effects) and anti-diabetic properties based upon low GI.

Methodological approach:

- Examine prebiotic effect of spices and herbs. The student will examine the effect of spices and herbs on growth of known probiotics used in dairy-based foods by microbial plating
- Develop yoghurts with extracts from spices. The student will formulate yoghurts with different concentrations of selected spices.
- Examine the physicochemical and organoleptic properties of the novel yoghurts. The student will test the physical properties of the yoghurts using viscosity, texture, color, and pH.
- Examine the Glycaemic Index (GI) properties of the selected dairy-based yoghurts using *in vitro* GI analysis. The student will establish the GI analytical method and test the chosen products to determine those with low GI.

Necessary skills/knowledge:

The student will need to be confident in laboratory skills, to be well organized and like working with members of the Functional Foods group. All training will be undertaken by Dr Shirani Gamlath and Dr Stuart Smith but a basic knowledge of product development, laboratory skills and statistical analysis would be useful.

VALIDATION OF ACCELEROMETER DERIVED DATA IN FIELD TEAM SPORTS

Supervisor: Dr Paul Gustin

Supervisor's profile:

Paul Gustin is a Senior Lecturer in Exercise and Sport Science. He has twenty years experience working in high performance sport including head of Sports Science at the VIS and Technical Manager and Advisor in Performance Planning at UK Sport. Research interests relate to methods of athlete management and monitoring including performance planning, work load assessment, training manipulation and adaptation, athlete perception of wellness and energy system contributions.

Two honours projects were supervised in 2008 through a partnership with the Geelong FC investigating relationships between player assessments of fitness, training and wellness and on-field performance and injury.

Previous research has focused on energy system contributions during high intensity exercise:

Gustin PB. Energy system interaction and relative contribution during maximal exercise. *Sports Medicine*, 31: 725-741, 2001.

Co-supervisor: Dr Kevin Netto

Contact details:

Dr Paul Gustin

Ph: (03) 9244 6334

Email: paul.gustin@deakin.edu.au

Project description:

The recent introduction of data loggers and wireless technologies for monitoring player responses in complex team sports provides previously unavailable insight into the training and competition demands of these sports. Technologies used in Australian Rules Football for example combine heart rate, GPS and accelerometer sensors. Heart rate and GPS derived data relating to speed and distance have previously been validated. Data from triaxial accelerometers, collected at 100 Hz, have not been validated in the context to which they are being used. Proprietary hardware and software (GPSports) use accelerometer data to derive a variable described as measuring body load. This includes ground reaction forces related to running and change of direction but also physical contact from sudden and significant body acceleration as a result of the impact. The accurate assessment of external force on the body during field based sports, and in particular those that include body contact, has great potential to enhance our understanding of game demands. Such insight has implications for training design, athlete development and recovery, injury prevention and management.

Research Objective:

Validate accelerometer data from GPSports technologies in controlled laboratory conditions, and in training and competition in Australian Rules Football.

Methodological approach:

The project will comprise two methodological approaches. The first will be investigative in nature and will assess the validity and reliability of accelerometer data in GPSports technologies collected under controlled laboratory conditions. This will include comparison against a known standard (i.e. force platform) during varying controlled impact tasks such as running and jumping as well as with dropped objects from a height and mechanically controlled movements. The influence of location and fit of the unit on the body will also be considered.

The second approach will be to manage, analyze and interpret data collected during training and competition in AFL football. The School of Exercise and Nutrition Sciences has formed a partnership with the Geelong FC. Much of the data is routinely collected by the club and will be made available for analysis; however additional complementary data may be gathered for the purposes of the project. Inter- and intra-player variability will be considered along with the influence of variables such speed, strength, power, body morphology, previous injury, ground surface, change of direction, and physical contact.

Note: This project could be offered to two students or one part only undertaken

Necessary skills/knowledge:

An interest in applied sports science (particularly physiology and biomechanics) with a focus on athlete assessment, performance technologies and data manipulation. A willingness to travel to Geelong for the purposes of data collection and management

EFFICACY OF ATHLETE PERCEPTION OF WELLNESS THROUGHOUT A SEASON IN AUSTRALIAN RULES FOOTBALL

Supervisor: Dr Paul Gustin

Supervisor's profile:

Paul Gustin is a Senior Lecturer in Exercise and Sport Science. He has twenty years experience working in high performance sport including head of Sports Science at the VIS and Technical Manager and Advisor in Performance Planning at UK Sport. Research interests relate to methods of athlete management and monitoring including performance planning, work load assessment, training manipulation and adaptation, athlete perception of wellness and energy system contributions.

Two honours projects were supervised in 2008 through a partnership with the Geelong FC investigating relationships between player assessments of training and wellness and on-field performance and injury.

Previous research has focused on energy system contributions during high intensity exercise:

Gustin PB. Energy system interaction and relative contribution during maximal exercise. *Sports Medicine*, 31: 725-741, 2001.

Co-supervisor: TBA

Contact details:

Dr Paul Gustin

Ph: (03) 9244 6334

Email: paul.gustin@deakin.edu.au

Project description:

Athlete perceptions of wellness are routinely used by coaches and support staff to assess adaptive responses to training and manage performance. Wellness variables, rated on a Likert scale, can be physical (e.g. fatigue, muscle soreness, muscle stiffness), psychological (e.g. mood, stress, wellbeing) or even lifestyle related (e.g. sleep quality). Ratings are generally recorded in some form of training diary with analysis and feedback, if provided at all, typically subjective and qualitative in nature. The efficacy of these practices in an applied team sport setting has received little attention in the literature. The purpose of this research is to evaluate ratings of wellness over the course of a competitive season in elite team sport athletes (AFL and NRL players). Inter- and intra- player variability along with the relationship between training and competition load and perception of wellness are of interest.

Research Objective:

Assess the efficacy of athlete perception of wellness throughout a competitive season in elite team sport; in particular investigate the sensitivity of perception of wellness to changes in training and competition load.

Methodological approach:

The project will manage, analyze and interpret data collected in 2008 during training and competition from elite players in the AFL (Geelong FC). Inter- and intra-player variability will be considered along with the influence of variables such as playing experience, travel, injury, and training and competition load. The sensitivity of

perception of wellness will be evaluated by considering the relationship between changes in wellness with measures of physical load derived from heart rate, speed and body load data.

Analysis will include descriptive and relationship statistics along with multi-level modeling.

Necessary skills/knowledge:

An interest in athlete assessment, along with skills relating to data management and interpretation

ACTIVE TRANSPORT AND CHILDREN'S PHYSICAL ACTIVITY

Supervisor: Dr Clare Hume

Supervisor's profile:

I am interested in investigating environmental influences on children's physical activity, particularly relating to the physical and social environment in the neighborhoods, and am involved in several studies examining these issues. I also have a focus on examining mediating and moderating factors in relation to the environment and physical activity. Additionally, I am interested in the development of unique strategies to promote physical activity and reduce sedentary behaviours among children, and have been involved in two large-scale interventions examining such strategies.

I received The Asics Award for Best New Investigator: Health Promotion for my oral presentation at the sixth National Physical Activity Conference in October 2007; I received the Applied Research in Sport and Recreation Science Award from the Department of Victorian Communities for the Switch-Play study in October 2006; and I received a merit award for my oral presentation at the Australian Society for the Study of Obesity (ASSO) Annual Scientific Conference in October, 2005.

Relevant publications:

Hume C, Salmon J, Ball K. (2007) Associations of children's perceived neighborhood environments with walking and physical activity. American Journal of Health Promotion, Vol 21 (3), 201-207.

Hume C, Ball K, Salmon J. (2006) Development and reliability of a self-report questionnaire to examine children's perceptions of the physical activity environment at home and in the neighborhoods. International Journal of Behavioural Nutrition and Physical Activity, Vol 3 (16), 1-6.

Co-supervisor: Alison Carver

Contact details:

Clare Hume
Ph: (03) 9251 7723
email: clare.hume@deakin.edu.au

Project description:

Children's participation in active transport (walking and cycling) has declined in recent years and they are increasingly being driven to/from school and other destinations. Active transport and independent mobility can make a significant contribution to children's overall physical activity; however we currently have poor measures of these behaviours. It is therefore important that valid and reliable measures of active transport and independent mobility to school and other destinations are developed and tested.

Aim:

The aim of this honours project is to explore active transport and independent mobility among Victorian children and adolescents.

Methods:

The study will involve the development of a series of survey questions measuring children's and adolescents' active transport and independent mobility to several destinations in their local neighbourhood. A sample of children and their parents will be recruited to participate, and will complete the survey on two occasions to test the reliability of the questions. Children will also be asked to wear an accelerometer (a sophisticated device that objectively assesses physical activity), in order to test the survey for validity.

This study is important and will make a significant contribution to the field of public health as it will provide the basis upon which programs aiming to increase children's active transport and independent mobility can be accurately assessed for effectiveness.

Methodological approach:

Measurement and validation

Necessary skills/knowledge:

HSE203 essential

HSE313 and/or HSE316 desirable

STRATEGIES TO REDUCE THE CONCENTRATION OF SALT IN THE FOOD SUPPLY

Supervisor: Dr Russell Keast

Supervisor's profile:

Our sense of taste is the gatekeeper to our gastrointestinal tract and understanding the functional significance of taste can significantly increase human well-being. Human sensory research examines perceptual phenomenon and provides clues to the nutritional significance of our senses. Using psychophysical methodology, the majority of Dr Keast's published research has focused on understanding our senses and their influence on health and he consistently published in the top ranking journals of his field. Using a novel sensory directed approach to the chemical separation of foods, Keast co-discovered a natural non-steroidal anti-inflammatory compound in virgin olive oil named oleocanthal which we propose is partially responsible for the health benefits of the Mediterranean diet. In addition, the CI's recent research has questioned the role of caffeine in soft-drinks, the role of dietary fat in satiety, and high levels of sodium in foods. Much of the CI's research was directly supported by Government and Industry grants including: NIH, Diabetes Australia, Firmenich SA and Wm Wrigley Co.

Co-supervisor: Dr Gie Liem

Contact details:

Dr Russell Keast

Ph: 03 92446944

Email: russell.keast@deakin.edu.au

Project description:

The level of salt (NaCl) in processed food products is alarmingly high and is currently being addressed by industry. The major problem facing the food industry is consumer's preference for high salt food products and that salt is a cheap food ingredient. Increased consumption of NaCl has been linked to increased rates of hypertension and associated health related illnesses.

A reduced NaCl diet has been shown to cause a decreased preference and an increased sensitivity of NaCl taste in both NaCl solutions and foods suggesting a relationship may exist between salt consumption, NaCl taste sensitivity and NaCl taste preference. However, no studies have directly assessed if a relationship exists between NaCl taste sensitivity as measured by NaCl taste recognition threshold and liking of NaCl foods.

A potential strategy to reduce the concentration of NaCl yet maintain the level of saltiness is called sub-threshold integration. This is when a flavor-eliciting compound (e.g., sucrose) is present but cannot be recognized by an individual. The subthreshold flavour eliciting compound can decrease the threshold of NaCl and the phenomenon is named sub-threshold integration. Using this knowledge the NaCl content in food may be reduced through enhancement of salty taste using sub-threshold compounds.

Aims

The first aim of the project is to determine if a relationship exists between sensitivity of NaCl and liking of varying concentrations of NaCl in a prototypical food.

The second aim of this project is to determine if NaCl content may be reduced without affecting saltiness using the theory of sub-threshold integration.

Methodological approach:

Sensory screening study to determine NaCl sensitivity in a group of people, followed by a study on liking of prototypical foods with varying concentration of NaCl. The third sensory study will investigate sub-threshold investigation.

Necessary skills / knowledge:

Understand basic concepts of sensory testing, along with food and nutritional knowledge.

References

1. Albertson-Erlanson, C., *How palatable food disrupts appetite regulation*. Pharmacology and Toxicology, 2005. **97**: p. 61-73.
2. Gilbertson, T.A., et al., *Fatty acid modulation of K⁺ channels in taste receptor cells: gustatory cues for dietary fat*. Am J Physiol, 1997. **272**(4 Pt 1): p. C1203-10.
3. Chale-Rush, A., J.R. Burgess, and R.D. Mattes, *Evidence for human orosensory (taste?) sensitivity to free fatty acids*. Chem Senses, 2007. **32**(5): p. 423-31.
4. Chale-Rush, A., J.R. Burgess, and R.D. Mattes, *Multiple routes of chemosensitivity to free fatty acids in humans*. Am J Physiol Gastrointest Liver Physiol, 2007. **292**(5): p. G1206-12.
5. Chandrashekar, J., et al., *The receptors and cells for mammalian taste*. Nature, 2006. **444**(7117): p. 288-94.
6. Gilbertson, T., *The lure of dietary fat: are taste buds to blame?* ChemoSense, 2003. **5**(2): p. 1-6.
7. Tepper, B.J.N.R., *Fat perception is related to PROP taster status*. Physiol Behav, 1996. **61**(6): p. 949-954.
8. Westerterp-Plantenga, M.S., I.J. MJ, and N.E. Wijckmans-Duijsens, *The role of macronutrient selection in determining patterns of food intake in obese and non-obese women*. Eur J Clin Nutr, 1996. **50**(9): p. 580-91.
9. Westerterp-Plantenga, M.S., *Fat intake and energy-balance effects*. Physiol Behav, 2004. **83**(4): p. 579-85.
10. Kamphuis, M.M., W.H. Saris, and M.S. Westerterp-Plantenga, *The effect of addition of linoleic acid on food intake regulation in linoleic acid tasters and linoleic acid non-tasters*. Br J Nutr, 2003. **90**(1): p. 199-206.
11. Kamphuis, M.M., M.S. Westerterp-Plantenga, and W.H. Saris, *Fat-specific satiety in humans for fat high in linoleic acid vs fat high in oleic acid*. Eur J Clin Nutr, 2001. **55**(6): p. 499-508.

THE ROLE OF FAT SENSITIVITY IN THE DEVELOPMENT OF SENSORY SPECIFIC SATIETY

Supervisor: Dr Russell Keast

Supervisor's profile:

Our sense of taste is the gatekeeper to our gastrointestinal tract and understanding the functional significance of taste can significantly increase human well-being. Human sensory research examines perceptual phenomenon and provides clues to the nutritional significance of our senses. Using psychophysical methodology, the majority of the CI's published research has focused on understanding our senses and their influence on health and he consistently published in the top ranking journals of his field. Using a novel sensory directed approach to the chemical separation of foods, Keast co-discovered a natural non-steroidal anti-inflammatory compound in virgin olive oil named oleocanthal which we propose is partially responsible for the health benefits of the Mediterranean diet. In addition, the CIs recent research has questioned the role of caffeine in soft-drinks, the role of dietary fat in satiety, and high levels of sodium in foods. Much of the CI's research was directly supported by Government and Industry grants including: NIH, Diabetes Australia, Firmenich SA and Wm Wrigley Co

Co-supervisor: Dr Conor Delahunty (CSIRO), Dr Matt Golding (CSIRO)

Contact details:

Dr Russell Keast

Ph: 03 92446944

Email: russell.keast@deakin.edu.au

Project description:

Fats have long been considered nutrients of interest due to their hedonically pleasing sensory properties and high energy density, which are thought to drive consumption. During the past decade research in support of a fatty acid taste modality, responsive to components of dietary fat (free fatty acids) has grown. The fatty acid taste modality is thought to represent the fat content of foods, similar to sweet or umami foods, which signal the presence of carbohydrate or protein-rich foods respectively. Similar to other tastes, fatty acid taste is thought to vary in the population, but the degree of variance is still largely unknown. A small number of studies have suggested differences in fatty acid taste sensitivity (high sensitivity versus low or no sensitivity) may alter dietary preferences for, and the consumption of fatty foods. Due to these taste effects, fatty acids may also influence the development of sensory specific satiety (a decrease in the pleasantness of a food, leading to meal termination based on a foods sensory properties). The ability to taste fatty acids in foods may therefore serve as an oral regulator of food and fat consumption.

Aims

The aims of this project are to evaluate population variance to fatty acids and determine what effects fatty acid taste has on fattiness perception of foods, fat consumption and the development of sensory specific satiety.

Methodological approach:

Sensory screening study to determine fat sensitivity in a group of people, followed by a study on fattiness perception and the development of sensory specific satiety after preloads of foods made with specific fatty acids. Subjects will also need to complete questionnaires and a food diary to evaluate food consumption.

Necessary skills / knowledge:

Understand basic concepts of sensory testing, along with food and nutritional knowledge.

References

1. Albertson-Erlanson, C., *How palatable food disrupts appetite regulation*. Pharmacology and Toxicology, 2005. **97**: p. 61-73.
2. Gilbertson, T.A., et al., *Fatty acid modulation of K⁺ channels in taste receptor cells: gustatory cues for dietary fat*. Am J Physiol, 1997. **272**(4 Pt 1): p. C1203-10.
3. Chale-Rush, A., J.R. Burgess, and R.D. Mattes, *Evidence for human orosensory (taste?) sensitivity to free fatty acids*. Chem Senses, 2007. **32**(5): p. 423-31.
4. Chale-Rush, A., J.R. Burgess, and R.D. Mattes, *Multiple routes of chemosensitivity to free fatty acids in humans*. Am J Physiol Gastrointest Liver Physiol, 2007. **292**(5): p. G1206-12.
5. Chandrashekar, J., et al., *The receptors and cells for mammalian taste*. Nature, 2006. **444**(7117): p. 288-94.
6. Gilbertson, T., *The lure of dietary fat: are taste buds to blame?* ChemoSense, 2003. **5**(2): p. 1-6.
7. Tepper, B.J.N.R., *Fat perception is related to PROP taster status*. Physiol Behav, 1996. **61**(6): p. 949-954.
8. Westerterp-Plantenga, M.S., I.J. MJ, and N.E. Wijckmans-Duijsens, *The role of macronutrient selection in determining patterns of food intake in obese and non-obese women*. Eur J Clin Nutr, 1996. **50**(9): p. 580-91.
9. Westerterp-Plantenga, M.S., *Fat intake and energy-balance effects*. Physiol Behav, 2004. **83**(4): p. 579-85.
10. Kamphuis, M.M., W.H. Saris, and M.S. Westerterp-Plantenga, *The effect of addition of linoleic acid on food intake regulation in linoleic acid tasters and linoleic acid non-tasters*. Br J Nutr, 2003. **90**(1): p. 199-206.
11. Kamphuis, M.M., M.S. Westerterp-Plantenga, and W.H. Saris, *Fat-specific satiety in humans for fat high in linoleic acid vs fat high in oleic acid*. Eur J Clin Nutr, 2001. **55**(6): p. 499-508.

THE ROLE OF CAFFEINE IN DRIVING CONSUMPTION OF SOFT-DRINKS

Supervisor: Dr Russell Keast

Supervisor's profile:

Our sense of taste is the gatekeeper to our gastrointestinal tract and understanding the functional significance of taste can significantly increase human well-being. Human sensory research examines perceptual phenomenon and provides clues to the nutritional significance of our senses. Using psychophysical methodology, the majority of Dr Keast's published research has focused on understanding our senses and their influence on health and he consistently published in the top ranking journals of his field. Using a novel sensory directed approach to the chemical separation of foods, Keast co-discovered a natural non-steroidal anti-inflammatory compound in virgin olive oil named oleocanthal which we propose is partially responsible for the health benefits of the Mediterranean diet. In addition, the CI's recent research has questioned the role of caffeine in soft-drinks, the role of dietary fat in satiety, and high levels of sodium in foods. Much of the CI's research was directly supported by Government and Industry grants including: NIH, Diabetes Australia, Firmenich SA and Wm Wrigley Co.

Co-supervisor: Dr Lynn Riddell

Contact details:

Dr Russell Keast

Ph: 03 92446944

Email: russell.keast@deakin.edu.au

Project description:

Caffeine is a widely-consumed mildly-addictive chemical occurring naturally in coffee, tea, and chocolate, and as an additive in soft-drinks. Caffeine helps develop flavor preferences for a food/flavor with its positive post-ingestive consequences including increased vigilance and attention, enhanced mood and arousal as well as enhanced motor activity. Behavioural studies have shown that the consumption of caffeine promotes a physiologic and psychologic dependence that is reinforced with repeat consumption. The common method of repeat caffeine consumption is via caffeinated beverages such as coffee, tea, cocoa, and soft drinks which are hedonically pleasant to drink. In addition, when caffeine is co-consumed with a source of sugar (glucose), there appears to be a synergy of cognitive modulating effects. This is of particular concern for soft-drinks sold to children and adolescents as the dose of caffeine required to modify behaviour in humans is low (>50 mg), similar to the dose delivered in 500 ml common cola soft-drinks (~53-65 mg, 0.55-0.67 mM). Such doses of caffeine may cause children and adolescents to consume more of the sugar sweetened soft-drink due to physiologic and psychologic modes of action. Moreover, the consumption of sugar sweetened soft-drinks has been linked to increasing body mass index and risk of obesity, and the prevalence of obesity is an emerging epidemic that increases the personal and economic burden of diet related diseases.

Aims

The aim of the project is to determine if caffeine increases liking of soft-drinks.

Methodological approach:

Sensory study to determine liking of soft-drinks with and without caffeine. The study will include a flavor learning phase followed by a series of sessions evaluating liking of the soft-drinks.

Necessary skills / knowledge:

Understand basic concepts of sensory testing, along with food and nutritional knowledge.

FUNCTIONAL ANALYSIS OF A NEW DIABETES CANDIDATE GENE IN INSULIN ACTION

Supervisor: Nicky Konstantopoulos

Supervisor's profile:

My research focus extends into the functional biochemistry of the Insulin Receptor and its subsequent signalling processes in normal and pathological states. I have worked on the identification of the signalling proteins involved in insulin resistance and Type 2 Diabetes. This work was published in *Science*, 293: 1673 (2001). One of the major projects that I am currently involved in at the Metabolic Research Unit is the identification and validation of a subset of genes characteristic of insulin sensitivity and insulin resistance. This gene signature profile is being used to identify novel compounds with anti-diabetic activity. Furthermore, the focus is to also characterize novel genes/proteins associated with Insulin Action and Type 2 Diabetes in a range of cell and animal models to determine their functional role(s).

Co-supervisor: Janine McMillan

Contact details:

Metabolic Research Unit,
School of Health Sciences
Waurin Ponds campus
Email: nickyk@deakin.edu.au
Ph: 5227 2513

Project description:

Impairment of insulin action is an early defect that contributes to insulin resistance, obesity and Type 2 Diabetes (T2D). However, there are multiple and redundant metabolic pathways that control the actions of insulin. Complex network of interactions have made conventional drug discovery approaches for T2D difficult. Many drugs act on multiple targets to alter the overall state of the cell/tissue/organism. Our approach was to identify the smallest number of genes that can discriminate between cells that cannot respond to insulin anymore (insulin resistant) and cells that can respond to insulin (insulin sensitive). One of the genes in this particular gene subset is of immense interest. This project will focus on the significance of this gene in Insulin Action by suppressing the endogenous gene expression levels in cellular models such as fat, liver and/or muscle cells. We will be suppressing or silencing gene levels using a powerful tool known as RNA interference. Effects on insulin action will be determined by examination of the phosphorylation status of key insulin sensitive proteins and regulation of glucose and lipid metabolism.

Methodological approach:

Exciting new technologies such as RNA interference will be used to knock down the target protein expression levels in cells. The consequences of this protein knock down on insulin action will be assessed by a range of biochemical approaches. Techniques such as the design and generation of RNAi molecules, mammalian cell culture maintenance, transient transfection and retroviral infection of cells, RNA and protein extraction, quantitative PCR, immunoprecipitation, SDS-gel electrophoresis and Western blotting, glucose transport and fatty acid uptake assays will be used.

Necessary skills/knowledge:

An enthusiasm and keen interest to learn and partake in scientific research is essential. Course work in biochemistry and/or molecular biology is required but not necessary.

SCREENING FOR A SAFER PHARMACEUTICAL TREATMENT FOR TYPE 2 DIABETES

Supervisor: Nicky Konstantopoulos

Supervisor's profile:

My research focus extends into the functional biochemistry of the Insulin Receptor and its subsequent signalling processes in normal and pathological states. I have worked on the identification of the signalling proteins involved in insulin resistance and Type 2 Diabetes. This work was published in *Science*, 293: 1673 (2001). One of the major projects that I am currently involved in at the Metabolic Research Unit is the identification and validation of a subset of genes characteristic of insulin sensitivity and insulin resistance. This gene signature profile is being used to identify novel compounds with anti-diabetic activity. Furthermore, the focus is to also characterize novel genes/proteins associated with Insulin Action and Type 2 Diabetes in a range of cell and animal models to determine their functional role(s).

Co-supervisor: Fred Pfeffer

Contact details:

Metabolic Research Unit,
School of Health Sciences
Waurin Ponds campus
Email: nickyk@deakin.edu.au
Phone: 5227 2513

Project description:

Diabetes is one of the most debilitating chronic diseases and the World Health Organisation estimates that the current number of sufferers worldwide is 150 million and this number will double by 2030. A range of treatments are currently available for Type 2 diabetes including insulin, metformin and thiazolidinediones. None of these treatments are ideal in terms of their side effect profile, and for the popular thiazolidinediones, such as Rosiglitazone, recent evidence has identified that weight gain and fluid retention associated with their use contributes to an elevated risk of coronary heart failure. There is, therefore, a crucial need to develop improved, safer treatments for this chronic disease that uncouple the anti-diabetic properties from the deleterious side effects.

This project will involve screening a small number of compounds known as flavonoids in selected cell-based bioassays to identify the compounds with the most potent anti-diabetic effects. Compounds with biological activity in these initial screens will then be examined in cells to determine their potential mode of action(s).

Methodological approach:

The Metabolic Research Unit is a purpose built facility for the discovery of novel pharmaceuticals for the treatment of Type 2 diabetes. The biological assays that the successful candidate will be learning and using include:

i. Glucose Transport assay.

A key action of insulin is the stimulation of glucose transport into adipose and muscle cells. This metabolic event will be measured using the 2-deoxyglucose uptake assay in 3T3-L1 adipocytes and L6 myotubes.

ii. Adipocyte Differentiation assay:

The ability to promote lipid accumulation is thought to be responsible for the weight gain in Type 2 diabetic sufferers treated with Rosiglitazone. Compounds will be tested for their ability to promote the differentiation of fibroblasts into mature lipid-laden adipocytes by quantification of Oil Red O staining.

iii. Modes of action – Insulin signal transduction:

Compounds that possess activity in the Glucose Transport Assay and only possess partial or nil activity in the Adipocyte Differentiation assay will be further evaluated for their ability to stimulate genes and/or proteins critical in the Insulin Signalling cascade using techniques such as mammalian cell culture, RNA and protein extraction, quantitative PCR, immunoprecipitation, SDS-gel electrophoresis and Western blotting.

Necessary skills/knowledge:

A sincere interest to learn and be part of a dynamic scientific research group is highly recommended. Course work in biochemistry and/or molecular biology is required but not necessary.

ESTABLISHING A BASELINE FOR FOLIC ACID FORTIFICATION AND FOLIC ACID – NTD HEALTH CLAIM

Supervisor: A/Prof Mark Lawrence

Supervisor's profile:

Mark is a public health nutritionist with over 20 years experience in food policy. He is actively involved in public health nutrition research analyzing the development of policies and programs to protect and promote the nutritional health of populations. For example, nutrient reference values, dietary guidelines and food selection guides. He is particularly interested in monitoring and evaluating the public health implications of food fortification, functional foods and health claims. Mark is an advisor to the WHO and is a member of the FSANZ food fortification and food labeling committees.

Grants:

- i) Chief Investigator, National Health and Medical Research Council Strategic Award: Preventive Healthcare and Strengthening Australia's Social and Economic Fabric (2007 – 11), 'A comprehensive regulatory strategy for obesity prevention in Australia' (\$A761,184)
- ii) Team Investigator, NHMRC Capacity Building Grants in Population Health Research – Rounds 4 & 5 (2007 – 11), 'Obesity Prevention in Children and Adolescents' (\$A1,958,075)

Publications:

- i) Lawrence, M (2006). Evaluation of the implementation of the folate–neural tube defect health claim Pilot and its impact on the availability of folate-fortified food in Australia. *Australian and New Zealand Journal of Public Health* 30(4), 363-368.
- ii) Lawrence, M and A Robertson. (2007). Public health nutrition reference standards. In: *Public Health Nutrition: from Principles to Practice*. Lawrence, M and A Worsley (eds). Sydney, Allen & Unwin.

Co-supervisor: Dr Lynn Riddell

Contact details:

A/Prof Mark Lawrence

Ph: 03 92443789

Email: mark.lawrence@deakin.edu.au

Project description:

In September 2009 mandatory folic acid fortification of bread-making flour will commence in Australia. This is a complex and controversial policy. Into the future there will be close scrutiny of the public health and safety impact of this policy. A baseline needs to be put in place before the commencement of the policy implementation to support future monitoring and evaluation.

Aims:

To establish a baseline of food product fortification and use of the folic acid-NTD health claim prior to the implementation of the folic acid fortification policy intervention (in September 2009).

Methodological approach:

The methodological approach involves 3 steps:

- Framing the survey: Review of the food standards relevant to this policy topic (food standards related to food composition and food labeling)
- Design of a survey instrument and sample frame: Based on the food standards' provisions, the development of a survey instrument and sample frame to survey relevant food products (nutrition information panels and food labels for relevant claims)
- Data collection: Using the survey instrument and sample frame collect data from Melbourne supermarkets during March – April 2009.
- Data analysis: Analyze collected data for:
 - a. compliance with food standards' provisions;
 - b. description of number of fortified food products, level of fortification and use of health claim among food groups; and
 - c. comparison of these analyses with data collected in 1998 and 2004 – 2007.

Necessary skills/knowledge:

- Successful completion of unit HSN309 would be an advantage
- Knowledge of the Food Standards Code and the scientific and political basis to the folic acid – neural tube defect relationship
- Good monitoring and surveillance skills
- Good data collation and manipulation skills
- Good writing and communication skills

EVALUATING RISK ANALYSIS IN THE FOOD REGULATORY SYSTEM: HOW ARE ENVIRONMENTAL AND SOCIAL DIMENSIONS ADDRESSED?

Supervisor: A/Prof Mark Lawrence

Supervisor's profile:

Mark is a public health nutritionist with over 20 years experience in food policy. He is actively involved in public health nutrition research analyzing the development of policies and programs to protect and promote the nutritional health of populations. For example, nutrient reference values, dietary guidelines and food selection guides. He is particularly interested in monitoring and evaluating the public health implications of food fortification, functional foods and health claims. Mark is an advisor to the WHO and is a member of the FSANZ food fortification and food labeling committees.

Grants:

- iii) Chief Investigator, National Health and Medical Research Council Strategic Award: Preventive Healthcare and Strengthening Australia's Social and Economic Fabric (2007 – 11), 'A comprehensive regulatory strategy for obesity prevention in Australia' (\$A761,184)
- iv) Team Investigator, NHMRC Capacity Building Grants in Population Health Research – Rounds 4 & 5 (2007 – 11), 'Obesity Prevention in Children and Adolescents' (\$A1,958,075)

Publications:

- iii) Lawrence, M (2006). Evaluation of the implementation of the folate–neural tube defect health claim Pilot and its impact on the availability of folate-fortified food in Australia. *Australian and New Zealand Journal of Public Health* 30(4), 363-368.
- iv) Lawrence, M and A Robertson. (2007). Public health nutrition reference standards. In: *Public Health Nutrition: from Principles to Practice*. Lawrence, M and A Worsley (eds). Sydney, Allen & Unwin.

Co-supervisor: TBC

Contact details:

A/Prof Mark Lawrence

Ph: 03 92443789

Email: mark.lawrence@deakin.edu.au

Project Description:

Environmental sustainability and social considerations (access to food, cost, etc) are critical factors confronting food policy. Currently the food regulatory system is responsible for developing policies and food standards to regulate the development of new food products and ingredients in the marketplace. Little research has been undertaken to examine if or how environmental and social dimensions are taken into account when making policy and regulatory decisions in the food regulatory system.

The primary objective when setting food standards within the food regulatory system is the 'protection of public health and safety' and there is a well-established process of risk analysis to inform decision-making so that this objective is addressed. However, the protection of public health and safety has not been defined – does it refer to toxicological measures or does it extend to broader nutrition, environmental and social measures?

Aims:

To evaluate the nature and scope of risk analysis in the food regulatory system in Australia and New Zealand, selected countries and at Codex

To identify if and how environmental and social dimensions are addressed in the decision-making for food regulation

Methodological approach:

The methodological approach involves 3 steps:

- Reviewing the risk analysis policy and procedures for the food regulatory system in Australia, selected countries and at Codex
- Review the scientific literature to identify environmental and social dimensions as they relate to food regulation
- Evaluating how policies and procedures are applied in practice by selecting a case study food standard to analyze how risk was managed and the standard was developed.
 - a. Data collection: Accessing the FSANZ public register for public submissions to identify issues raised by stakeholders
 - b. Data analysis: Analyze collected data to determine how the protection of public health and safety was interpreted in terms of the risk analysis and how data compare with environmental and social dimensions raised in the literature.

Necessary skills/knowledge:

- Successful completion of unit HSN309 would be an advantage
- Knowledge of the New Nutrition Science and the Food Standards Code and the scientific and political basis to risk analysis procedure
- Good literature searching and review skills
- Good writing and communication skills

ASSESSING SOCIO-ECONOMIC, GEOGRAPHICAL, POLICY AND SEASONAL FACTORS AFFECTING THE COST OF PURCHASING A HEALTHY DIET IN AUSTRALIA

Supervisor: A/Prof Mark Lawrence

Supervisor's profile:

Mark is a public health nutritionist with over 20 years experience in food policy. He is actively involved in public health nutrition research analyzing the development of policies and programs to protect and promote the nutritional health of populations. For example, nutrient reference values, dietary guidelines and food selection guides. He is particularly interested in monitoring and evaluating the public health implications of food fortification, functional foods and health claims. Mark is an advisor to the WHO and is a member of the FSANZ food fortification and food labeling committees.

Grants:

- v) Chief Investigator, National Health and Medical Research Council Strategic Award: Preventive Healthcare and Strengthening Australia's Social and Economic Fabric (2007 – 11), 'A comprehensive regulatory strategy for obesity prevention in Australia' (\$A761,184)
- vi) Team Investigator, NHMRC Capacity Building Grants in Population Health Research – Rounds 4 & 5 (2007 – 11), 'Obesity Prevention in Children and Adolescents' (\$A1,958,075)

Publications:

- v) Lawrence, M (2006). Evaluation of the implementation of the folate–neural tube defect health claim Pilot and its impact on the availability of folate-fortified food in Australia. *Australian and New Zealand Journal of Public Health* 30(4), 363-368.
- vi) Lawrence, M and A Robertson. (2007). Public health nutrition reference standards. In: *Public Health Nutrition: from Principles to Practice*. Lawrence, M and A Worsley (eds). Sydney, Allen & Unwin.

Co-supervisor: Dr Cate Burns

Contact details:

A/Prof Mark Lawrence

Ph: 03 92443789

Email: mark.lawrence@deakin.edu.au

Project description:

The cost of food is a major factor affecting access to food and food security among the population. In 2008 the Australian government announced its food price watch scheme to monitor and publicize the comparative prices of food products available in supermarket stores across Australia on a regular basis.

This purpose of the study is to assess the cost of meeting nutrient requirements (NRVs and core food group's recommendations) by surveying the price of food in different supermarket chains, different store locations and at different times of the year.

Aims:

To assess the comparative cost of purchasing food to meet nutrient reference values and core food groups recommendations by different supermarket chains (policy pricing variable)

To assess the comparative cost of purchasing food to meet nutrient reference values and core food groups recommendations by different store locations (geographical and socio-economic status variable)

To assess the comparative cost of purchasing food to meet nutrient reference values and core food groups recommendations by different times of the year (seasonality)

Methodological approach:

Research design

- i) Identify relevant nutrient reference values and core food group recommendations
- ii) Construct dietary profiles from food product serves that meet the relevant NRVs and core food group recommendations
- iii) Establish sample frame of supermarket stores, locations and time periods

Data collection

- i) Access price watch data base
- ii) Collect data for identified food product serves

Data analysis

- Assess pricing policy factors by comparing the distribution of prices for food products individually and diets in total at Coles and Woolies supermarket chains
- Assess socio-economic and geographical factors by comparing the distribution of prices for food products individually and diets in total at different locations classified by SEIFA index, state and territory distribution and urban/regional/remote location.
- Assess seasonal factors by comparing the distribution of prices for food products individually and diets in total at 4 different time periods during Feb – Sept 2009.

Necessary skills/knowledge:

- Successful completion of unit HSN309 would be an advantage
- Good understanding of descriptive statistical concepts and basic statistical tests, eg comparison of means.
- Good spreadsheet and data manipulation skills
- Good writing and communication skills

DOES AUSTRALIAN CANOLA OIL CONTAIN TOXIC SUBSTANCES WHICH SHORTEN LIFE DUE TO INCREASED OXIDATIVE STRESS?

Supervisor: Dr Paul Lewandowski

Supervisor's profile:

Dr Lewandowski's research focus is on understanding how free radicals contribute to the development of diseases such as cardiovascular disease, obesity, fatty liver disease, muscle wasting, cancer and the aging process using a range of animal models and human volunteers. To compliment this mechanistic research Dr Lewandowski uses a range of dietary supplementation and functional foods to treat disease. The tools employed in Dr Lewandowski's research include nutrigenomics, molecular biology techniques and a range of free radical and antioxidant measures. Investigations in the area of 'toxic canola' have attracted significant funding to support a team of postdoctoral researchers and PhD students.

Co-supervisor: Dr Sunil Ratnayake

Contact details:

Dr Paul Lewandowski
School of Medicine Deakin University Geelong
Ph: 03 522 71111
Email: paul.lewandowski@deakin.edu.au

Project description:

Since 1996, a number of papers have reported that canola oil has life shortening effects in Stroke-Prone Spontaneously Hypertensive Rats (SHRSP). The two candidate compounds suspected in the oils were the fatty acids and the plant sterols, however both these have been ruled out in further studies. While this strain of rats is prone to stroke, the cause of death has not always been due to stroke as autopsies also show kidney damage and significant infiltration of macrophages in other organs. The mechanism(s) leading to these changes have not been investigated thus in the current study we aim to:

1. Measure antioxidant, oxidative stress and endothelial dysfunction markers in plasma, red blood cells, white blood cells and target organs of SHRSP rats.
2. To measure the gene regulation of various antioxidant, oxidative stress and endothelial dysfunction markers in red blood cells, white blood cells and target organs of SHRSP rats.

This project will hopefully discover the underlying mechanism responsible for the life shortening canola effect. It is anticipated that with the mechanism involved will be related to increased levels of oxidative stress in circulation and susceptible organs. Determining the mechanism responsible for the life shortening effects of canola oil consumption in the SHRSP rat is of particular importance, because if the mechanism responsible for this effect can also be found in at risk members within the community such as hypertensive patients a potentially challenging issue for canola farmers and consumers of canola oil in Australia will evolve.

Methodological approach:

The project will use the following methods to achieve the described aims;

RNA isolation

Real-time PCR

Western Blotting

A range of measures of oxidative stress

A range of measures of free radical capacity

Animal surgery and experimentation

Necessary skills/knowledge:

Basic nutrition, biochemistry and physiology, together with a desire to work hard to 'find the answer'

DIFFERENTIAL EFFECTS OF DIETARY OILS ON INFLAMMATORY INDEX

Supervisor: Dr Paul Lewandowski

Supervisor's profile:

Dr Lewandowski's research focus is on understanding how free radicals contribute to the development of diseases such as cardiovascular disease, obesity, fatty liver disease, muscle wasting, cancer and the aging process using a range of animal models and human volunteers. To compliment this mechanistic research Dr Lewandowski uses a range of dietary supplementation and functional foods to treat disease. The tools employed in Dr Lewandowski's research include nutrigenomics, molecular biology techniques and a range of free radical and antioxidant measures. Investigations in the area of dietary oils and inflammation have attracted funding to support a team of postdoctoral researchers and PhD students.

Co-supervisors: A/Prof David Cameron-Smith and Professor Alister Ward

Contact details:

Dr Paul Lewandowski
School of Medicine Deakin University Geelong
Ph: 03 522 71111
Email: paul.lewandowski@deakin.edu.au

Project description:

Consider the following question: What would happen if every meal you ate was pro-inflammatory?

An answer to this question is already partially known from research that has demonstrated the link between over consumption of saturated fat and the increased the risk of developing cardiovascular disease (CVD). CVD is now recognized as an inflammatory disease, and considered in that context it would be possible to explain the consequences of an individual consuming food rich in saturated fat (pro-inflammatory) five out of seven days each week. By consuming a diet rich in saturated fat five out of seven days each week that individual would be in a pro-inflammatory state five out of seven days each week. Furthermore if this saturated fat induced pro-inflammatory state was sustained for many years the individual would develop CVD or some other chronic illness. In contrast if only one out of seven days each week was pro-inflammatory then the likelihood of the individual developing CVD or other chronic illness is reduced. The current project hopes to develop a reliable way to measure how different foods stimulate a pro- or anti-inflammatory response and gain insight how this response is mediated at a cellular level.

Methodological approach:

The project will use the following methods to achieve the described aims;
RNA isolation
Real-time PCR
Western Blotting
A range of measures of oxidative stress
A range of measures of free radical capacity
Human experimentation

Necessary skills/knowledge:

Basic nutrition, biochemistry and physiology, together with a desire to work hard to 'find the answer'

CAN CHOCOLATE OR RED WINE PREVENT FATTY LIVER DISEASE?

Supervisor: Dr Paul Lewandowski

Supervisor's profile:

Dr Lewandowski's research focus is on understanding how free radicals contribute to the development of diseases such as cardiovascular disease, obesity, fatty liver disease, muscle wasting, cancer and the aging process using a range of animal models and human volunteers. To compliment this mechanistic research Dr Lewandowski uses a range of dietary supplementation and functional foods to treat disease. The tools employed in Dr Lewandowski's research include nutrigenomics, molecular biology techniques and a range of free radical and antioxidant measures. Investigations using chocolate or red wine as an antioxidant source are an ongoing focus of Dr Lewandowski's research group¹.

¹Micallef M, Lexis L, & **Lewandowski P**. Red wine consumption increases antioxidant status and decreases oxidative stress in the circulation of both young and old humans. *Nutr J.* 2007 24;6:27.

Co-supervisor: TBA

Contact details:

Dr Paul Lewandowski

Ph: 03 522 71111

Email: paul.lewandowski@deakin.edu.au

Project description:

Non Alcoholic Fatty Liver Disease (NAFLD) is a condition that results from fat accumulation in the liver and as the name suggests is not linked with alcohol consumption. The prevalence of NAFLD is increasing due to increasing rates of obesity and improvements in treating cardiovascular disease. While easy to diagnose the underlying mechanisms that cause NAFLD are unknown and treatments for the condition are limited. One potential mechanism responsible for the development of NAFLD is fat induced free radical damage to the liver. This project will investigate if changes in free radical levels cause NAFLD and then if antioxidants, found in chocolate and red wine, can be used to treat or prevent the development of NAFLD. A range of state of the art molecular biology methods, novel analytical techniques and measures of free radical damage will be used to identify mechanisms causing NAFLD and the efficacy of chocolate and red wine antioxidants in its treatment.

Methodological approach:

The project will use the following methods to achieve the described aims;

RNA isolation

Real-time PCR

Western Blotting

A range of measures of oxidative stress

A range of measures of free radical capacity

Animal experimentation

Necessary skills/knowledge:

Basic nutrition, biochemistry and physiology, together with a desire to work hard to 'find the answer'

FOOD CHOICE OF CHILDREN, LIKING AND DESIRE

Supervisor: Dr Gie Liem

Supervisor's profile:

Dr Gie Liem has experience in both industry (Unilever Research) and academic research (Monell Chemical Senses Center US, Wageningen University, the Netherlands). His research focuses on taste development and food choice of children. He supervised 4 honours students. This resulted in excellent marks for the students and 2 publications in peer reviewed journals.

Liem DG, Wolterink S, Westerbeek A., Kok FJ, De Graaf C. Sour taste preferences of children relates to preference for novel and intense stimuli. *Chemical Senses* 2004;29(8):713-20.

Liem DG, De Graaf C. Sweet and Sour Preferences in Young Children and Adults: Role of Repeated Exposure. *Physiology & Behaviour* 2004;15(83):421-9.

Co-supervisor: Dr Karen Campbell

Contact details:

Dr Gie Liem (Lecturer)

Ph: 03 92446039

Email: Gie.liem@deakin.edu.au

Project description:

Children in Australia have many foods to choose from. Both healthy and unhealthy options are available to them. In order to steer children to healthy food options we need to understand why children choose the foods they do.

Liking and desire are amongst the most important determinants of children's food choices (Birch & Fisher, 1998). Liking can be measured with specialized sensory methods and can be influenced by repeated exposure. Less is known about how to measure and influence children's desire for healthy foods.

Knowledge about how desire determines children's food choices and how this can be measured and influenced is very important for our understanding why children choose the foods they do. Recent research suggests that a difference in desire for food is related to unhealthy outcomes such as obesity in adults and children (Saelens et al, 1996, Temple et al, 2008.).

Aims

This study aims to investigate the relative importance of desire in children's food choices. The research will involve the following steps 1: Development of a tool to measure desire for food, 2: Investigation of the importance of taste and desire on children's food choice, 3: Change desire and liking to impact children's food choice, by means of short intervention and/or psychological experiments

Methodological approach:

Students will be trained to conduct, analyze and interpret sensory and psychological tests with young children (5-12 yrs) (Liem et al 2004 a, b). About 50 children will be tested during the course of the project. Food choice will be measured by behavioural

experiment. This research includes 1) development of experimental methodology with children, 2) recruitment of subjects, 3) execution of sensory and behavioural experiments 4) data analysis and interpretation.

Necessary skills/knowledge:

Students need to have a general interest in food choice, good organizational skills, and reasonable knowledge about basic statistics; Students who are keen to work with children and are eager to learn about children's food choices are preferred.

- Birch LL, Fisher JO. Development of eating behaviours among children and adolescents. *Paediatrics*. 1998 Mar; 101(3 Pt 2):539-49.
- Liem DG, Mars M, de Graaf C. Consistency of sensory testing with 4- and 5-year old children. *Food Quality and Preference* 2004;15:541-8.
- Liem DG, Wolterink S, Westerbeek A., Kok FJ, De Graaf C. Sour taste preferences of children relates to preference for novel and intense stimuli. *Chemical Senses* 2004b;29(8):713-20.
- Saelens BE, Epstein LH. Reinforcing value of food in obese and non-obese women. *Appetite*. 1996; 27:41-50
- Temple JL, Legierski CM, Giacomello AM, Salvy S-J & Epstein LH. Overweight children find food more reinforcing and consume more energy than do non overweight children. *American Journal of Clinical Nutrition*. 2008; 87: 1121-7

INFLUENCE ON LABELING OF PERCEPTION AND LIKING OF PRODUCT WITH REDUCED SODIUM, SUGAR AND FAT

Supervisor: Dr Gie Liem

Supervisor's profile:

Dr Gie Liem has experience in both industry (Unilever Research) and academic research (Monell Chemical Senses Center US, Wageningen University, and the Netherlands). His research focuses on taste development and food choice. He supervised 4 honours students. This resulted in excellent marks for the students and 2 publications in peer reviewed journals.

- Liem DG, Wolterink S, Westerbeek A., Kok FJ, De Graaf C. Sour taste preferences of children relates to preference for novel and intense stimuli. *Chemical Senses* 2004;29(8):713-20.
- Liem DG, De Graaf C. Sweet and Sour Preferences in Young Children and Adults: Role of Repeated Exposure. *Physiology & Behavior* 2004;15(83):421-9.

Co-supervisor: Dr Russell Keast

Contact details:

Dr Gie Liem (Lecturer)

Ph: 03 92446039

Email: Gie.liem@deakin.edu.au

Project description:

Salt has long been added to food to increase consumers' liking for these foods. At least 75% of consumer's daily salt intake is derived from commercially sourced products (Mattes and Donnelly 1991). Due to the increasing evidence of the negative health effect of a high salt consumption (e.g high blood pressure) and consumers' concerns, major food industries aim to decrease salt in their products (Dötsch, et al unpublished)

Although the reduction of salt consumption will benefit consumers' health, they may hold the belief that salt reduction negatively affects taste, like some consumers think that reduction of fat affects taste (Tuorila et al 1994). These negative expectations may affect consumers' liking and desire for these products. It remains to be investigated whether labeling such as "now reduced in salt" will affect consumers' expectations of taste. Previous research suggests that labeling can have a major impact on consumer's perception and liking of foods (Wansink & Park, 2002). In order for industry to sell salt reduced products and for public health professionals to promote low salt options to a wide range of consumers, it needs to be investigated a) Which consumers hold negative beliefs against low sodium products, b) Whether negative expectations influence the perception and liking of products which are reduced in salt, c) how negative expectations can be changed

Aim:

This project aims to investigate the influence of food labeling and advertisement on taste perception, satiation and food choice of commercially sourced products which are reduced in salt.

Methodological approach:

Sensory testing, food choice, survey

Necessary skills/knowledge:

Sensory testing, food choice

Dötsch, M., Busch, J., Batenburg M, Liem, G, Tareilus, E., Mueller, R., Meijer, G. Strategies to reduce sodium consumption; a food industry perspective. Under review

Mattes, R.D. & Donnelly, D. (1991) Relative contributions of dietary sodium sources. *J Am Coll Nutr*, **10**: 383-393.

Tuorila, H., Cardello, A.V. and Lesher, L.L. (1994) Antecedents and expectations related to fat-free and regular food. *Appetite*, **23**, 247-264

Wansink, B. & Park, S.-B. (2002). Sensory suggestiveness and labeling: do soy labels bias taste. *Journal of sensory studies*, **17**, 483-491.

DIET QUALITY IN AUSTRALIAN CHILDREN AND ADOLESCENTS: THE ROLE OF WHOLEGRAIN FOODS

Supervisor: Dr Sarah McNaughton

Supervisor's profile:

Dr McNaughton is a public health nutritionist and research fellow supported by an NHMRC Public Health Postdoctoral Fellowship. Current research interests focus on the assessment of dietary patterns, diet quality and indicators of a healthy diet and the impact of specific dietary patterns on chronic disease outcomes, particularly cardiovascular disease and diabetes. She is currently collaborating on research using two large nationally representative cohort studies, the Australian Diabetes, Obesity and Lifestyle Study (AusDiab) and the Childhood Determinants of Adult Health study. She has previously conducted analysis of the 1995 National Nutrition Survey looking at dietary patterns of adolescents.

Recent publications include:

McNaughton SA, Mishra GD, Brunner EJ. (2008). Dietary patterns, insulin resistance and incidence of type 2 diabetes in the Whitehall II Study. *Diabetes Care*, 31: 1343-48. IF 7.91

McNaughton SA, Mishra GD, Ball K, Crawford D. (2008). Dietary patterns of adolescents and risk of obesity and hypertension. *Journal of Nutrition*, 138(2): 364-70. IF 4.01

Co-supervisor: Prof David Crawford

Contact details:

Dr Sarah McNaughton

Ph: 03 9251 7842

Email: sarah.mcnaughton@deakin.edu.au

Project description:

Nutrition during childhood and adolescence is important in terms of current and future health. Inadequate intake of energy and nutrients during adolescence may negatively impact on growth and development and poor eating patterns during adolescence may have long-term health implications. Epidemiological research has shown that whole-grain cereals may be protective against a range of chronic disease including cardiovascular disease, diabetes and some cancers. The exact mechanisms surrounding this beneficial effect are not well understood but may relate to increased content of fibre, minerals such as iron, and zinc or a range of photochemical, or it may be related to the synergistic effects of these dietary constituents when consumed as the whole food. The Dietary Guidelines for Australia Adults and the Australia Guide to Healthy Eating recommend the consumption of whole-grain cereals, however little is known about the intakes of these foods, particularly in Australian children and adolescents.

Aims:

- To describe the intakes of wholegrain cereals and identify key indicator foods among Australian children and adolescents.
- To describe the characteristics of children and adolescents with high intakes of whole-grains and those meeting recommendations for whole-grain intakes.
- To assess the contribution of wholegrain foods to nutrients intakes and quality of the diet.

This project will provide an understanding of the role of whole-grain foods in the Australia diet and will also inform the future development of population indicators of whole-grain intake and provide baseline data for monitoring the adherence of Australians to the dietary guidelines concerning cereal intakes.

Methodological approach:

This project involves secondary statistical analysis of dietary data collected from children and adolescents in the National Children's Nutrition and Physical Activity Survey. This survey represents the most recent and most comprehensive data on dietary intakes of Australian children. This nationally representative survey has collected dietary intake using two 24-hour recalls conducted among 4440 children aged 2-16 years. Initially it will involve working with a food database, classifying foods according to whether they are wholegrain and may involve calculation of wholegrain content of mixed dishes. Further analyses will involve basic statistics (mean, frequencies, cross-tabulations).

Necessary skills/knowledge:

This project is suited to someone with a basic knowledge of nutrition, and an interest and understanding of food and food products. Some experience in the analysis of data using SPSS or STATA is desirable or a willingness and interest in acquiring these skills. Further training and support will be provided. Experience with Microsoft Excel is required.

FISH CONSUMPTION AND AUSTRALIAN HEALTH: THE ANALYSIS OF THE NUTRIENTS AND CONTAMINANTS

Supervisor: Dr Elizabeth Manickam

Supervisor's profile:

Elizabeth is an inaugural winner of the Alfred Deakin Postdoctoral Fellowship, working to examine how nutrients regulate inflammation. Elizabeth has previously worked on radiation-chemistry and heavy metal contamination of food. Elizabeth has extensive cell culture and laboratory experience working to identify strategies to increase fat metabolism to combat obesity. Elizabeth is new to the School of Exercise and Nutrition and will provide an exciting hands-on laboratory experience in a highly topical area of nutritional biochemistry. Elizabeth works closely with Associate Professor David Cameron-Smith.

Co-supervisor: Associate Professor David Cameron-Smith

Contact details:

Associate Prof David Cameron-Smith

Ph : 03 9244 6502.

Email (davidcs@deakin.edu.au)

Project description:

An increased intake of fish and other seafood is particularly recommended in the Australian nutritional guidelines. Fish is a good source of many important nutrients, such as proteins, very long-chain omega-3 fatty acids, vitamin D, vitamin B12, selenium and iodine. The beneficial effect on health by including fish in the diet has been documented in several studies. Canned tuna is the main source of fish consumption in Australia. Increasing interest in the health gains obtained by regular fish intake has put emphasis on the need for documentation of both nutrients and contaminants in fish, with a balanced risk assessment. In this study, the content of good source of nutrients in canned tuna such as omega-3 (EPA and DHA), vitamin D, vitamin B12, selenium and iodine will be analyzed. In conjunction, the content of contaminants in canned tuna, such as the radioactive Po-210 and mercury, will also be measured. This project hopes to elucidate the positive and negative health effects of fish, hence clarify the safety of fish consumption in the daily diet.

Methodological approach:

Varieties of canned tuna collected from common supermarkets. Proximate analysis, fatty acid analysis, vitamins, selenium and iodine (nutrients) will be measured, in conjunction with the radioactive Po-210 and mercury analysis. The risk-benefit assessment of tuna consumption by the Australians will be calculated.

Necessary skills/knowledge: A strong knowledge of nutrition and food science.

REGULATION OF NFkB MEDIATED INFLAMMATION BY COCOA-DERIVED POLYPHENOLS

Supervisor: Dr Elizabeth Manickam

Supervisor's profile:

Elizabeth is an inaugural winner of the Alfred Deakin Postdoctoral Fellowship, working to examine how nutrients regulate inflammation. Elizabeth has previously worked on radiation-chemistry and heavy metal contamination of food. Elizabeth has extensive cell culture and laboratory experience working to identify strategies to increase fat metabolism to combat obesity. Elizabeth is new to the School of Exercise and Nutrition and will provide an exciting hands-on laboratory experience in a highly topical area of nutritional biochemistry. Elizabeth works closely with Associate Professor David Cameron-Smith.

Co-supervisor: Associate Professor David Cameron-Smith

Contact details:

Associate Prof David Cameron-Smith

Ph : 03 9244 6502.

Email (davidcs@deakin.edu.au)

Project description:

Chronic inflammation has been implicated in many aging-associated conditions, involving the accumulation of reactive oxygen species (ROS) and activation of inflammatory NFkB pathways. NFkB is a redox-sensitive transcription factor, which play an important role in inflammatory change in cells in various pathophysiological conditions. Chronic activation of NFkB can induce the production of ROS and transcription of many genes implicated in pro-inflammation, including cytokines and chemokines (e.g. TNF α). During the aging process, the mechanisms related to innate immunity involving Toll-like receptor (TLR) are also upregulated. TLR4 is activated by bacterial lipopolysaccharide (LPS), which activates NFkB and MAPK signaling cascades. Exogenous TNF α can induce oxidative stress and up-regulate upstream molecules in NFkB pathway. In this study anti-inflammatory effect of various dietary polyphenols will be tested in cell culture to study the differential effect in TNF α and LPS mediated NFkB pathway.

Methodological approach:

Cultured cells (C₂C₁₂ muscle cells) will be pre-treated accordingly with or without LPS or TNF α to induce pro-inflammatory state. The anti-inflammatory effect of polyphenols will be evaluated. Cells will be analysed using Bioplex, ELISA, Western blots, immunofluorescence, PCR and other relevant techniques, to determine the changes in inflammatory cytokines, oxidative stress, gene and protein modification related to inflammatory pathways.

Necessary skills/knowledge: A strong knowledge of biochemistry and nutrition.

MOLECULAR MECHANISMS OF MUSCLE FORMATION AND FUNCTION

Supervisor: Juan C. Molero

Supervisor's profile:

My research interests include the study of insulin action, paying special attention to the role in fat cells and the muscle fibre, as well as the molecular mechanisms that lead to the development of obesity and Diabetes. My research interests cover all aspects of molecular and cell biology to whole-body physiology. Along my career, I have studied the molecular mechanisms underlining the development of insulin resistance observed during aging, late pregnancy or fat rich diets in animal models. Among the highlights of my career is the discovery of the gene c-Cbl as a new anti-diabetic and anti-obesity gene. Animals lacking this protein are leaner and exhibit improved insulin action despite displaying hyperphagia. I also have extensive experience in studying the cellular metabolism of the fat cell which has proven to be a very useful *in vitro* model in understanding disorders of insulin action in mammals.

Molero et al. c-Cbl-deficient mice have reduced adiposity, higher energy expenditure, and improved peripheral insulin action. *J Clin Invest* (2004) 114(9):1326-33

Molero et al. Casitas b-lineage lymphoma-deficient mice are protected against high-fat diet-induced obesity and insulin resistance. *Diabetes*. (2006) 55(3):708-15.

Molero et al. Genetic ablation of the c-Cbl ubiquitin ligase domain results in increased energy expenditure and improved insulin action. *Diabetes* (2006) 55, 3411-3417.

Molero JC, Clark SF, James DE. Release of insulin receptor substrate proteins from an intracellular complex coincides with the development of insulin resistance. *J Biol Chem*. (2000); 275(6):3819-26.

Co-supervisor: Janette Tenne-Brown

Contact details:

Metabolic Research Unit
Faculty of Health and Behavioural Sciences
Waurm Ponds Campus, Geelong
Ph: 03 5227-1197
Email:juan@deakin.edu.au

Project description:

Skeletal muscle plays an essential role in the body allowing movement and controlling whole-body energy metabolism. Deregulation of this tissue can result in severe pathological syndromes like muscular atrophy and several forms of muscular dystrophy responsible for a large number of disability cases, or insulin resistance that may lead to the development of type 2 Diabetes. We have reported that c-Cbl-deficient mice lacking the protein exhibit enhanced muscle metabolism and mitochondrial function. Further experimentation revealed that the *in vivo* effects of c-Cbl suppression in skeletal muscle could be driven by a faster differentiation of muscle precursor cells into mature functional muscle fibres. The aim of this project is to investigate the role of c-Cbl in the muscle cell differentiation process and in particular the involvement of the mitochondrial machinery. To address this issue we

will ablate the expression of c-Cbl in cultured C2C12 muscle cells and investigate its effect on the activity of proteins governing muscle differentiation and mitochondrial metabolism. These studies will open new therapeutic avenues targeting pathologies like muscular atrophy, dystrophies and Type 2 Diabetes.

Methodological approach:

This project involves a variety of techniques including cell transfection, cell culture, fluorescence microscopy and protein function analysis. All the required techniques are already established at the Metabolic Research Unit. We will knock-down c-Cbl in C2C12 myoblasts using RNA interference technology and examine the cells at different stages of differentiation. We will analyze the expression, activity and cellular localization of proteins involved in the different intracellular signaling pathways controlling muscle maturation after the addition of selective inhibitors or activators of each of these signaling pathways.

Necessary skills/knowledge:

Candidates should be highly motivated, enthusiastic and work well in a team environment

MOLECULAR MECHANISMS OF SIGMA RECEPTORS IN FAT CELL DIFFERENTIATION AND INSULIN ACTION

Supervisor: Juan C. Molero

Supervisor's profile:

My research interests include the study of insulin action, paying special attention to the role in fat cells and the muscle fibre, as well as the molecular mechanisms that lead to the development of obesity and Diabetes. My research interests cover all aspects of molecular and cell biology to whole-body physiology. Along my career, I have studied the molecular mechanisms underlining the development of insulin resistance observed during aging, late pregnancy or fat rich diets in animal models. Among the highlights of my career is the discovery of the gene c-Cbl as a new anti-diabetic and anti-obesity gene. Animals lacking this protein are leaner and exhibit improved insulin action despite displaying hyperphagia. I also have extensive experience in studying the cellular metabolism of the fat cell which has proven to be a very useful *in vitro* model in understanding disorders of insulin action in mammals.

Molero et al. c-Cbl-deficient mice have reduced adiposity, higher energy expenditure, and improved peripheral insulin action. *J Clin Invest* (2004) 114(9):1326-33

Molero et al. Casitas b-lineage lymphoma-deficient mice are protected against high-fat diet-induced obesity and insulin resistance. *Diabetes*. (2006) 55(3):708-15.

Molero JC, Clark SF, James DE. Release of insulin receptor substrate proteins from an intracellular complex coincides with the development of insulin resistance. *J Biol Chem*. (2000); 275(6):3819-26.

Co-supervisor: Nicky Konstantopoulos

Contact details:

Metabolic Research Unit
Faculty of Health and Behavioural Sciences
Waurm Ponds Campus, Geelong
Ph: 03 5227-1197
Email:juan@deakin.edu.au

Project description:

The role of the fat cell in energy metabolism has dramatically changed in the last decade from a mere energy storage tissue to a hyperactive endocrine organ. Fat cells, or adipocytes, release a battery of circulating factors that regulate the function of other organs like the brain, liver or skeletal muscle. Adipocytes differentiate from fibroblastic-like precursors. During this process the cells accumulate triglycerides in large cytoplasmic lipid bodies and trigger a gene expression program that confers to these cells the ability to respond to fluctuations in the levels of insulin and cytokines present in the extracellular medium. Sigma receptors are G-protein coupled receptors that have been associated with the generation of lipid bodies and delivery of cholesterol and neutral lipids to different microdomains inside the cell. Inhibition of sigma receptor function impairs cholesterol delivery to membrane domains thus affecting the action of cytokines and growth factors in several cell lines. The aim of

this project is to assess the putative role of sigma receptors in the differentiation of an adipocyte cultured cell line (3T3-L1 cells) and its potential impact in insulin action.

Methodological approach:

This project involves a variety of cutting-edge techniques in molecular and cellular biology such as cell culture, fluorescence microscopy and protein function analysis. All the required techniques are already established at the Metabolic Research Unit. We will over-express sigma-1 receptors in 3T3-L1 pre-adipocytes using retroviral vectors to increase the normal protein levels. We will also deplete the cells of sigma-1 receptors using RNA interference technology. Then we will examine the effect of these manipulations on the differentiation of 3T3-L1 adipocytes and their metabolic response to insulin stimulus. Special attention to the formation of lipid bodies by fluorescence microscopy will be made. We will also measure changes on insulin-stimulated glucose and fat uptake, lipid synthesis and glucose transporters movement.

Necessary skills/knowledge:

Candidates should be highly motivated, enthusiastic and work well in a team environment

MUSCULOSKELETAL FITNESS AND HEALTH IN VICTORIAN RURAL FIREFIGHTERS

Supervisor: Dr Kevin Netto

Supervisor's profile:

Dr Kevin Netto's research background lies in quantifying musculoskeletal load during occupationally and athletically demanding and injurious tasks. Specifically, his research has delved into spinal injuries experienced by combat pilots, during cycling, after whiplash and while using a computer workstation. Dr Netto has published numerous papers in international peer-reviewed journals and has presented his work at a number of international conferences. He currently holds funding from the RAAF in preventing neck injuries during flying. Two recent publications include:

Netto, K. J., Burnett, A. F. and Coleman, J. L. (2007). "Neck Exercises Compared to Muscle Activation During Aerial Combat Maneuvers." *Aviation, Space, and Environmental Medicine* 78(5): 478-484.

Burnett, A. F., Coleman, J. L. and **Netto, K. J.** (2008). "An Electromyographic Comparison of Neck Conditioning Exercises in Healthy Controls." *Journal of Strength and Conditioning Research* 22(2): 447-454.

Co-supervisor: Dr Brad Aisbett

Contact details:

Dr Kevin Netto

Ph: (03) 9251 7277

Email: kevin.netto@deakin.edu.au

Project description:

Each summer, volunteers from Victoria's Country Fire Authority (CFA) work long hours in hot, smoky conditions to fight bushfires. Data from the CFA indicates that musculoskeletal strains and sprains is the number one cause of injury for volunteer firefighters during bushfire suppression. In the United States (US), the risk of injury on duty is inversely related to firefighter's health and fitness levels. The potential for Australian firefighter's health and fitness to mediate their risk of injury and fatality when on duty is unknown. It is possible that since Australian and US fire brigades share some common duties, Australian firefighter's health and fitness may also influence their safety when on duty. At present, there is no published data on the musculoskeletal health and fitness of Australian volunteer firefighters. This information is paramount to understanding, managing and possibly preventing musculoskeletal injury in Victoria's volunteer firefighters. Identifying susceptible firefighters is paramount for CFA and Victoria as an injured or ill firefighter can also compromise the safety of their crew and the public.

Research Objective: Measure the musculoskeletal health and fitness of CFA firefighters, including known risk factors for musculoskeletal injury.

Methodological approach:

Volunteer CFA firefighters will report to the biomechanics laboratory on two occasions. Firstly, they will be surveyed on their current lifestyle and any previously diagnosed medical ailments. Thereafter, strength and balance assessments will be carried out. The firefighter's leg and back extension as well as arm and shoulder

flexion strength will be measured using an isokinetic dynamometer. Both static and dynamic balance will be assessed using a force plate. The collect data will build a database and be used to risk stratify individuals susceptibility to musculoskeletal injury.

Necessary skills/knowledge:

Biomechanics and analysis knowledge is preferred but not essential. Good time management.

EMG ANALYSIS OF MUSCLE LOAD DURING COMMON BUSHFIRE FIGHTING TASKS

Supervisor: Dr Kevin Netto

Supervisor's profile:

Dr Kevin Netto's research background lies in quantifying musculoskeletal load during occupationally and athletically demanding and injurious tasks. Specifically, his research has delved into spinal injuries experienced by combat pilots, during cycling, after whiplash and while using a computer workstation. Dr Netto has published numerous papers in international peer-reviewed journals and has presented his work at a number of international conferences. He currently holds funding from the RAAF in preventing neck injuries during flying. Two recent publications include:

Netto, K. J., Burnett, A. F. and Coleman, J. L. (2007). "Neck Exercises Compared to Muscle Activation During Aerial Combat Maneuvers." *Aviation, Space, and Environmental Medicine* 78(5): 478-484.

Burnett, A. F., Coleman, J. L. and **Netto, K. J.** (2008). "An Electromyographic Comparison of Neck Conditioning Exercises in Healthy Controls." *Journal of Strength and Conditioning Research* 22(2): 447-454.

Co-supervisor: Dr Brad Aisbett

Contact details:

Dr Kevin Netto

Ph: (03) 9251 7277

Email: kevin.netto@deakin.edu.au

Project description:

Each summer, volunteers from Victoria's Country Fire Authority (CFA) work long hours in hot, smoky conditions to fight bushfires. Preliminary data collected by our group has shown that firefighting largely comprises 'lift, carry, and drag' activities requiring high levels of muscular strength and endurance. Further, data from the CFA indicates that musculoskeletal strains and sprains is the number one cause of injury for volunteer firefighters during bushfire suppression. Establishing a relationship between the duties firefighters perform and the injuries they risk requires systematic analyses of the musculoskeletal load incurred by firefighters during common fire ground duties. At present, there has been no study to quantify the musculoskeletal load incurred during bushfire fighting tasks. Identifying firefighting tasks requiring very high muscle loads may enable the re-design of high-risk duties to better preserve the health and safety of Victoria's volunteer firefighters. Identifying high-risk tasks is paramount for CFA and Victoria as an injured or ill firefighter can also compromise the safety of their crew and the public.

Research Objective: Measure the musculoskeletal load incurred during common bushfire suppression tasks performed by CFA firefighters.

Methodological approach:

Muscle activation levels from eight global muscles will be tested using surface electromyography during 10 common bushfire fighting tasks. Participants will be asked to perform a series of maximal contractions prior to testing for normalization

purposes. Simulations of the task will then be performed in a laboratory setting. It is envisaged that 20 participants will be tested.

Necessary skills/knowledge:

Biomechanics and analysis knowledge is preferred but not essential. EMG knowledge will be taught. Good time management.

THE INFLUENCE OF UNIVERSITY EDUCATION ON FOOD BEHAVIORS: A PROSPECTIVE STUDY

Supervisor: Dr Lynn Riddell

Supervisor's profile:

My research is in the prevention and treatment of weight gain. Replacing the consumption of energy dense nutrient poor foods with low energy dense nutrient rich foods is a potentially sustainable long term strategy for weight control. The dilemma however is how to achieve this as current research indicates limited long term effectiveness of weight loss programs. I am currently investigating ways to alter the food supply to result in decreased energy intake without requiring significant individual behavior change.

Key publications include:

1. Keast RSJ, **Riddell L**. Caffeine as a flavour additive in soft-drinks *Appetite* 2007;49:255-259
2. Lowe, MR, Annunziato RA, Markowitz JT, Didie E, Bellace DL, **Riddell L**, Maille C, McKinney S, Stice E. Multiple types of dieting prospectively predict weight gain during the freshman year of college. *Appetite* 2006;47(1):83-90

Co-supervisor: Dr Wendy Hunter

Contact details:

Dr. Lynn Riddell

Ph: 9251 7270

Email: lynn.riddell@deakin.edu.au

Project description:

Understanding the factors associated with food behaviours is the first step in designing effective public health interventions aimed at improving food intake. Historically, dietary interventions have attempted to educate people as to the health benefits of a healthy diet yet there is limited evidence supporting the effectiveness of this approach. However, higher education levels are consistently associated with a higher intake of fruits and vegetables, lower fat intakes and general dietary intakes that are more closely aligned to the dietary guidelines. What aspects of education result in improved dietary intakes? The aim of this study is to investigate the effect of three years of university education on food behaviours.

Aim:

To determine the effect of 3 years of an undergraduate nutrition degree on the food related behaviours of university students.

Methodological approach:

This is a three year follow-up study looking at dietary intakes and food behaviours in students enrolled in a nutrition unit. In 2006, students enrolled in HSN101 Food Culture and Innovation completed an assignment task detailing their food intake and food related behaviours. One hundred and thirty students provided informed consent for their data to be used in this study and to be contacted in 2008 for a follow-up study. All of the baseline data have been entered and analyzed. This current project

will involve contacting all these students again to see if they are able to take part in the follow-up study. You will be required to send out the existing data collection forms to the participants, enter and collate all the data and compare dietary intakes and food related behaviors to base line levels to determine if there have been any significant changes over the duration of their undergraduate degree. One hundred and thirty students took part in the baseline study and a response rate for the follow-up study is estimated to be 80%.

Ethical approval has already been given for this study.

METABOLISM AND PHYSIOLOGICAL ROLE OF LONG CHAIN OMEGA 3 FATTY ACIDS

Supervisor: Prof Andy Sinclair

Supervisor's profile:

In the Lipid Laboratory at Burwood and the Metabolic Research Unit at Waurn Ponds, we use cutting edge lipid analytical and molecular technologies, respectively, to identify and characterize the response of cells and animal models to essential nutrients. The focus of my group is to understand how polyunsaturated fatty acids are metabolized and establish their physiological roles in cells. Two recent papers we have published:

- Stahl L, Weisinger RS, Begg D, **Sinclair AJ**. Role of omega 3 fatty acids in mood disorders. **Current Opin Invest Drugs** 2008;9:57-64.
- Jayasooriya AP, Mathai ML, Walker LL, Begg DP, Denton DA, Cameron-Smith D, Egan GF, McKinley MJ, Rodger PD, **Sinclair AJ**, Wark JD, Weisinger HS, Jois M, Weisinger RS. Mice lacking angiotensin-converting enzyme have increased energy expenditure, with reduced fat mass and improved glucose clearance. **Proc Natl Acad Sci U S A**. 2008 May 6;105(18):6531-6.

Co-supervisor: Ms Gunveen Kaur (PhD student) & Mr Dan Barr (Research Fellow)

Contact details:

Prof Andy Sinclair
Ph: 03 9251 7282
Email: andys@deakin.edu.au

Project description:

Three long chain omega 3 fatty acids exist in nature: EPA, DPA and DHA. Theoretically, EPA is metabolised to DHA via DPA, however there have been no studies on the conversion of EPA and DPA to DHA in cells or whole animals. We know that ingested DHA is rapidly and efficiently deposited in brain and liver. However, there have been no studies on the metabolic partitioning of EPA and DPA towards DHA in the animal tissues.

While the roles of EPA and DHA have been studied by others, demonstrating that both are effective in reducing triacylglycerol synthesis in the liver, there has been very little attention paid to DPA because, until now, it has been difficult to obtain pure supplies of this fatty acid.

Aim:

1. To study the extent of deposition of EPA, DPA and DHA in rat tissues (liver & brain) during the period of rapid brain growth (end of weaning), and estimate the rate of conversion of EPA and DPA to DHA in liver & brain.
2. To determine the effect of DPA on liver triacylglycerol synthesis, compared with EPA and DHA.

Project Design:

Weanling rats will be orally dosed with 50 mg of EPA, DPA or DHA daily for 7 days, following which [a] the liver & brain tissue membrane lipids will be analyzed by gas liquid chromatography to determine the extent of metabolism & deposition as DHA, [b] the liver tissue will be analyzed by thin layer chromatography of liver lipids to

determine the triacylglycerol level, and [c]] the liver tissue will be analyzed by RT-PCR to determine the levels of expression of genes related to fatty acid synthesis and fatty acid oxidation.

Methodological approach:

- a) **Measurement of tissue EPA, DPA & DHA levels:** Liver and brain membrane phospholipids will be isolated from tissues by thin layer chromatography and the levels of the omega 3 fatty acids determined by gas liquid chromatography.
- b) **Measurement of liver triacylglycerol levels:** These will be measured by a commercial kit following extraction of the total lipids from liver tissue.
- c) **Measurement of expression of genes involved in fat synthesis and fat oxidation in liver:** The RNA will be extracted from the liver using standard methods and the quality and concentration of the resulting RNA samples will be determined using the Agilent 2100 Bioanalyser following the manufacturer's instructions. The RNA will be reverse transcribed to first strand cDNA using the AMV reverse transcriptase kit. Real-time polymerase chain reaction (RT-PCR) will be performed using GenAmp 7500 sequence detection system (Applied Biosystems, Foster City, CA) to study the expression of genes involved in fat synthesis and fat oxidation. All data will be normalized to the reference gene cyclophilin.
- d) All these techniques are standard in the laboratory & staff are available to support the honours student learn the techniques.

Necessary skills/knowledge: Apart from hard work and attention to detail, all necessary training will be provided.

ABSORPTION OF SUGAR POLYOLS (SORBITOL AND MANNITOL) PRESENT NATURALLY IN FOOD BY HEALTHY INDIVIDUALS

Supervisor: Dr Stuart Smith

Supervisor's profile:

Dr Stuart Smith is actively engaged in nutritional research focusing on gut health and interaction between gut epithelia and gut microbiota. This field encompasses expertise in a number of areas including molecular microbiology, gut microbiota, gut models (tissue culture) and molecular biology in dietary intervention studies. This research has implications for policy decisions on the dietary behavior of humans; especially regarding the gut health in chronic gut disorders and dysfunctions, which appear to be influenced by the types of gut microbiota present and their microbial metabolic activities.

Co-supervisor:

Dr Jane Muir, Monash University (Department of Gastroenterology), Box Hill Hospital.

Email Jane.Muir@med.monash.edu.au

Contact details:

Dr Stuart Smith

Ph: 03 9251 7260

Email: stuart.smith@deakin.edu.au

Project description:

One in six Australians suffer from Irritable Bowel Syndrome (IBS), characterized by abdominal bloating, pain, and irregular bowel habit. Standard medical therapy is generally inadequate at controlling these symptoms. *The research team at Box Hill Monash University (Department of Gastroenterology) has identified dietary triggers that might be responsible for the induction of symptoms in the majority of patients with IBS.* These triggers involve a group of small carbohydrates that are commonly found in a wide variety of foods and can be poorly absorbed in the small intestine and include; fructose (in apples, pears and fruit juice, high fructose corn syrups), lactose (milk), fructans (onions), galacto-oligosaccharides (legumes) and **sugar alcohols** (sorbitol and mannitol). We have named this group of compounds **FODMAPs** - Fermentable Oligo-, Di- and Mono-saccharides And Polyols.

Sugar polyols are emerging as FODMAPs that can cause problems for patients with IBS. Sugar polyols include sorbitol (found commonly in pears, apples and stone fruits and often used as artificial sweeteners-for example 'Extra' chewing gum). Mannitol is also a sugar polyol that is commonly found in a wide range of foods including; mushrooms cauliflower and celery. The malabsorption of polyols varies widely and may be as high as 74% for some individuals. The research team at Monash has developed the techniques, base on HPLC, to quantify levels of sugar polyols in food.

In this proposed study we will investigate, in healthy individuals, if there is a difference in the absorption/tolerance (as assessed by breath hydrogen testing and gastrointestinal symptoms) between 2 diets that differ greatly in the levels of two common sugar polyols (sorbitol and mannitol).

The aims of this study are;

To compare the absorption of the sugar polyols- mannitol and sorbitol from two diets in healthy individuals.

Hypothesis to be tested in healthy volunteers;

That a diet that is high in sugar polyols (mannitol and sorbitol) will be more poorly absorbed (as determined by an increase in breath hydrogen and gastrointestinal symptoms) than a diet that is low in these polyols.

Methodological approach:

- Low FODMAP meal preparation. The student will help in making some low FODMAP foods to hand out to volunteers. This greatly assists with compliance to the dietary protocol.
- The student will be trained on the analysis of FODMAP carbohydrates via HPLC.
- Test Food Preparation-the student will be required to prepare the test foods that will contain foods that are naturally high or low in sugar polyols.
- Collection of breath hydrogen samples – the student will be trained on how to collect breath hydrogen samples.
- Analysis of bowel symptoms questionnaires and food diaries using computer software.

Necessary skills/knowledge:

- Communication with the research team- the student will need to develop good communication skills with the enthusiastic team (Gastroenterologist, Scientists, Dietitians, and Nurses) who work in the Department of Gastroenterology.
- Communication with volunteers – the student will require good communication skills with the volunteers, to explain the study protocol and keep them enthused about the study.
- Basic knowledge of functional foods, food composition data, extraction and analytical skills and statistical analysis would be useful.

DETERMINING THE CELL-SURFACE PROPERTIES OF BIFIDOBACTERIA AS POTENTIAL PROBIOTICS

Supervisor: Dr Stuart Smith

Supervisor's profile:

Dr Stuart Smith has actively established a research program focusing on gut health and interaction between gut epithelia and the gut microbiota. This field encompasses expertise in a number of areas including food microbiology, gut microbiota, gut models (tissue culture) and molecular biology in dietary intervention studies. This research has implications for policy decisions on the dietary behavior of humans; especially regarding the gut health in chronic gut disorders and dysfunctions, which appear to be influenced by the types of gut microbiota and microbial metabolic activities.

Co-supervisor: Dr Phillip Parker, School of Life Sciences.

Contact details:

Dr Stuart Smith

Ph: 03 9251 7260

Email: stuart.smith@deakin.edu.au

Project description:

The protective role of probiotic bacteria against enteric pathogens remains unclear but bifidobacteria are known to impart gut health benefits in general and have been proposed to reduce chronic inflammatory bowel diseases (IBDs) such as ulcerative colitis (UC) and Crohn's. Adherence by bacteria to gut epithelia is required for colonisation and infection and the ability to adhere to gut epithelia and mucosal surfaces are considered important properties of probiotic bacteria such as lactobacilli and bifidobacteria. A relationship between aggregation and adhesion capability has been reported for some strains of *Bifidobacterium longum* (Del Re et al., 2000) but many other strains of *Bifidobacterium* spp. have yet to be studied. Therefore, the cell surface characteristics of bifidobacteria (i.e. hydrophobicity and ability to cause aggregation of pathogens) need to be examined to determine their role as physical properties enhancing efficacy and capability of novel probiotic strains in medical therapies..

The hypothesis of this project is that the cell surface characteristics of probiotics, as determined by adhesion to hydrocarbons and aggregation abilities, are critical parameters for identifying the functional properties of a probiotic. This information will: a) provide a better understanding of the characteristics of novel probiotic strains that are beneficially important for product development and b) identify novel strains of bifidobacterium that may act as probiotics for therapeutic approaches with gastrointestinal diseases.

Methodological approach:

Novel bifidobacteria will be examined for their surface characteristics using a series of novel methods involving testing their ability to:

- a) adhere to hydrocarbons by the BATH test (Canzi et al., 2005),
- b) aggregate using an autoaggregation assay,
- c) compete with known enteric pathogens by quantifying their cell adherence using a co-aggregation assay, and

d) selecting specific strains from the results of methods (a), (b) and (c) and re-testing with human epithelial (caco-2) cells.

Canzi E, Guglielmetti S, Mora D, Tamagnini I, Parini, C.2005. Conditions affecting cell surface properties of human intestinal bifidobacteria. *Antonie Van Leeuwenhoek*. 88 (3-4): 207-19.

Del Re B, Sgorbati B, Miglioli M and Palenzona D. 2000. Adhesion, autoaggregation and hydrophobicity of 13 strains of *Bifidobacterium longum*. *Lett Appl. Microbiol* 31: 438-442.

Necessary skills/knowledge:

The student will need good laboratory skills, to be well organized and like working with other members of the Functional Foods group and the volunteer subjects. A basic knowledge of functional foods, microbiology, laboratory skills and statistical analysis would be useful.

RESPONSES TO STRESS: IMPORTANCE OF CIRCULATING SEX STEROIDS IN WOMEN

Supervisor: Dr Anne Turner

Supervisor's profile:

Dr Anne Turner is a Lecturer in Human Physiology in the School of Exercise and Nutrition Sciences. She is new to Deakin this year, having spent the last 8 years at Monash University as a Research Fellow where she studied the physiology and endocrinology of stress and reproduction in animal models (pigs and sheep). In collaboration with existing expertise in the School of Exercise and Nutrition Sciences (Nowson and Torres), Anne will now apply her expertise to human models of stress to characterize responses to stress in humans and to determine the effects of stress on human health. Two previous publications:

Turner AI, Rivalland ETA, Clarke IJ, Tilbrook AJ (2008) Cortisol responses to exercise, endotoxin and wetting stress in sheep: Importance of sex and type of stressor. *Proceedings of the Endocrine Society of Australia*: 358

Turner AI, Hemsworth PH and Tilbrook AJ (2005) Susceptibility of reproduction in female pigs to impairment by stress or elevation of cortisol. *Domestic Animal Endocrinology* **29**: 398-410 [Invited review]

Co-supervisors: Professor Caryl Nowson and Dr Susan Torres

Contact details:

Anne Turner BSc(Hons) PhD
Ph: 03 9244 6950
Email: anne.turner@deakin.edu.au

Project description:

Normal physiological responses to everyday stressors are essential for healthy living. Mostly, our physiological systems (sympatho-adrenal medullary system and the hypothalamo-pituitary adrenal axis) are effective in returning the body to a state of homeostasis. Nevertheless, severe stress is associated with the increased prevalence of devastating conditions such as depression, dementia and impaired cognition; cardiovascular disease; impaired immune function with increased vulnerability to disease; impaired growth and reproductive function; osteoporosis; diabetes and reduced life expectancy. There is now a growing body of evidence that certain characteristics of a person (i.e. sex, sex steroid status) may determine a person's response to stress. The type of stressor encountered (i.e. psychological, physical or immune) may also determine our response to stress. It follows that such factors may also determine the consequences of stress to other physiological systems (i.e. cardiovascular, reproductive, growth, immune) and cortisol is thought to be an important mediator of the effects of stress.

In this research, we will investigate such factors. We will test the hypothesis that circulating sex steroids in women influence responses to stress as measured by heart rate, blood pressure and cortisol response.

Methodological approach:

Postmenopausal women with and without hormone replacement therapy will be recruited. On an experimental day, women will be subjected to a psychological stressor and measurements will be made before, during and after the imposition of the stressor. Measurements will include heart rate, blood pressure and cortisol response to the stressor. Saliva (and possibly blood) samples will be collected and concentrations of cortisol will be measured by radioimmunoassay.

Necessary skills/knowledge:

Good communication and organizational skills and a good knowledge of statistical analyses.

ANTIDIABETIC EFFECTS OF A NEW SECRETED PROTEIN ASSOCIATED WITH TYPE 2 DIABETES

Supervisor: Dr Ken Walder

Supervisor's profile

At the Metabolic Research Unit, we use cutting edge genetic technologies to identify and characterize novel genes and proteins involved in the development of obesity and type 2 diabetes. The focus of the group is to develop new assays that we use to screen for novel genes/proteins associated with these diseases. Candidate proteins are then characterized in a range of cell and animal models to determine their physiological role(s).

Co-supervisor: Juan-Carlos Molero

Contact details:

Metabolic Research Unit
Faculty of Health and Behavioural Sciences
Waurn Ponds Campus, Geelong
Ph: 03 5227-2883
Email: walder@deakin.edu.au

Project description:

As part of our discovery program, we recently identified TXNDC12 as a novel secreted protein associated with type 2 diabetes in *P. obesus*. TXNDC12 gene expression was reduced in skeletal muscle of diabetic *P. obesus*, and was negatively correlated with blood glucose levels. We produced recombinant TXNDC12 and treated adipocytes in cell culture, leading to improvement in insulin-stimulated glucose uptake. These data suggest that TXNDC12 is secreted from skeletal muscle and acts to increase insulin action in adipocytes, and therefore represents a potential new target for treatment of type 2 diabetes.

The overall aim of this project is to test the effects of TXNDC12 on measures of energy balance and glucose metabolism in db/db mice. Specifically, the aims are:

- 1) To produce and purify a sufficient quantity of TXNDC12 to facilitate an efficacy study in db/db mice.
- 2) To test the effects of continuous infusion of TXNDC12 (for 7 days) in db/db mice on:
 - a) primary endpoint - fasting blood glucose,
 - b) secondary endpoints - food intake, body weight, body composition, energy metabolism and glucose tolerance (ipGTT).
- 3) To analyze the levels and (where appropriate) phosphorylation states of key proteins in various tissues of animals treated with TXNDC12, to facilitate preliminary analysis of mechanism of action of the protein.

The significance of the project is the potential identification of a new secreted protein that improves glucose metabolism in a widely used model of obesity and type 2 diabetes. Such findings would make TXNDC12 a new candidate for development as an anti-diabetes agent.

Methodological approach:

Recombinant TXNDC12 will be produced using standard molecular techniques. We will use the TXNDC12/pGEX-5x-1 construct and standard techniques for protein expression in bacterial BL21 cells. Proteins produced using the pGEX-5x-1 system contain a N-terminal GST tag that will be utilised to bind to Glutathione Sepharose 4 Fast Flow matrix. Bound GST-TXNDC12 protein will then be cleaved using Factor Xa to remove the TXNDC12 protein. The resulting TXNDC12 supernatant will then be purified with Factor Xa removal resin to remove Factor Xa that is in solution. Any endotoxins that may be present in solution will be removed using endotoxin-removing gel. Finally, the quality and purity (>90% required) of the final purified TXNDC12 will be assessed using SDS-PAGE and silver staining. Efficacy studies in mice will be conducted using standard protocols. The recombinant protein will be tested for bioactivity in cultured adipocytes before progressing to in vivo administration. Mice will be randomized to 4 treatment groups as follows: 1) vehicle (control), 2) 200 ng/kg/d TXNDC12, 3) 400 ng/kg/d TXNDC12, and 4) 800 ng/kg/d TXNDC12. Treatments will be administered by continuous infusion for 7 days using osmotic pumps (Alzet model 1007D; Alza Corporation, Cupertino, USA) surgically implanted in the subscapular region of the mice. Before and after treatment, mice will be assessed for body composition (by DEXA), glucose tolerance (by IPGTT) and energy metabolism (by indirect calorimetry). Body weight, food intake and water consumption will be measured regularly throughout the study. At the completion of the study, key metabolic tissues will be collected and used to measure the levels and phosphorylation states of proteins in a range of metabolic pathways to elucidate the mechanism of action of TXNDC12.

Necessary skills/knowledge: Nil required, all necessary training will be provided.

ROLE OF CYTOKINE RECEPTOR SIGNALING IN DEVELOPMENT AND DISEASE

Supervisor: Prof. Alister C. Ward

Supervisor's profile:

Professor Ward has made a significant contribution to research in the fields of molecular biology, biochemistry, developmental biology and haematology, particularly in the area of cytokine receptor signalling and its disruption in disease. He has authored more than 80 publications that consistently appear in leading journals, such as *Blood* and *Leukaemia*. These have been collectively cited over 1600 times, including 11 with more than 50 citations. Professor Ward has obtained in excess of \$3.5 million in competitive funding, with the majority from National Competitive Grant Schemes, including receipt of prestigious fellowships from ASBMB, EMBO and the Viertel Foundation.

Ward, A. C., J. Gits, F. Majeed, A. A. Aprikyan, R. S. Lewis, L. A. O'Sullivan, M. Freedman, S. Shigdar, I. P. Touw, D. C. Dale, and Y. Dror. 2008. Functional interaction between mutations in the granulocyte colony-stimulating factor receptor in severe congenital neutropenia. *Br. J. Haematol.* 142: 653-656.

Lewis, R. S., and **A. C. Ward**. 2008. Stat5 as a marker of leukemia. *Expert Rev. Mol. Diag.* 8:73-82.

Co-supervisor: Dr Janet McLeod, School of Medicine

Contact details:

Prof. Alister C. WARD
Deakin Medical School, Geelong Campus
Waurm Ponds
Ph: 0401 153 277
Email: award@deakin.edu.au

This project would be based at the Deakin Medical School, Geelong Campus at Waurm Ponds.

Project description:

The correct development and maintenance of multi-cellular organisms is supported by systems enabling cells to respond to distinct cues. Cytokines and their specific receptors represent one key system. Cytokines are polypeptides that are produced and secreted by cells in response to a variety of stimuli, and induce a range of effects via specific cell surface cytokine receptors. These receptors signal to the nucleus via the Jak-Stat-Socs intracellular signaling pathway to mediate effects on gene transcription and cell physiology, which is particularly important in blood and muscle. Perturbation of this pathway is associated with diseases, including inflammation and cancer.

The aim of our research is to understand the role of this pathway at the molecular level, elucidating how changes in this pathway lead to disease. This approach will provide insight into the underlying biology as well as establishing a platform for the development of therapeutics to combat relevant diseases.

Methodological approach:

This project aims to use zebra fish and other cell model systems to investigate the role of one or more components of the Cytokine receptor-Jak-Stat-Socs pathway by expression studies, as well as gene knockdown and subsequent phenotypic and biochemical analyses.

Necessary skills/knowledge:

The student should have a solid background in understanding health and disease at the molecular level.

TRANSCRIPTIONAL CHANGES IMPORTANT FOR CANCER DEVELOPMENT

Supervisor: Prof. Alister C. Ward

Supervisor's profile:

Professor Ward has made a significant contribution to research in the fields of molecular biology, biochemistry, developmental biology and haematology, particularly in the area of cytokine receptor signalling and its disruption in disease. He has authored more than 80 publications that consistently appear in leading journals, such as *Blood* and *Leukaemia*. These have been collectively cited over 1600 times, including 11 with more than 50 citations. Professor Ward has obtained in excess of \$3.5 million in competitive funding, with the majority from National Competitive Grant Schemes, including receipt of prestigious fellowships from ASBMB, EMBO and the Viertel Foundation.

Ward, A. C., J. Gits, F. Majeed, A. A. Aprikyan, R. S. Lewis, L. A. O'Sullivan, M. Freedman, S. Shigdar, I. P. Touw, D. C. Dale, and Y. Dror. 2008. Functional interaction between mutations in the granulocyte colony-stimulating factor receptor in severe congenital neutropenia. *Br. J. Haematol.* 142: 653-656.

Lewis, R. S., and **A. C. Ward**. 2008. Stat5 as a marker of leukemia. *Expert Rev. Mol. Diag.* 8:73-82.

Co-supervisor: Dr. Tania de Koning-Ward, School of Medicine

Contact details:

Prof. Alister C. WARD
Deakin Medical School, Geelong Campus
Waurn Ponds
, Ph: 0401 153 277
Email: award@deakin.edu.au

This project would be based at the Deakin Medical School, Geelong Campus at Waurn Ponds.

Project description:

A key recent development in our understanding of cancer has been the recognition of gene expression 'signatures' that can be used diagnostically, but also to identify potential new targets for therapeutic intervention. Given that the Jak-Stat signaling pathway has been implicated in cancer development and also directly impacts on transcription, we hypothesize that this pathway is largely responsible for the 'gene signature' in cancer.

The aim of this project is to directly investigate the downstream target genes of key components of the Jak-Stat pathway, and assess how these are modulated by relevant therapeutics.

Methodological approach:

This project will use a range of molecular approaches, including microarray analysis to analyze the *in vivo* transcriptional changes mediated by components of the Jak-

Stat pathway and determine how these are modulated by cancer therapies. This will use both zebra fish and relevant cell line models.

Necessary skills/knowledge:

The student should have a solid background in understanding health and disease at the molecular level.

ABERRANT CYTOKINE RECEPTOR SIGNALING IN OVARIAN CANCER

Supervisor: Prof. Alister C. Ward

Supervisor's profile:

Professor Ward has made a significant contribution to research in the fields of molecular biology, biochemistry, developmental biology and haematology, particularly in the area of cytokine receptor signalling and its disruption in disease. He has authored more than 80 publications that consistently appear in leading journals, such as *Blood* and *Leukaemia*. These have been collectively cited over 1600 times, including 11 with more than 50 citations. Professor Ward has obtained in excess of \$3.5 million in competitive funding, with the majority from National Competitive Grant Schemes, including receipt of prestigious fellowships from ASBMB, EMBO and the Viertel Foundation.

Ward, A. C., J. Gits, F. Majeed, A. A. Aprikyan, R. S. Lewis, L. A. O'Sullivan, M. Freedman, S. Shigdar, I. P. Touw, D. C. Dale, and Y. Dror. 2008. Functional interaction between mutations in the granulocyte colony-stimulating factor receptor in severe congenital neutropenia. *Br. J. Haematol.* 142: 653-656.

Lewis, R. S., and **A. C. Ward**. 2008. Stat5 as a marker of leukemia. *Expert Rev. Mol. Diag.* 8:73-82.

Co-supervisors:

Dr. Nuzhat Ahmed, Women's Cancer Research Centre, Royal Women's Hospital
Dr. Tania de Koning-Ward, School of Medicine

Contact details:

Prof. Alister C. Ward
Deakin Medical School, Geelong Campus
Waurn Ponds
Ph: 0401 153 277
Email: award@deakin.edu.au

This project would be based at the Deakin Medical School, Geelong Campus at Waurn Ponds.

Project description:

Cytokines play a pivotal role in a diverse range of developmental processes and cellular responses. These include the development, maintenance and activation of red blood cells (via erythropoietin or EPO), white blood cells (via colony-stimulating factors or CSFs) and immune cells (via interleukins or ILs), as well as the growth of a range of cell types (via growth hormone). These act via specific intracellular signalling pathways, including the JAK/STAT/SOCS pathway. Dysregulation of various members of the Cytokine receptor/JAK/STAT/SOCS pathway contributes to a number of diseases, including cancer. We have recently identified such perturbation in ovarian cancer, and wish to determine how this impacts on the phenotype of the cancer.

Methodological approach:

The expression and/or activation status of key Cytokine receptor/JAK/STAT/SOCS pathway components will be analyzed in a panel of ovarian cell lines. Those components identified will be further analyzed in primary tissue biopsies to examine possible relationships with the grade of malignancy, and cell phenotype.

Necessary skills/knowledge:

The student should have a solid background in understanding health and disease at the molecular level.

PERITONEAL METASTASIS IN THE PROGRESSION OF OVARIAN CARCINOMA

Supervisor: Prof. Alister C. Ward

Supervisor's profile:

Professor Ward has made a significant contribution to research in the fields of molecular biology, biochemistry, developmental biology and haematology, particularly in the area of cytokine receptor signalling and its disruption in disease. He has authored more than 80 publications that consistently appear in leading journals, such as *Blood* and *Leukaemia*. These have been collectively cited over 1600 times, including 11 with more than 50 citations. Professor Ward has obtained in excess of \$3.5 million in competitive funding, with the majority from National Competitive Grant Schemes, including receipt of prestigious fellowships from ASBMB, EMBO and the Viertel Foundation.

Ward, A. C., J. Gits, F. Majeed, A. A. Aprikyan, R. S. Lewis, L. A. O'Sullivan, M. Freedman, S. Shigdar, I. P. Touw, D. C. Dale, and Y. Dror. 2008. Functional interaction between mutations in the granulocyte colony-stimulating factor receptor in severe congenital neutropenia. *Br. J. Haematol.* 142: 653-656.

Lewis, R. S., and **A. C. Ward**. 2008. Stat5 as a marker of leukemia. *Expert Rev. Mol. Diag.* 8:73-82.

Co-supervisors:

Dr. Nuzhat Ahmed, Women's Cancer Research Centre, Royal Women's Hospital
Prof. Jock Findlay, Women's Cancer Research Centre, Royal Women's Hospital
Dr. Tania de Koning-Ward, School of Medicine

Contact details:

Prof. Alister C. Ward
Deakin Medical School, Geelong Campus
Waurin Ponds
, Ph: 0401 153 277
Email: award@deakin.edu.au

This project would be based at the Women's Cancer Research Centre, Royal Women's Hospital, and Parkville.

Project description:

Ovarian cancer is a 'silent killer' as it is asymptomatic and there are no sensitive and specific markers to detect it at an early stage. A significant proportion of ovarian cancer cells in peritoneal ascites exist as multicellular aggregates or spheroids with the capacity to metastasize to local organs. The pathology of localized metastasis includes attachment of shed tumour cellular aggregates in the peritoneum onto mesothelial-lined spaces resulting in tumour masses as a secondary growth. In this context, the role of shed tumour cells forming spheroids, implantation onto the mesothelial lining of the peritoneum with consequent disaggregation and dissemination is not well understood. On the contrary, these free floating tumour spheroids are often dismissed as nonviable and non-metastatic cells undergoing

apoptosis, compromising the clinical management of ovarian cancer. Hence, a more comprehensive understanding of ascites spheroid biology is needed to combat ovarian cancer dissemination.

Preliminary data obtained from our laboratory suggests that malignant cells in patient's ascites exist as cellular aggregates or spheroids; cancer cells proliferate (in vitro) as spheroids for several days and acquire characteristics of invasive mesenchymal-like cells undergoing a process of epithelial to mesenchymal transition (EMT). In this context, disruption of the EMT process by targeting EMT-associated molecules may provide a potential end-point for inhibiting the invasiveness of not only free-floating but also implanted tumour cellular aggregates. Based on these observations we hypothesize-(i) peritoneal tumour cellular aggregates (PTCs) surviving in ascites are invasive and undergo epithelial to mesenchymal transition (EMT) for localized invasion; (ii) up regulation of EMT-associated molecules are crucial for maintaining the survival and invasiveness of PTCs, and suppression of ovarian cancer growth in the peritoneum may be achieved by targeting such molecules; (iii) PTC undergoes mesenchymal to epithelial transition (MET) after attachment to secondary site on the peritoneum.

Methodological approach:

The aims of the project are: (i) to characterize EMT/MET in ovarian tumours and cellular aggregates isolated from ascites of cancer patients; and (ii) in vitro to suppress the growth of PTC by targeting EMT associated molecules [such and FGFR] that are up regulated in spheroids or cellular aggregates. Experimental methods to use: Mutiplex tandem PCR (MT-PCR), immunohistochemistry, tissue culture, transfection methods and in vitro cell biological methods.

Necessary skills/knowledge:

The student should have a solid background in understanding health and disease at the molecular level.

ROLE OF BRN-3A TRANSCRIPTION FACTOR IN THE PROGRESSION OF OVARIAN CARCINOMA

Supervisor: Prof. Alister C. Ward

Supervisor's profile:

Professor Ward has made a significant contribution to research in the fields of molecular biology, biochemistry, developmental biology and haematology, particularly in the area of cytokine receptor signalling and its disruption in disease. He has authored more than 80 publications that consistently appear in leading journals, such as *Blood* and *Leukaemia*. These have been collectively cited over 1600 times, including 11 with more than 50 citations. Professor Ward has obtained in excess of \$3.5 million in competitive funding, with the majority from National Competitive Grant Schemes, including receipt of prestigious fellowships from ASBMB, EMBO and the Viertel Foundation.

Ward, A. C., J. Gits, F. Majeed, A. A. Aprikyan, R. S. Lewis, L. A. O'Sullivan, M. Freedman, S. Shigdar, I. P. Touw, D. C. Dale, and Y. Dror. 2008. Functional interaction between mutations in the granulocyte colony-stimulating factor receptor in severe congenital neutropenia. *Br. J. Haematol.* 142: 653-656.

Lewis, R. S., and **A. C. Ward**. 2008. Stat5 as a marker of leukemia. *Expert Rev. Mol. Diag.* 8:73-82.

Co-supervisors:

Dr. Nuzhat Ahmed, Women's Cancer Research Centre, Royal Women's Hospital
Prof. Jock Findlay, Women's Cancer Research Centre, Royal Women's Hospital
Dr. Tania de Koning-Ward, School of Medicine

Contact details:

Prof. Alister C. WARD
Deakin Medical School, Geelong Campus
Waurn Ponds
, Ph: 0401 153 277
Email: award@deakin.edu.au

This project would be based at the Women's Cancer Research Centre, Royal Women's Hospital, and Parkville.

Project description:

Over 1400 new cases of ovarian cancers are diagnosed in Australia each year, and approximately 800 Australian women die of this disease every year making this the 4th most frequent cause of death amongst Australian women. The incidence and treatment for ovarian cancer has not improved over the past 30 years. Death rate from ovarian cancer has doubled since 1930 and ~75% of women diagnosed with the disease die within the first five years. This is due to lack of specific early screening markers and inadequate knowledge about the biology of cancer progression.

Brn-3a transcription factor has been shown to regulate the expression and activities of multiple oncogenes (such as Bcl-2, Bax, p21, hsp 27, etc) and tumour suppressor genes (such as BRCA 1) at different cellular levels. The novel hypothesis to be tested in this project is that the ability of ovarian cancer cells to grow, invade and spread is influenced by the expression of Brn-3a transcription factor. Our laboratory has recently demonstrated the expression of Brn-3a factor in ovarian tumours but not in normal ovaries. This warrants the need to understand the biology of the Brn-3a factors in ovarian cancer progression.

Methodological approach:

This project aims to (i) evaluate the expression pattern of the Brn-3a factor in neoplastic ovarian specimens as potential diagnostic and prognostic marker of ovarian cancer; and (ii) establish how changes in Brn-3a expression in normal and ovarian cancer cells affects the phenotype of ovarian tumours in terms of their ability to metastasize in vitro and in vivo. Immunohistochemistry, quantitative real time PCR (RT-PCR), Western blotting, tissue culture, cell transfection and *in vitro* cell biological assays.

Necessary skills/knowledge:

The student should have a solid background in understanding health and disease at the molecular level.

ROLE OF CYTOKINE RECEPTOR SIGNALING IN DEVELOPMENT AND DISEASE

Supervisor: Prof. Alister C. Ward

Supervisor's profile:

Professor Ward has made a significant contribution to research in the fields of molecular biology, biochemistry, developmental biology and haematology, particularly in the area of cytokine receptor signalling and its disruption in disease. He has authored more than 80 publications that consistently appear in leading journals, such as *Blood* and *Leukaemia*. These have been collectively cited over 1600 times, including 11 with more than 50 citations. Professor Ward has obtained in excess of \$3.5 million in competitive funding, with the majority from National Competitive Grant Schemes, including receipt of prestigious fellowships from ASBMB, EMBO and the Viertel Foundation.

Ward, A. C., J. Gits, F. Majeed, A. A. Aprikyan, R. S. Lewis, L. A. O'Sullivan, M. Freedman, S. Shigdar, I. P. Touw, D. C. Dale, and Y. Dror. 2008. Functional interaction between mutations in the granulocyte colony-stimulating factor receptor in severe congenital neutropenia. *Br. J. Haematol.* 142: 653-656.

Lewis, R. S., and **A. C. Ward**. 2008. Stat5 as a marker of leukemia. *Expert Rev. Mol. Diag.* 8:73-82.

Co-supervisor: Dr Janet McLeod, School of Medicine

Contact details:

Prof. Alister C. WARD
Deakin Medical School, Geelong Campus
Waurm Ponds
Ph: 0401 153 277
Email: award@deakin.edu.au

This project would be based at the Deakin Medical School, Geelong Campus at Waurm Ponds.

Project description:

The correct development and maintenance of multi-cellular organisms is supported by systems enabling cells to respond to distinct cues. Cytokines and their specific receptors represent one key system. Cytokines are polypeptides that are produced and secreted by cells in response to a variety of stimuli, and induce a range of effects via specific cell surface cytokine receptors. These receptors signal to the nucleus via the Jak-Stat-Socs intracellular signaling pathway to mediate effects on gene transcription and cell physiology, which is particularly important in blood and muscle. Perturbation of this pathway is associated with diseases, including inflammation and cancer.

The aim of our research is to understand the role of this pathway at the molecular level, elucidating how changes in this pathway lead to disease. This approach will provide insight into the underlying biology as well as establishing a platform for the development of therapeutics to combat relevant diseases.

Methodological approach:

This project aims to use zebra fish and other cell model systems to investigate the role of one or more components of the Cytokine receptor-Jak-Stat-Socs pathway by expression studies, as well as gene knockdown and subsequent phenotypic and biochemical analyses.

Necessary skills/knowledge:

The student should have a solid background in understanding health and disease at the molecular level.

TRANSCRIPTIONAL CHANGES IMPORTANT FOR CANCER DEVELOPMENT

Supervisor: Prof. Alister C. Ward

Supervisor's profile:

Professor Ward has made a significant contribution to research in the fields of molecular biology, biochemistry, developmental biology and haematology, particularly in the area of cytokine receptor signalling and its disruption in disease. He has authored more than 80 publications that consistently appear in leading journals, such as *Blood* and *Leukaemia*. These have been collectively cited over 1600 times, including 11 with more than 50 citations. Professor Ward has obtained in excess of \$3.5 million in competitive funding, with the majority from National Competitive Grant Schemes, including receipt of prestigious fellowships from ASBMB, EMBO and the Viertel Foundation.

Ward, A. C., J. Gits, F. Majeed, A. A. Aprikyan, R. S. Lewis, L. A. O'Sullivan, M. Freedman, S. Shigdar, I. P. Touw, D. C. Dale, and Y. Dror. 2008. Functional interaction between mutations in the granulocyte colony-stimulating factor receptor in severe congenital neutropenia. *Br. J. Haematol.* 142: 653-656.

Lewis, R. S., and **A. C. Ward**. 2008. Stat5 as a marker of leukemia. *Expert Rev. Mol. Diag.* 8:73-82.

Co-supervisor: Dr. Tania de Koning-Ward, School of Medicine

Contact details:

Prof. Alister C. Ward
Deakin Medical School, Geelong Campus
Waurm Ponds
Ph: 0401 153 277
Email: award@deakin.edu.au

This project would be based at the Deakin Medical School, Geelong Campus at Waurm Ponds.

Project description:

A key recent development in our understanding of cancer has been the recognition of gene expression 'signatures' that can be used diagnostically, but also to identify potential new targets for therapeutic intervention. Given that the Jak-Stat signaling pathway has been implicated in cancer development and also directly impacts on transcription, we hypothesize that this pathway is largely responsible for the 'gene signature' in cancer.

The aim of this project is to directly investigate the downstream target genes of key components of the Jak-Stat pathway, and assess how these are modulated by relevant therapeutics.

Methodological approach:

This project will use a range of molecular approaches, including microarray analysis to analyze the *in vivo* transcriptional changes mediated by components of the Jak-Stat pathway and determine how these are modulated by cancer therapies. This will use both zebra fish and relevant cell line models.

Necessary skills/knowledge:

The student should have a solid background in understanding health and disease at the molecular level.

THE EFFECT OF POST-EXERCISE HYDROTHERAPY ON ACCLIMATION TO EXERCISE IN THE HEAT

Supervisor: Dr Stuart Warmington

Supervisor's profile:

Dr. Warmington recently joined the School after 10 years working in Trinity College, Dublin, Ireland. Originally trained as a muscle physiologist, his more recent research interests include the physiology of recovery from exercise, the effect of posture on exercise performance, and applications of exercise to health.

Egaña M, Green S, Garrigan E & Warmington S. (2006). Effect of posture on high-intensity constant-load cycling performance in men and women. *European Journal of Applied Physiology* 96, 1-9.

Co-supervisor: Associate Prof. Rod Snow

Contact details:

Dr. Stuart Warmington

Ph: 03 92517013

Email: stuart.warmington@deakin.edu.au

Project description:

The use of hydrotherapy (both ice-bath and contrast baths) by athletes is becoming more commonplace following training and competition in order to improve recovery from exercise and as preparation for subsequent exercise. It is no doubt important to consider recovery from exercise as being important, especially in scenarios where more than one performance is expected in a single day (morning heats versus evening finals) and particularly at major sporting events (Olympics, world cups, tennis majors) that are most often held in environments where ambient temperature exceeds 30°C.

However, to date there is very little evidence that hydrotherapy effects subsequent exercise performance and there is a considerable lack of well controlled studies that have analyzed the performance or physiological aspects of hydrotherapy. In addition, given the ubiquitous use of hydrotherapy in elite sports, the impact of a period of acclimation prior to a major competition has not been tested and it may seem counter intuitive to immerse the body in an ice-bath following exercise in the heat where the sole aim is to assist in rapid acclimation to a hot environment prior to an event.

As such this project aims to investigate the physiology, performance and rate of acclimation during exercise in the heat and the impact that ice-bath therapy during recovery from exercise might have on these critical variables.

Methodological approach:

This study will involve recruitment and testing of two groups of subjects. Each subject will be required to exercise in the heat on repeated occasions to acclimatize to the heat. One group will undergo ice-bath treatment following each exercise session; the other will act as a control. Fitness and performance trials will be completed before and after the acclimation period.

Measurements of cardiovascular and metabolic parameters will be taken during all exercise sessions and during recovery. In addition, analysis of blood parameters

such as lactate and glucose, and hemoglobin and haematocrit will be taken along with measurements of core temperature and sweating.

Necessary skills/knowledge:

This project would suit a variety of student interests including athlete care and performance, and training methodologies and management. An interest or familiarity with the physiology of thermoregulation, lactate, and acclimation as it applies to exercise would be additionally useful.

THE EFFECT OF POST-EXERCISE HYDROTHERAPY ON THE PHYSIOLOGY OF RECOVERY FOLLOWING HIGH-INTENSITY BICYCLING EXERCISE

Supervisor: Dr Stuart Warmington

Supervisor's profile:

Dr. Warmington recently joined the School after 10 years working in Trinity College, Dublin, Ireland. Originally trained as a muscle physiologist, his more recent research interests include the physiology of recovery from exercise, the effect of posture on exercise performance, and applications of exercise to health.

Egaña M, Green S, Garrigan E & Warmington S. (2006). Effect of posture on high-intensity constant-load cycling performance in men and women. *European Journal of Applied Physiology* 96, 1-9.

Co-supervisor: Associate Prof. Rod Snow

Contact details:

Dr. Stuart Warmington

Ph:03 92517013

Email: stuart.warmington@deakin.edu.au

Project description:

The use of hydrotherapy (both ice-bath and contrast baths) by athletes is becoming more commonplace following training and competition in order to improve recovery from exercise and as preparation for subsequent exercise. It is no doubt important to consider recovery from exercise as being important, especially in scenarios where more than one performance is expected in a single day (morning heats versus evening finals), or repetitive training sessions. However, to date there is very little evidence that hydrotherapy neither effects subsequent exercise performance nor enhances traditional markers of recovery from exercise. Despite much anecdotal evidence, there is a considerable lack of well controlled studies that have analyzed performance or physiological aspects of hydrotherapy such as skin and muscular responses, clearance of lactate and other fatigue related metabolites, and the alterations in temperature and blood flow that may be critical to exercise recovery and subsequent performance. As such this project aims to investigate the physiology, performance and rate of recovery from high-intensity bicycling exercise, and the impact of hydrotherapy on critical variables.

Methodological approach:

This study will involve recruitment and testing of volunteers. Each subject will be required to complete a fitness assessment and then complete three exercise performance trials on different occasions separated by at least 1 week. Once as a control trial, once to assess the effect of ice-bath therapy and once to assess the effect of contrast-bath therapy. Each trial will consist of a bout of high-intensity cycling followed by a recovery intervention, and then another bout of high-intensity cycling.

During each trial measurements will be taken of cardiovascular and metabolic parameters during both exercise and recovery. In addition, analysis of blood parameters such as lactate and glucose, and haemoglobin and haematocrit will be taken along with measurements of core and muscle temperature.

Necessary skills/knowledge:

This project would suit a variety of student interests including high-intensity cycling, applied mechanisms of athlete care and performance, and training methodologies and management. An interest or familiarity with the physiology of muscle metabolism and thermoregulation would be additionally useful.

GLOBAL GENE EXPRESSION PROFILING OF EXERCISE-TRAINED HUMAN SKELETAL MUSCLE

Supervisor: Kelly Windmill

Supervisor's profile:

Dr Kelly Windmill is a Senior Research Fellow based at the Metabolic Research Unit on the Waurm Ponds campus. My scientific interests are focused around the areas of type 2 diabetes (T2D) and obesity, in particular the discovery and validation of novel protein targets for metabolic diseases. Publications include:

1. Windmill et al (2008). Thioredoxin domain containing protein 12 (TXNDC12): a secreted protein with a role in glucose metabolism. *Endocrinology* (in preparation)
2. Windmill K, Tenne-Brown J, Bayles R, Trevaskis J, Gao Y, Walder K, Collier GR. (2007). Localization and expression of selenoprotein S in the testis of *Psammomys obesus*. *J Mol Histol* 38:97-101

Co-supervisor: Nicky Konstantopoulos

Contact details:

Metabolic Research Unit,
School of Health Sciences
Waurm Ponds campus
Ph: 03 5227-2618/52272513
Email: Kelly.windmill@deakin.edu.au

Project description:

Skeletal muscle is an important tissue in helping to maintain whole body metabolism and energy homeostasis due to its large mass and oxidative capacity. Diseases such as insulin resistance and T2D have been shown to be in part due to defects in skeletal muscle function. Skeletal muscle is able to adapt to demands such as exercise and it is clear that aerobic exercise is associated with improved skeletal muscle oxidative capacity and insulin sensitivity. The observed benefits of exercise can be partly explained by alterations in a number of genes involved in skeletal muscle metabolism. An example of such a gene is GLUT4, the insulin-regulated glucose transporter that is highly expressed in skeletal muscle and adipose tissues.

In this project we will use Microarray technology to determine gene expression patterns in human skeletal muscle samples following a bout of exercise. Skeletal muscle samples have been obtained from human participants following an intensive exercise regime. RNA will be extracted from the human muscle samples and quantified before being used to generate fluorescently labeled cDNA that will be hybridized to Agilent human microarray slides containing >41,000 human transcripts. Analysis of microarray data will identify numerous genes that are differentially expressed in human skeletal muscle samples post-exercise. Following microarray analysis, a number of important and functionally relevant genes will be selected and their differential gene expression confirmed using real-time PCR. These genes will also undergo bioinformatics analysis to determine their relevance in skeletal muscle following exercise.

Methodological approach:

A wide range of state of the art molecular techniques have been established in this laboratory and will be used in this project including all facets of cDNA microarray use as well as RNA extraction, cDNA synthesis, quantitative PCR and bioinformatics analysis.

Necessary skills/knowledge:

A genuine interest to learn and be part of a scientific research team is highly desirable. Course work in biochemistry, physiology and/or molecular biology.

INVESTIGATION OF THE ROLE OF A NOVEL PROTEIN IN INSULIN RESISTANCE AND TYPE 2 DIABETES

Supervisor: Kelly Windmill

Supervisor's profile:

Dr Kelly Windmill is a Senior Research Fellow based at the Metabolic Research Unit on the Waurn Ponds campus. My scientific interests are focused around the areas of type 2 diabetes (T2D) and obesity, in particular the discovery and validation of novel protein targets for metabolic diseases. Publications include:

1. Windmill et al (2008). Thioredoxin domain containing protein 12 (TXNDC12): a secreted protein with a role in glucose metabolism. *Endocrinology* (in preparation)
2. Windmill K, Tenne-Brown J, Bayles R, Trevaskis J, Gao Y, Walder K, Collier GR. (2007). Localization and expression of selenoprotein S in the testis of *Psammomys obesus*. *J Mol Histol* 38:97-101

Co-supervisor: Nicky Konstantopoulos

Contact details:

Metabolic Research Unit
Faculty of Health and Behavioural Sciences
Waurn Ponds Campus, Geelong
Ph: 03 5227-2618
Email: Kelly.windmill@deakin.edu.au

Project description:

In 2001, it was estimated that over 170 million individuals had T2D and it is predicted that by 2010 this figure could grow by 50%. T2D arises from the development of insulin resistance and/or pancreatic β -cell dysfunction. Insulin is an important factor in maintaining blood glucose concentration as it promotes glucose uptake by skeletal muscle and adipose tissue via recruitment of specific glucose transporters to the cell surface.

In our lab, we have identified a secreted protein, TXNDC12 that demonstrates differential gene expression in tissues from normal, insulin resistant and T2D *P. obesus*, an animal model of obesity and diabetes. TXNDC12 expression levels are elevated in adipose tissue of insulin resistant/T2D *P. obesus* compared with normal animals. In previous cell culture studies, we have shown that addition of recombinant TXNDC12 protein to insulin-resistant 3T3-L1 adipocytes was able to partially reverse that insulin resistance. TXNDC12 protein was able to increase basal and insulin-stimulated glucose uptake and increase the translocation of the GLUT4 glucose transporter to the plasma membrane in insulin-sensitive 3T3-L1 cells. These results suggest that TXNDC12 may play an important role in insulin resistance and T2D. Further studies are required to improve our understanding and to identify molecular pathways facilitating these processes. In this project, we aim to determine the effects of recombinant TXNDC12 on GLUT4 translocation in a L6 muscle cell line

in both insulin sensitive and insulin resistant states and to also identify the signalling pathways involved in the TXNDC12-mediated effects on L6 cells.

Methodological approach:

Techniques that will be used in this project include recombinant protein production in bacteria, SDS-PAGE, cell culture, GLUT4 translocation studies, immunoblotting and statistical analysis

Necessary skills/knowledge:

A genuine interest to learn and be part of a scientific research team is highly desirable. Course work in biochemistry and/or molecular biology.

ROLE OF WINE AGING ON MODIFICATION OF BIOACTIVE ANTIOXIDANT ACTIVITY

Supervisor: Dr. Adel Yousif

Supervisor's profile:

Dr. Yousif is a Lecturer in the area of Food Science in the School of Exercise and Nutrition Sciences. He teaches at the undergraduate level and also supervises higher degree students. Dr. Yousif is an active researcher into a range of issues related to the effect of post harvest storage on grain protein and carbohydrate physical, chemical and nutritional functionality. He is also interested in the effect of post harvest storage on other grain bioactive components such as flavonoids, phytosterols and tocopherol.

Awards:

Deakin University Central Research Grants Services 2006

Deakin University, Faculty of Health and Behavioral Sciences-Faculty Research Development Grant 2005

Publications:

Yousif, A. M., Kato, J. and Deeth, H. C. (2007). Effect of storage on the biochemical structure and processing quality of adzuki beans (*Vigna angularis*). *Food Reviews International*, 23 (1), 1-33.

Co-supervisor: Dr Duncan Mcgillivray

Contact details:

Dr. Adel Yousif,

Ph: 03 9251-7261

Email: adel.yousif@deakin.edu.au

Project description:

Wine bioactives;

- ascorbic acid
- flavones, isoflavones and flavanones
- flavonoids
- flavanols, Quercetin, kaempferol, myricetin, (+)-catechin, (-)-epicatechin, proanthocyanidins (referred to as procyanidins or tannins) and quercetin
- anthocyanins and anthocyanidins (e.g. cyanidin, pelargonidin)
- caffeic acid
- stilbenes, e.g. the phytoestrogen resveratrol

Play an important role in protecting the body against ailments such as;

- coronary heart disease (CHD)
- slow buildup of plaque formation and limits LDL oxidation
- act as antioxidant scavenging agents for carcinogens
- inhibit cancer (breast, colon, ovarian, prostate) cell proliferation

This is an innovative study to observe the role of wine aging on the related bioactive component oxidant activity. Wine makers may store wine so that there can be

additional clarification and, in some wines, to give it a more complex flavors. The wine may be barrel aged for several months to several years. No air is allowed to enter the barrels during this period.

Wine aging may affect changes to the stability of the wine bioactive wine components. These changes in turn are considerably related to wine bioactives component mode of action and potency and its ability to protect the health of the consumer by counteracting CHD, reducing LDL cholesterol, inhibiting cancer, acting as an antioxidant etc.

Methodological approach:

Method for the extraction and analysis of bioactive in samples;

Extract weighed sample in 1:1 Chloroform/Methanol.

Filter, remove solvents.

Make up in DCM and transfer to vial.

Analysis by HPLC;

Using a 150mm C-18 column, with an isocratic solvent system of 70% Acetonitrile, 10% methanol, and 20% DCM (DICHLOROMETHANE CH_2Cl_2) flowing at 1ml/min.

Method: DB TOC1.M Monitored wavelength is 298nm.

Necessary skills/knowledge:

Attending the subject of Food Composition and food analysis & QA

EFFECT OF SOYBEAN (GLYCIN MAX) STORAGE ON FIBRE-ENRICHED FOODS BENEFICIALLY MODIFY SERUM LIPIDS

Supervisor: Dr. Adel Yousif

Supervisor's profile:

Dr. Yousif is a Lecturer in the School of Exercise and Nutrition Sciences. He teaches at the undergraduate level and also supervises higher degree students. Dr. Yousif is an active researcher into a range of issues related to the effect of post harvest storage on grain protein and carbohydrate physical, chemical and nutritional functionality. His area of interest is in the study of grain nutritional quality; specifically bio-active components such as carbohydrates (dietary fiber and indigestible starch). Carbohydrate-rich, cereal-based foods may be reformulated to reduce starch digestibility. This will result in blood glucose lowering and satiety elevating effects. He is also interested in assessing the starch digestibility of Australian sorghum varieties using an in vitro model of human digestion then determines the inter-varietal relationship between digestibility and chemical composition.

Awards:

Deakin University Central Research Grants Services 2006

Deakin University, Faculty of Health and Behavioral Sciences-Faculty Research Development Grant 2005

Publications:

Yousif, A. M., Kato, J. and Deeth, H. C. (2007). Effect of storage on the biochemical structure and processing quality of adzuki beans (*Vigna angularis*). *Food Reviews International*, 23 (1), 1-33.

Co-supervisor: Dr. Shirani Gamlath

Contact details:

Dr. Adel Yousif,

Ph: 03 9251-7261

Email: adel.yousif@deakin.edu.au

Project description:

Epidemiological evidence demonstrates the effectiveness of legume consumption on lowering the risk of coronary heart disease (CHD). Dietary modification remains the preferred initial treatment option for improving major lipid risk factors rather than instigating drug therapy. Dietary intervention studies have shown that numerous legumes (eg, soy beans, navy beans, field beans, lentils, chickpeas and pinto beans) beneficially modify serum lipids.

This is an innovative study to combine soybean storage related changes to carbohydrate (35%) content, product development and the reduction of serum lipids. Due to the production cycle soybeans (*Glycine max*) undergo storage before processing. Improper storage time and conditions may result in biochemical changes to the native structure of the soybean fiber components. Changes to the fiber levels may ultimately affect the ability to protect the health of the consumer through counteracting LDL cholesterol.

In general, soluble dietary fibres such as psyllium, pectin and the legume-derived guar gum are considered to be hypocholesterolaemic agents. Nevertheless, the ability of these soluble fibres to impact positively on consumer health has been questioned due to difficulties in incorporating them into palatable food products. This project will aim to address this question through product development and sensory analysis of pita bread

Methodological approach:

Experimental foods

Different Soy flour levels (5, 10, 15 and 20%), will be incorporated into a pita bread formulation, the pita bread will be manufactured at the Deakin University product development laboratory.

Healthy subjects (40) are to be recruited through direct personal communication in Melbourne, Australia (Deakin University Ethics Committee approval required).

Subjects are to consume a high fibre pita bread diet for a 28 day test diet in comparison to a control diet.

Blood samples will be obtained after the subjects had fasted for 10–12 h overnight and will be collected immediately before the commencement (day 1), toward the end (day 26) and upon completion (day 29) of each intervention.

Questionnaires on perception of satiety and on palatability of the experimental foods were conducted on day 18 of each intervention. Height and weight (after overnight fast, without shoes and in light clothing) will be measured during clinic visits immediately before the commencement (day 1) and upon completion (day 29) of each intervention.

Necessary skills/knowledge:

Attending the subject of Food Composition and food analysis & QA

