Higher Degree Research
Hot Topics

Griffith Health

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Behavioural Basis of Health

Cognitive development of young children

- the development of episodic memory and its relations to theory of mind and executive functions,
- the development of prospective memory,
- the development of self regulation
- embodied cognition and children’s learning, and shared intentionality.

In related research with both children and adults, I am examining the role of inhibitory processes in episodic memory using electrophysiological measures. I have also recently commenced studies of embodied approaches to understanding memory and cognition.

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Cognitive rehabilitation for cancer survivors

This project aims to evaluate whether a group psychological intervention can improve actual and perceived cognitive performance in people who have completed treatments for cancer. It is hypothesised that group cognitive rehabilitation will improve objective cognitive performance, subjective cognitive function and quality of life to a greater extent than any change seen with treatment as usual.

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Effects of brain injury on human (adults and children) cognitive process and treatment of these problems

Sample journal publications

Emotion and learning processes provide the foundation with which to understand many psychological disorders, such as anxiety disorders and substance dependence

Our research continues to elaborate on the fundamental processes of emotion and learning and to apply this knowledge to improve the health of people.

Health behaviours for people with cancer or other chronic illnesses

For people who have been diagnosed with a chronic illness, such as some types of cancer, health behaviours such as optimal nutrition, physical activity, and understanding and managing psychological distress can help to improve quality of life and may also affect longer term survival prospects. There are projects available both in:
Investigating how people with chronic illness learn about and implement changes or maintenance in health behaviours after diagnosis, and
The use of online support tools for monitoring and improving health behaviour.

Mental processes play an important role in sport and exercise

We are conducting important research on attentional focus strategies in a variety of sports using a combination of behavioural and psychophysiological methods. Our findings are leading to ways to improve performance and ultimately enhance enjoyment during sport and exercise.
Prospective memory (ability to remember to do things in the future): Nature, impairment and neural basis

Sample journal publications


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The leading treatment for anxiety disorders, such as phobia, is behavioural-based exposure therapy

However, short-term gains in the relief of fear symptoms are often not maintained in the long-term. New research has pointed to several mechanisms that can produce a return of fear after exposure treatment. We are conducting urgent research that aims to understand the basic processes that underlie these mechanisms and their application to reducing relapse following therapy. Neumann, D. L., Boschen, M. J., & Waters, A. M. (2008). The return of extinguished conditioned behaviour in humans: New research and future developments. In L. N. Piccard (Ed.), *Biological Psychology: New Research.* Hauppauge NY: Nova Publishers.

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The role of career adaptability in career development

Career development literature has focused primarily on individual differences (eg. Holland) and stage models (eg. Super) when attempting to account for career decision-making and management of career pathways. In recent years, there has been an interest in process theories to account for career development. An important process construct being applied in the career development literature is “career adaptability”. However, this construct is yet to be clearly defined and conceptually clarified. One path to doing this is to apply and test self-regulation as adaptability. A research project focused on career adaptability and self-regulation theory has the potential to lead to high quality outcomes for a PhD candidate and
contribute substantially to our understanding of how young people manage their development processes.

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**Using technology to assist delivery of psychological services**

There are now a variety of technologies (web, mobile phone, virtual reality, handheld computers) that have enormous potential to increase the availability and accessibility of psychological treatment services. Technology can be either used as adjuncts to normal face to face delivery of treatment, or to provide stand alone treatment. Research in this area is still developing, but evidence to date suggests that clients are willing to access treatment services using these means, and that satisfactory clinical outcomes can be achieved.

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**Behavioural Basis of Health**

**Ischemic Intolerance and Refractoriness to Cytoprotection in Obesity and aging**

Analysis from the WHO indicates that globally ~1.6 billion adults were overweight and ~400 million obese in 2005, and this is set to rise to 2.3 billion overweight and 700 million obese adults by 2015. Obesity increases the risk of development of major chronic diseases, including cardiovascular disease, insulin-resistant diabetes, liver disease, and certain cancers. In part as a result of this obesity epidemic, together with the aging of our population, incidence of ischaemic heart disease is rising and is presently the leading cause of death and disability in Australia and worldwide. Obesity and aging may not only worsen outcome from cardiac ischaemia, but appears to accelerate onset of myocardial infarction. With these independent risk factors (obesity and aging) increasing the prevalence and impact of ischaemic heart disease, an important goal is the development of clinically applicable 'cardioprotective' strategies to limit the adverse consequences of I/R in aged and or obese patients. Cardioprotective therapies are aimed at inhibiting progression to irreversible injury (infarction) in at-risk myocardium following planned (surgical) or unplanned (disease-dependent) ischaemia and reperfusion. Current efforts into improving cardioprotection are primarily focussed on 'conditioning' responses (pre- and postconditioning) and their underlying mechanisms. However, past and current research into ischaemia/reperfusion injury and cardioprotection is almost exclusively undertaken in young healthy tissue, invariably from males. It now seems that the diseased and aged myocardium, in need of protective intervention, is unlikely to respond effectively to therapies evolved from our understanding of the mechanisms involved in the preconditioning and postconditioning phenomena. The key to developing effective protective therapies is therefore to extend our understanding of protective signalling and ischaemic pathobiology to the obese and aged myocardium of both males and females.

Our studies therefore aim to characterize the effects of obesity and aging in male and female hearts, identifying loci of cardioprotective signalling dysfunction, and testing means of
Molecular Basis of Age-Related Changes in Cardiac Disease Tolerance

As we age our hearts become more sensitive to injury/damage with coronary artery disease and myocardial infarction. At the same time the aged heart becomes less responsive to therapeutic interventions. Our research supports a role for alterations in G-protein coupled receptor triggered protective responses and the downstream kinase signalling pathways linked to these receptors. This project will examine the nature and importance of these molecular changes during the ageing process in both male and female hearts. Studies are undertaken in isolated and in situ hearts, and isolated myocytes, with analysis of changes in cell/organ physiology and resistance to disease during ageing, together with analysis of regulatory protein expression and functionality in wild-type and genetically modified models.


Novel Opioid Mediated Cardioprotective Mechanisms

Novel therapeutic approaches to limiting cardiac damage during ischaemia-reperfusion (eg. myocardial infarction, cardiac surgery) are highly desirable, yet there has been limited translation of experimental approaches to the clinical setting. This likely stems from failure of conventional responses with age and in diseased tissue. We have identified an entirely novel response involving sustained activation of opioid receptors, triggering a profound and prolonged protected state in mammalian hearts. This response is preserved in young to aged hearts and is a good candidate for potential clinical translation. This project will examine and identify the molecular signalling mechanisms involved in triggering and mediating this protection during myocardial infarction, and examine its applicability in different clinically relevant models.

Oxidative Stress in the Pathogenesis of Preeclampsia

Pre-eclampsia is a complex disease of the placenta that affects approximately 7% of human pregnancies. It is the single biggest risk to both mother and baby and can result in maternal and foetal mortality and morbidity. It is of considerable economic cost to health care providers especially in caring for premature infants, preserving maternal well-being and monitoring for vital symptoms during regular visits to obstetric clinics. The initial symptoms of pre-eclampsia include hypertension, (blood pressure greater than 140 mm Hg systolic or 90 mm Hg diastolic; or a rise of >30 mm Hg or >15 mm Hg above initial systolic and diastolic pressures, respectively), proteinuria (defined as > 0.3 g of protein secreted/ 24 hours) and edema. If these initial symptoms persist then the mother is generally admitted to hospital and carefully monitored. The secondary symptoms of pre-eclampsia are referred to as HELLP syndrome and include Hemolysis, Elevated Liver enzymes and Low Platelet count. There is no cure for pre-eclampsia and once the secondary symptoms of HELLP syndrome appear, the only course of action is to deliver the baby regardless of the length of gestation. Once the placenta is removed from the uterine cavity the symptoms usually disappear within 48 hours and the mother can expect to make a full recovery.

Placental oxidative stress is central in the pathogenesis of pre-eclampsia. Oxidative stress arises when there is an excessive production of Reactive Oxygen Species (a type of free radical) or there is a diminished production of anti-oxidants. We have been studying the cellular production of the glutathione and thioredoxin anti-oxidant enzyme systems in placental cells. We have found that both enzyme systems are diminished during pre-eclampsia. We are now looking at how this increased oxidative stress modulates the degree of apoptosis in placental tissues from pre-eclamptic mothers. We are also studying methods of up regulating anti-oxidant enzyme systems in placental cells with a view to developing treatments for this serious complication of pregnancy.

Molecular Basis of Disease

Bacterial Pathogenesis and Immunity to Infection

Several NHMRC-funded microbiology research projects are currently available in the areas of microbial pathogenesis and mechanisms of microbial disease in the urogenital tract. Overall, the research is centred on elements of bacterial virulence and innate immunity that impact disease progression and control of infection in the urogenital tract. Projects are set within a challenging research academic environment and draw on both medical and basic science research comprising both in vitro & in vivo approaches. Specific projects available focus on the molecular mechanisms used by pathogenic streptococci and E. coli in colonization, survival, and evasion of host responses in the urogenital tract. These projects utilize elements of clinical and molecular microbiology, immunology, proteomics, and genetics to investigate and understand how bacterial disease develops in the human host.
Cancer biology, Metabolism, MicroRNAs and Cancer Stem Cells

Identify microRNAs that are involved in regulation of angiogenesis and validate them to develop more effectively diagnose and treatment for lung, colon and liver cancers.

Facilitate the discovery of new targets and the development of therapies that will be more effective, less toxic and can be combined with targeted bacterial oncolytic therapies.

Effectively design and perform preclinical studies in animal models to validate new rationally targeted therapies.

Most cancer treatment will require a combination of different therapeutic agents in order to overcome the problem of heterogeneity and destroy the whole tumour. Using our advanced microscopy systems we have shown that our bacterial system destroy the majority of the tumour, but leave a viable outer rim which will continue to grow. To overcome the problem we are developing other novel, combined treatments using medicinal herbs and antivascular agents.

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Developing novel cancer gene therapies

90% of all cancers are solid tumours. Current conventional therapies are useful, but very limited with NO Cure for cancers. Recent studies reveal that these tumours have unique microenvironments. We are developing a novel anaerobic bacteria based therapy that can specifically takes advantage of the tumour’s own environment, penetrate into tumour to not only lyse tumour tissue/cells, but deliver in situ antitumour transgene products/agents.

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Envirogenomic Studies on Migraine

This project will investigate environmental and genetic components of migraine in the Norfolk Island population. The Norfolk cohort is a unique genetic isolate population that has originated from a limited number of founders descending from the original Mutiny on the Bounty paternal founders and a number of maternal Tahitian founders. This unique genetic isolate population is an ideal resource to study the genetics of complex disorders. We have been studying this population for a number of years investigating cardiovascular disease and migraine. This project will focus on using a variety of phenotypic and genotypic data from this population to pinpoint factors that relate to migraine. The project has a strong focus on computational analysis and will assess the role of genomic variants including CNV, eQTL transcripts and
MtDNA variants, as well as biochemical and environmental risk factors, with respect to migraine incidence in the N1 population. The study will also look at migraine status change in relation to our initial N1 collections in 2000 and our longitudinal follow-up data obtained this year in 2010. This is a unique molecular genetic and bioinformatic focused project that would ideally suit a candidate with a background in molecular or population genetics, biostatistics and bioinformatics.

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**Exploring the role of F-BAR intracellular signal transduction proteins in human disease**

F-BAR proteins are a major family of intracellular signalling proteins expressed in most human tissues (e.g. neurons, blood cells, vascular endothelium, bone) and conserved throughout eukaryotic evolution. Tissue-specific F-BAR proteins are implicated in a wide range of human diseases including cancer, cardiovascular disease, diabetes, inflammatory disease, and neurodegeneration. Each F-BAR protein contains an F-BAR domain that in vitro can directly bind and tubulates lipid bilayer membranes. We have shown in a simple model eukaryote (yeast) that some F-BAR proteins switch from a normal to a pathological state that is toxic for cells. This project aims to understand the basis for this switch of F-BAR proteins to a toxic state. Preliminary data suggests a link to prions - proteins of a switched conformation that are infectious and switch all other molecules of the same protein into the same infectious conformation (yes - even yeast cells harbour prions!). We will elucidate the molecular mechanism responsible for the toxicity of F-BAR proteins in yeast. We will then determine whether similar mechanisms are responsible for F-BAR protein toxicity in cultured mammalian cells. Our findings will improve our understanding of the molecular basis of diseases known to be associated with aberrant F-BAR protein signalling. In the future this knowledge will facilitate the development of improved diagnostics and therapeutics.

This project has received $235,000 in funding from the Australian Research Council (ARC) for 2011-2013. This project is in collaboration with Yury Chernoff at Georgia Tech, Atlanta, Georgia, USA; Barbara Winsor at Université de Strasbourg, Strasbourg, France; Thirumaran Thanabalu at Nanyang Technological University, Singapore; Mingjie Cai, China; and Werner Müller-Esterl and Stefanie Oess at Johann Wolfgang Goethe University, Frankfurt, Germany.

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**Heparan Sulfate Proteoglycans And The Breast Cancer Niche**

The cancer stem cell hypothesis states that tumours arise from cells with the ability to self-renew and differentiate into multiple cell types, and that these cells persist in tumours as a distinct population that causes disease relapse and subsequent metastasis. The crux of this hypothesis is that these cells are the only cells capable of, by themselves, giving rise to new tumours. As defined by the Hayflick limit, differentiated cells cannot divide indefinitely. Cancer cells therefore, must be capable of some level self-regulation toward continuous proliferation and self-renewal in order to initiate and sustain the growth of a tumour. The questions is, what proportion of a tumour consists of these stem cell-like cells?
cells and how can we identify them? The identification of cancer stem cells along with the genetic and micro-environmental changes involved in breast tumours are as yet to be fully elucidated.

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Immune mechanisms in the Middle Ear

These studies are being conducted to understand immune mechanisms in the middle ear of children who are susceptible to infections (Otitis Media). Samples of middle ear fluid and mucosal tissue (biopsy) will be collected from children who are having grommets inserted in their ear drums. Specific immune and inflammatory markers will be measured in the middle ear fluid. Biopsies will be examined for bacterial biofilms. The presence of bacteria and viruses will be determined by PCR.

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Isolation of low-Mr compound inhibitors of a host factor critical for infection by viruses

Host factors play an essential role in the budding (release) of enveloped viruses from host cells during infection, e.g. human immunodeficiency virus (HIV), Ebola (EBOV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and Herpes Simplex Virus (HSV). One such host factor is Vps4, a cytoplasmic protein that acts as an ATP-powered protein dissociation machine for a set of macromolecular protein complexes involved in virus budding. The 3D crystal structure of the Vps4 monomer has recently been elucidated. We have solved the structure of the Vps4 oligomer by electron microscopy. Recent work funded by the US Department of Defence has shown that down-regulation of Vps4 in a living mouse protects the mouse from an otherwise lethal dose of EBOV. Hence, Vps4 may be an ideal target for broad-spectrum antiviral compounds active against diverse viruses. This project will identify Vps4 inhibitors using a yeast-based colorimetric assay we have developed. In the future we will test the effect of these Vps4 inhibitors on viral infection (in collaboration with an HIV virology lab).

This project is in collaboration with Ben Hankamer and Michael Landsberg, Institute for Molecular Bioscience, University of Queensland and Johnson Mak, MacFarlane Burnet Institute for Medical Research and Public Health, Melbourne.

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**Lymphoma**

Lymphoma is a blood cancer that develops in the lymphatic system affecting white blood cells. It is the most common blood cancer, causing 11% of childhood cancers. With the rates of lymphoma incidence increasing at 4% per year, over the last 20 years the number of cases in Australia has doubled. Patients suffer from the disease for long periods of time and some existing treatments can lead to debilitating side effects. Many of the subtypes are currently incurable or have a high relapse rate. The GRC undertakes research aimed at identifying the genes involved in lymphoma susceptibility, development and progression, in the hopes of being able to developing better diagnosis and treatment.

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**Maximising cancer therapy by developing multimodel therapeutics**

Most cancer treatment will require a combination of different therapeutic agents in order to overcome the problem of heterogeneity and destroy the whole tumour. Using our advanced microscopy systems we have shown that our bacterial system destroy the majority of the tumour, but leave a viable outer rim which will continue to grow. To overcome the problem we are developing other novel, combined treatments using medicinal herbs and antivascular agents.

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**Mesenchymal stem cells in brain repair**

Mesenchymal stem cells or MSCs are multipotent stem cells that can differentiate into a variety of cell types including osteoblasts (bone), chondrocytes (cartilage) and neuronal cells. MSCs can be described as multipotent cells derived from both the bone marrow and non-marrow tissues, with a large capacity for self-renewal while maintaining their multipotency. As MSCs potentially contribute to both the niche and structural support of normal cells, but also tumourigenic and damaged cells, we can utilise them as potential regulators of cells. We will look at the potential role of MSCs in ameliorating abnormal neuronal conditions by focusing on the use of these cells as they progress down the differentiative pathway and what changes occur within the cell (in terms of cell signalling) and also in their niche towards the regulation/repair of sites of brain injury.

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Migraine

The GRC was one of the first laboratories in the world to undertake studies on the genetics of migraine. Our research has shown that migraine is a multifactorial disorder with a strong genetic component. Our research to date has implicated neurotransmitter, hormonal and vascular related genes in this disorder. We are keen to continue our migraine molecular genetic research by undertaking studies to identify all of the genes involved in this disorder but also by translating this information through the development of DNA diagnostic tests and clinical trials of new directed therapeutics aimed at specific underlying molecular causes of migraine. This personalised approach to migraine has already led to diagnostic testing for three sub-types of migraine which is undertaken in our laboratory and a promising clinical trial of new effective migraine treatment targeted to a specific DNA defect found in around 20% of migraine sufferers.

Molecular pathology of colorectal cancer

Colorectal cancer is amongst the most common malignancy found in the Western world and usually ranks high in incidence and mortality among malignancies in those countries. Globally, colorectal cancers accounted for about 1 million new cases. There is evidence that research contributes directly to improve the care of patients with colorectal cancer by more accurately refining prognosis and selecting the most appropriate adjuvant therapy for individual patients with colorectal carcinoma. In order to do this, our research focuses on studying novel tissue-based prognostic indicators at the molecular level.

Molecular pathology of oral, oesophageal and head/neck cancers

Oral, oesophageal and head/neck cancer is the sixth most common cancer worldwide with a global annual incidence of 500,000. This group of cancer is a heterogeneous group of cancers, with a variable, but usually poor prognosis in patients. Besides the poor outcome, head and neck cancer has a great impact on the patient’s quality of life, due to its anatomic location. Our research studies the group of cancers by animal experiments, cell line cultures, gene profiling and clinicopathological correlations in order to understand the biological behaviour and to reveal the underlying mechanisms of cancer progression and therapy resistance.
Molecular pathology of thyroid and endocrine cancers

Endocrine tumours (thyroid cancer, adrenal tumours, etc) affect mainly females and may have significant systemic effects. The morphologies of these cancers are diverse and making a definite diagnosis often needs the works of specialists. In addition, the behaviour of these lesions may not be predicted by clinicopathological features. Our research team works on genetic profiles, pathological classification and prognostic markers studies in thyroid and other endocrine lesions.

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Multiple Sclerosis

Multiple Sclerosis is a common degenerative disorder that shows variable onset and progression. It is a disease that affects the central nervous system, causing degeneration of the white matter or myelin sheath that provides insulation to nerves. MS occurs mostly in young adults and leads to physical disorders such as a loss of motor control and functioning. Studies undertaken in the United States have shown that a person has a 1/1000 chance of developing MS and this risk rises from 1/100 to 1/50 for close relatives of a sufferer, with up to a 1 in 3 chance for an identical twin of a sufferer to develop the disease. The GRC investigates genes involved in MS by comparing gene expression in archival brain material from sufferers of MS as well as non-sufferers. Blood samples are also taken from MS sufferers as well as control subjects to further investigate implicated susceptibility genes.

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Osteoblast -titanium interaction

Dental implants manufactured from titanium have become a well established treatment modality for the replacement of missing teeth. These devices utilize the unique biocompatibility properties of titanium which facilitate the apposition of bone directly on the metal surface, a phenomena known as osseointegration. Due to these increasing demands, there are continuing efforts to modify implant surfaces in order to enhance the rate and amount of osseointegration. However, further improvements in implant design, surface characteristics and surgical protocol is hampered by a lack of understanding of the fundamental cellular and molecular mechanisms that result in osseointegration. In addressing the interaction of cells with titanium during the process of osseointegration, this program will advance the understanding of the cellular and molecular mechanisms involved in osseointegration, and will result in leads for the development of clinical applications that will result in improved outcomes, not only in the field of dentistry, but also in other disciplines, such as orthopaedics.

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Probiotics and Mucosal Health

Clinical studies are being conducted to examine the clinical efficacy of oral probiotics in improving mucosal immunity and preventing mucosal infections such as respiratory infections. These studies are being undertaken on elite sports men and women. Additional studies are being conducted to determine what mucosal immune mechanisms are modified by nutritional supplements.

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Reprograming microbes by genetic modification

Up date molecular biological skills are used to modify microbes to develop more robust tumour-killing virus or bacteria in state of the art laboratory. Modification of bacteria to express anti-tumour secondary metabolites or immunotoxins specifically targeting various cancers.

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Risk factors affecting dental implant survival and success

Although survival rates for dental implants placed in ideal sites and healthy patients are above 90% there are local and systemic factors that lead to increased implant failure. This research program aims to study such risk factors, especially those that predispose to the initiation and progression of peri-implantitis, an inflammatory disease that leads to bone loss around implants. A particular focus of this program is understanding the role of periodontitis as a risk factor for subsequent development of peri-implantitis.

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Role of alpha-synuclein in the pathology of alcoholic brain damage

Alcoholism is a complex, multi-factorial disorder with a significant burden of disease in Australia and throughout the world. The α-synuclein gene (SNCA) is highly polymorphic with a number of well-characterized genetic variations known to have a functional effect on expression levels of the gene. Hence, we investigate whether the SNCA genotypic profile of an individual determines the basal expression level of α-synuclein and predisposes them to the neurotoxic effects of alcohol. We also investigate the expression of microRNAs that are predicted to
target α-synuclein as a possible mechanism for the selective regulation of specific splice variant transcripts. We have the following projects which are all focused on taking a comprehensive approach to understanding the role of α-synuclein in the pathophysiology of chronic alcohol abuse.

1. Expression of known splice variants of α-synuclein in regions of the brain that are susceptible to the neurotoxic effects of alcohol.
2. Analysis of individual variation in the SNCA gene sequence of SNCA and how it influences if α-synuclein expression.
3. Expression of SNCA-targeting miRNAs in pathologically susceptible cortical regions of alcoholics and controls.
4. Development of cell culture models to understand how SNCA genotype influences the effects of alcohol on the brain.

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Studies on the Norfolk Island Population Isolate

The GRC investigates the genetic basis of cardiovascular disease (CVD) risk factors as well as migraine. The Norfolk Island community is a unique population isolate derived primarily from 18th century English Bounty mutineers and Polynesian women who relocated from Pitcairn in the 1850s. Expression profiling and genome wide association scanning are used to enable CVD risk trait and migraine susceptibility gene mapping. Migraine susceptibility and the risk traits that are related to CVD, such as high density and low density lipoprotein cholesterol, triglycerides, systolic BP and BMI, can be partly explained by heritable variation in gene expression. The uniquely closed population of Norfolk Island provides a pedigree that is ideal for mapping the loci that underpin these variations in gene expression.

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Tissue engineering of bone and periodontium

The ultimate goal of periodontal therapy is the regeneration of the tissues lost to the disease process. However, currently available regenerative techniques are clinically unpredictable. This is largely a result of a lack of understanding of the biological processes involved in the regenerative process. The aims of this research program are to identify cellular and molecular mechanisms involved in the regeneration of periodontal tissues with a view to using this information to develop tissue engineering strategies for clinical application.

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Neural Stem Cell Fate mediation by the Niche

Primary neural stem cells can be propagated in vitro and used as a model to examine the regulatory pathways involved in neural differentiation and dysregulation. With the appropriate mixture of exogenous factors, these cells can be differentiated into the three main cell types of the brain, astrocytes, oligodendrocytes and neurons. These cells can then expanded in vitro and used as a model to examine interactions and regulators, and to determine efficacy of potential therapeutics to reduce damage to brain cells. The ability to maintain sustained levels of neural precursor-mediated transgene expression following transplantation may prove beneficial as an alternative therapeutic strategy in the cell-based management of brain damage.

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Musculoskeletal

Biology of Stress Fracture Healing

Disorders of remodelling are central to many diseases of bone, but factors that initiate and co-ordinate remodelling in vivo are not well understood. Stress fractures (SFx) are debilitating injuries affecting athletes at all levels of sport. We have optimised a rat model of stress fracture that provides an innovative approach to examine focal remodelling with a known time course and precise anatomical location. Using gene expression data we will select key molecules to determine tissue and cell localisation using immuno-histochemistry (IHC) and in-situ hybridisation (ISH). We will determine cellular signalling adjacent to, and distant from, the remodelling of a SFx. This will advance knowledge of the regulation of SFx, and provide insights into mechanisms important for stimulating healing in this model. We will also study techniques to activate directed remodelling to heal potential sites of non-union.

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Causes and treatment of knee and hip osteoarthritis

Joint osteoarthritis (OA) is one of the most common musculoskeletal conditions affecting many people worldwide. We are investigating how daily activities (gait and exercise) affect the development and progression of knee and hip OA, and how to treat those people who are at “high risk” of OA developing or progressing quickly. We study the therapeutic effects of resistance training, using the programs that target the neuromuscular characteristics of “high risk” people. How training affects changes in 1) joint architecture (using MRI and specialised X-rays methods), and 2) pain and dysfunction experienced is also studied.

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Cellular regulation of bone remodelling in vivo

Bone remodelling is a normal skeletal function to renew bone tissue, but is also directed to heal stress fractures and can become imbalanced leading to bone loss in osteoporosis or skeletal cancer. How do the bone cells know which skeletal sites to target? We will use an innovative model of stress fracture in vivo to investigate chemokine expression during activated remodelling of early SFx healing and to test the hypothesis using transgenic mouse models with bone cell-specific knockout of the target chemokines. We will also use a highly innovative gene therapy approach to deliver a dominant negative mutant to MCP1 (7ND) to inhibit its action in bone in vivo. This knowledge will be important to develop approaches to facilitate healing in cases of non-union or slow SFx repair and many conditions that increase fracture risk such as osteoporosis, inflammatory bone loss and loosening of orthopaedic implants.

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Development and Evaluation of a Haptic Simulator for Motion Palpation of the Cervical Spine

Physiotherapists often base treatment decisions on perceptions of cervical mobility that are gained during manual palpation of movement. The skills necessary for motion palpation of the spine are some of the most difficult for physiotherapy students to develop. One reason for this difficulty is a lack of standard references. We are only beginning to understand the relationships that exist between patient symptoms, changes in segmental mobility and the changes that are perceived or perceivable during manual palpation.

Using this information and expanding further on the physical characteristics of the tissues being palpated, the intention of this project is to develop and assess a haptic (force feedback) device to simulate motion palpation of the spine. Such a device would be a useful teaching and research tool. The device would be programmed to reproduce responses found in manual therapy palpation for use as a teaching tool to assist students in refining their perceptual skills. Standardized references representing specific conditions could be produced to ensure that students have the opportunity to feel representative samples of conditions and to assist their ability to perceive relevant differences in palpation findings. The effectiveness of the device as a teaching tool would then be assessed.

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Neuromuscular skeletal modelling of the lower limb

All of our studies use neuromuscular skeletal modelling methods that ascertain tissue loading (bone, muscle, tendon, cartilage and ligament) in the lower limb. We study how the loading of these tissues affects the stress and strain within the tissues. These models need to be more subject specific using an individual’s musculoskeletal geometry, muscle activation and movement patterns to drive the solutions. This work continues to integrate traditional and new imaging methods (pqCT, MRI, ultrasound, motion analysis) to develop and validate the models. We are creating computer models to develop subject specific exercise and treatment programs that treat the musculoskeletal conditions.

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Preventing knee ligament and muscle injuries in sport

Lower limb injuries are common in sport and lead to a high risk of having joint disease later in life. Ways to prevent these from occurring are a national priority and we are examining the causes of and ways to prevent knee ligament and muscle injuries in sport. We have identified the most likely knee loading patterns and muscle activation patterns that would cause the knee ligaments to be highly loaded. We are now investigating ways to train people to lower knee ligament and muscle loading and improve muscle activation patterns. These are being trialled using computer simulation, and laboratory and in-the-field studies.

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Sterilisation Conditions for Allograft Bone for Joint Replacement Surgery

Despite advances in biomaterials, allograft bone remains a necessary graft material in orthopaedics. To eliminate bacterial infection, gamma irradiation at 25 KGy is used for terminal sterilisation. We have been working to reduce the dose of radiation because it weakens the bone tissue and destroys many bio-active factors. One approach is to protect the bone using free radical scavengers. So, cortical bone will be irradiated at 0, 10, 25 and 50 kGy in the presence or absence of vitamin E (alpha tocopherol) or tocopherol acetate. Specimens will be subjected to microbiological assays to determine the sterility assurance level (SAL); mechanical tests; assessment of collagen structure and its cross-links; and cell culture for bone cell activity. Finally, tocopherol treated bone will be implanted in Cr:NIH-mu nude rats to test efficacy of incorporation. We will also determine if growth factors such as the bone morphogenetic proteins (BMPs) are maintained.

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The influence of pain on joint loading in persons with mid to late stage osteoarthritis of the lower extremity

There is strong evidence that the loading patterns experienced by an osteoarthritic joint during activities of daily living influence the rate of disease progression. Many individuals with symptomatic osteoarthritis use pharmacological agents to reduce pain and maintain function, however recent evidence suggests that the use of such pharmacological agents may increase loading of degenerative regions of the joint, thereby increasing the rate of disease progression. Previous research has focussed on the relationship between the acute use of pharmacological agents and joint loading, however many osteoarthritic individuals use pain relieving pharmacological agents over long periods of time. As such, we are currently planning investigations into the chronic effect of pharmacological pain relief agents on joint loading and structural progression of knee and hip joint osteoarthritis.

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Tissue engineering to treat Achilles tendinopathy

Tendinopathy is common disability that is very difficult to treat and occurs when the tendon remodelling goes wrong. We are investigating exercise or tissue engineering to treat the condition. We are developing a multiscale computational biology model of tendon to understand the biomechanics and biochemistry of tendon remodelling. We are developing multiscale experimental and computational biology computer models of a NZ white rabbit model of Achilles tendinopathy. This model is used to understand and develop tendon tissue engineering to treat the condition.

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What aspects of a clinician or their clinical practice influence patient outcomes?

For patients with neck and back pain, a great deal of research has been performed attempting to determine whether particular treatments are effective or what aspects of a patient’s presentation predict their outcomes. Recently studies also been performed to evaluate what patients think is important and how much difference is necessary for them to consider an intervention to be worthwhile. To date however little work has been done to investigate the aspects of the clinician or the clinician’s care that predict outcomes. In many settings it can be difficult to quantify and compare patient outcomes. In an insurance setting such as worker’s compensation, however there are clear, quantifiable outcome measures such as time to return to work or cost of the injury. The first question for this research is whether there are differences across clinicians within a particular discipline (e.g. general practitioners, physiotherapists, or chiropractors) in the outcomes that are achieved for patients with neck or back pain. If so, what factors specific to the clinicians or their care result in better outcomes. This research will consider qualitative as well as quantitative aspects of the clinician-patient interaction. It is hoped that a clearer understanding of the factors that contribute to effective practice will result in improved patient outcomes and enable more effective education of future clinicians.

Griffith Health School  
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Population Health

Cancer - Multivariate analysis of microarray data

The advent of high-throughput technologies has revolutionized molecular biology, and indeed is setting the stage for the rapid evolution of the way disease is diagnosed, classified, and treated. However, the complexity of tumours makes it likely that a diagnostic test will be based on marker profiles rather than individual markers. Our aim is to develop new methodologies which are able to process thousands of microarray profiles and identify those markers that are biologically heterogeneous and therefore potential markers for cancer type, treatment therapies, or clinical outcomes.

Engaging consumers in decision-making for healthcare policy

Engaging consumers in health care policy making is a hot topic. We have an ARC grant with two PhD scholarships available. The project involves design, use and analysis of discrete choice experiments, and deliberative approaches with Citizen Juries. This study will be suitable for a candidate with a background in economics, marketing, psychology and with competent skills in statistics (or a related field).

Epidemiology of a birth cohort (EFHL)

The Environments for Healthy Living is a large birth cohort with annual waves of recruitment; currently there are 2900 participants enrolled. Recruitment will end in 2012 when we reach 4000 participants. The first cohort turn 5 years old at the end of this year (2011). There is a plethora of data available for linkage and analysis. Data are available for analysis; in addition, there is potential to easily collect additional data for a topic of interest to a candidate. This would be most suitable for someone with skills in statistics, epidemiology, public health or a related field.
Evaluating the use of health services, costs and quality of life in a birth cohort (EFHL)

The Environments for Healthy Living is a large birth cohort with annual waves of recruitment; currently there are 2900 participants enrolled. Recruitment will end in 2012 when we reach 4000 participants. The first cohort turn 5 years old at the end of this year (2011). There is a plethora of data available for linkage and analysis. This specific project is focussed on the linkage and analysis of health services data (hospital inpatient, emergency department, GP data) and relating these factors to socio-economic and environmental data collected from the cohort. This would be suitable for someone with skills in statistics or econometrics, and an interest in economics, health services research, public health or a related field.

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Evaluation of Participative Community Singing on the Mental Health of Aboriginal and Torres Strait Islander People-Voices United for Harmony Project

The purpose of this study is to examine the effects of a participative community singing intervention on the resilience and mental health of Aboriginal and Torres Strait Islander people.

The general aims of this project are:

1. To assess the impact for indigenous people of active engagement in community music activities on measures of wellbeing, health, social inclusion and the use of health and social care services
2. To undertake a cost-benefit analysis of the intervention focusing on the potential savings which could accrue to social and social care services from the assessed benefits
3. To explore the feasibility of mainstreaming such a model of community music-making in partnership with Aboriginal and Islander Community Controlled Health Services

The research team at Griffith University and the Queensland Aboriginal and Islander Health Council aims to conduct a health promotion project for Aboriginal and/or Torres Strait Islander people, and it is currently working on a programme of research to explore the benefits of singing for health. A central focus of this work is the evaluation of an innovative initiative – the Voices United for Harmony Project - which provides opportunities for Aboriginal and/or Torres Strait Islander people to come together on a regular basis to make music and sing, with the support of professional musicians and volunteers drawn from established choral societies, singing groups and Aboriginal and Islander Community Controlled Health Services.

The project is currently working with three communities in Cape York, Cairns and Townsville in North Queensland. Three new singing Club projects will be established in three community controlled health services in North Queensland. The practical interventions will be funded separately from the proposed evaluation. The approach adopted will build upon a recent assessment of the impact of creative activity on Aboriginal and/or Torres Strait Islander people in five South East Queensland communities, by including alternative intervention and non-intervention comparison groups using cross-over study design. Non-intervention comparison groups will be intervention groups when intervention groups have finished six months rehearsal. Pre and post and follow-up intervention assessments will involve gathering psychosocial, mental health, and chronic disease information.
The economic evaluation of nursing interventions for hospitalised patients

Prof Scuffham is a chief investigator with the National Centre for Research Excellence in Nursing (NCREN) funded by the NHMRC. We are developing several clinical trials on a large array of nursing interventions. Modelling the expected value of information to identify the key information to collect in the trials is a highly important aspect. Subsequently within-trial cost-effectiveness analysis with modelling to extrapolate the costs and outcomes will have an important influence on nursing practice. Some funding is available for the right candidate.

Implementing a Health Promotion Project – Smoking Less Campaign: A Comprehensive Setting-Based Intervention on Smoking in University Settings

The Smoke-Less Campaign pilot project was funded by Griffith University’s Vice Chancellor Professor Ian O’Connor and its implementation was supported by the Deputy Vice Chancellor and Provost, Professor Marilyn McMeniman and her office.

The project took place on the Mt Gravatt campus of Griffith University during Semester 2, 2009. The next stage of the project will be to implement it across the whole of the University.

Over the last three decades there have been major public health achievements in declines in the prevalence of smoking. However, smoking is still widely prevalent, and remains the first- and third-largest attributable factors to the burden of disease and disability in Australia. Smoking clusters within people and within neighbourhoods; socioeconomically-disadvantaged groups and residents of deprived areas are more likely to smoke and consume alcohol to harmful levels. Some evidence suggests that the prevalence of smoking has plateaued in recent years, and currently there is little evidence for effective strategies that will achieve further gains in tobacco-control, and reductions in socioeconomic inequalities in these behaviours.

A university campus represents an intervention point for policy and health promotion to achieve further gains in tobacco-control through addressing the structural (i.e. access to tobacco/alcohol outlets and affordability of tobacco/alcohol products) and psychosocial features (i.e. stressors, social cohesion) of universities. This project pushes the boundaries of conventional approaches to tobacco-control to date and has the potential to change the behaviours of the most easy-to-reach groups. It is only through identifying and understanding the barriers experienced by these groups, and how barriers operate at multiple levels, can further reductions in smoking be achieved.
Improving oral health of rural, remote & Indigenous Australians

The poor oral health of rural, remote & Indigenous Australians is well documented, however how best to improve the oral health of these communities remains unresolved. This topic will investigate various strategies to improve the oral health of rural, remote & Indigenous communities.

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International preferences for health system characteristics

Health systems can be judged by a number of characteristics, such as the level of health achieved for its population, the responsiveness of the system to the needs of the population, and the fairness of the system within society. This study will employ discrete choice methods to identify the characteristics of a health system that Australian citizens value most, and compare these to the preferences of citizens from other countries.

This project would suit a Research Masters (for part of the project) or Doctorate candidate With a background in health economics, statistics, health policy or health disciplines.

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Matrix factorization for the statistical analysis of high-dimensional data

Extracting interesting knowledge and information from experimental raw data sets and observations is pervasive throughout science and medical science, especially for key applications that involve data of very high dimension with redundant or irrelevant features. We aim to develop fast matrix factorization methods to dimension reduction and enable the extraction of information from high-dimensional data sets. The approach uses matrix factorization to provide an approximation to the data matrix, whereby the essential features are captured by a smaller set of so-called metavariables. Statistical analyses can then be performed in terms of the metavariables to understand and draw inferences from complex data sets. Key applications include the discovery of new subclasses of cancer and their diagnosis and prognosis.

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Multilevel analysis of birth cohort data

A large-scale 25-year birth cohort study was launched in 2006 to investigate how social and environmental factors impact on children health and development in the South East Queensland of Australia. Multilevel regression models can be used to quantify the relationships between determinants (individual- and multiple-level risk factors) and outcomes of interest. This approach overcomes common methodological barriers associated with conventional regression analysis, where correlation among individuals sharing the same local environment is not accounted for.

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Optimising pharmacist delivered services to support chronic disease management in the community

Pharmacists have extensive knowledge of medication use, monitoring and adherence. They are also one of the most easily accessible health professionals in a community setting. As a consequence they have a potential role to assist and improve the management of chronic diseases through a number of strategies such as medication review, blood glucose monitoring, and educational support. Tailoring these strategies to meet the needs of the community is likely to be crucial to support uptake and outcomes. Yet little is known about the community’s preferences for the delivery of these services, or the value they deliver in terms of economic as well as clinical outcomes.

The aims of this project are to:
(i) Identify what is currently known of community preferences for pharmacist delivered strategies to support chronic disease management in Australia, and the value they provide.
(ii) Use health economic modelling approaches to estimate the costs and benefits associated with these strategies in Australia; and/or
(iii) Measure community preferences for the delivery of one or more of these strategies using methods such as the discrete choice experiment.

This project would suit a PhD candidate with a background in health economics, pharmacy, health policy or related disciplines.

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Realising the potential of the discrete choice experiment to inform priority-setting in health care

Health care treatments and services are in high demand. Difficult decisions have to be made about which service or treatment should be subsidised by the government, and for whom. This is called health care priority-setting. It is important that public opinion is considered when priority-setting decisions are made.

This project will explore methods that can be used to find out what the public think should be important when priority setting decisions are made in health care. Specifically, the project will explore the role of a survey method called the Discrete Choice Experiment, as a method to
measure the strength of public opinion surrounding priority setting. This method is increasingly being used in health economics to quantify the strength of consumer preferences surrounding different health care interventions.

The project will tell us whether the Discrete Choice Experiment is an appropriate method to use to seek public input to priority-setting decisions. It is anticipated that the research will be undertaken in specific health care decision-making contexts, which are flexible. For example, priority-setting for high cost medications, transplants, elective surgery, or the use of genetic testing might be explored. Ultimately, the research described in this proposal will support the development of a framework for public involvement in priority-setting processes.

This project would suit a Research Masters (part of the project) or Doctorate candidate with a background in health economics, statistics, health policy or health discipline.

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Resilience and mental health promotion in schools

Resilience has been described as the interaction between risk and protective factors, specifically, a process that results from individual reaction to risk factors, or vulnerabilities, that are present in the environment. Studies on resilience in terms of adaptation despite risk often cite protective factors to explain why only some children living in adverse conditions manifest problem behaviours and symptoms of psychopathology. Protective factors have been referred to as those factors in the individual or the environment that enhance an individual’s ability to resist problems and deal with life’s stresses. Thus protective factors exert their effect only when a risk is present. Protective factors have been considered to either compensate the risk, or buffer the effect of risk on child development. In recent years, there has been a change in the direction of research focus away from the negative outcomes and damage caused by risk factors. The direction of research is now tending towards an emphasis on the socio-ecological context in which people experience risk factors, and identification of the resources they use for coping. These concepts have been captured in relation to resilience in Antonovsky’s salutogenic model and Bronfenbrenner’s ecological model.


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Secondary Prevention of Cardiovascular Disease Patients

Rationale: The proposed study aims to use arts or exercise, novel therapeutic adjuncts to optimize outcomes of secondary prevention. Both arts and exercise are enjoyable and are well-known to improve functional status, physical and mental health.

The aims of this study are:
(1) To compare the magnitude of difference in perceptions of illness, exercise tolerance, quality of life, readmission to hospital between those participating in the intervention groups and usual care program.
(2) To determine the feasibility of generalising a therapeutic arts and exercise, and arts and
exercise combined program by exploring factors that affect uptake, adherence and sustainability.

(3) To conduct a cost-effectiveness analysis alongside the randomised controlled trial to assess if the intervention is an acceptable and affordable health care investment.

Research Methodology: A pre-test, post-test design with interventions and usual care secondary prevention groups will be used. Four hundred participants across two countries (200 is each site) will be recruited from secondary prevention programs at Gold Coast Hospital. Participants will undergo a baseline on-site testing session to measure clinical measures, exercise capacity, perceptions of illness and health-related quality of life, EQ5D. Following six month of interventions all participants will attend a repeat on-site testing session, then follow up assessment after three months. To explore the feasibility of the program, we will monitor attendance at each intervention classes as well as incidence of reported adverse events throughout the duration of the study.

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Singing, health and quality of life

A number of qualitative studies have shown that singers report a wide range of social, psychological, spiritual and health benefits associated with singing. A recent study indicates that many singers in choirs feel that singing brings them both social and emotional benefits as well as physical and spiritual benefits. The most common benefits identified include ‘improved lung function’, ‘improved mood’ and ‘combats stresses’. Singing as an activity has been shown to carry benefits for health and well-being across the whole of the lifespan and with people of diverse social backgrounds and health status. Clift, S. M., and Hancox, G. (2001). The perceived benefits of singing: Findings from preliminary surveys of a university college choral society. Journal of the Royal Society for the Promotion of Health, 121, 248–256.

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Sun and Health – The Duality Problem of Vitamin D Production and Skin Cancer Development

The new Centre for Research Excellence in Sun and Health based at QUT is seeking expressions of interest from potential PhD candidates wishing to study the association between ultraviolet radiation (UVR) and chronic disease. Supervision is available from collaborators including Queensland University of Technology, Queensland Institute of Medical Research, Griffith University, Australian National University, University of Melbourne, Cancer Council Queensland, and Cancer Council Victoria.

The research will seek to define the mechanisms of Vitamin D production and explore the role and interactions of skin cancer risk.

Applications are strongly encouraged from candidates with a background in a health related field (eg. medicine, public health, epidemiology, health economics) or science (biochemistry,
statistics, biostatistics).

Up to three scholarships are available for commencement in 2011, with the remainder available from 2012 - and are open to domestic and international applicants.

All PhD projects will be considered and include:

1. Sun protection practices of Australians
2. Attitudes of Australians to sun exposure for good health
3. In vivo synthesis of Vitamin D in humans
4. Cellular responses to ultraviolet radiation exposure in vivo in humans
5. Sun exposure and chronic disease
6. Sun exposure and type II diabetes
7. Assessments of personal ultraviolet radiation exposures for health outcomes
8. Technological tools for the dissemination of a sun exposure message
9. Examining the effectiveness of Vitamin D supplementation in Australians
10. The changing UVR disease burden due to climate change

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The health promoting school as an approach to promoting health and well-being and preventing disease

The emergence of the Health Promoting Schools (HPS) (WHO, 1995) framework during the past decade has provided one approach based on providing schools with a set of values and praxis necessary for promoting health and civil society. HPS is an holistic and systemic approach to school governance that has gained world-wide attention during the past decade, principally for its provision of a framework to help schools promote a safe, supportive and caring environment that fosters the social, physical and mental health development of students. As a socio-ecological response to concerns with global health and wellbeing, particularly related to children and youth, this approach offers considerable potential at a number of levels, including infectious and lifestyle diseases as well as the promotion of children’s capacity to cope with adversity. WHO (1995). Global School Health Initiative. [www.who.int/school_youth_health/gshi/en](http://www.who.int/school_youth_health/gshi/en)

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Research Centre for Clinical and Community Practice Innovations

Are we preparing nursing students to be culturally aware of gender and sexuality diversity on Entry to Practice
This study will explore knowledge, attitude and beliefs about gender and sexuality including awareness of HIV and other sexual health related issues in a cohort of student nurses. The students would be required to conduct a literature review, develop a survey and organise the recruitment and administration of a survey on campus amongst a group of student nurses followed by analysis and reporting of the data.

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### Assessing the utility of online devices for prevention and management of chronic disease

Researchers at Griffith University are developing online methods for delivering health education; and tracking health outcomes related to physical activity, exercise, diet and psychological factors.

Opportunities exist for research students to use and contribute to the development of the online applications for promoting healthy outcomes, and assessing the effectiveness and utility of the electronic methodologies. Clinical collaborations are in place.

Topics would suit physiotherapy and exercise science research students. Engineering graduates are welcome to discuss possible opportunities.

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### Barriers to CALD Communities keeping medical appointments

This would entail working collaboratively with the Ethnic Communities Council to investigate why particular CALD populations are less consistent with keeping medical appointments. This study would include a literature survey and consultation (through key informant interviews) with health service providers and significant community representatives. No client contact will be made due to issues of securing ethics approval. This study will involve some consultation of the Ethnic Communities Council of QLD.

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### Biofilms on intravascular devices
Intravascular devices (IVDs) are the most frequently used medical devices in hospitals. However, they are associated with life-threatening IVD-related bloodstream infection (IVD-BSI), which is one of the main hospital-acquired infections, and continue to be associated with morbidity, mortality and additional medical cost. Most published studies focus on measuring the rate of IVD-BSIs and addressing their importance, but only a few studies have mentioned the possible routes for microbes entering the bloodstream, which would help in developing effective prevention methods, and large trial studies are lacking. Some studies on IVD-BSIs have reported the most frequently isolated microbes, but caution needs to be made since many fastidious microbes are not isolated under current laboratory conditions. Although it is known that microbes colonise IVC surfaces and develop biofilms, leading to IVD-BSI, the relationships of microbial biofilms with patients' symptoms or outcomes remain unclear. Here we discuss the knowledge gained from microbial research in other (non-IVD) medical and non-medical applications that may be helpful in understanding the IVD context. In addition, published theory and data regarding microbial colonisation and biofilm development specifically in IVDs are reviewed. More research is needed to explore mechanisms of IVD-BSI and to provide superior prevention strategies.

Microbial attachment on the IVC surface is likely to be followed by biofilm development and maturation and then dispersion of microbial cells from the biofilm into the bloodstream. The most frequently isolated bacteria from IVCs are coagulase-negative staphylococci and Staphylococcus aureus. These bacteria can originate from the cutaneous flora of the patient or from the hands of medical personnel and then reach the patient's tissues and organs via the blood, causing serious infections and high mortality rates. Thus, the infectious route for these organisms is likely through the skin to the bloodstream, i.e. bacteria enter the bloodstream through IVC wounds in the skin and cause subsequent infection in other organs. Initially, IVCs are often primarily colonised by a single species, but multiple species enter subsequent to the development of biofilms. However, all the microbes reported are isolated by culture-dependent methods, which bias microbes that favour the growth media and grow quickly under standard laboratory conditions. In addition, some microbial species may compete with others for nutrients or they may even inhibit other microbes from growing, and the sensitivity of the semiquantitative method may also be reduced when the patient is receiving antibiotic treatment.

Molecular detection of bacterial community on IVDs. We hypothesise that a molecular examination of bacterial community on IVDs, including analysis of the interior surfaces will help our understanding of the variety of organisms that are present in this niche environment, which in turn may lead to new diagnostics and/or treatment regimes. Recent developments in biotechnology for culture-independent methods, such as 454 GS FLX Titanium sequencing, would avoid shortfalls of culture-dependent techniques and provide a more complete picture of the bacterial community on these devices.

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**Creating and supporting a "Research Ready" Health Workforce**

Demands for evidence based practice co-exist with workforce shortages of health professionals who can generate this evidence. Projects can focus on nursing, medical or other disciplines or take a multidisciplinary approach. Projects can investigate the current clinical research workforce, including the role of Research Coordinators or Clinical Trial Nurses. Other topics focus on the evaluation of models which promote "Research Readiness" amongst clinicians.

**Griffith Health School** Nursing and Midwifery
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**Effects of exercise and physical activity as an adjunct to supportive cancer care**

Researchers at Griffith University are investigating the effects of exercise and physical activity in cancer survivors - both for prevention and management. A number of research opportunities and models exist including the use of resistance, aerobic or mixed methods exercise in different types of cancer. Clinical collaborations are in place. The research would suit physiotherapy or exercise science research students.

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**Mentoring Relationships at Work**

Mentoring relationships in the workplace are increasingly a topic of empirical investigation and practical application. Much of the research to date has focussed on a static picture of mentoring and has fallen short of capturing the dynamic nature of the mentoring relationship as it changes over time. Research, and its subsequent application, would benefit from investigation of the mentoring functions, benefits and costs that occur over the stages of a mentoring relationship, the long-term personal and career outcomes that emanate from a relationship, and the changing interactions between particular functions and benefits over the course of a relationship.

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Microbial pathogenesis of intravascular device infection

Biofilms play a detrimental role in infectious diseases such as valve endocarditis, osteomyelitis, middle ear infections, dental caries, medical-device related infections and chronic lung infections in cystic fibrosis patients.[1] These biofilms are composed of multi-species bacterial consortia (e.g., dental caries) or are single species (e.g., endocarditis). In either case, the pathogens within disease-related biofilms are extremely difficult to eradicate and may take up to 1,000 times higher concentrations of antibiotics than for the same pathogen not growing in a biofilm ecosystem (planktonically).[2] IVDs are small plastic tubes commonly inserted into the veins and arteries of hospital patients to deliver medication, fluids and nutrition directly to the bloodstream, and also for blood tests and blood pressure measurement.[3] Unfortunately, IVDs carry significant risk of bloodstream infection (BSI), if bacteria colonize the device or are injected into the blood. BSIs increase the expense and length of hospital stay and the mortality of hospital patients.[4] Therefore, successful diagnosis, management and control biofilms on IVDs are three main duties for current medical researchers in this area.

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Prevention of infection in intravascular devices (IVDs)

A variety of projects are available which aim to understand infection risks, describe clinical practice, and test the effectiveness of strategies to prevent, diagnose and treat infection. Research generates evidence to support clinical practice in relation to the care of IVDs and their associated infusion systems and dressings. Central, arterial, peripheral, venous, haemodialysis and other IVDs can be studied in a range of acute and critical care settings.

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Prevention of unnecessary blood loss through diagnostic testing from intravascular devices (IVDs)

Research involves clinical investigation of techniques to ensure accurate blood tests without excessive blood loss. Projects are available in the oncology, paediatric, anaesthesia, emergency, acute and critical care areas.

GHI Research Program Clinical and Community Practice Innovation
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Sexual risk behaviour of merchant seamen

Investigation of sexual risk behaviour and epidemiological significance of merchant seamen - Biala Community Health Centre. This would entail a literature review, consultation with representatives of the seafarers’ centre in Brisbane and Gladstone, the development of a research protocol and design of a survey. The students would not be undertaking the study itself, but developing the proposal.

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Sexual risk behaviours and International students

This study would entail a brief literature review of current knowledge re the sexual behaviours and risks of international students, and then the use of a prepared survey amongst a recruited sample of international students. The students would be required to organise the recruitment and administration of a survey on campus amongst a group of international students, followed by analysis and reporting of the data. This study will involve some consultation of the Ethnic Communities Council of QLD.

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School Based

Clinical Reasoning

Good decision-making skills are integral to being an effective medical or allied health practitioner. Within decision-making, the practitioner needs to be able to identify, prioritize, clarify and resolve, i.e., reason out, each of the patient’s clinical problems in order to deliver quality health care. Clinical reasoning and decision-making skills occur developmentally. They can also be taught and fine-tuned through learning and practice. The projects on clinical reasoning and decision-making concentrate on the developmental sequence and how it can be integrated and adapted into the education, training and practice of different categories of medical and allied health practitioners. These projects are often of interest to practitioners wanting to further their career through research into their discipline.

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Interprofessional learning appraisal in the dental school

The conceptual difference between a Interprofessional learning / education and an education based upon a conventional dental curriculum is, perhaps, the starting point for the development of new curricula. An Interprofessional learning leads to a competency-based curriculum which identifies what is essential for dental practice, and then provides a sequence of defined learning experiences so that the student may graduate as a qualified beginner. The differences between a discipline-based and a competency-based education must be taken into account when planning and developing curricula that are intended to provide the dental practice needs of the future. An integrated approach whereby competency is achieved by defining the essential knowledge that is required, and by assessing the required skills and attitudes of students, is a way forward in the development of traditional courses.

The research will be based on different evaluation and input from the students and peers.

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Medical Education

Contemporary health issues need to be designed into medical curricula, with the content being assessed during the course and evaluated following graduation. Some contemporary issues, like mental health and cardiovascular health, have been identified by the WHO. A number of other content areas, e.g., nutrition and obesity, complementary medicine, have also been identified locally and recently included in medical courses in Australia, the US and the UK. The effectiveness of the teaching and learning with respect to the content areas reflecting these and other international and local contemporary health issues warrants rigorous investigation. The projects use a variety of qualitative and qualitative methodologies and would suit medical and other graduates, e.g., education, health science, law, interested in medical education and clinical practice.

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Provision of Health Services

Access to health care is a universal problem. Access can be affected by local and global issues, and the patient groups and medical and health issues can be complex. Projects are designed in conjunction with the student researcher and invariably rely on the cultural awareness and local knowledge of the student researcher for a richer project. Collaborative supervision through a local hospital, university or other institution is encouraged. Recent projects have examined obstetric and infant health services in rural India; sex education and fertility counselling in Indonesia; HIV-AIDS and partner tracing in Taiwan; and paediatric surgery in rural Australia. Findings have been of interest to governments, private agencies and individual service providers. Such projects tend to suit international student researchers.
and international medical graduates wanting to tackle medical or health issues in specific geographic regions.

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**CLINICAL REASONING**
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**PROVISION OF HEALTH SERVICES**
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**MEDICAL EDUCATION**
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**OTHER TOPICS BY NEGOTIATION**
Projects are available at the PhD level or can be undertaken as smaller projects for students wanting to complete a Masters degree or Fellowship project. If you are interested in any of the above areas please contact me for discussion and further information.

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The use of forensic science in police investigations and for intelligence gathering

Associate Professor Kebbell is a Chief Investigator at the ARC Centre of Excellence in Policing and Security. The Centre is cross-disciplinary and exists to enhance policing and security in Australia. Forensic Science plays an increasingly important role in Policing in Security and the Centre is looking at developing research in this area with our partners that include various police services and forensic science organisations. For example, we are interested in researching typologies of approaches to collecting forensic evidence (e.g., search and analysis strategies) and the intersection between forensic science and investigators (e.g., detectives' and scientists' perceptions and use of forensic evidence). If you are interested in these topics please contact Associate Professor Kebbell.

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Other

NHMRC Centre of Research Excellence in Nursing Interventions for Hospitalised Patients (NCREN)

NCREN will provide evidence for clinicians and policy makers to improve nursing services for a broad range of hospitalised patients who are at risk of complications of (i) Skin Integrity and (ii) Symptom Management. Research examining effective methods of knowledge transfer will also be undertaken.

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<td>• Intravascular devices</td>
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<td>Symptom Management</td>
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<td>Professor Leanne Aitken</td>
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