

Cardiovascular Research in South Australia 2007

With the Annual Scientific Meeting of the High Blood Pressure Council of Australia coming back to Adelaide this December for the first time since the early 1990s, it is timely to give members an overview of the significant range of cardiovascular research which is currently active in South Australia. The major sites engaged in such research are the Flinders University School of Medicine and Flinders Medical Centre, the Royal Adelaide and Queen Elizabeth Hospitals linked with the University of Adelaide Medical School, the University of Adelaide Department of Public Health and the University of South Australia Faculty of Health Sciences.

ANBP2

A key research activity linked to the Council, which has been led from South Australia since its inception in the early 1990s is the Second Australian National Blood Pressure Study (ANBP2). Professor Lindon Wing, who has recently retired from the Deanship of the Flinders University School of Medicine, continues as Chair of the ANBP2 Management Committee. The Data Management Centre for ANBP2 continues to be led by Professor Phil Ryan and Kristyn Willson in the Department of Public Health at the University of Adelaide. The study is still actively working on publications from the various associated sub-studies and together with Associate Professor Chris Reid in the Department of Epidemiology and Preventive Medicine at Monash University is engaged in a 10-year follow-up of participants.

FLINDERS UNIVERSITY SCHOOL OF MEDICINE / FLINDERS MEDICAL CENTRE

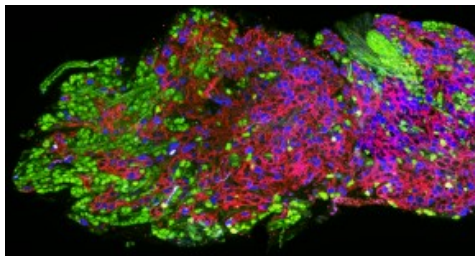
There are a number of groups in the joint Flinders University School of Medicine/Flinders Medical Centre complex with major cardiovascular interests. These include groups led by Professor Ian Gibbins and Associate Professor Judy Morris, Professor Bill Blessing, Dr Eugene Nalivaiko, Associate Professor Ida Llewellyn-Smith, Dr Arduino Mangoni and Professor Phillip Aylward.

Ian Gibbins and Judy Morris' group

Ian Gibbins is Professor and Head of Anatomy and Histology, Flinders University. Judy Morris is an Associate Professor in the same department.

For many years, they have been interested in the role of autonomic and visceral sensory neurons in the regulation of the vasculature. Most recently, they have been investigating the regulation of two vascular beds: the mesenteric circulation, controlled by the prevertebral sympathetic ganglia; and the pelvic vasculature, controlled by pelvic pathways. The prevertebral ganglia also regulate gastrointestinal motility and secretion, but together with their vasomotor pathways, they effectively act to control blood volume. They have made comprehensive studies of the synaptic organisation of these pathways, and these studies have formed the basis of their recent electrophysiological studies. They have found that low levels of peptides, such as angiotensin II or substance P, can dramatically potentiate synaptic transmission through the prevertebral ganglia, thereby facilitating the retention of fluid by the GIT. These effects are not obviously affected in conditions such as experimental Type I diabetes. Remarkably, in these pathways, as well as in the pelvic vasodilator pathways investigated by Judy Morris and Phil Jobling, ganglionic transmission is dramatically facilitated by a potent neurotransmitter, whose identity is totally unknown.

Their current research is focussing on the identification and synaptic organisation of small unmyelinated sensory neurons that lack neuropeptides. They have predicted that there is a unique population of these neurons that has been largely overlooked, and that may be responsible for much of the nociceptive transmission from the viscera, including from blood vessels.



*Low magnification confocal view of part of a guinea-pig coeliac ganglion. The green neurons (green = neuropeptide Y) on the left are mostly vasoconstrictor neurons innervating the mesenteric circulation. The blue neurons (blue = somatostatin) inhibit the activity of secretomotor neurons in the gut; their activity is enhanced by activation of peptide-containing visceral afferents, as well as direct projections from neurons in the gut (pink = vasoactive intestinal peptide in the endings of those neurons). (Adapted from Fig 1a in: Gibbins IL, Teo EH, Jobling P, Morris JL (2003) Synaptic density, convergence and dendritic complexity of prevertebral sympathetic neurons. *Journal of Comparative Neurology* 455: 285-298).*

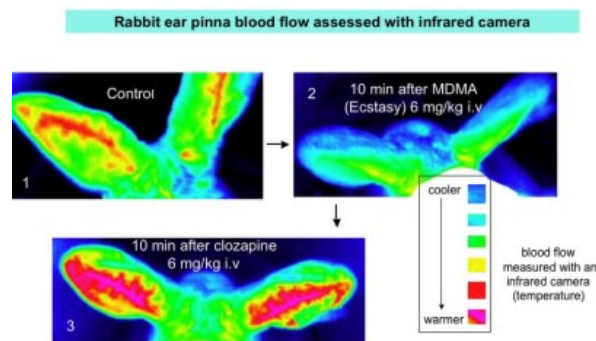
Recent publications

1. Morris JL, Koenig P, Shimizu T, Jobling P, Gibbins IL (2005) Most peptide-containing sensory neurons lack proteins for exocytotic release and vesicular transport of glutamate. *Journal of Comparative Neurology* 483: 1-16 (with cover illustration).
2. Morris JL, Gibbins IL, Jobling P (2005) Post-stimulus potentiation of transmission in pelvic ganglia enhances sympathetic dilatation of guinea-pig uterine artery. *Journal of Physiology* 566: 189-203 (with editorial commentary).
3. Gibbins IL, Teo EH, Jobling P, Morris JL (2003) Synaptic density, convergence and dendritic complexity of prevertebral sympathetic neurons. *Journal of Comparative Neurology* 455: 285-298 [with cover illustration and editorial commentary].
4. Gibbins IL, Jobling P, Teo EH, Matthew SE, Morris JL (2003) Heterogeneous expression of SNAP-25 and synaptic vesicle proteins by convergent synaptic inputs to sympathetic neurons. *Journal of Comparative Neurology* 459: 25-43 [with cover illustration].
5. Baker SJ, Morris JL, Gibbins IL (2003) Cloning of a C-terminally truncated NK-1 receptor. *Molecular Brain Res* 111:136-147.

Bill Blessing's group

Bill Blessing is a NH&MRC Senior Principal Research Fellow and Professor in the Department of Human Physiology. He is Head of the Neurology Laboratory in the Department.

Bill's lab is interested in measuring biological variables indicative of brain control of thermoregulation and energy balance, and to use their findings to elucidate higher brain functions relevant to mental disorders including schizophrenia. They use a variety of experimental approaches including electrophysiology, neurotransmitter receptor pharmacology, neuroanatomy with combined immunohistochemistry and tract tracing (viral and conventional), together with experience in creating neurotransmitter-specific lesions using retrograde transport of neurotoxic lectins coupled to neurotransmitter specific antibodies.



Clozapine reverses MDMA-elicited vasoconstriction in the rabbit ear (from data published in Blessing WW, Seaman B, Pedersen NP, Ootsuka Y. (2003). Clozapine reverses hyperthermia and sympathetically mediated cutaneous vasoconstriction induced by 3,4-methylenedioxymethamphetamine (Ecstasy) in rabbits and rats. J Neuroscience 23 (15):6385-6391).

Recent publications

1. Blessing WW and Ootsuka Y. (2007) Activation of dopamine D(2) receptors in the CNS inhibits sympathetic cutaneous vasomotor alerting responses (SCVARs), contributing to clozapine's SCVAR-inhibiting action. *Progress in Neuropsychopharmacology and Biological Psychiatry*. 31: 328-336. IF=2.8
2. Ootsuka Y and Blessing WW. (2006) Activation of 5-HT1A receptors in rostral medullary raphe inhibits cutaneous vasoconstriction elicited by cold exposure in rabbits. *Brain Research* 1073-1074: 252-61. IF=2.3
3. Blessing WW, Zilm A and Ootsuka Y. (2006) Clozapine reverses increased brown adipose tissue thermogenesis induced by 3,4-methylenedioxymethamphetamine and by cold exposure in conscious rats. *Neuroscience* 141: 2067-2073. IF=3.4
4. Ootsuka Y and McAllen RM. (2006) Comparison between two rat sympathetic pathways activated in cold defense. *American Journal of Physiology*, 291(3):R589-95
5. Toth IE, Toth DE, Boldogkoi Z, Hornyak A, Palkovits M and Blessing WW. (2006) Serotonin-synthesizing neurons in the rostral medullary raphe/parapyramidal region transneuronal labeled after injection of pseudorabies virus into the rat tail. *Neurochemical Research* 31: 277-286. IF=2.2 (1)
6. Ootsuka Y and Blessing WW. (2006) Thermogenesis in brown adipose tissue: increase by 5-HT2A receptor activation and decrease by 5-HT1A receptor activation in conscious rats. *Neuroscience Letters* 395: 170-174. IF=1.9 (2)

Eugene Nalivaiko's group



Dr Eugene Nalivaiko is a NHF Senior Research Fellow and Senior Lecturer in the Department of Human Physiology, Flinders University. His research, both basic and clinical, is located at the crossroads of neuroscience and cardiology: he is trying to elucidate mechanisms whereby mental disorders - anxiety and depression - provoke cardiac disorders. He has recently demonstrated that in animals, similar to humans, acute stressors may precipitate cardiac arrhythmias, that these arrhythmias are sympathetically mediated, and that they could be prevented by suppressing excessive cardiac sympathetic drive at its origin, in the brain.

Recent publications

Animal studies

1. Salomé N, Ngampramuan S, Nalivaiko E (2007) Intra-amygdala injection of GABA_A agonist, muscimol, reduces tachycardia and modifies cardiac sympatho-vagal balance during restraint stress in rats. *Neuroscience (in press)*.
2. Nalivaiko E, De Pasquale CG, Blessing WW (2004) Ventricular arrhythmia triggered by alerting stimuli in conscious rabbits pre-treated with dofetilide. *Basic Research in Cardiology* 99:142-151.
3. Nalivaiko E, Blessing WW (2004) CRF1 receptor antagonist CP-154,526 reduces cardiovascular responses during acute psychological stress in rabbits. *Brain Research* 1017: 234-237.
4. Nalivaiko E, Ootsuka Y. and Blessing WW. (2005) Activation of 5-HT1A receptors reduces cardiovascular changes elicited by acute psychological and inflammatory stresses in rabbits. *Am. J. Physiol.* 289: R596-R604.

Human studies

1. Nalivaiko E, Catcheside PG, Adams A, Jordan AS, Eckert DJ and McEvoy RD (2007) Cardiac changes during spontaneous and sound-induced arousals during non-REM sleep in healthy volunteers. *Am. J. Physiol.* 292: 1320-1327.

Invited reviews

1. Nalivaiko E. (2006) 5-HT1A receptors in stress-induced cardiac changes: a possible link between mental and cardiac disorders. *Clin Exp Pharmacol Physiol* 33: 1259-1264.
2. Paton JFR, Boscan P, Pickering AE and Nalivaiko E (2005) The ying and yang of cardiac autonomic control: vago-sympathetic interactions revisited. *Brain Research Reviews* 49: 555-565.

Ida Llewellyn-Smith's group

Ida Llewellyn-Smith is a NH&MRC Principal Research Fellow and Associate Professor in the Department of Medicine.

The primary aim of her laboratory is to understand how the central nervous system controls blood pressure in both health and disease by identifying the nerves in the brain and spinal cord that control blood pressure and characterising their connections. They use labels that are visible with light and electron microscopy to determine whether nerves in one region 'talk to' nerves in another region, to identify what neurotransmitters these nerves use to communicate and to establish what receptors the nerves use to bind the neurotransmitters. In physiological studies, they inject transmitter-related drugs into the brain to see how the drugs affect blood pressure. In their experiments they use not only normal animals but also animals in which blood pressure control has been disrupted by spinal cord injury.

Recent publications

1. Fenwick NM, Martin CL and Llewellyn-Smith IJ: (in press) Immunoreactivity for cocaine- and amphetamine-regulated transcript in rat sympathetic preganglionic neurons projecting to sympathetic ganglia or the adrenal medulla. *J Comp Neurol*
2. Llewellyn-Smith IJ, Weaver LC and Keast JR: (2005) Effects of spinal cord injury on synaptic inputs to sympathetic preganglionic neurons. *Prog Brain Res* 152: 11-26
3. Llewellyn-Smith IJ, Dicarolo SE, Collins HL, Keast JR: (2005) Enkephalin-immunoreactive interneurons extensively innervate sympathetic preganglionic neurons regulating the pelvic viscera. *Journal of Comparative Neurology* 488(3):278-89
4. Burman KJ, Sartor DM, Verberne AJ, Llewellyn-Smith IJ: (2004) Cocaine- and amphetamine-regulated transcript in catecholamine and noncatecholamine presympathetic vasomotor neurons of rat rostral ventrolateral medulla. *Journal of Comparative Neurology* 476(1):19-31
5. Burman KJ, Ige A, White J, Marshall F, Emson PC, Minson JB and Llewellyn-Smith IJ: (2003) GABA_B receptor subunits, R1 and R2, in brainstem catecholamine and serotonin neurons. *Brain Research* 970(1-2):35-46
6. Llewellyn-Smith IJ, Martin CL, Marcus JN, Yanagisawa M, Minson JB, Scammell TE: (2003) Orexin-immunoreactive inputs to rat sympathetic preganglionic neurons. *Neurosci Lett* 351(2):115-9

Flinders Cardiology group

The principal investigators in this group are Professor Phillip, Associate Professor Derek Chew, Dr Carmine De Pasquale and Dr Joseph Selvanayagam.

For some years **Phillip Aylward** has led a team interested involved in multicentre clinical trials relating to antithrombotic therapy in acute coronary syndromes and atrial fibrillation. Recent completed studies in which the group has had a major role are ACUITY (NEJM 2006, 355, 2203-16) and STEEPLE (NEJM 2006 355, 106-117) which looked at the preferred antithrombin in acute coronary syndromes and PCI (ACUITY) and elective angioplasty (STEEPLE). Ongoing studies by the group are of the clopidogrel-like drugs prasugrel, cangrelor and AZD6140 in various populations but predominantly related to coronary stenting. Atrial fibrillation is also becoming a major focus and they are involved in two studies looking at different oral antithrombins to replace warfarin.

Derek Chew's current interests are in the application of current evidence and new technologies to the management of acute and stable coronary artery disease. These have included a national audit of acute coronary syndrome management extending to the evaluation of risk among these patients and how well therapy matches this risk. In addition, his group is currently exploring the factors associated with late stent thrombosis in the era of drug-eluting stents.

Recent publications

1. Chew DP, Amerena J, Coverdale S, Rankin J, Astley C, Brieger D. (2007) Current management of acute coronary syndromes in Australia: observations from the acute coronary syndromes prospective audit (ACACIA). *Internal Medicine Journal* (accepted).
2. Shishehbor MH, Lauer MS, Singh IM, Chew DP, Karha J, Brener SJ, Moliterno DJ, Ellis SG, Topol EJ, Bhatt DL. (2007) In unstable angina or non-ST-segment ACS, should patients with multivessel coronary artery disease undergo multivessel or culprit-only stenting? *JACC* 49 (8): 849-54
3. Worthley S, Farouque O, Meredith IT, Baldi M, Chew DP, Worthley M. (2006). The RADI pressure wire high-sensitivity thermistor and culprit lesion temperature in patients with acute coronary syndromes. *The Journal of Invasive Cardiology*. 18(11):528-31.
4. White HD, Kleiman NS, Mahaffey KW, Likhnygina Y, Pieper KS, Chiswell K, Cohen M, Harrington RA, Chew DP, Petersen JL, Berdan LG, Aylward PEG, Ferguson JJ, Califf RM. (2006) Efficacy and safety of percutaneous coronary intervention in high-risk non-ST-elevation acute coronary syndromes treated with enoxaparin or unfractionated heparin in the superior yield of the new strategy of enoxaparin revascularization and glycoprotein IIb/IIIa inhibitors (SYNERGY) trial. *Am Heart J*. 152(6): 1042-50.
5. Chew DP. (2005) If only all things were equal: Cost-effectiveness of drug-eluting stents. (Editorial). *Medical Journal of Australia* 81:376-377.
6. Chew DP, Aylward PEG, White HD. (2005) Facilitated percutaneous coronary intervention: is this strategy ready for implementation? *Current Cardiology Reports* 7:235-241.

Carmine De Pasquale is responsible for the group's ongoing research in relation to heart failure.



L to R: Dr Dani-Louise Bryan, Professor Andrew Bersten, Dr Carmine de Pasquale

The group's major research is at the basic science level. With Professor Andrew Bersten they are in their second year of a NH&MRC grant funding investigating the effect of chronic heart failure on respiratory function. They are using a rat model of infarct-induced congestive heart failure (CHF) and are performing respiratory mechanics, surfactant analysis and pressure volume-loops on CHF lungs. They have found that CHF lungs have normal mechanics until the effect of surfactant is removed they then have reduced compliance compared to controls. Furthermore, CHF lungs have increased lavage surfactant suggesting there is a homeostatic mechanism in play in CHF to maintain normal respiratory mechanics. We have presented this work and the manuscript is in preparation for submission.

De Pasquale CG, Bryan D-L, De Smet H, Bersten AD. Reduced surface tension normalises lung mechanics in a rodent chronic heart failure model. Presented at the American Thoracic Society International Conference, San Francisco, May 2007 and the Cardiac Society of Australia and New Zealand, Christchurch, August 2007.*

The group's also has a clinical research and is engaged in multicentre clinical trials in heart failure. Their PhD student, Rebecca Perry is exploring the ability of high-resolution transthoracic echocardiography of the left anterior descending coronary artery to act as a marker of coronary atherosclerosis.

Perry R, De Pasquale CG, Chew DP, Aylward PE, Joseph MX. (2007) High-resolution transthoracic echocardiography of the left anterior descending coronary artery: a novel non-invasive assessment of coronary vasoreactivity. J Am Soc Echocard (in press).

In regard to multicentre clinical trials in heart failure, the group is currently involved in the RED-HF study which is a morbidity-mortality trial of the use of darbepoetin in anaemia in CHF; in the SHIFT study, another morbidity-mortality trial of the use of ivabradine (a novel potassium channel blocking drug which slows the sinus node) in CHF; in the ASCEND HF trial a morbidity-mortality trial of the use of nesiritide in acute decompensated CHF; in the REVIVE study of levosimendan in acute decompensated CHF; in the FUSION II study of twice weekly nesiritide infusions in out-patients with CHF; and in the Universe trial of rosuvastatin in CHF, which is exploring the beneficial effects of high dose statins on left ventricular function in non-ischaemic CHF.

Krum H, Ashton E, Reid C, Kalf V, Rogers J, Amarena J, Singh B, Tonkin A. (2007) Double-blind, randomized, placebo-controlled study of high-dose HMG CoA reductase inhibitor therapy on ventricular remodeling, pro-inflammatory cytokines and neurohormonal parameters in patients with chronic systolic heart failure. J Card Fail. 13(1):1-7.

Joseph Selvanayagam has recently joined the group. He has been working with Hugh Watkins in Oxford and has developed a major research interest in MRI cardiac imaging.

Arduino Mangoni's group

Arduino Mangoni is Senior Lecturer in Clinical Pharmacology in the Flinders University School of Medicine and Consultant Physician in Clinical Pharmacology and General Medicine at Flinders Medical Centre. He runs a clinical research laboratory.

Arduino's laboratory is interested in the identification of pharmacological and non-pharmacological interventions affecting endothelial function, arterial stiffness and blood pressure. Current research projects include: acute effects of NSAIDs on endothelial function and blood pressure; acute effects of haemodialysis on endothelial function and predictors of intradialytic hypotension; and acute and chronic effects of folic acid and tetrahydrobiopterin in patients with ischaemic heart disease. They have recently developed a new protocol for the combined assessment of peripheral and coronary vasoreactivity.

Recent publications

1. Hewitson CL, Whiting MJ, Barbara JA, Mangoni AA. (2007) Acute effects of haemodialysis on biochemical modulators of endothelial function. *J Intern Med* (in press).
2. Perry R, Joseph MX, De Pasquale CG, Chew DP, Yiu D, Aylward PEG, Mangoni AA. (2007) High resolution transthoracic echocardiography of the left anterior descending coronary artery: a novel non-invasive assessment of coronary vasoreactivity. *J Am Soc Echocardiogr* (in press).
3. Paul B, Gieroba Z, Mangoni AA. (2007) Influence of comorbidities and medication use on tilt table test outcome in elderly patients. *Pacing Clin Electrophysiol* 30: 540-543.
4. Jarmuzewska EA, Ghidoni A, Mangoni AA. (2007) Hypertension and sensorimotor peripheral neuropathy. *Eur Neurol* 57: 91-95.
5. Hart S, Mangoni AA, Swift CG, Jackson SHD. (2006) The effect of methionine loading on endothelial function in elderly volunteers. *Heart Lung Circ* 15: 358-361.
6. Hart S, Mangoni AA, Swift CG, Jackson SHD. (2006) The effect of methionine loading on pulse-wave velocity in elderly volunteers. *Postgrad Med J* 82: 524-527.
7. Pathansali R, Mangoni AA, Creagh-Brown B, Lan ZC, Ngow GL, Yuan XF, Ouldred EL, Sherwood RA, Swift CG, Jackson SHD. (2006) Effects of folic acid supplementation on psychomotor performance and hemorheology in healthy elderly subjects. *Arch Gerontol Geriatr* 43: 127-137.
8. Mangoni AA, Folic acid and inflammation in atherosclerosis: false hopes or the need for better trials? *Chim Clin Acta* 367: 11-19.

Professor Paddy Phillips and Flinders Centre for Clinical Change and Health Services Research

Professor Paddy Phillips is a member of the High Blood Pressure Research Council of Australia. He is co-leader of the Flinders Centre for Clinical Change & Health Care Research (FCCCHCR), a 93-membered Area of Strategic Research Investment at Flinders University. Members of FCCCHCR share a common goal: to develop and disseminate evidence to inform optimum and cost-effective health care interventions. Rigorous assessment of clinical and health system interventions and outcomes is complemented by original research to gain better understanding, and to effect knowledge transfer.



The group's research is collaborative and involves medical specialists, allied health and nursing disciplines across a range of health care settings, including primary, acute, ambulatory, transitional, rehabilitation and residential aged care facilities. Since December 2004, when the group was selected competitively to represent an area of key research capability for Flinders University, members have attracted more than \$30M in competitive grants and tenders.

The group's four key areas of research focus are: Evidence based clinical practice; Later life care; End-of-life care; and Chronic disease management.

A number of members of the FCCCHCR have a focus of current research in South Australia relevant to the cardiovascular system in health and disease and more specifically research which relates to blood pressure and its control, to hypertension, to cardiovascular risk factors in general, and to vascular structure, physiology and disease

Further details are available at <http://clinicalchange.flinders.edu.au/index.html>.

ROYAL ADELAIDE HOSPITAL / UNIVERSITY OF ADELAIDE

The major active cardiovascular research groups at the Royal Adelaide Hospital are those led by Professor Stephen Worthley, Helpmann Professor of Cardiology, and by Professor Prash Sanders, Knapman Professor of Cardiology.

Stephen Worthley's group

The group's major interest is in cardiac MRI imaging. They have recently completed the Cardiovascular Magnetic Resonance (CMR) sub-study of a large multi-centre trial in infarct angioplasty. Previous CMR sub-study involvement with trials such as ONTARGET, STITCH and TELMAR has positioned the group as a centre of excellence in this area.

The group's major research foci have expanded to include the development of a 'one stop shop' of vascular and ventricular structure and function with CMR, with particular diseases of interest including obesity, diabetes mellitus and chronic kidney disease. They have established unique protocols assessing myocardial T2 relaxometry, a novel marker of myocardial iron overload in beta-thalassaemia. Their core research work, in the field of atherosclerosis imaging, continues with co-registration work with magnetic resonance imaging and multidetector CT imaging of carotid and bypass graft atherosclerosis, including high resolution invasive imaging with intravascular ultrasound (IR IVUS). The group's imaging expertise has evolved to assess atrial structure and function and several patents have resulted. In collaboration with Dr Andrew Zannettino and Dr Stan Gronthos at the Hanson Institute, the group has established large animal models of ischaemic and non-ischaemic left ventricular dysfunction and are utilising high resolution CMR to assess mechanisms of benefit of immuno-selected bone marrow stromal stem cell therapy in these groups.

Recent publications

1. Worthley SG, Helt G, Corti R, Worthley MI, Chew DP, Fayad ZA, Zaman AG, Fallon JT, Fuster V, Badimon JJ. (2007) Statin therapy alone and in combination with an acyl-CoA:cholesterol-o-acyltransferase inhibitor on experimental atherosclerosis. *Pathophysiol Thromb Haemost* (in press)
2. Worthley SG, Reis ED, Helft G, Worthley MI, Fayad ZA, Siddiqui M, Nusbaum A, Hollier L. (2007) Serial magnetic resonance imaging predicts clinical outcome in an experimental model of spinal cord ischemia. *Stroke* (in press).
3. Psaltis PJ, Dundon BK, Teo KSL, Worthley SG. (2007) Delayed presentation of right heart failure secondary to intramyocardial dissection and ventricular septal defect: utility of cardiac magnetic resonance imaging. *Heart Lung and Circulation* (in press).
4. Duncan RF, Teo KSL, Worthley SG. (2007) Cardiac magnetic resonance documentation of a double atrial septal defect before and after percutaneous closure with an Amplatzer septal occluder. *Int J Card* (in press).
5. Duncan RF, Brown MA, Worthley SG. (2007) Increasing identification of isolated left ventricular non-compaction with cardiovascular magnetic resonance: A mini case series highlighting variable clinical presentation. *Heart Lung and Circulation* (in press).
6. Dundon BK, Yeend RAS, Worthley SG. (2007) Percutaneous closure of a post-surgical left ventricular pseudoaneurysm. *Heart* (in press).
7. Duncan RF, Brown MA, Worthley SG. (2007) Recurrent, multiple cardiac myxoma. *Heart Lung and Circulation* (in press).
8. Dundon BK, Worthley MI, Worthley SG. (2007) Very late drug-eluting stent thrombosis. *Heart, Lung and Circulation* (in press).

Prash Sanders' group

Professor Prash Sanders heads a group with major interests in cardiac electrophysiology.

University of South Australia

Professor Peter Howe is Director of the Nutritional Physiology Research Centre, which is part of the ATN Centre for Metabolic Fitness, a national research collaboration comprising researchers from the University of South Australia, Curtin University of Technology, Queensland University of Technology, University of Technology Sydney and RMIT University. The research focus of the ATN Centre for Metabolic Fitness is the optimisation of health through lifestyle modification. The Nutritional Physiology Research Centre also collaborates with the University of Adelaide, Spencer Gulf Rural Health School, CSIRO Human Nutrition, Queen Elizabeth Hospital, Royal Adelaide Hospital, Institute of Medical and Veterinary Science, University of Western Australia and University of Wollongong. It has active research partnerships with the food industry supported by ARC Linkage grants and consultancies, as well as research programs supported by the NHMRC, National Heart Foundation and Diabetes Australia.

The research focus of the group is in cardiovascular, metabolic, anti-inflammatory and mental health benefits of diet and physical activity and the underlying mechanisms. Physiological effects of a range of bioactive nutrients (e.g. omega-3 fats, phyto-estrogens, antioxidants) and other dietary modifications are evaluated, alone or in combination with regular exercise in human trials. Assessments include physical and mental performance (mood, behaviour and cognition), non-invasive cardiovascular risk factors (ambulatory blood pressure, baroreflex function, arterial elasticity, endothelial function) and circulating biomarkers (lipids, eicosanoids, cytokines) and body composition indices (total body fat, abdominal adiposity and bone density).



Recent publications

1. Grenyer BF, Crowe T, Meyer B, Owen AJ, Grigonis-Deane EM, Caputi P, Howe PR. (2007) Fish oil supplementation in the treatment of major depression: A randomised double-blind placebo-controlled trial. *Prog Neuropsychopharmacol Biol Psychiatry*. (in press).
2. Hill AM, Buckley JD, Murphy KJ, Howe PR. (2007) Combining fish-oil supplements with regular aerobic exercise improves body composition and cardiovascular disease risk factors. *Am J Clin Nutr*. 85(5):1267-74.
3. Meyer BJ, Hammervold T, Rustan AC, Howe PR. (2007) Dose-dependent effects of docosahexaenoic acid supplementation on blood lipids in statin-treated hyperlipidaemic subjects. *Lipids*. 42(2):109-15.
4. Hill AM, Worthley C, Murphy KJ, Buckley JD, Ferrante A, Howe PR. (2007) n-3 fatty acid supplementation and regular moderate exercise: differential effects of a combined intervention on neutrophil function. *Br J Nutr*. 98(2):300-9.
5. Murphy KJ, Meyer BJ, Mori TA, Burke V, Mansour J, Patch CS, Tapsell LC, Noakes M, Clifton PA, Barden A, Puddey IB, Beilin LJ, Howe PR. (2007). Impact of foods enriched with n-3 long-chain polyunsaturated fatty acids on erythrocyte n-3 levels and cardiovascular risk factors. *Br J Nutr* 97(4):749-57.
6. Hill AM, LaForgia J, Coates AM, Buckley JD, Howe PR. (2007) Estimating abdominal adipose tissue with DXA and anthropometry. *Obesity (Silver Spring)*. 15(2):504-10.
7. Coates AM, Howe PR. (2007) Edible nuts and metabolic health. *Curr Opin Lipidol*. 18(1):25-30.
8. Buckley JD, Thorp AA, Murphy KJ, Howe PR. (2006) Dose-dependent inhibition of the post-prandial glycaemic response to a standard carbohydrate meal following incorporation of alpha-cyclodextrin. *Ann Nutr*
9. Patch CS, Tapsell LC, Mori TA, Meyer BJ, Murphy KJ, Mansour J, Noakes M,
10. Clifton PM, Puddey IB, Beilin LJ, Annison G, Howe PR. (2005) The use of novel foods enriched with long-chain n-3 fatty acids to increase dietary intake: a comparison of methodologies assessing nutrient intake. *J Am Diet Assoc*. 105(12):1918-26.