



Government of Western Australia
Department of Health
Sir Charles Gairdner Hospital

West Australian Sleep Disorders
Research Institute (Inc)



WEST AUSTRALIAN SLEEP DISORDERS RESEARCH INSTITUTE (INC.)

SUMMARY OF RESEARCH ACTIVITY

July 1 2008 – June 30 2009

Level 5, G Block
Queen Elizabeth II Medical Centre
Hospital Avenue
Nedlands
Western Australia 6009
Australia

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Research Personnel

Dr Jason Kirkness	Postdoctoral Research Fellow (-Feb 2009)
Dr Kelly Shepherd	Postdoctoral Research Fellow (Feb 2009-)
Dr Jennifer Walsh	Postdoctoral Research Fellow
Ms Vanessa Baker	Research Assistant (Jul 2008-)
Ms Kathleen Maddison	Research Assistant
Ms Bernadett Szegner	Research Assistant
Ms Kelly Shepherd	PhD Candidate (-Feb 2009)
Ms Laila Simpson	PhD Candidate
Ms Kate Smith	PhD Candidate
Ms Sian Turner	PhD Candidate
Dr Jonathan Williamson	PhD Candidate
Ms Catherine Hillman	4 th Year Medical Student Research Project
Mr Evan Heinecke	4 th Year Medical Student Research Project
Mr Justin Hii	4 th Year Medical Student Research Project
Ms Ashleigh Becu	Honours Candidate
Mr Joshua Goldman	Honours Candidate

Fields of Work

1. Sleep-Disordered Breathing
 - Upper airway function during anaesthesia and sleep
 - Computational dynamics of the human upper airway
 - Upper and lower airway imaging using endoscopic optical coherence tomography
 - Upper and lower oesophageal sphincter function during wakefulness and sleep
 - Non-invasive detection of gastric insufflation
 - Intramuscular recording of genioglossus myoelectric activity
 - The relationship between sleep apnoea, vascular function and erectile dysfunction
 - The relationship between travel, sleep quality and elite athletic performance
 - Continuous positive airway pressure (CPAP) usage adherence
2. Chronic Lung Disease
 - The role of respiratory muscle training in chronic lung disease
 - Measuring functional capacity in chronic lung disease
 - Defining the burden of disease and benefits of exercise in moderate to severe asthma

Techniques

1. Oesophageal impedance
2. Oesophageal manometry
3. Oesophageal pH monitoring
4. Administration of non-invasive ventilation
5. Polysomnography
6. Optical coherence tomography
7. Intramuscular electrodes
8. Neuro-stimulators
9. Respiratory muscle training
10. Portable metabolic gas analyser
11. Cycle ergometry

12. Treadmill ergometry
13. Dual energy X-ray absorptiometry (DEXA)
14. Questionnaires

Collaborations

Local

A/Prof G Allison	Centre for Musculoskeletal Studies, The University of Western Australia
Dr D Chambers	Lung Transplant Unit, Royal Perth Hospital
Prof E Gabbay	Lung Transplant Unit, Royal Perth Hospital
Dr E Giles	Anaesthetics, Sir Charles Gairdner Hospital
Mr G Hee	Ear, Nose and Throat surgeon, Sir Charles Gairdner Hospital
Prof J Hamdorf	Medical Education, Faculty of Medicine, Dentistry and Health Sciences, University of Western Australia
A/Prof S Jenkins	Department of Physiotherapy, Sir Charles Gairdner Hospital; School of Physiotherapy, Curtin University
Dr S Mukherjee	West Australian Sleep Disorders Research Institute, Queen Elizabeth II Medical Centre
Winthrop Prof L Palmer	Centre for Genetic Epidemiology and Biostatistics, The University of Western Australia
A/Prof J Pan	Department of Mechanical Engineering, The University of Western Australia
Dr M Phillips	Department of Respiratory Medicine, Sir Charles Gairdner Hospital
Dr P Platt	Department of Anaesthetics, Sir Charles Gairdner Hospital
Dr T Russel	Department of Anaesthetics, Sir Charles Gairdner Hospital
Prof D Sampson	Department of Electronic and Electrical Engineering, The University of Western Australia
Winthrop Prof PJ Thompson	Lung Institute of Western Australia, Queen Elizabeth II Medical Centre

National

Dr T Amis	Department of Respiratory Medicine, Westmead Hospital, NSW
Dr R Grunstein	Sleep Disorders Centre, Royal Prince Alfred Hospital, NSW
Prof R Holloway	Department of Gastroenterology Hepatology, Royal Adelaide Hospital, SA
Dr D McEvoy	Department of Respiratory Medicine, Repatriation Hospital, SA
A/Prof J Wheatley	Department of Respiratory Medicine, Westmead Hospital, NSW

International

Mr R Brandmeier	MAP Medizin-Technologie GmbH, Martinsreid, Germany
A/Prof A Schwartz	Johns Hopkins Sleep Disorders Centre, Johns Hopkins Medical School, Baltimore, Maryland, USA
A/Prof H Schneider	Johns Hopkins Sleep Disorders Centre, Johns Hopkins Medical School, Baltimore, Maryland, USA.

Grants

Year	Principle Invest.	Funding Body; Project Title	\$ Awarded
2005-2008	Kirkness, JP	<i>NHMRC (513716) CJ Martin Fellowship</i> Neurohumoral and neuromuscular control of upper airway patency in obesity and sleep apnoea	\$301 462
2006-2008	Eastwood, PR Sampson, DD Hillman, DR	<i>NHMRC (403953)</i> Mechanisms of pharyngeal collapse in obstructive sleep apnoea defined by optical coherence tomography	\$467 750
2008	Williamson, J Eastwood, PR	<i>Sir Charles Gairdner Hospital Research Foundation</i> Using optical imaging to investigate and manage disorders of the low airway	\$9 980
2008	Williamson, J Eastwood, PR	<i>Sir Charles Gairdner Hospital Research Foundation (PhD top-up scholarship)</i> Applications of anatomical optical coherence tomography in lower airways of human	\$5 000
2008	Eastwood, PR	<i>Medical and Health Infrastructure Fund (WA)</i> Department of Health, Government of Western Australia Infrastructure Grant - Round 11	\$37 778
2008-2010	Eastwood, PR Hillman, DR Sampson, DD Phillips, M	<i>NHMRC (513854)</i> Bronchoscopic applications of anatomical optical coherence tomography	\$395 125
2008-2012	Eastwood, PR	<i>NHMRC (513705)</i> Senior Research Fellowship	\$595 000
2009	Eastwood, PR	<i>Medical and Health Infrastructure Fund (WA)</i> Department of Health, Government of Western Australia Infrastructure Grant - Round 12	\$22 487
2009	Jenkins, SC Cecins, N Eastwood, PR Hill, K	<i>Sir Charles Gairdner Hospital Research Fund</i> Do wheeled walkers increase physical activity in people with chronic obstructive pulmonary disease?	\$45 931
2009-2011	Eastwood, PR Hillman, DR Walsh, J Kirkness, J	<i>NHMRC (572647)</i> Collapsibility of the human upper airway – relationships between sleep sedation and anaesthesia and head posture	\$451 250
2009-2011	Allison, JA Jenkins, SC Eastwood, PR Jenkins, CR Hillman, DR McKeogh, ZJ	<i>NHMRC (570814)</i> Optimising outcomes for chronic obstructive pulmonary disease (COPD): Evaluation of walking training	\$421 500

Presentations and Invited Lectures

Local

1. Eastwood PR. Invited speaker Professional Development program: 'Achieving work-family balance in medical research career'. Australian Society for Medical Research. August 2008.
2. Eastwood PR. Distinguished speaker. Thoracic Society of Australia and New Zealand Annual Scientific Meeting (WA Branch), Mandurah. October 2008.
3. Smith KF, Jenkins S, Williamson J, Cecins N, Hillman DR, Eastwood P. Treadmill and cycle exercise in people with chronic obstructive pulmonary disease (COPD). Thoracic

- Society of Australia and New Zealand Annual Scientific Meeting (WA Branch), Mandurah. October 2008.
4. Walsh JH. Invited speaker Rising Stars session: 'The Upper Airway in Motion'. Thoracic Society of Australia and New Zealand Annual Scientific Meeting (WA Branch), Mandurah. October 2008.
 5. Shepherd K. Invited speaker: 'Body-bits beyond the lung: The Gut'. Australian New Zealand Society for Respiratory Scientists Symposium (WA Branch). October 2008.
 6. Smith KF. 'Treadmill and cycle exercise in people with chronic obstructive pulmonary disease (COPD).' Curtin University School of Physiotherapy, Research Update. October 2008.
 7. Hillman DR. Invited speaker: 'Obstructive sleep apnoea and anaesthesia'. Australian and New Zealand College of Anaesthetists/Australian Society of Anaesthetists (WA branch), Bunker Bay. November 2008.
 8. Hillman DR. Invited speaker: 'Updates in anaesthesia'. Australian and New Zealand College of Anaesthetists/Australian Society of Anaesthetists (WA branch), Bunker Bay. November 2008.
 9. Smith KF. 'Treadmill and cycle exercise in people with chronic obstructive pulmonary disease (COPD).' Lung Research Group, Sir Charles Gairdner Hospital. February 2009.
 10. Eastwood PR. Keynote Speaker: 'New imaging techniques for visualising the airways'. Lung Institute of Western Australia Lung and Biological Science Symposium. March 2009.
 11. Eastwood PR. 'A new facility to undertake sleep teaching and research in WA.' Australian Society of Sleep Technologists (WA Branch). June 2009.
 12. Smith KF, Jenkins SC, Williamson J, Cecins N, Hillman D & Eastwood P. Ventilatory, metabolic and symptom responses to maximal treadmill and cycle exercise tests in people with chronic obstructive pulmonary disease (COPD). Australian Society for Medical Research (WA Branch). Research Week. June 2009.
- Award:** The UWA School of Pathology and Laboratory Medicine Award
13. Williamson JP, Armstrong JJ, McLaughlin RA, Sampson DD, Regli A, Walsh JH, Maddison KJ, James AL, Noffsinger WJ, Hillman DR, Eastwood PR. 'Airway wall stiffness in asthma - regional airway compliance using an optical coherence tomography.' Australian Society for Medical Research (WA Branch). Research week, Perth. June 2009.
 14. Smith KF, Jenkins SC, Williamson J, Cecins N, Hillman D & Eastwood P. Ventilatory, metabolic and symptom responses to maximal treadmill and cycle exercise tests in people with chronic obstructive pulmonary disease (COPD). Australian Physiotherapy Association (WA Branch), Research Week. June 2009.

National

1. Hillman DR. Invited speaker: 'Home-based sleep studies'. Breakfast Session: Australasian Sleep Association Annual Scientific Meeting, Adelaide, SA. October 2008.
2. Eastwood PR. 'Mechanisms of the effect of obesity on the upper airway in obstructive sleep apnoea.' Australian Health and Medical Research Congress, Brisbane, QLD. November 2008.
3. Walsh JH. 'Posture and OSA: It's not just about supine vs. lateral.' Upper Airway Symposium, Thredbo, ACT. February 2009
4. Shepherd K, Holloway R, Hillman D, Eastwood P. Gastroesophageal reflux: A burning issue in OSA. Upper Airway Symposium, Thredbo, ACT. February 2009.
5. Hillman DR. 'OSA: is it all the same?' Upper Airway Symposium, Thredbo, ACT. February 2009.

- Hillman DR. 'Genioglossus stimulation to treat OSA.' Upper Airway Symposium, Thredbo, ACT. February 2009.

International

- Walsh JH. Dynamic Imaging of the Upper Airway: Awake and asleep (Symposium). European Sleep Research Society Congress, Glasgow, UK. *J Sleep Res* 2008 Sept; 17(Suppl. 1): S72: 86.
- Jenkins S, Eastwood P, Hill K, Cecins N. Change in 6-minute walk distance (6MWD) following a familiarisation test and exercise training in patients with chronic obstructive pulmonary disease (COPD): Influence of disability. European Respiratory Society Annual Congress, Berlin, Germany. *Eur Respir J* 2008 Sept; Abstracts issue: 478s.
- Jenkins S, Cecins N, Camarri C, Williams C, Thompson P, Eastwood P. Published regression equations underestimate 6-minute walk distance (6MWD) for healthy Australians aged 45-85 years. European Respiratory Society Annual Congress, Berlin, Germany. *Eur Respir J* 2008 Sept; Abstracts issue: 733s.
- Turner S, Eastwood P, Cook A, Thompson P, Jenkins S. Effects of exercise training on quality of life and 6-minute walk distance (6MWD) in adults with fixed airway obstruction asthma (FAOA). European Respiratory Society Annual Congress, Berlin, Germany. *Eur Respir J* 2008 Sept; Abstracts issue: 731s.
- Hillman DR. Invited speaker: 'Respiratory high dependency units'. Rotorua Respiratory Workshop, Rotorua, New Zealand. October 2008.
- Hillman DR. Invited speaker: 'Home-based sleep studies'. Rotorua Respiratory Workshop, Rotorua, New Zealand. October 2008.
- Hillman DR. Invited speaker: 'Obesity and obstructive sleep apnoea – the Challenge for day surgery'. Australasian Society of Anaesthetists/New Zealand Society of Anaesthetists Joint Scientific Congress, Wellington, New Zealand. October 2008.
- Maddison K, Walsh J, McLaughlin R, Becker S, Armstrong J, Sampson D, Hillman D, Eastwood P. Inter-individual variability in pharyngeal patency across the wakeful respiratory cycle. 20th Annual Scientific Meeting of the Australasian Sleep Association and Australasian Sleep Technologists Association. *Sleep and Biological Rhythms* 2008 Oct; 5(Suppl 1): A29.
- Walsh J, Maddison K, Armstrong J, McLaughlin R, Becker S, Sampson D, Hillman D, Eastwood P. Case study – detecting site of pharyngeal collapse during sleep using anatomical optical coherence tomography: implications for surgical intervention. 20th Annual Scientific Meeting of the Australasian Sleep Association and Australasian Sleep Technologists Association. *Sleep and Biological Rhythm* 2008 Oct; 5(Suppl 1): A47.
- Simpson L, Palmer L, Mukherjee S, Hillman D, Eastwood P, Potter J, Love G, Cooper M, Ward K, Fedson A, Lee J, Maddison K, Walsh J, Kirkness J. Regional fat deposition and severity of obstructive sleep apnoea. 20th Annual Scientific Meeting of the Australasian Sleep Association and Australasian Sleep Technologists Association. *Sleep and Biological Rhythms* 2008 Oct; 5(Suppl 1): A13.
- Woods M, McLean N, Godde K, Eastwood P, Hillman D, Kirkness J. A novel therapy for sleep-disordered breathing and the relationship of self-efficacy and outcome expectations with perceived sleep quality and treatment acceptability. 20th Annual Scientific Meeting of the Australasian Sleep Association and Australasian Sleep Technologists Association. *Sleep and Biological Rhythms* 2008 Oct;;5(Suppl 1): A57.
- Williamson JP, Armstrong JJ, McLaughlin RA, Sampson DD, Regli A, Walsh JH, Maddison KJ, James AL, Noffsinger WJ, Hillman DR, Eastwood PR. Regional airway compliance in asthma measured using anatomical optical coherence tomography. Thoracic Society of Australia and New Zealand, Annual Scientific Meeting, Darwin NT. *Respirology* 2009 Apr; 14(Suppl 1): A89.

13. Smith KF, Jenkins SC, Williamson J, Cecins N, Hillman D, Eastwood P. Ventilatory, metabolic and symptom responses to maximal treadmill and cycle exercise tests in people with chronic obstructive pulmonary disease (COPD). Thoracic Society of Australia and New Zealand, Annual Scientific Meeting, Darwin, NT. *Respirology* 2009 Apr; 14(Suppl 1): A56. **Award:** Best poster – Physiotherapy.
14. Williamson JP, Armstrong JJ, McLaughlin RA, Sampson DD, Regli A, Walsh JH, Maddison KJ, James AL, Noffsinger WJ, Hillman DR, Eastwood PR. Regional airway compliance in asthma measured using anatomical optical coherence tomography. American Thoracic Society Annual Scientific Meeting, San Diego, USA. *Am J Respir Crit Care Med* Apr 2009; 179; A5624.
15. Eastwood PR, Walsh JH, Maddison JK, Tesfayesus W, Hillman DR. The effect of genioglossus muscle stimulation on pharyngeal collapsibility and sleep-related inspiratory flow limitation. Associated Professional Sleep Societies, Seattle, USA. *Sleep* 2009 Jun; 32(Abstract Suppl.): A172.
16. Eastwood PR, Walsh JH, Maddison KJ, Hoegh TB, Hillman DR. Respiratory impedance sensing to trigger inspiratory - synchronous stimulation of the genioglossus muscle. Associated Professional Sleep Societies, Seattle, USA. *Sleep* 2009 Jun; 32(Abstract Suppl.): A380.

Publications

1. Shepherd KL, DC Chambers, E Gabbay, DR Hillman, PR Eastwood. Obstructive sleep apnoea and nocturnal gastroesophageal reflux are common in lung transplant patients. *Respirology* 2008; 13(7): 1045-1052.
2. Hill K, Jenkins SC, Cecins N, Philippe DL, Hillman DR, Eastwood PR. Estimating maximum work rate during incremental cycle ergometry testing from six-minute walk distance in patients with chronic obstructive pulmonary disease. *Arch Physical Med Rehab* 2008; 89: 1782-1787. **'Editor's Choice'** *Respiratory Care* November 2008
3. Jenkins S, Cecins N, Camarri B, Williams C, Thompson P, Eastwood P. Regression equations to predict six-minute walk distance in middle-aged and elderly adults. *Physiotherapy Theory and Practice*. In Press: accepted 8-September-2008.
4. Walsh JH, Maddison KJ, Platt PR, Hillman DR, Eastwood PR. Influence of head extension, flexion and rotation on collapsibility of the passive upper airway. *Sleep* 2008; 31(10): 1140-1147.
5. Walsh JH, Leigh MS, Paduch A, Maddison KJ, Armstrong JJ, Sampson DD, Hillman DR, Eastwood PR. Effect of body posture on pharyngeal shape and size in adults with and without obstructive sleep apnea. *Sleep* 2008; 31(11): 1543-1549.
6. McLaughlin RA, Armstrong JJ, Becker S, Walsh JH, Kirkness J, Jain A, Leigh MS, Williamson JP, Hillman DR, Eastwood PR, Sampson DD. Respiratory gating of endoscopic OCT images of the upper airway. 19th International Conference on Optical Fibre Sensors (OFS-19). *Proc SPIE* 2008; 7004: 70045V.
7. Shaw JE, Punjabi NM, Wilding JP Alberti K, Zimmet P, Amiel S, Cohen M, Ficker J, Fulcher G, Goldberg LR, Groop L, Hillman D, Ip M, Laakso M, Matsuzawa Y, Mbanya JC, Punjabi N, Rossner S, Sadikot S, Shaw J, Silink M, Standl E, Sullivan C, Wilding J. Sleep-disordered breathing and type 2 diabetes: a report from the International Diabetes Federation Taskforce on Epidemiology and Prevention. *Diabetes Res Clin Pract*. 2008; 81: 2-12.
Editors: David Sampson, Stephen Collins, Kyunghwan Oh, Ryoza Yamauchi
8. McLaughlin RA, Williamson JP, Phillips MJ, Armstrong JJ, Becker S, Hillman DR, Eastwood PR, Sampson DD. Applying anatomical optical coherence tomography to quantitative 3D imaging of the lower airway. *Opt Express* 2008;16(22): 17521-17529.

9. McEvoy RD, Pierce RJ, Hillman D, Esterman A, Ellis EE, Catcheside PG, O'Donoghue FJ, Barnes DJ, Grunstein RR. Nocturnal non-invasive nasal ventilation in stable hypercapnic COPD: A randomised controlled trial. *Thorax* 2009; 64:561-56.
10. McLaughlin RA, Armstrong JJ, Becker S, Walsh JH, Jain A, Hillman DR, Eastwood PR & Sampson DD. Respiratory gating of anatomical optical coherence tomography images of the human airway. *Optics Express*. 2009; 17 (8): 6568-6577.
11. Johnson LG, Colyer KE, Edwards DJ, Philippe DL, Eastwood PR, Walters SE, Thickbroom GW, Mastaglia FL. Improvement in aerobic capacity after an exercise program in sporadic inclusion body myositis (IBM). *J Clin Neuromuscul Dis* 2009; 10(4): 178-184.

Book Chapter

1. Armstrong JJ, Leigh MS Hillman DR, Eastwood PR, Sampson DD. Anatomical optical coherence tomography for imaging the human upper airway. In: *Optical Coherence Tomography: Technology and Applications* (editors, W. Drexler and JG Fujimoto), Springer. Book Chapter. In press: November 2008 (ISBN:978-3-540-77549-2).

DR STEWART CULLEN

SLEEP APNOEA

Fields of Work

1. Predictors of sleep apnoea using questionnaires and laser measurements of oral dimensions
2. Treatment of sleep apnoea:
 - Mandibular advancement splints: new models
 - Tongue retaining devices
 - Positional therapy: new appliances
3. Validation of the radical pulse oximeter in the detection of sleep apnoea
4. Sleep studies in the Busselton Health Survey

Techniques

1. Lasers
2. Radical oximeters
3. Mandibular advancement splints and tongue retaining devices

Collaborations

Local

A/Prof A James	Department of Pulmonary Physiology/West Australian Sleep Disorders Research Institute, Queen Elizabeth II Medical Centre
Dr N McArdle	Sleep Disorders Clinic, Queen Elizabeth II Medical Centre
Mr W Noffsinger	Department of Pulmonary Physiology/West Australian Sleep Disorders Research Institute, Queen Elizabeth II Medical Centre
Dr S Phung	Sleep Disorders Clinic, Queen Elizabeth II Medical Centre

Presentations and Invited Lectures

Local

1. Cullen S. 'The lateral walls of the pharynx and OSA – Part I'. West Australian Sleep Disorders Research Institute Continuing Medical Education Program. July 2008.

**ASSOC PROF ALAN JAMES
EPIDEMIOLOGY**

AIRWAY REMODELING / INFLAMMATION,

Research Personnel

Dr Mark Carroll	Research Officer (April 2009-)
Mr John Elliot	Research Officer
Ms Peta Grayson	Research Officer (part-time)
Ms Robyn Jones	Research Assistant (-April 2009)
Mr Mark Carroll	PhD Candidate (-Apr 2009)
Dr Jonathon Williamson	PhD Candidate (- Dec 2009)
Ms Robyn Jones	PhD Candidate (April 2009-)

Fields of Work

1. Airway Remodeling
 - Hypertrophy and hyperplasia of airway smooth muscle (ASM) in asthma
 - Stereological measurement of ASM and extracellular matrix (ECM)
 - Validation of methods – serial section and validation
 - Relation of changes in ASM and ECM to age and duration and severity of asthma
 - Comparison of airway remodeling (smooth muscle, extracellular matrix, reticular basement membrane) in biopsies and airway transverse sections.
 - Assessment of deep inspiration on in vitro and in vivo lung function, and its relation to airway structure
2. Airway Inflammation
 - Validation study of biopsy to assess airway remodeling and inflammation
 - Mast cells in fatal asthma
3. Population Studies
 - Burden of obstructive lung disease (BOLD)
 - Multi-centre national study that involves a random sample of the Busselton adult population
 - Busselton Health Survey 2005-2007
 - Random sample of the Busselton population (adults and children)
 - Analysis: correlates of asthma; cluster analyses of asthma phenotypes
 - Collaborative (The Netherlands; Italy; Hungary) study of bronchodilator response of forced oscillatory technique (FOT)
 - Predicted values for FOT
 - Indigenous Health
 - Working Party on Aboriginal Respiratory Health
 - Epidemiology of obstructive sleep apnoea (Busselton and WA Sleep Health Study)
4. Genetic influences on airway disease and allergy
 - Single nucleotide polymorphisms
 - Collaborative studies with Canadian (AllerGen) and European (GABRIEL; DeCODE; Spirometa) consortia to achieve large genome wide associations.
 - HLA-DR polymorphisms and asthma/allergy
5. Clinical Trials
 - AMAZES: randomised placebo-controlled trial of azithromycin in the treatment of asthma

Techniques

1. Morphometry and stereology
2. Immunohistochemistry
3. Physiology - airway responsiveness; forced oscillation technique
4. Exhaled nitric oxide
5. Atopy
6. Induced sputum
7. Population surveys and epidemiology

Collaborations

Local

Prof A Baddeley	School of Mathematics, University of Western Australia
Dr K Finucane	Department of Pulmonary Physiology, Sir Charles Gairdner Hospital
Dr G Hall	Institute for Child Health Research
Dr D Hillman	Department of Pulmonary Physiology, Sir Charles Gairdner Hospital
Dr A Kicic	Institute for Child Health Research
Dr P McFawn	Department of Physiology, University of Western Australia
Dr G Maguire	WA Department of Health (Broome)
Prof H Mitchell	Department of Physiology, University of Western Australia
Prof AW Musk	Department of Respiratory Medicine, Sir Charles Gairdner Hospital
Dr P Noble	Department of Physiology, University of Western Australia
Mr W Noffsinger	Department of Pulmonary Physiology, Sir Charles Gairdner Hospital
Prof L Palmer	Centre for Genetic Epidemiology and Biostatistics, The University of Western Australia
Prof P Sly	Telethon Institute for Child Health Research
A/Prof S Stick	Telethon Institute for Child Health Research
Dr D Turner	Telethon Institute for Child Health Research
Dr S Young	ProHealth Training.

National

A/Prof M Abramson	Department of Epidemiology and Preventive Medicine, Monash Medical School, Alfred Hospital, VIC
Dr G King	Woolcock Institute of Medical Research, University of Sydney, NSW
A/Prof R Kumar	School of Pathology, University of New South Wales, NSW
Dr K MacKay	Department of Respiratory Medicine, Children's Chest Research Centre, Children's Hospital at Westmead, NSW
A/Prof G Marks	Woolcock Institute of Medical Research, NSW
A/Prof P Robinson	Department of Thoracic Medicine, Royal Children's Hospital, VIC
Dr B Toelle	Woolcock Institute of Medical Research, NSW
Prof J Upham	Princess Alexandra Hospital, QLD
Prof H Walters	School of Medicine, University of Tasmania, TAS
Dr R Wood-Baker	Respiratory Medicine, University of Tasmania, TAS

International

Prof T Bai	MacDonald Research Laboratory, St Paul's Hospital, Vancouver, Canada
Prof M Bonsignore	Istituto di Fisopatologia, Palermo, Italy
Prof W Cookson	Imperial College London, England
Dr M Dohnikof	Department of Pathology, Sao Paulo University Medical School, Brazil
Dr F Green	Faculty of Medicine, University of Calgary, Canada
Dr Z Hantos	University of Szeged, Szeged, Hungary

Prof J Hogg	James Hogg iCAPTURE Centre, University of British Columbia, Vancouver, Canada
Dr D Knight	James Hogg iCAPTURE Centre, University of British Columbia, Vancouver, Canada
Dr T Mauad	Department of Pathology, Sao Paulo University Medical School, Brazil
Dr E Oostveen	University Hospital, Antwerp, Belgium
Prof P Pare	MacDonald Research Laboratory, St Paul's Hospital, Vancouver, Canada
Prof E Spindel	Oregon Regional Primate Research Centre, Oregon, USA

Grants

Year	Principle Invest.	Funding Body; Project Title	\$ Awarded
2007-2009	James, AL Carroll, NG	<i>NHMRC (446800)</i> Assessment of airway smooth muscle hypertrophy in asthma and chronic obstructive pulmonary disease (COPD)	\$286 325
2007-2009	Marks, G Abramson, M James, AL Maguire, G Toelle, B Wood-Baker, R	<i>NHMRC (457385)</i> Burden of obstructive lung disease in Australia	\$737 788 \$122 835 (WA)
2008-2010	McFawn, P Noble, P James, A Mitchell, H	<i>NHMRC (513842)</i> Response of human airways to deep inflation in health and disease	\$270 000
2008	James, AL	<i>Sir Charles Gairdner Hospital Research Foundation (0804)</i> Airway smooth muscle in non-eosinophilic asthma	\$10 000
2008	James, A Elliot, J	<i>Hollywood Private Hospital Research Foundation (RF034)</i> Airway smooth muscle in non-eosinophilic asthma	\$10 000
2008	James, A	<i>Medical Health Research and Infrastructure Fund</i> Department of Health, Government of Western Australia Infrastructure Grant - Round 12	\$18 369
2009	James, A	<i>Hollywood Private Hospital Research Foundation</i> Does sampling the large airways tell you about the small airways in asthma?	\$20 000
2009	James, A	<i>Asthma Foundation of WA</i> Non-eosinophilic asthma	\$45 000
2009	James, A	<i>Sir Charles Gairdner Hospital</i> The use of bronchial biopsies to assess remodeling of airway smooth muscle	\$62 979
2009	James, A	<i>Sir Charles Gairdner Hospital Research Foundation</i> Does sampling the large airways tell you about the small airways in asthma?	\$20 000

Presentations and Invited Lectures

Local

1. James A. Invited speaker: 'Asthma and COPD'. Asthma Foundation WA. September 2008.
2. James A. Invited speaker: 'Asthma management. Asthma Foundation presentation to WA College of Pharmacists. November 2008.

3. Elliot J, Jones R, Carroll M, Mauad T, Dolhnikoff M, Abramson M, McKay K, Bai T, Green F, James A. Extracellular matrix within the airway smooth muscle layer in asthma. Thoracic Society of Australia and New Zealand Annual Scientific Meeting (WA Branch), Mandurah. October 2008.
4. Jones R, Elliot J, Carroll M, Mauad T, Dolhnikoff M, Abramson M, McKay K, Bai T, Green F, James A. The effect of variable tissue depth on estimation of airway smooth muscle cell volume. Thoracic Society of Australia and New Zealand Annual Scientific Meeting (WA Branch), Mandurah. October 2008.

National

1. James A. Invited speaker. 'Morphology of future risk'. Astra Zeneca Leadership Forum, Sydney, NSW. February 2009.

International

1. Carroll M, Carroll N, Baddeley A, Gundersen HJ, James A. Mast cell densities in endobronchial biopsies and in small airways are related. European Respiratory Society Annual Congress, Berlin, Germany. *Eur Respir J* 2008; Abstracts issue: 655s.
2. Carroll M, Carroll N, Baddeley A, Gundersen HJ, James A. Mast cell densities in endobronchial biopsies and whole lung are not related. European Respiratory Society Annual Congress, Berlin, Germany. *Eur Respir J* 2008; Abstracts issue: 655s.
3. James A. Invited speaker: Phenotyping asthma by cluster analysis of quantitative traits. Vancouver, Canada. March 2009.
4. James A. Invited speaker for the affirmative: Masterclass debate: 'The FEF₂₅₋₇₅ should be removed from the pulmonary function report on flow limitation'. Australia and New Zealand Society of Respiratory Scientists Annual Scientific Meeting. Darwin, Northern Territory. April 2009.
5. James A. Invited speaker. 'Prevalence of asthma in indigenous children'. Australia and New Zealand Society of Respiratory Scientists Annual Scientific Meeting. Darwin, Northern Territory. April 2009.
6. James A. Invited speaker. 'Managing asthma for current control and future risk'. AstraZeneca Satellite Symposium, Thoracic Society of Australia and New Zealand Annual Scientific Meeting. Darwin, Northern Territory. April 2009.
7. Hui J, Musk AW, Knuiman MW, Divitini ML, Maier G, Hunter M, Palmer LJ, James AL. Increased doctor-diagnosed asthma in Busselton adults: Is it really asthma? Thoracic Society of Australia and New Zealand Annual Scientific Meeting, Darwin, NT. *Respirology* 2009; 14(1): A17.
8. Elliot J, Jones R, Carroll M, Mauad T, Dolhnikoff M, Abramson M, McKay K, Bai T, Green F, James A. Extracellular matrix within the airway smooth muscle layer in asthma. Thoracic Society of Australia and New Zealand Annual Scientific Meeting, Darwin, NT. *Respirology* 2009; 14(1): A34.
9. Jones R, Elliot J, Carroll M, Mauad T, Dolhnikoff M, Abramson M, McKay K, Bai T, Green F, James A. The effect of variable tissue depth on estimation of airway smooth muscle cell volume. Thoracic Society of Australia and New Zealand Annual Scientific Meeting, Darwin, NT. *Respirology* 2009; 14(1): A35.
10. Musk AW, Hui J, Knuiman MW, Divitini ML, Maier G, Hunter M, Palmer LJ, James AL. Increased doctor-diagnosed asthma in Busselton adults: Is it really asthma? American Thoracic Society Annual Scientific Meeting, San Diego, USA. *Am J Respir Crit Care Med* 179; 2009: A4768.
11. He JQ, Hallstrand TS, Knight D, Chan-Yeung M, Sandford A, Zamar D, Bosse Y, Kozyrskyi A, James A, Laprise C, Daley D, Tripp B. Thymic stromal lymphopoietin gene variant is associated with asthma and airway hyperresponsiveness (AHR). American Thoracic Society Annual Scientific Meeting, San Diego, USA. *Am J Respir Crit Care*

Med 2009; 179; A5421.

12. Williamson JP, Armstrong JJ, McLaughlin RA, Sampson DD, Regli A, Walsh JH, James AL, Hillman DR, Eastwood PR. Regional airway compliance in asthma measured using anatomical optical coherence tomography. American Thoracic Society Annual Scientific Meeting, San Diego, USA. *Am J Respir Crit Care Med* 2009; 179; A5624.
13. Oostveen A, Boda K, van der Grinten C, James A, Nieland H, Young Y, Hantos Z. Reference values for respiratory impedance in adults: A five-centre five-setup study. American Thoracic Society Annual Scientific Meeting, San Diego, USA. *Am J Respir Crit Care Med* 2009; 179; A6061.

Publications

1. Araujo B, Dolhnikoff M, Silva L, Elliot J, Lindeman J, Ferreira D, Mulder A, Gomes H, Fernezlian S, James A, Mauad T. Extracellular matrix components and regulators within the airway. *Eur Resp J* 2008; 32(1): 61-69.
2. James AL, Green FH, Abramson MA, Bai TR, Dolhnikoff M, Mauad T, McKay KO, Elliot JG. Airway basement membrane perimeter distensibility and airway smooth muscle area in asthma. *J Appl Physiol* 2008; 104: 1703-1708.
3. Tremblay K, Daley D, Chamberland A, Lemire M, Montpetit A, Laviolette M, Musk AW, James AL, Chan-Yeung M, Becker A, Kozyrskyj AL, Sandford AJ, Hudson TJ, Paré PD, Laprise C. Genetic variation in immune signaling genes differentially expressed in asthmatic lung tissues. *J Allergy Clin Immunol* 2008; 122(3): 529-536.
4. Gudbjartsson DF, Bjornsdottir US, Halapi E, Helgadottir A, Sulem P, Jonsdottir GM, Thorleifsson G, Helgadottir H, Steinthorsdottir V, Stefansson H, Williams C, Hu J, Beilby J, Warrington N, James A, Palmer LJ, Koppelman GH, Heinzmann A, Krueger M, Boezen HM, Wheatly A, Altmuller J, Shin HD, Uh S-T, Cheong HS, Jonsdottir B, Gislason D, Park C-S, Rasmussen L, Porsbjerg C, Hansen JW, Backer V, Werge T, Janson C, Jönsson U-B, Ng MCY, Chan J, So WY, Ma R, Shah SH, Granger CB, Quyyumi AA, Levey AI, Vaccarino V, Reilly MP, Rader DJ, Williams MJA, van Rij AM, Jones GT, Trabetti E, Malerba G, Pignatti PF, Boner A, Pescollenderung L, Girelli D, Olivieri O, Martinelli N, Ludviksson BR, Ludviksdottir D, Eyjolfsson GI, Arnar D, Thorgeirsson G, Deichmann K, Thompson PJ, Wjst M, Hall IP, Postma DS, Gislason T, Gulcher J, Kong A, Jonsdottir I, Thorsteinsdottir U, Stefansson K. Sequence variants affecting eosinophil numbers associate with asthma and myocardial infarction. *Nature Genet* 2009; 41(3): 342-347.
5. Elliot J, Abramson MJ, Drummer OH, Walters EH, James AL. Time to death and mast cell degranulation in fatal asthma. *Respirology* 2009; 14: 808-813.
6. Jamrozik, E, Knuijna M, James A, Divitini M, Musk AW. Risk factors for adult onset asthma: A 14-year longitudinal study in the Busselton Population. *Respirology* 2009; 14: 813-821.
7. Daley D, Lemire M, Akhabor L, Chan-Yeung M, He1 J, McDonald T, Sandford A, Stefanowicz D, Tripp B, Zamar D, Bosse Y, Ferretti V, Montpetit A, Tessier M-C, Becker A, Kozyrskyj AL, Beilby J, McCaskie PA, Musk AW, Warrington N, James A, Laprise C, Palmer LJ, Paré PD, Hudson TJ. Analyses of associations with asthma in four asthma population samples from Canada and Australia. *Hum Gen*; 2009; 125(4): 445-459.
8. James AL, Bai TR, Mauad T, Abramson MJ, Dolhnikoff M, McKay KO, Maxwell PS, Elliot JG, Green FH. Airway smooth muscle thickness in asthma is related to severity but not duration of asthma. *Eur Respir J* 2009; 34(5): 1040-5.

Fields of Work

1. Sleep apnoea and vascular disease
2. Treatment of sleep apnoea
3. Diagnostic strategies for sleep apnoea
4. Sleep Apnea and cardiovascular Endpoints (SAVE) Study
 - Multi-centre, randomised, controlled trial to determine the effects of nasal continuous positive airway pressure (CPAP) in preventing cardiovascular disease in high risk patients with moderate-severe OSA
5. Predicting Use of Continuous positive airway pressure in Obstructive Sleep Apnoea (PUCOSA study)
 - Prospective, longitudinal cohort study of carefully characterized sleep clinic patients with effective measurement of potential predictors of adherence (e.g. self-efficacy, illness representations, mood, and OSA severity).

Collaborations**Local**

Prof L Beilin	Royal Perth Hospital
Dr K Gain	Royal Perth Hospital
Dr S Mukherjee	West Australian Sleep Disorders Research Institute
Prof L Palmer	Centre for Genetic Epidemiology and Biostatistics, The University of Western Australia
Dr S Phung	West Australian Sleep Disorders Research Institute
Prof G Watts	Royal Perth Hospital

Presentations and Invited Lectures**Local**

1. McArdle, N. Invited speaker: 'Clinical updates: Domiciliary sleep assessment'. Thoracic Society of Australia and New Zealand Annual Scientific Meeting (WA Branch), Mandurah. October 2008.

National

1. McArdle, N. Chair: 'Insomnia and Sleep Health SIG Symposium (CPAP adherence). Australasian Sleep Association Annual Scientific Meeting, Adelaide, SA.

Research Personnel

Ms Jessica Lee	Study Coordinator
Mr Greg Love	Research Assistant (part-time)
Ms Bernadett Szegner	Study Coordinator
Ms Cass Edwards	PhD Candidate
Ms Annette Fedson	PhD Candidate
Ms Laila Simpson	PhD Candidate
Ms Kim Ward	PhD Candidate
Dr John Tan	Cardiology Registrar
Ms Archana Aran	4 th Year Medical Student Research Project
Mr Jian Yang Chong	4 th Year Medical Student Research Project
Mr Chin Loon Chua	4 th Year Medical Student Research Project
Ms Radhika Ellies	4 th Year Medical Student Research Project
Ms Amelea Fang	4 th Year Medical Student Research Project
Ms Lauren Gibson	4 th Year Medical Student Research Project
Ms Natalie Koroznikova	4 th Year Medical Student Research Project
Ms Emma Lancaster	4 th Year Medical Student Research Project
Mr Sam McTigue	4 th Year Medical Student Research Project
Ms Elena Mamaeva	4 th Year Medical Student Research Project
Mr Simon Papaelias	4 th Year Medical Student Research Project
Mr Kavinda Senasinghe	4 th Year Medical Student Research Project
Ms Priya Siva	4 th Year Medical Student Research Project
Mr Benedict Tan	4 th Year Medical Student Research Project
Mr Derek Teh	4 th Year Medical Student Research Project
Ms Joelin Teh	4 th Year Medical Student Research Project
Ms Sheyva Tiwari	4 th Year Medical Student Research Project
Mr Kent Hodgson	Health Science Practicum Student
Ms Sarah McMichael	Health Science Practicum Student

Fields of Work

1. WA Sleep Health Study (WASHS)
 - Epidemiology and genetic epidemiology of obstructive sleep apnoea (OSA)
2. Epidemiology of obstructive sleep apnoea
 - Inter-relationship of OSA with cardiovascular disease and depression
3. Busselton Healthy Ageing Study (BHAS)
 - Causes and risk factors for a wide range of conditions of public health importance in an ageing population:
 - respiratory disease
 - cardiovascular disease
 - sleep disorders.
4. Sleep Apnea and cardiovascular Endpoints (SAVE) Study
 - Multi-centre, randomised, controlled trial to determine the effects of nasal continuous positive airway pressure (CPAP) in preventing cardiovascular disease in high risk patients with moderate-severe OSA

5. Genetic epidemiology
 - Biologically plausible candidate genes for OSA susceptibility, severity and response to therapy in WASHS participants and in the Busselton Health Study
 - International Sleep Genetics Consortium (ISGC)

Techniques

1. Population surveys
2. Questionnaires and other self-report instruments
3. Blood biochemistry
4. Blood biospecimen – DNA, plasma and serum
5. Polysomnography
6. Genotyping
7. Home sleep study devices
8. Dual Energy X-Ray Absorptiometry (DEXA)
9. Anthropometric measurements
10. Carotid Intima-Media Thickness (CIMT) ultrasound
11. Assessment of mental health outcomes in sleep patients

Collaborations

Local

Prof O Almeida	School of Psychiatry and Clinical Neurosciences, The University of Western Australia
Dr D Blacker	Department of Neurology, Sir Charles Gairdner Hospital
Prof N de Klerk	Department of Biostatistics, Telethon Institute for Child Health Research
Prof P Eastwood	West Australian Sleep Disorders Research Institute
Prof G Hankey	Department of Neurology, Royal Perth Hospital
Prof J Hung	Department of Cardiology, Sir Charles Gairdner Hospital
A/Prof A James	West Australian Sleep Disorders Research Institute
Dr J Kirkness	West Australian Sleep Disorders Research Institute
Clin Prof AW Musk	Department of Respiratory Medicine, Sir Charles Gairdner Hospital
Dr S Shetty	Department of Cardiology, Royal Perth Hospital

National

Prof R Grunstein	Woolcock Institute of Medical Research in Sydney
Prof D McEvoy	Adelaide Institute for Sleep Health
Prof G Marks	Woolcock Institute of Medical Research
A/Prof N Rogers	Brain & Mind Research Institute, University of Sydney

International

Prof D Christiani	Harvard School of Public Health, USA
Dr A Malhotra	Harvard Medical School, USA
Prof A Pack	University of Pennsylvania Medical School

Grants

Year	Principle Invest.	Funding Body; Project Title	\$ Awarded
2004-2009	Palmer, LJ Holman, D Stanley, F de Klerk, N Zeps, N van Bockxmeer, F Semmens, J Smith, M	<i>NHMRC Enabling Grant (Special Facilities)</i> (303312) A national population-based genetic epidemiology, biospecimen and bioinformatic resource	\$2 900 000 15% allocated to sleep research
2005-2009	Grunstein, R McEvoy, D Palmer, LJ Marks, G Pierce, R Rogers R	<i>NHMRC Enabling Grant (Clinical Trials)</i> (343020) Australian Sleep Health Clinical Trials Network.	\$1 040 000 10% allocated to sleep research
2006-2010	Palmer, L Beilby, J van Bockxmeer, F Zeps, N Semmens, J Stanley, F Klinken, P Constable, I Christiansen, F	<i>NHMRC Enabling Grant (Special Facilities)</i> (404116) The Western Australian DNA Bank	\$1 375 000 15% allocated to sleep research
2008	Mukherjee, S	<i>Hollywood Private Hospital Research Foundation</i> The Western Australian Sleep Health Study	\$20 000
2008	Mukherjee, S	<i>Sir Charles Gairdner Hospital Research Foundation</i> The Western Australian Sleep Health Study	\$20 000

Presentations and Invited Lectures

Local

1. Mukherjee S. Invited speaker: 'Sleep Disorders'. WA Department of Industry and Resources as part of their workplace seminars. October 2008.

International

1. Mukherjee S. Invited speaker: 'GORD, sleep apnoea and asthma. Australian Indian Medical Association, Perth. October 2008.
2. Mukherjee S. Invited speaker: 'New strategies in asthma therapy'. Australian Indian Medical Association, Perth. July 2008.
3. Palmer LJ. Invited speaker: Plenary Session 'Complex Genetics': 'Biobanks: Next steps in gene discovery'. Human Genetics Society of Australasia Annual Scientific Meeting, Adelaide, Australia. August 2008.
4. Lee J, Fedson A, Simpson L, Ward K, Love G, Cooper M, Singh B, Hillman D, Palmer LJ, Mukherjee S. The Western Australian Sleep Health Study (WASHS). 20th Annual Scientific Meeting of the Australasian Sleep Association and Australasian Sleep Technologists Association. *Sleep and Biological Rhythms* 2008 Oct; 5(Supp 1): A40.
5. Fedson A, Mukherjee S, Cooper M, Love G, Lee J, Simpson L, Ward K, Hung J, Palmer LJ, Hillman D. Development of a screening instrument to assist in the diagnosis of obstructive sleep apnoea. 20th Annual Scientific Meeting of the Australasian Sleep Association and Australasian Sleep Technologists Association. *Sleep and Biological Rhythms* 2008 Oct; 5(Supp 1): A9.

6. Fedson A, Hung J, Cooper M, Love G, Lee J, Ward K, Simpson L, Palmer LJ, Hillman D, Mukherjee S. The independent association of cardiovascular disease outcomes with obstructive sleep apnoea. 20th Annual Scientific Meeting of the Australasian Sleep Association and Australasian Sleep Technologists Association. *Sleep and Biological Rhythms* 2008 Oct; 5(Supp 1): A12.
7. Simpson L, Palmer LJ, Mukherjee S, Hillman D, Eastwood P, Potter J, Cooper M, Ward K, Fedson A, Lee J, Maddison K, Walsh J, Kirkness J. Regional fat deposition and severity of obstructive sleep apnoea. 20th Annual Scientific Meeting of the Australasian Sleep Association and Australasian Sleep Technologists Association. *Sleep and Biological Rhythms* 2008 Oct; 5(Supp 1): A13.
8. Ward K, Hudson E, Cooper M, Lee J, Love G, Fedson A, Simpson L, Hillman D, Palmer LJ, Mukherjee S. Self-reported motor vehicle crashes (MVC) and obstructive sleep apnoea (OSA). 20th Annual Scientific Meeting of the Australasian Sleep Association and Australasian Sleep Technologists Association. *Sleep and Biological Rhythms* 2008 Oct; 5(Supp 1): A11.
9. Palmer LJ. Invited speaker: 'Shaking the tree: Population-based Human Genome Epidemiology in Western Australia'. Samuel Lunenfeld Research Institute, Mt Sinai Hospital, Toronto, Canada. March 2009.
10. Palmer LJ. Invited speaker: 'Betting on Genomics in Western Australia'. Institute for Translational Medicine and Therapeutics (ITMAT) International Symposium Global Approaches to Translational Research. University of Pennsylvania School of Medicine, United States of America. April 2009.

Publications

1. Musk AW, James AL, Palmer LJ, Ryan GF, Lake F, Golledge C, de Klerk NH. Respiratory infections and lung function in an Australian Aboriginal community. *Respirology* 2008; 13(2): 257-262.
2. McCaskie PA, Chapman CML, Beilby JP, Hung J, McQuillan BM, Powell BL, Thompson PL, Palmer LJ. Single nucleotide polymorphisms and haplotypes in the 15-Lipoxygenase gene are associated with LDL-C and carotid plaque but not carotid intima-media thickness or risk of coronary heart disease. *Human Genetics* 2008; 123(5): 445-453.
3. CRP CHD Genetics Collaboration: Danesh J, Hingorani A, Wensley F, Casas JP, Smeeth L, Samani NJ, Hall A, Whincup P, Morris R, Lawlor DA, Davey Smith G, Timpson N, Ebrahim S, Brown M, Sandhu M, Reiner A, Psaty B, Lange L, Cushman M, Tracy R, Nordestgaard BG, Tybjaerg-Hansen A, Zacho J, Hung J, Thompson P, Beilby J, Palmer LJ, Fowkes G, Lowe G, Tzoulaki I, Kumari M, Overvad K, Khaw KT, Benjamin EJ, Larson MG, Yamamoto JF, Chiodini B, Franzosi M, Norman PE, Hankey GJ, Jamrozik K, Rimm E, Pai J, Heckbert S, Bis J, Yusuf S, Anand S, Engert J, Collins R, Melander O, Berglund G, Ladenvall P, Johansson L, Jansson JH, Hallmans G, Humphries S, Manson J, Saleheen D, Frossard P, Sattar N, Robertson M, Shepherd J, Schaefer E, Hofman A, Witteman JCM, Kardys I, de Faire U, Bennet A, O'Reilly D, McMahan A, Packard C, Clarke R, Greenland P, Bowden J, Di Angelantonio E, Shah T, Thompson S, Verzilli C, Walker M, Whittaker J. Collaborative pooled analysis of data on C-reactive protein gene variants and coronary disease: judging causality by Mendelian randomization. *Eur J Epidemiol* 2008; 23(8): 531-540.
4. Lawlor DA, Harbord RM, Timpson NJ, Lowe GD, Rumley A, Gaunt TR, Baker I, Yarnell JW, Kivimäki M, Kumari M, Norman PE, Jamrozik K, Hankey GJ, Almeida OP, Flicker L, Warrington N, Marmot MG, Ben-Shlomo Y, Palmer LJ, Day IN, Ebrahim S, Smith GD. The association of C-reactive protein and CRP genotype with coronary heart disease: findings from five studies with 4,610 cases amongst 18,637 participants. *PLOS ONE* 2008; 3(8): e3011.

5. Carter KW, Hung J, Powell BL, Wiltshire S, Foo BT, Leow YC, McQuillan BM, Jennens M, McCaskie PA, Thompson PL, Beilby JP, Palmer LJ. Association of interleukin-1 gene polymorphisms with central obesity and metabolic syndrome in a coronary heart disease population. *Human Genet* 2008; 124(3): 199-206.
6. Powell BL, Wiltshire S, Arscott G, McCaskie PA, Hung J, McQuillan BM, Thompson PL, Carter KW, Palmer LJ, Beilby JP. Association of PARL rs3732581 genetic variant with insulin levels, metabolic syndrome and coronary artery disease. *Human Genet* 2008; 124(3): 263-270.
7. Smallwood L, Allcock R, van Bockxmeer F, Warrington N, Palmer LJ, Iacopetta B, Golledge J, Norman PE. Polymorphisms of the matrix metalloproteinase 9 gene and abdominal aortic aneurysm. *Br J Surg* 2008; 95(10): 1239-1244.
8. Webster RJ, Warrington NM, Weedon MN, Hattersley AT, McCaskie PA, Beilby JP, Palmer LJ, Frayling TM. The association of common genetic variants in the APOA5, LPL and GCK genes with longitudinal changes in metabolic and cardiovascular traits. *Diabetologia* 2009; 52(1): 106-114.
9. Gudbjartsson DF, Bjornsdottir US, Halapi E, Helgadottir A, Sulem P, Jonsdottir GM, Thorleifsson G, Helgadottir H, Steinthorsdottir V, Stefansson H, Williams C, Hui J, Beilby J, Warrington NM, James A, Palmer LJ, Koppelman GH, Heinzmann A, Krueger M, Boezen HM, Wheatley A, Altmuller J, Shin HD, Uh ST, Cheong HS, Jonsdottir B, Gislason D, Park CS, Rasmussen LM, Porsbjerg C, Hansen JW, Backer V, Werge T, Janson C, Jönsson UB, Ng MC, Chan J, So WY, Ma R, Shah SH, Granger CB, Quyyumi AA, Levey AI, Vaccarino V, Reilly MP, Rader DJ, Williams MJ, van Rij AM, Jones GT, Trabetti E, Malerba G, Pignatti PF, Boner A, Pescollerung L, Girelli D, Olivieri O, Martinelli N, Ludviksson BR, Ludviksdottir D, Eyjolfsson GI, Arnar D, Thorgeirsson G, Deichmann K, Thompson PJ, Wjst M, Hall IP, Postma DS, Gislason T, Gulcher J, Kong A, Jonsdottir I, Thorsteinsdottir U, Stefansson K. Sequence variants affecting eosinophil numbers associate with asthma and myocardial infarction. *Nat Genet* 2009; 41(3): 342-347.
10. Daley D, Lemire M, Akhabir L, Chan-Yeung M, He JQ, McDonald T, Sandford A, Stefanowicz D, Tripp B, Zamar D, Bosse Y, Ferretti V, Montpetit A, Tessier M-C, Becker A, Kozyrskyj AL, Beilby J, McCaskie PA, Musk B, Warrington N, James A, Laprise C, Palmer LJ, Paré PD, Hudson TJ. Analyses of associations with asthma in four asthma population samples from Canada and Australia. *Human Genet* 2009; 125(4): 445-359.
11. Golledge J, Clancy P, Jones GT, Cooper M, Palmer LJ, van Rij AM, Norman PE. Possible association between genetic polymorphisms in transforming growth factor beta receptors, serum transforming growth factor beta1 concentration and abdominal aortic aneurysm. *Br J Surg* 2009; 96(6): 628-632.
12. Chandler D, Dragović M, Cooper M, Badcock JC, Mullin BH, Faulkner D, Wilson SG, Hallmayer J, Howell S, Rock D, Palmer LJ, Kalaydjieva L, Jablensky A. Impact of Neuritin 1 (NRN1) polymorphisms on fluid intelligence in schizophrenia. *Am J Med Genet B Neuropsychiatr Genet* 2009 Jun 30. [Epub ahead of print].

Book Chapter

1. Pennell C, Palmer L, Knight B, Relton C, Lye S. Approaches to evaluate gene-environment interactions underlying the developmental origins of health disease. In: Newnham JP, Ross MG, eds. Early life origins of human health and disease. Basel: Karger 2009.

Research Personnel

Fields of Work

1. Neuro-mechanical efficiency of the diaphragm
2. Respiratory failure and the chemical control of breathing in chronic obstructive lung disease
3. Lung volume reduction surgery in emphysema
4. Atrial fibrillation and obstructive sleep apnoea
5. The effect of positive end-expiratory pressure

Techniques

1. Measurement of diaphragm displacement by radiography, fluoroscopy and ultrasound;
2. Measurement of diaphragm electromyography;
3. Transthoracic pneumonostomy.

Collaborations

Local

Dr Martin Phillips	Department of Respiratory Medicine, Sir Charles Gairdner Hospital
Dr Pradyot Saklani	Department of Cardiology, Sir Charles Gairdner Hospital
Dr Adrian Regli	Intensive Care Unit, Sir Charles Gairdner Hospital
Dr Vernon van Heerden	Intensive Care Unit, Sir Charles Gairdner Hospital

SUMMARY OF RESEARCH ACTIVITIES: 2008 - 2009

Number of research staff	
Full-time	9
Part-time	2
Total	11
Number of students	
Honours	2
4 th Medical Students	20
PhD	10
Cardiology Registrar	1
Total	33
Number of publications, including book chapters	31
Number of presentations	
Local	21
National	8
International	39
Total	68
Grants awarded to WASDRI Researchers:	
Total of all current grants	\$4 070 186
Total for 2008/2009	\$1 025 375