

WEST AUSTRALIAN SLEEP DISORDERS RESEARCH INSTITUTE (INC.)

SUMMARY OF RESEARCH ACTIVITY

DRS BHAJAN SINGH AND BILL FINUCANE – DIAPHRAGM/CONTROL OF BREATHING

Fields of Work

1. Neuro-mechanical efficiency of the diaphragm;
2. Respiratory failure and the chemical control of breathing in chronic obstructive lung disease.

Grants 2001-2002

2000-01	B Singh	ALF Boehringer Ingelheim Chronic Airflow Limitation Fellowship	\$41,000 p.a.
2001	B Singh KE Finucane DR Hillman JA Panizza	Sir Charles Gairdner Hospital Research Foundation	\$12,000
2002	B Singh KE Finucane DR Hillman	Sir Charles Gairdner Hospital Research Foundation	\$10,000

Research Personnel

Ms Karen Wills Research Assistant Commenced 29 July 2002

Collaborations

Australian Research Centre for Medical Engineering (ARCME), Murdoch University

Techniques

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

Presentations and Invited Lectures

Local

1. Singh B. Measuring neural drive to the diaphragm. Lung Research Group, Perth.

Publications

1. Singh B, Eastwood PR, Finucane KE. The volume displaced by diaphragm motion in emphysema. *J Appl Physiol* 2001; 91(5): 1913-1923.

2. Lee YCG, Singh B, Pang SC, De Klerk NH, Hillman DR and Musk AW. Radiographic (ILO) readings predict arterial oxygen desaturation during exercise in subjects with asbestosis. *Occup Environ Med* 2002 [In Press].
3. Singh B, Panizza JA, Finucane KE. Breath-by-breath measurement of the volume displaced by diaphragm motion. *Jappt Physiol* 2002 [Accepted].

Patent

2002 KE Finucane, B Singh. Breath by breath measurement of the volume displaced by the diaphragm. *Patent pending*.

DRS DAVID HILLMAN AND PETER EASTWOOD- UPPER AIRWAY, RESPIRATORY MUSCLES

Fields of Work

1. Assessment of upper airway dimensions using optical interferometry;
2. Effect of lung volume on upper airway collapsibility;
3. Respiratory muscle training in patients with chronic lung disease;
4. Aerophagia and gastroesophageal reflux in non-invasive positive pressure ventilation.

Grants 2001-2002

2001	PR Eastwood DR Hillman PR Platt	Sir Charles Gairdner Hospital Research Foundation (F01/02)	\$12,500
2001	PR Eastwood DD Sampson DR Hillman	Australian Health Management Group (139006)	\$50,842
2000-02	PR Eastwood DR Hillman	NHMRC (109903)	\$317,324
2002	PR Eastwood DR Hillman	Sir Charles Gairdner Hospital Research Foundation	\$10,000
2002	PR Eastwood	Medical and Health Research Infrastructure Council (WA)	\$15,000
2002-04	PR Eastwood DR Hillman SC Jenkins N Cecins D Green M Phillips	NHMRC (212016)	\$340,000

Research Personnel

Dr Tom Van der Touw	Research Fellow	Commenced 2 June 2002
Ms Kelly Shepherd	Research Assistant	
Mr Gavin Sturdy	Research Assistant	Commenced 17 June 2002
Mrs Cathryn Jensen	Research Assistant, AVCAL trial	

Ms Kylie Hill	PhD candidate
Ms Cara Weisbrod	Masters candidate
Ms Louise Richmond	Honours candidate
Mr Michael Hibbard	Honours candidate
Ms Bernie Camarri	Honours candidate

Collaborations

Local

A/Prof S Jenkins, Department of Physiotherapy, SCGH; School of Physiotherapy, Curtin University;

Dr P Platt, Department of Anaesthetics, SCGH;

Professor D, Sampson, Department of Electronic and Electrical Engineering, UWA;

A/Prof J Pan, Department of Mechanical Engineering, UWA;

A/Prof G Allison, Centre for Musculoskeletal Studies, UWA.

National

Dr D McEvoy, Department of Respiratory Medicine, Repatriation Hospital, SA;

Dr R Grunstein, Sleep Disorders Centre, Royal Prince Alfred Hospital, NSW;

Dr E Ellis,

Dr M Berthon-Jones, ResMed Ltd, North Ryde, NSW;

A/Prof J Wheatley, Department of Respiratory Medicine, Westmead Hospital , Sydney, NSW;

Dr T Amis, Department of Respiratory Medicine, Westmead Hospital , Sydney, NSW;

Mr J Kirkness, Department of Respiratory Medicine, Westmead Hospital , Sydney, NSW.

International

A/Prof A Schwartz, Johns Hopkins Medical School, Asthma and Allergy Centre, Baltimore, Maryland, USA;

Mr R Brandmeier, MAP Medizin-Technologie GmbH, Martinsreid, Germany.

Techniques

1. Oesophageal impedance
2. Oesophageal manometry
3. Administration of non-invasive ventilation
4. Polysomnography
5. Respiratory muscle training

Presentations and Invited Lectures

Local

1. PR Eastwood. "Famous cases of ethical misconduct." Thoracic Society of Australia and New Zealand Winter Scientific Meeting (Western Australian Branch). York, WA, July 2001.
2. PR Eastwood. "Laboratory-based exercise testing" and "Respiratory muscle function: assessment and role of training". Short course in Pulmonary Rehabilitation. Curtin University of Western Australia. September 2001.
3. PR Eastwood. "Upper airway collapse during general anaesthesia and sleep." Thoracic Society of Australia and New Zealand Summer Scientific Meeting (Western Australian Branch). Yanchep, WA, November 2001.

4. PR Eastwood. "Sleep and exercise." Australian Institute of Management, Senior management of Alcoa of Australia, December 2001.
5. PR Eastwood. "Publications: choosing the right journal." Thoracic Society of Australia and New Zealand Winter Scientific Meeting (Western Australian Branch). York, WA, July 2002.
6. PR Eastwood. Chair – Research Updates. Thoracic Society of Australia and New Zealand Winter Scientific Meeting (Western Australia Branch). York, WA July 2002
7. PR Eastwood. "Behaviour of the upper and lower oesophageal sphincters during sleep." Lung Research Group Sir Charles Gairdner Hospital, Nedlands, WA, August 2002.
8. PR Eastwood. Invited Lecture "Gastroesophageal reflux and sleep apnoea." Sleep-disordered breathing support group of Western Australia, October 2002.

National

1. DR Hillman. "Bilevel ventilation in ventilatory failure". Australasian Sleep Association, Postgraduate Course, Adelaide 2001
2. DR Hillman. "Pathophysiology and Medical Management of Sleep Disordered Breathing". Australasian Otolaryngology Registrar's Conference, Perth 2001.
3. DR Hillman. "Medical Management of Sleep Apnoea". Australian Society of Otolaryngology Head and Neck Surgery, Annual Scientific Meeting, Perth 2002.
4. DR Hillman. "Pathophysiology of Obstructive Sleep Apnoea". Australian Society of Otolaryngology Head and Neck Surgery, Annual Scientific Meeting: Snoring and Sleep Apnoea Workshop, Perth 2002.
5. DR Hillman. "Daytime predictors of sleep related hypoventilation in neuromuscular disease", "Upper airway evaluation in obstructive sleep apnoea", "Utility of mandibular advancement splints in OSA", "Workshop: Non-invasive Ventilation". Thoracic Society of Australia and New Zealand, New Zealand Branch Annual Scientific Meeting Invited Speaker, Wellington 2002.
6. PR Eastwood. Invited Lectures: "Upper and lower oesophageal sphincter function during sleep" and "Peroral vs percutaneous approach for measuring genioglossus EMG". Symposium on Sleep and Breathing. Melbourne, February 2002.

International

1. DR Hillman. "Subjective tests of sleepiness are not better than objective measurements." American Thoracic Society, International Conference. Atlanta May 2002.
2. PR Eastwood. Chair - Control of breathing during wakefulness and sleep. American Thoracic Society Annual Scientific Meeting. Atlanta May 2002.
3. Eastwood PR, Shepherd KL, Szollosi I, Allison GT, Hillman DR. Genioglossus EMG – percutaneous vs peroral approach. *Am J Respir Crit Care Med* 2002; 165: A40.
4. Katagiri S, Hillman DR, Shepherd KL, Eastwood PR. Modulation of upper and lower esophageal sphincter tone by sleep state. *Am J Respir Crit Care Med* 2002; 165: A406.

Publications

1. Loadman JA, Hillman DR. Anaesthesia and Sleep Apnoea. *Brit J Anaesth* 2001; 86: 254-66.
2. Rogers IR, Inglis S, Speedy D, Hillman D, Noffsinger W, Jacobs I. Changes in respiratory function during a wilderness multisport endurance competition. *Wild Environ Med* 2001; 12:13-16.

3. Sher AE, Flexon PB, Hillman D et al. Temperature controlled radio-frequency tissue volume reduction in the treatment of snoring. *Otolaryngol Head Neck Surg* 2001; 125: 312-318.
4. Singh B, Eastwood PR, Finucane KE. The volume displaced by diaphragm motion in emphysema. *J Appl Physiol* 2001; 91: 1913-1923.
5. Eastwood PR, Hillman DR, Finucane, KE. Inspiratory muscle performance in endurance athletes and sedentary subjects. *Respirology* 2001; 6: 95-104.
6. Satoh M, Eastwood PR, Smith CA, Dempsey JA. Non-chemical elimination of inspiratory motor output via mechanical ventilation in sleep. *Am J Respir Crit Care Med* 2001, 163: 1356-1364.
7. Rogers IR, Speedy D, Hillman D, Noffsinger W, Inglis S. Respiratory function changes in a wilderness multisport endurance competition: a prospective case study. *Wild Environ Med* 2002; 13: 135-9.
8. Eastwood PR, Szollosi I, Platt PR, Hillman DR. Collapsibility of the upper airway during anaesthesia with Isoflurane. *Anesthesiology* 2002; 97: 786-93.
9. Eastwood PR, Szollosi I, Platt PR, Hillman DR. Upper airway collapse during general anaesthesia and sleep. *Lancet* 2002; 359: 1207-1209, 2002.
10. Dempsey, JA, Smith CA, Wilson CR, Eastwood PR and Khoo MCK. Sleep-Induced Respiratory Instabilities. In: Sleep Apnea (editor, A.J. Pack), Marcel Dekker, New York, 2002, p 57-98.
11. Sturdy GS, Hillman DR, Green D, Jenkins S, Cecins N, Eastwood PR. Feasibility of high-intensity interval-based respiratory muscle training in COPD. *Chest* [in press, accepted 28-Jul-2002].
12. Lee YCG, Singh B, Pang SC, De Klerk NH, Hillman DR, Musk AW. Radiographic (ILO) readings predict arterial oxygen desaturation during exercise in subjects with asbestosis. *Occup Environ Med* 2002 [in press].

DRS ALAN JAMES AND NEIL CARROLL – AIRWAY REMODELING AND INFLAMMATION

Fields of Work

1. Mechanisms of persistent airway inflammation
 - In asthma and COPD
 - Lymphoid aggregates
 - Proliferation, apoptosis
 - Dendritic cells
 - Inflammatory cells
 - HL-DR
2. Airway remodeling and airway mechanics
 - Airway dimensions
 - Fibroblasts
 - Growth factors
3. Assessment of airway inflammation
 - Induced sputum, methacholine vs. hypertonic saline
4. Epidemiology of respiratory disease
 - Aboriginal population studies
 - Busselton population studies

5. Genetic influences on airway disease and allergy
 - Polymorphisms
 - Genome screen
 - HLA-DR
6. SIDS
 - Influence of parental smoking on airway structure and inflammation

Grants 2001-2002

2000-02	AL James NH de Klerk ML Croft J Hansen	NHMRC (110320)				\$387,349
2001-03	AL James NG Carroll	NHMRC (169901)				\$100,000
2002-03	M Knuiman AL James AW Musk	NHMRC (211988)				\$113,800
2002	AL James P Maxwell	Hollywood Private Hospital Foundation	Research			\$5,000
2003-05	AL James NG Carroll	Western Australian Institute for Medical Research				\$63,000
2003-05	AW Musk AL James PN le Souëf WOC Cookson G Waterer M Knuiman NG de Klerk J Beilby	Western Australian Institute for Medical Research				\$73,000 p.a.

Research Personnel

Ms Jasmine Lamb	Research Officer	Commenced July 2002
Ms P Maxwell	Research Officer	
Mr John Elliot	Research Officer	
Mr Mark Carroll	Research Assistant	
Mr Slavko Mutavdzic	Research Assistant	
Mrs Cathryn Jensen	Research Assistant	Commenced August 2002

Collaborations

Local

Clin Prof AW Musk, Department of Respiratory Medicine, SCGH;
 Prof N de Klerk, Department of Biostatistics, Institute for Child Health Research;
 Dr K Finucane, Department of Pulmonary Physiology, SCGH;
 Dr D Hillman, Department of Pulmonary Physiology, SCGH;
 Dr J Hansen, Department of Respiratory Medicine, Institute for Child Health Research;
 Dr D Knight, University Department of Medicine, UWA;
 Prof P le Souëf, Department of Paediatrics, Princess Margaret Hospital;
 A/Prof H Mitchell, Department of Physiology, UWA;

Clinical Prof AW Musk, Department of Respiratory Medicine, SCGH;
Prof P Sly, Institute for Child Health Research;
Dr D Turner, Institute for Child Health Research;
Prof P Thompson, University Department of Medicine, UWA.

National

A/Prof R Kumar, School of Pathology, University of New South Wales;
Dr K MacKay, Department of Respiratory Medicine, Children's Chest Research Centre, Children's Hospital at Westmead, NSW;
A/Prof M Abramson, Department of Epidemiology and Preventive Medicine, Monash Medical School, Alfred Hospital, Victoria;
Prof H Walters, Department of Epidemiology and Preventive Medicine, Monash Medical School, Alfred Hospital, Victoria;
A/Prof P Robinson, Department of Thoracic Medicine, Royal Children's Hospital, Victoria;
A/Prof J Wilson, Department of Respiratory Medicine, Alfred Hospital, Victoria.

International

Dr F Green, Faculty of Medicine, University of Calgary, Canada;
Prof J Hogg, MacDonald Research Laboratory, St Paul's Hospital, Vancouver, Canada;
Prof P Pare, MacDonald Research Laboratory, St Paul's Hospital, Vancouver, Canada;
Prof WOCM Cookson, Henry Wellcome Building for Human Genetics, Oxford University, England;
Prof P Jeffrey, Royal Brompton National Heart and Lung Institute, London, England;
Prof M Vignola, Istituto di Fisopatologia, Palermo, Italy;
Prof E Spindel, Oregon Regional Primate Research Centre, Oregon, USA.

Techniques

1. Morphometry
2. Immunohistochemistry
3. Airway responsiveness
4. Lung function
5. Atopy testing
6. Induced sputum.

Presentations and Invited Lectures

National

1. Carroll N, Carroll M, Dromey J, Down K, Elliot J, Mutavdzic S, James A. In-situ proliferation of inflammatory cells and smooth muscle cells in patients with and without asthma. *Respirology* 2002; 7: A1.
2. Elliot J, Carroll N, James A. Airway lymphoid aggregates in non-smokers, smokers and mild and severe asthmatics. *Respirology* 2002; 7: A18.
3. James A, Maxwell P, Elliot J, Carroll N. Comparison of sputum induction using inhaled methacholine or hypertonic saline. *Respirology* 2002; 7: A19.
4. James A, Elliot J, Carroll N, Mutavdzic S, Robinson P. Maternal cigarette smoking and HLA-DR expression in airway lymphomononuclear cells in infants. *Respirology* 2002; 7: A30.

International

1. Carroll N, Carroll M, Dromey J, Down K, Elliot J, Mutavdzic S, James A. In-situ proliferation of inflammatory cells and smooth muscle cells in patients with and without asthma. *Am J Respir Crit Care Med* 2002; 165(8): A313.
2. James A, Elliot J, Carroll N, Mutavdzic S, Robinson P. Maternal cigarette smoking and HLA-DR expression in airway lymphomononuclear cells in infants. *Am J Respir Crit Care Med* 2002; 165(8): A450.
3. Elliot J, Carroll N, James A. Airway lymphoid aggregates in non-smokers, smokers and mild and severe asthmatics. *Am J Respir Crit Care Med* 2002; 165(8): A311.
4. A James. Invited speaker - "Remodeling of airway smooth muscle in asthma." American Thoracic Society Annual Scientific Meeting, Atlanta, Georgia, USA. April 2002.
5. A James. Invited speaker - "Natural History of Asthma." New Zealand Annual Respiratory Scientific Meeting. Rotorua, New Zealand. July, 2002.
6. A James. Invited speaker - 'Structure: normal and abnormal development of alveoli in preterm and term infants.' European Respiratory Symposium, Stockholm, Sweden. September 2002.

Publications

1. Palmer LJ, Knuiman MW, Divitini ML, Burton PR, James AL, Bartholomew HC, Ryan G, Musk AW. Familial aggregation and heritability of adult lung function: Results from the Busselton Health Study. *Eur Respir J* 2001; 17: 696-702.
2. Moffat MF, Schou C, Faux JA, Abecasis GR, James AL, Musk AW, Cookson WOCM. Association between quantitative traits underlying asthma and the HLA-DRB1 locus in a family – based population sample. *Eur J Hum Genet* 2001; 9: 341-346.
3. Palmer LJ, Cookson WOCM, James AL, Musk AW, Burton PR. Gibbs-sampling – based segregation analysis of asthma-associated quantitative traits in a population-based sample of nuclear families. *Genet Epidemiol* 2001; 20: 356-372.
4. James AL. Peripheral airways in asthma. Current Allergy and Asthma Reports. Ed Kaliner MA. Current Science Inc. Philadelphia PA. *Current Allergy and Asthma Reports* 2002; 2(2): 166-174.
5. Carroll NG, Mutavdzic S, James AL. Distribution and degranulation of airway mast cells in normal and asthmatic subjects. *Eur Respir Dis* 2002; 19: 879-885.
6. Carroll NG, Mutavdzic S, James AL. Increased mast cells and neutrophils in submucosal mucous glands and mucous plugging in patients with asthma. *Thorax* 2002. [In press].
7. James AL, Carroll NG. Transbronchial biopsy as a tool to evaluate small airways disease in asthma. Cons. Editorial. *Eur Respir J* 2002; 20:1-3.
8. Verheijden MW, Ton A, James AL, Wood M, Musk AW. Respiratory morbidity and lung function in two aboriginal communities in Western Australia. *Respirology* 2002; 7: 247-253.
9. James AL, Maxwell P, Pearce-Pinto G, Elliot JG, Carroll NG. The relationship of reticular basement membrane thickness to airway wall remodeling in asthma. *Am J Respir Crit Care Med* 2002. [Accepted].
10. Elliot J, Carroll N, James A, Robinson P. Airway alveolar attachment points and exposure to cigarette smoke in utero. *Am J Respir Crit Care Med* 2002. [Accepted].