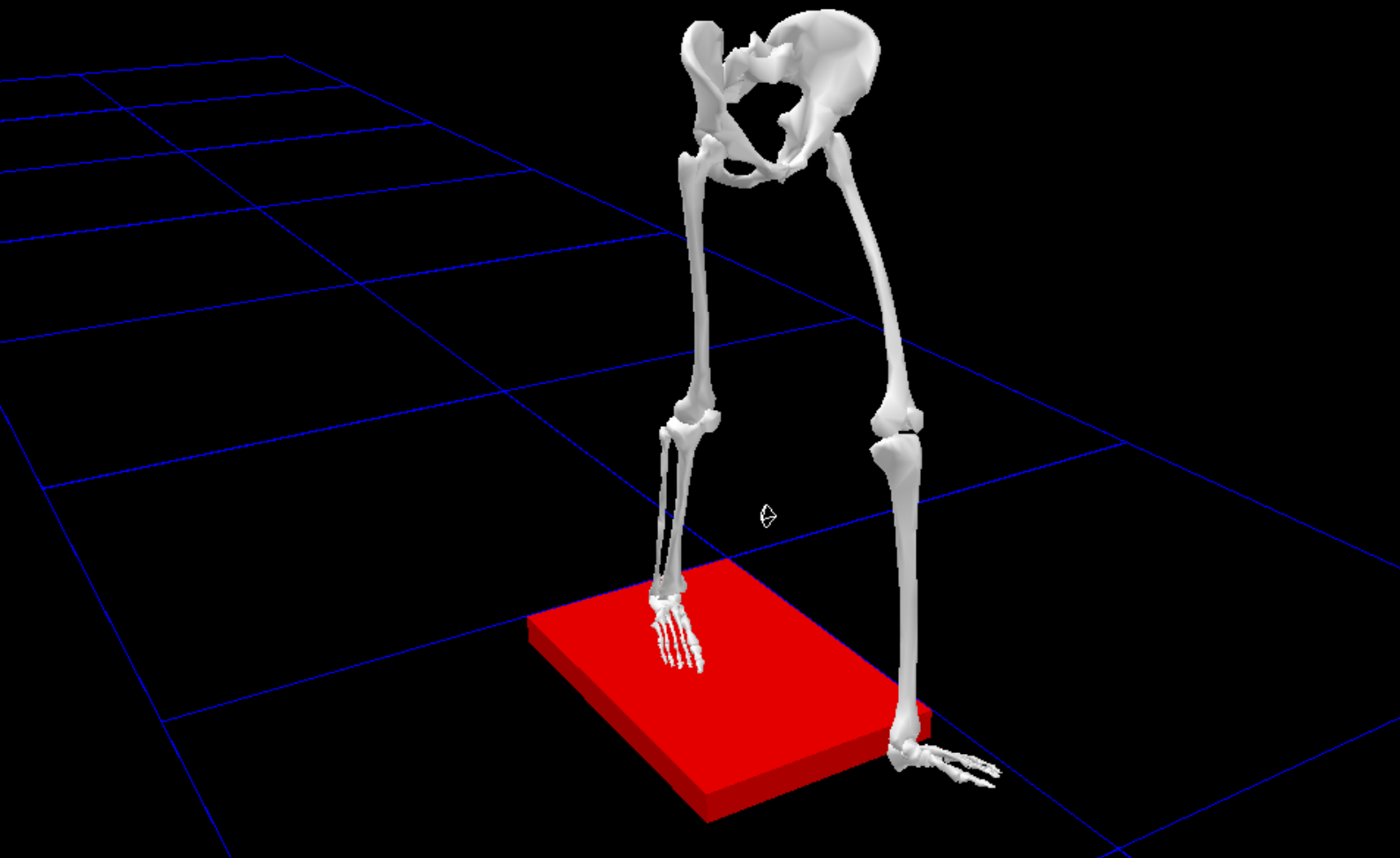




# MUSCULOSKELETAL RESEARCH CENTRE

*Annual Report 2006-2007*



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## Director's report

The 2006-2007 period was a challenging yet rewarding one for the Musculoskeletal Research Centre (MRC). Following several planning discussions in 2005 and 2006, the MRC was expanded from a research unit within the School of Physiotherapy to become a Faculty-based research centre. This move necessitated the drafting of a new constitution and strategic plan, which was approved by Academic Board in April 2007.

These changes took place in the context of the restructure of the Faculty of Health Sciences, which also involved moving key MRC staff from the School of Physiotherapy offices on Level 5 to offices on Level 2. This move has provided the MRC with a highly visible research hub, and the proximity to the gait laboratory offers several advantages in relation to testing of research participants.

### Staffing

A/Prof Jill Cook left La Trobe to take up a position at Deakin University in March 2007, however she retains an adjunct appointment in the School of Physiotherapy and is an associate member of the MRC. In 2007 we welcomed Prof Keith Hill (Professor of Allied Health at Northern Health), Dr Pazit Levinger (post-doctoral fellow), Dr Björn Barenius (a visiting orthopaedic fellow from Sweden) and Mr Martin Spink (research assistant).

### Grant successes

MRC staff attracted nearly \$3M of research grant funding in 2006-2007, including an NHMRC fellowship, three NHMRC project grants, and several project grants from Multiple Sclerosis Australia, Alzheimer's Australia and the Australasian Podiatry Education and Research Foundation. As with previous years, MRC staff also had considerable success in attracting internal Faculty of Health Sciences research grants.

### Awards

MRC researchers were recognised for their high quality research by receiving several awards in 2006-2007, including the Young Tall Poppy Science Award (A/Prof Hylton Menz), Sol Polsen Research Award (Aaron McDonald), the Fred P



**A/Prof Hylton B. Menz**  
 NHMRC Clinical Research Fellow  
 Director, MRC

Sage Award (Profs Karen Dodd and Nick Taylor) and the Physiotherapy Research Foundation Prize (Edwina Lorbach).

### Publications

The MRC continues to set a high standard in publication productivity. In 2006-2007, MRC researchers published 2 books, 6 book chapters and 81 peer-reviewed journal articles. MRC research was published in some of the most prestigious journals in the fields of rehabilitation, physical therapy, podiatry, orthopaedics, biomechanics, sports medicine and rheumatology.

### The way forward

The MRC is well on track to meet its key performance indicators outlined in the 2007-2009 strategic plan. In 2008 we hope to attract at least 3 more PhD students, finalise the relocation and refurbishment of the office area and gait laboratory, and expand our industry collaboration.

### Thanks to our supporters

I would like to take the opportunity to sincerely thank all university staff who have supported the continued development and expansion of the MRC throughout 2006-2007, particularly the Dean of Health Sciences, Prof Hal Swerissen, and the Associate Dean (Research), Prof Anthony Smith.

# About the MRC

## Background

Following the opening of the La Trobe University Medical Centre (LUMC) in 1999, the MRC was established in 2000 as a collaboration between the School of Physiotherapy and LUMC. The co-founders were Prof Meg Morris (then Head of the School of Physiotherapy) and A/Prof Julian Feller (orthopaedic surgeon).

The MRC was located, both administratively and physically, in the School of Physiotherapy and was formally opened in November 2000 by the then Federal Health Minister, Senator Kay Patterson. The aim of the MRC was to draw together researchers, academics and clinicians from a range of Schools at the University, the LUMC and other healthcare institutions in order to conduct research as an evidence base for clinical practice in musculoskeletal rehabilitation.

## Program of research activity

In 2007, the MRC was expanded to encompass musculoskeletal research being conducted across the Faculty of Health Sciences. The MRC's research program is built on three underlying research themes: (i) healthy ageing; (ii) injury prevention and recovery, and; (iii) chronic disease management.

Overlying these three themes are six inter-related, multi-disciplinary research groups:

- (i) Bone and cartilage
- (ii) Gait, balance and falls
- (iii) Muscle rehabilitation
- (iv) Foot and ankle
- (v) Knee orthopaedics
- (vi) Prosthetics and orthotics

## Mission of the MRC

The mission of the MRC is to maintain and enhance mobility in people affected by chronic musculoskeletal conditions. It achieves this by conducting high quality research into the causes and treatment of musculoskeletal disorders, with a particular em-

phasis on conditions affecting middle-aged and older people. It is a key provider of postgraduate research training for allied health professionals, and assists in the research and development of products designed to evaluate and manage chronic diseases affecting mobility. The MRC is unique in providing "benchside to bedside" research facilities and expertise, enabling the transfer of laboratory findings to the clinical environment.

## Membership

### Director

A/Prof Hylton Menz

### Deputy Director

Prof Nicholas Taylor

### Board of Management

Prof Hal Swerissen  
 Prof Anthony Smith  
 Prof Chris Handley  
 Prof Karen Dodd  
 A/Prof Julian Feller  
 A/Prof Tim Bach  
 Dr Karl Landorf  
 Dr Kate Webster

### Bone, cartilage and tendon group

Prof Chris Handley  
 Dr Brian Grills  
 Dr John Schuijers  
 Dr Phil Dooley  
 Dr Alex Ward  
 Dr Elly Djouma  
 Dr Karina Aprico  
 Dr Mirna Ilic  
 Dr Tom Samiric  
 A/Prof Jill Cook (adjunct)  
 Aaron McDonald  
 Stuart McDonald  
 Eileen Lay  
 John Parkinson

### Gait, balance and falls group

Prof Keith Hill  
 A/Prof Julian Feller  
 A/Prof Tim Bach  
 Dr Kate Webster  
 Dr Andrew Bendrups  
 Les Barnes  
 Jo Wittwer  
 Wesley Pryor  
 David Orr  
 Anita Raspovic

George Murley  
 Gerard Zammit  
 Jodie McClelland  
 Christian Barton  
 Brianna Julien  
 Martin Spink

### Muscle rehabilitation group

Prof Nicholas Taylor  
 Prof Karen Dodd  
 A/Prof Alex Ward  
 Dr James Wickham  
 Dr Nora Shields  
 Dr Tania Pizzari  
 Dr Rod Green  
 Dr Adam Bird  
 Stacey Lucas-Toumbouro  
 George Murley  
 Phillip Hughes

### Foot and ankle group

Dr Karl Landorf  
 Dr Shannon Munteanu  
 Dr Adam Bird  
 Daniel Bonanno  
 Gerard Zammit  
 George Murley  
 Anita Raspovic  
 Craig Payne  
 Martin Spink

### Knee orthopaedics group

A/Prof Julian Feller  
 Dr Kate Webster  
 Jo Wittwer  
 Dr Tim Whitehead  
 Dr Pazit Levinger  
 Dr Cameron Norsworthy  
 Dr Björn Barenus  
 Jodie McClelland  
 Christian Barton

### Prosthetics and orthotics group

A/Prof Tim Bach  
 Dr Michael Dillon  
 Rowan English  
 Les Barnes  
 Margaret Hodge  
 Anthony Francis  
 Wesley Pryor  
 David Orr  
 Aileen Ibuki  
 Renee Downie

**“The mission of the MRC is to maintain and enhance mobility in people affected by chronic musculoskeletal conditions”**

## Bone, cartilage and tendon

The Bone, Cartilage and Tendon Research Group consists of two sub-groups—the *Bone Research Group* lead by Dr Brian Grills, and the *Cartilage and Tendon Research Group* lead by Prof Chris Handley.

The *Bone Research Group*, in collaboration with researchers at both the Howard Florey Institute and St Vincent's Institute of Medical Research, are investigating novel aspects of skeletal metabolism, skeletal disease and fracture repair.

Galanin (GAL) is a neuropeptide found in various tissues and participates in many physiologic processes such as inhibition of inflammation, pain processing and cell division. In collaboration with A/Prof Andrew Gundlach at the Howard Florey Institute, we located GAL and its receptors in skeletal tissue and showed that production of GAL is increased after bone fracture. Subsequently we found that cells of the tissue that links the fracture ends together (callus) display GAL and GAL receptor immunoreactivity, suggesting a more direct influence of GAL on fracture repair.

Also, we have identified smooth muscle-like cells in early fractures and revealed that young, soft fracture callus contracts and relaxes in a similar fashion to smooth muscle. Contraction may re-establish callus static tension after bone fracture to facilitate fracture repair. This mechanism may be achieved by promoting bone formation and thus fracture repair.

Aaron McDonald received the prestigious Sol Posen Research Award at the 17th Annual Scientific Meeting of the Australian and New Zealand Bone and Mineral Society (ANZBMS) held in Queenstown, New Zealand in September 2007. The award carried a \$1000 prize and was for the best paper published in the past 18 months by an early research scientist who was first author and is a member of the society.

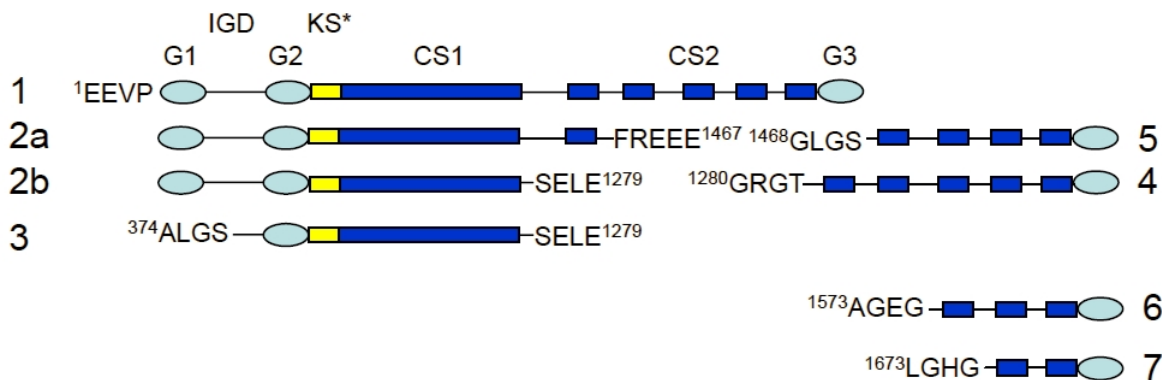
The *Cartilage and Tendon Research Group* have been investigating the regulation of two proteinases, ADAMTS-4 and ADAMTS-5, that have been identified as

being involved in the early changes that are observed in articular cartilage as the result of arthritis. We are studying the effect of inhibitors of transcription factor activation in order to determine whether these two proteinases are regulated at the transcriptional level. This work has been extended to investigating the role of these proteinases in other connective tissues of the synovial joint, namely tendon, ligament and joint capsule. We have successfully shown that the modulation of transcription factor activation can specifically result in the decrease in the activity of these proteinases.

Our other area of interest is to establish the bases of changes that occur in human patellar tendon in overuse tendinopathy. This condition results in painful tendons that restrict a person's ability to move. The underlying pathology is not known, neither are the causes. We have established that the extracellular matrix of the tissue undergoes an extensive change in composition and our work is suggesting that this results from a radical change in the metabolism of tissue.



**Aaron McDonald received the prestigious Sol Posen Research Award at the 17th Annual Scientific Meeting of the Australian and New Zealand Bone and Mineral Society**



**Schematic representation of aggrecan fragments identified by the Cartilage and Tendon Research Group**

## Grants

Handley CJ, Ilic MZ. 2006. La Trobe University Faculty of Health Sciences Research Grant. Effect of glucosamine on cartilage loss in arthritis: \$10,000.

Schuijers JA, Grills BL. 2006. La Trobe University Faculty of Health Sciences Research Grant: \$2,604.

Grills BL, Dooley PC, Schuijers JA. 2006. La Trobe University, Faculty of Health Sciences research grant: \$9,965.

McDonald AC. 2007. La Trobe University, Faculty of Health Sciences, Central Starter Research Grant: \$5000.

Grills BL, Dooley PC, Schuijers JA. 2007. School of Human Biosciences in-house research grant: \$9,000.

Handley CJ, Cook J, Ilic MZ. 2007. La Trobe University Faculty of Health Sciences Research Grant. Changes in the organization and metabolism of tendons in overuse tendon disease: \$15,000.

Handley CJ, Ilic MZ. 2007. La Trobe University Faculty of Health Sciences Research Grant. Transcription factors and cartilage loss in arthritis: \$10,000.

Handley CJ, Ilic MZ. 2007. La Trobe University Large Grant. Control of proteoglycan breakdown in joint connective tissues: \$25,000.

## Publications

### Book chapter

Handley CJ, Samiric T, Ilic, MZ. Structure, metabolism, and tissue roles of chondroitin sulfate proteoglycans, In: *Chondroitin Sulfate: Structure, Role and Pharmacological Activity*, Ed(s). Nicola Volpi, San Diego, California, USA, Elsevier, pp. 219-232.

### Journal publications

Ilic MZ, East CJ, Rogerson FM, Fosang AJ, Handley CJ. Distinguishing Aggrecan Loss from Aggrecan Proteolysis in ADAMTS-4 and ADAMTS-5 Single and Double Deficient Mice. *Journal of Biological Chemistry* 2007;282:37420-37428.

McDonald AC, Schuijers JA, Gundlach AL, Grills BL. Galanin treatment offsets the inhibition of bone formation and downregulates the increase in mouse calvarial expression of TNF $\alpha$  and GalR2 mRNA induced by chronic daily injections of an injurious vehicle. *Bone* 2007;40:895-903.

Samiric T, Ilic, MZ, Handley CJ. Sulfated polysaccharides inhibit the catabolism and loss of both large and small proteoglycans in explant cultures of tendon. *FEBS Journal* 2006;273:3479-3488.

Scott A, Lian O, Roberts CR, Cook JL, Handley CJ, Bahr R, Samiric T, Ilic MZ, Parkinson J, Hart DA, Duronio V, Khan KM. Increased versican content is associated with tendinosis pathology in the patellar tendon of athletes with jumper's knee. *Scandinavian Journal of Medicine & Science in Sports* 2007; (in

press).

Smith S, Tinley P, Gilheany M, Grills B, Kingsford A. The inferior calcaneal spur — Anatomical and histological considerations. *The Foot* 2007;17:25-31.

**“We have identified smooth muscle-like cells in early fractures and revealed that fracture callus contracts and relaxes in a similar fashion to smooth muscles”**

## Gait, balance and falls

2006-2007 has been a busy time for the Gait, Balance and Falls Group. Dr Kate Webster and A/Prof Hylton Menz were awarded a grant from Alzheimer's Australia to continue with their work on the relationship between Alzheimer's disease, gait abnormalities and falling.

In the first stage of this project it was shown that physiological falls risk assessment is feasible in older people with mild to moderate Alzheimer's disease. It was also shown that older people with Alzheimer's disease demonstrate significant impairments in several physiological domains, particularly reaction time, compared to age- and sex-matched controls.

Honours student Edwina Lorbach received several awards for her role in the project including the Margaret and Alan Hamer Research Prize, Eliza McAuley Memorial Prize, Josephine Jennings and Edith Pratt Memorial Prize and the Physiotherapy Research Foundation Research Prize. Researcher Joanne Wittwer has also been investigating the test-retest reliability of gait measures in this population.

A/Prof Hylton Menz's post-doctoral fellowship research on foot and footwear risk factors for falls was published in several journal articles in 2006. A/Prof Menz also co-authored the 2nd edition of the highly successful textbook *Falls in older people: risk factors and strategies for prevention* with colleagues from the Prince of Wales Medical Research Institute. The first edition of this book sold 2,400 copies and has been very well received in the geriatric and rehabilitation fields.

With colleagues at the University of Melbourne, A/Prof Menz was awarded two major grants to study the effectiveness of physical therapy in people to prevent falls in people with Parkinson's disease, and another NHMRC grant to assess the efficacy of a podiatry intervention to prevent falls.

Upgrades to the gait laboratory, including an 8 camera Vicon System and two additional force plates, has seen the lab being used extensively in 2006-2007.



**Gait initiation assessment using the GAITRite electronic walkway. Studies by our group in 2007 found that people with Alzheimer's disease demonstrate significantly more variable timing when initiating gait, which may contribute to an increased risk of falling.**

### Grants

Murley GS, Landorf KB, Menz HB. 2006. Australian Podiatry Education and Research Foundation (APERF). The effect of foot posture on lower limb muscle activity during walking: \$8,000.

Morris ME, Iansek R, Huxham F, McGinley J, Menz HB, Murphy A, Watts J. 2006. Michael J. Fox Foundation for Parkinson's Research. Preventing falls and improving mobility in people with Parkinson's disease: \$866,325 (US\$630,975).

Mickle K, Steele JR, Munro BJ, Menz HB. 2006. Australasian Podiatry Education and Research Foundation (APERF). Is foot structure and function associated with falls in the elderly?: \$4,000.

Webster KE, Menz HB. 2006. Alzheimer's Australia Hazel Hawke Research Grant. Falls risk assessment in older people with Alzheimer's disease: \$10,000.

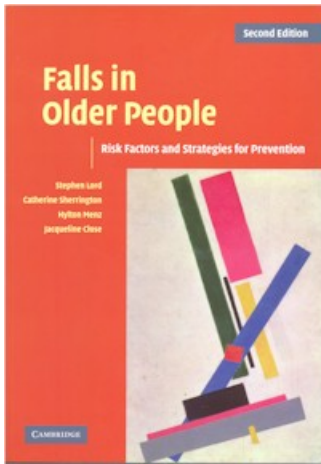
Menz HB. 2006. La Trobe University Central Large Grants Scheme. Randomised controlled trial of a tailored podiatry intervention to enhance functional mobility and prevent falls in older people: \$25,000.

Morris ME, Menz HB, Taylor NF, Huxham F, Watts J, Martin C. 2007. NHMRC Project Grant. Home based rehabilitation to reduce falls and disability in Parkinson disease: \$723,000.

Menz HB, Lord SR. 2007. NHMRC Primary Health Care Project Grant. Randomised controlled trial of a tailored podiatry intervention to enhance functional mobility and prevent falls in older people: \$450,125.

## Publications

### Book



Lord SR, Sherrington C, Menz HB, Close JCT. *Falls in older people: risk factors and strategies for prevention*. (2nd ed.) Cambridge: Cambridge University Press, 2007. ISBN: 9780521680998.

### Book chapter

Morris ME, Huxham F, Menz HB, Dobson F, Priyaprasarth P, Fok, P, Iansek R, Miller K. *Optimizing Movement and Preventing Falls in Parkinson's Disease: Strategies for Patients and Care-Givers*. In: Trail M. *Neurorehabilitation in Parkinson's disease: an evidence-based treatment model*. Slack, Inc. (in press). ISBN: 10 1-55642-771-9.

### Journal publications

Freiberger E, Menz HB, Abu-Omar K, Rütten A. Preventing falls in physically active community-dwelling older people: a comparison of two intervention techniques. *Gerontology* 2007;53:298-305.

Freiberger E, Menz HB. Characteristics of falls in physically active community-dwelling older people: findings from the "Standfest im Alter" study. *Zeitschrift für Gerontologie und Geriatrie* 2006;39:261-267.

Latt MD, Menz HB, Fung VS, Lord SR. Walking speed, cadence and step length are selected to optimize the stability of head and pelvis accelerations. *Experimental Brain Research* 2007; (in press).

Lorbach E, Webster KE, Menz HB, Wittwer J. Physiological Falls Risk Assessment in Older People with Alzheimer's Disease. *Dementia & Geriatric Cognitive Disorders* 2007;24:260-5.

atric *Cognitive Disorders* 2007;24:260-5.

Lord SR, Menz HB, Sherrington C. Home environment risk factors for falls in older people and the efficacy of home modifications. *Age & Ageing* 2006;35(S2):55-59.

McClelland J, Webster KE, Feller JA. Gait analysis of patients following total knee replacement: A systematic review. *The Knee* 2007;14:253-263.

Menant JC, Steele JR, Menz HB, Munro BJ, Lord SR. Effects of footwear features on balance and stepping in older people. *Gerontology* 2007; (in press).

Menant JC, Steele JR, Menz HB, Munro BJ, Lord SR. Optimizing footwear for older people at risk of falls. *Journal of Rehabilitation Research & Development* 2007; (in press).

Menz HB, Hill KD. Podiatric involvement in multidisciplinary falls-prevention clinics in Australia. *Journal of the American Podiatric Medical Association* 2007;97;377-384.

Menz HB, Lord SR, Fitzpatrick RC. A structural equation model relating sensorimotor function, fear of falling and gait patterns in older people. *Gait & Posture* 2007;25:243-249.

Menz HB, Lord SR, Fitzpatrick RC. A tactile stimulus applied to the leg improves postural stability in young, old and neuropathic subjects. *Neuroscience Letters* 2006;406:23-26.

Menz HB, Morris ME, Lord SR. Foot and ankle risk factors for falls in older people: a prospective study. *Journals of Gerontology, Series A, Biological Sciences & Medical Sciences* 2006;61A:M866-870.

Menz HB, Morris ME, Lord SR. Footwear characteristics and risk of indoor and outdoor falls in older people. *Gerontology* 2006;52:174-180.

Merory JR, Wittwer JE, Rowe CC, Webster KE. Quantitative gait analysis in patients with dementia with Lewy bodies and Alzheimer's disease. *Gait & Posture* 2007;26:414-419.

Murley GS, Bird AR. The effect of three levels of foot orthotic wedging on the surface electromyographic activity of selected lower limb muscles during gait. *Clinical Biomechanics* 2006; 21:1074-1080.

Webster KE, Feller JA, Wittwer JE. Balance confidence and function after

knee replacement surgery. *Journal of Aging & Physical Activity* 2006;14:181-191.

Webster KE, Merory JR, Wittwer JE. Gait variability in community dwelling adults with Alzheimer's disease. *Alzheimer Disease & Associated Disorders* 2006;20:37-40.

**"Upgrades to the gait laboratory, including an 8 camera Vicon System and two additional force plates, has seen the lab being used extensively in 2006-2007"**

## Muscle function and rehabilitation

The Muscle Function and Rehabilitation Research Group has two major streams of research. First, laboratory based studies on the anatomical and physiological bases of muscle function and the effects of electrophysical agents, and second, the application and effects of exercise and physical activity programs on people with a disability.

The group has produced more than 25 publications over the last two years. Of particular note, A/Prof Alex Ward has co-authored the 4<sup>th</sup> edition of *Electrotherapy Explained*, one of the world's leading textbooks on electrophysical agents in therapy.

Dr Nora Shields, Prof Karen Dodd, and Prof Nick Taylor have received recognition for their work in developing exercise programs for adults with Down Syndrome with their recent nomination as a finalist for the 2007 Victoria Sport and Recreation Applied Science award. Profs Dodd and Taylor were awarded the prestigious Fred P Sage Award at the American Academy of Developmental Medicine for their DVD *Strength training for young people with cerebral palsy*.

Two of our doctoral students, Simone O'Shea and Suzie Morris graduated in 2007. In addition, group member Adam Bird completed his PhD with his thesis, *The effect of foot orthoses on electromyographic activity of people with and without low back pain*.



**Our research into exercise in adults with Down syndrome attracted considerable recognition**

The group has also been active in attracting funds to support our research. Highlights of funding include a grant of \$90,000 in 2006 from MS Australia to Prof Karen Dodd, Prof Nick Taylor and Dr Nora Shields, who in collaboration with the MS Society are evaluating a community-based strength-training program for people with multiple sclerosis.

In addition, Prof Nick Taylor and Prof Karen Dodd, with collaborators Prof Kerr Graham and A/Prof Richard Baker from the Royal Children's Hospital have recently received a NHMRC project grant of \$256,000 to investigate strength training for adolescents and young adults with cerebral palsy who have difficulty walking. The project will start in 2008.

### Grants

Dodd KJ, Kilpatrick T, Taylor NF, McDonald E, Prasad D, Shields N. 2006. MS Research Australia. A randomized controlled trial of progressive resistance strength training for people with Multiple Sclerosis who have difficulty walking: \$90,000.

Green RA, Taylor NF. La Trobe University Faculty of Health Sciences Research Grant. 2006. Shoulder muscle activity of people presenting with shoulder pain during clinical testing for superior labral anterior to posterior (SLAP) lesions: \$6,086.

Morris ME, Menz H, Taylor NF, Huxham F, Watts J, Martin C. 2007. NHMRC project grant. Home based rehabilitation to reduce falls and disability in Parkinson disease: \$723,000.

Taylor NF, Graham HK, Dodd KJ, Baker R. 2007. NHMRC project grant. Targeted strength training to improve functional walking capacity of adolescents and young adults with cerebral palsy: \$256,050.

Walkley J, Taylor NF, Dodd KJ, Shields N, Ramcharan P. 2006. Department of Human Services. Evaluation of physical activity program for people with intellectual disability: \$11,000.

Ward AR. 2007. La Trobe University Faculty of Health Sciences Research Grant. A comparison of the analgesic effectiveness of two forms of electrical stimulation: \$6,752.

Ward AR, Lucas-Toumbourou, S. 2006. Faculty La Trobe University Faculty of Health Sciences Research Grant. The effect of duty cycle and frequency on sensory, motor and pain thresholds: \$6,100.

## Publications

### Books

Robertson VJ, Ward AR, Low J, Reed A. *Electrotherapy explained: principles and practice* (4<sup>th</sup> ed). 2006; Oxford: Butterworth-Heinemann.

### Journal publications

Brown JMM, Wickham JB, McAndrew DJ, Huang X-F. Muscles within muscles: Coordination of 19 muscle segments within three shoulder muscles during isometric motor tasks. *Journal of Electromyography & Kinesiology* 2007;17:57-73.

Brusco NK, Shields N, Taylor NF, Paratz J. A Saturday physiotherapy service may decrease length of stay in patients undergoing rehabilitation in hospital: a randomised controlled trial. *Australian Journal of Physiotherapy* 2007;53:75-81.

Davidson G, Pizzari T, Mayes S. The influence of second toe and metatarsal length on stress fractures at the base of the second metatarsal in classical dancers. *Foot & Ankle International* 2007;28:1082-1086.

Davidson G, Pizzari T, Mayes S. Reliability of measuring first and second metatarsal and toe length. *The Foot* 2007;17:32-37.

Dodd KJ, Taylor NF, Denisenko S, Prasad D. A qualitative analysis of a progressive resistance exercise programme for people with multiple sclerosis. *Disability & Rehabilitation* 2006;28:1127-1134.

Dodd KJ, Foley S. Partial body weight support treadmill training can improve walking in children with cerebral palsy: a clinical controlled trial. *Developmental Medicine & Child Neurology* 2007;49:101-105.

Dunn N, Shields N, Taylor NF, Dodd KJ. A systematic review of the self concept of children with cerebral palsy and perceptions of parents and teachers. *Physical & Occupational Therapy in Paediatrics*, 2007;27:55-71

Green RA, Shanley K, Taylor NF, Perrott M. The anatomical basis for clinical tests assessing musculoskeletal function of the shoulder. *Physical Therapy Reviews* 2007; (in press).

Green RA, Taylor NF, Mirkovic M, Perrott M. An evaluation of the anatomical basis of the O'Brien compres-

sion test for superior labral anterior and posterior (SLAP) lesions. *Journal of Shoulder & Elbow Surgery* 2007; (in press).

Kolt GS, Brewer BW, Pizzari T, Schoo AMM, Garrett N. The Sport Injury Rehabilitation Adherence Scale: A reliable scale for use in clinical physiotherapy. *Physiotherapy* 2007;93:17-22.

Macintosh S, Hill K, Dodd KJ, Goldie P, Culham E. Balance Score and a History of Falls in Hospital Predict Recurrent Falls in the Six Months Following Stroke Rehabilitation. *Archives of Physical Medicine & Rehabilitation* 2006;87:1583-9.

McManus FJ, Ward AR, Robertson VJ. The analgesic effects of interferential therapy on two experimental pain models: cold and mechanically induced pain. *Physiotherapy* 2006;92:95-102.

Morris ME, Perry A, Bilney B, Curran A, Dodd K, Wittwer J, Dalton G. Outcomes of Physical Therapy, Speech Pathology and Occupational Therapy for People with Motor Neuron Disease: A Systematic Review. *Journal of Neurological Rehabilitation & Neural Repair* 2006;20:424-34.

Murley GS, Bird AR. The effect of three levels of foot orthotic wedging on the surface electromyographic activity of selected lower limb muscles during gait. *Clinical Biomechanics* 2006;21:1074-80.

O'Shea SD, Taylor NF, Paratz JD. Progressive resistance exercise is beneficial for people with chronic obstructive pulmonary disease (COPD) if they can complete the program: a single blind randomised controlled trial. *Australian Journal of Physiotherapy* 2007; (in press).

O'Shea SD, Taylor NF, Paratz JD. Measuring muscle strength for people with chronic obstructive pulmonary disease: retest reliability of hand-held dynamometry. *Archives of Physical Medicine & Rehabilitation* 2007;88:32-36.

O'Shea SD, Taylor NF, Paratz JD. But watch out for the weather: factors affecting adherence to progressive resistance exercise for persons with COPD. *Journal of Cardiopulmonary Rehabilitation & Prevention* 2007;27:166-174.

O'Shea SD, Taylor NF, Paratz JD. Qualitative outcomes of progressive resistance exercise for people with COPD. *Chronic Respiratory Diseases*

2007;4:135-142.

Shanahan C, Ward AR, Robertson VJ. A comparison of the analgesic efficacy of interferential therapy and TENS. *Physiotherapy* 2006; 92: 247-253.

Shields N, Capper J, Polak T, Taylor N. Are cervical pillows effective in reducing neck pain? *New Zealand Journal of Physiotherapy* 2006;34:3-9.

Shields N, Murdoch A, Loy Y, Dodd KJ, Taylor NF. A systematic review of the self concept of children with cerebral palsy compared with children without cerebral palsy. *Developmental Medicine & Child Neurology* 2006;48:151-157.

Shields N, Loy Y, Murdoch A, Taylor NF, Dodd KJ. The self-concept of children with cerebral palsy compared with that of children without impairment. *Developmental Medicine & Child Neurology* 2007;49:350-354.

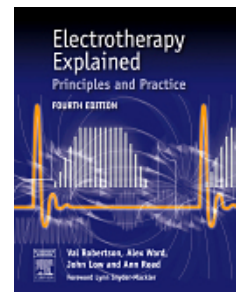
Taylor NF, Dodd KJ, Prasad D, Denisenko S. Progressive resistance exercise for people with multiple sclerosis. *Disability & Rehabilitation* 2006;28:1119-1126.

Taylor NF, Dodd KJ, Shields N, Bruder A. Therapeutic exercise in physiotherapy practice is beneficial: a summary of systematic reviews 2002-2005. *Australian Journal of Physiotherapy* 2007;53:7-16.

Ward AR, Oliver W, Buccella D. Wrist extensor torque production and discomfort associated with low frequency and burst modulated kHz frequency currents. *Physical Therapy* 2006;86:1360-1367.

Ward AR, Lucas-Toumbourou S. Lowering of sensory, motor and pain-tolerance thresholds with burst duration using kHz frequency alternating current electrical stimulation. *Archives of Physical Medicine & Rehabilitation* 2007;88:1036-1041.

Ward AR, Oliver W. A comparison of the hypoalgesic effectiveness of low frequency and burst modulated kHz frequency currents. *Physical Therapy* 2007;87:1056-1063.



**All Prof Alex Ward's  
Electrotherapy  
Explained—one of  
the world's leading  
textbooks on  
electrophysical  
agents in therapy**

## Foot and ankle

Although relatively inexperienced, the Foot and Ankle Group have been productive with a number of key outcomes in 2006-2007. The group produced 25 C1 journal publications, 1 Cochrane systematic review (and another protocol registered), 5 book chapters and grant income approaching \$1M. In addition, two members of the group completed their PhDs (Dr Adam Bird and Dr Anita Raspovic). The group also has 3 PhD students with another 2 coming on board in 2008.

During the past year the Foot and Ankle Group developed larger areas of research in osteoarthritis in the foot and podiatry interventions for common musculoskeletal disorders. Two randomised trials of note that will begin in 2008 include one evaluating a viscosupplement for osteoarthritis of the 1st metatarsophalangeal joint, and another investigating a tailored podiatry intervention to enhance functional mobility and prevent falls in older people. The tailored podiatry intervention trial has secured an NHMRC Primary Care Project Grant for \$450,125.

### Grants

Menz HB, Landorf KB, Munteanu SE, Zammit GV. 2006. La Trobe University Faculty of Health Sciences Research Grant. The effectiveness of hyaluronan for the treatment of osteoarthritis affecting the first metatarsophalangeal joint of the foot (hallux limitus): \$10,000.

Munteanu SE, Menz HB, Landorf KB. 2006. Australasian Podiatry Education and Research Foundation. The effectiveness of hyaluronan for the treatment of osteoarthritis affecting the first metatarsophalangeal joint of the foot (hallux limitus): \$4,000.



**PhD student George Murley studies the electromyographic activity of the tibialis posterior muscle**

Mickle K, Steele JR, Munro BJ, Menz HB. 2006. Australasian Podiatry Education and Research Foundation. Is foot structure and function associated with falls in the elderly?: \$4,000.

Murley GS. 2007. Postgraduate support grant, Faculty of Health Sciences, La Trobe University. The effect of foot posture on lower limb muscle activity during walking: \$500.

Menz HB. 2006. NHMRC Clinical Career Development Award. Epidemiology and management of foot disorders in older people, 2007 – 2011: \$445,000.

Menz HB. 2006. La Trobe University Central Large Grants Scheme. Randomised controlled trial of a tailored podiatry intervention to enhance functional mobility and prevent falls in older people: \$25,000.

Menz HB, Lord SR. 2007. NHMRC Primary Health Care Project Grant. Randomised controlled trial of a tailored podiatry intervention to enhance functional mobility and prevent falls in older people: \$450,125.

Landorf KB, Menz HB, Bird AR. 2007. La Trobe University Faculty of Health Sciences Research Grant. The effect of removing callus (hard skin) from the sole of the foot: \$9,979.

Murley G, Landorf KB, Menz HB. 2007. Australasian Podiatry Education and Research Foundation. Effect of foot posture on tibialis posterior muscle EMG during walking: \$8,000.

Perrin B, Swerisson HI, Payne C. 2007. Australian Podiatry Education and Research Foundation. The foot-specific personal beliefs of people with diabetes-related peripheral neuropathy: \$3,980.

Landorf K. 2007. La Trobe University Faculty of Health Sciences Research Grant. Effectiveness of scalpel debridement of plantar callosities on pain, plantar pressure and functional ability: a randomised trial: \$2,499.

### Publications

#### Book chapters

Landorf KB, Keenan A-M. Do foot orthoses prevent injury? In McCauley D & Best T (Eds), *Evidence-based Sports Medicine* (2nd ed.). Blackwell Publishing: Massachusetts, 2007. ISBN: 9781405132985.

Landorf KB, Burns J. Patient reported outcome measures. In Yates B (Ed), *Assessment of the Lower Limb* (3rd ed.). London: Elsevier. (in press).

Menz HB. Foot problems in older people. In: Markides SK (Ed). *Encyclopedia of Health and Aging*. Thousand Oaks: Sage Publications, 2007. ISBN: 13-978-1-4129-0949-5.

Menz HB. Assessment of older people. In: Yates B (Ed). *Assessment of the lower limb*. (3rd ed.). London: Elsevier (in press).

Payne C, Bird A. Methods of analysing gait. In: Yates B (Ed). *Assessment of the lower limb*. (3rd ed.).

London: Elsevier (in press).

#### Journal publications

Bennell K, Bowles KA, Payne C, Cicuttini F, Osborne R, Harris A, Hinman R. Effects of laterally wedged insoles on symptoms and disease progression in medial knee osteoarthritis: a protocol for a randomised, double-blind, placebo controlled trial. *BMC Musculoskeletal Disorders* 2007;8:96.

Burns J, Landorf KB, Ryan MM, Crosbie J, Ouvrier RA. Interventions for the prevention and treatment of pes cavus. *Cochrane Database of Systematic Reviews* 2007, Issue 4: Art. No.: CD006154.

Frescos N, Menz HB. Foot health service provision by the Australian Department of Veterans' Affairs: do major podiatric medical interventions reduce the number of maintenance treatments? *Journal of the American Podiatric Medical Association* 2007;97:469-474.

Hayward, S, Landorf KB, Redmond AR. Ice reduces needle stick-pain associated with digital nerve block of the hallux. *The Foot* 2006;16:145-148.

Irving DB, Cook JL, Menz HB. Factors associated with chronic plantar heel pain: a systematic review. *Journal of Science & Medicine in Sport* 2006;9:11-22.

Irving DB, Cook JL, Young MA, Menz HB. Impact of chronic plantar heel pain on health-related quality of life. *Journal of the American Podiatric Medical Association* 2007; (in press).

Irving DB, Cook JL, Young MA, Menz HB. Obesity and pronated foot type may increase the risk of chronic plantar heel pain. *BMC Musculoskeletal Disorders* 2007;8:41.

Landorf KB, Keenan A-M, Herbert RD. Effectiveness of three foot orthoses for plantar fasciitis: a randomised trial. *Archives of Internal Medicine* 2006;166:1305-1310.

Landorf KB, Menz HB. Plantar heel pain and fasciitis. *BMJ Clinical Evidence* 2007; (in press).

Landorf KB, Radford JA. Minimal Important Difference: Values for the Foot Health Status Questionnaire, Foot Function Index and Visual Analogue Scale. *The Foot* 2007; (in press).

Madeley LT, Munteanu SE, Bonanno DR. Endurance of the ankle joint plan-

tar flexor muscles in athletes with medial tibial stress syndrome: A case-control study. *Journal of Science & Medicine in Sport* 2007;10:356-362.

Menant JC, Steele JR, Menz HB, Munro BJ, Lord SR. Optimizing footwear for older people at risk of falls. *Journal of Rehabilitation Research & Development* 2007; (in press).

Menz HB, Hill KD. Podiatric involvement in multidisciplinary falls-prevention clinics in Australia. *Journal of the American Podiatric Medical Association* 2007;97:377-384.

Menz HB, Morris ME, Lord SR. Foot and ankle risk factors for falls in older people: a prospective study. *Journals of Gerontology, Series A, Biological Sciences & Medical Sciences* 2006;61A:M866-870.

Menz HB, Morris ME, Lord SR. Footwear characteristics and risk of indoor and outdoor falls in older people. *Gerontology* 2006;52:174-180.

Menz HB, Munteanu SE, Landorf KB, Zammit GV, Cicuttini FM. Radiographic classification of osteoarthritis in commonly affected joints of the foot. *Osteoarthritis & Cartilage* 2007;15:1333-1338.

Menz HB, Tiedemann A, Plumb K, Kwan MMS, Lord SR. Foot pain in community-dwelling older people: an evaluation of the Manchester Foot Pain and Disability Index. *Rheumatology* 2006;45:863-867.

Menz HB, Zammit GV, Munteanu SE, Scott G. Plantarflexion strength of the toes: age and gender differences and evaluation of a clinical screening test. *Foot & Ankle International* 2006;27:1103-1108.

Menz HB, Zammit GV, Munteanu SE. Plantar pressures are higher under callused regions of the foot in older people. *Clinical & Experimental Dermatology* 2007;32:375-380.

Munteanu SE, Bassed AD. Effect of foot posture and inverted foot orthoses on hallux dorsiflexion. *Journal of the American Podiatric Medical Association* 2006;96:32-37.

Munteanu SE, Strawhorn AB, Landorf KB, Bird AR, Murley GS. A weight-bearing technique for the measurement of ankle joint dorsiflexion is reliable. *Journal of Science & Medicine in Sport* 2007; (in press).

Murley GS, Bird AR. The effect of

three levels of foot orthotic wedging on the surface electromyographic activity of selected lower limb muscles during gait. *Clinical Biomechanics* 2006; 21:1074-1080.

Payne CB. Cost benefit comparison of plaster casts and optical scans of the foot for the manufacture of foot orthoses. *Australasian Journal of Podiatric Medicine* 2007;41:29-31.

Radford JA, Burns J, Buchbinder R, Landorf KB, Cook C. Does stretching increase ankle dorsiflexion range of motion? A systematic review. *British Journal of Sports Medicine* 2006;40:870-875.

Radford JA, Burns J, Buchbinder R, Landorf KB, Cook C. The Effect of Low-Dye taping on Kinematic, Kinetic and Electromyographic Variables: A Systematic Review. *Journal of Orthopaedic & Sports Physical Therapy* 2006;36:232-241.

Radford JA, Landorf KB, Buchbinder R, Cook C. Effectiveness of calf muscle stretching for the short-term treatment of plantar fasciitis: a randomised trial. *BMC Musculoskeletal Disorders* 2007;8:36.

Radford JA, Landorf KB, Buchbinder R, Cook C. Effectiveness of low-Dye taping for the short-term treatment of plantar fasciitis: a randomised trial. *BMC Musculoskeletal Disorders* 2006;7:64.

Scott G, Menz HB, Newcombe L. Age-related differences in foot structure and function. *Gait & Posture* 2007;26:68-75.

Zammit GV, Payne CB. Relationship Between Positive Clinical Outcomes of Foot Orthotic Treatment and Changes in Rearfoot Kinematics. *Journal of the American Podiatric Medical Association* 2007;97:207-212.

**“During the past year the Foot and Ankle Group developed larger areas of research in osteoarthritis and podiatry interventions for common musculoskeletal disorders”**

## Knee orthopaedics

The Knee Orthopaedics Group continued to produce very high level research outputs in 2006-2007. The group, headed by orthopaedic surgeon A/Prof Julian Feller, has a program of research focused on studying the outcomes of knee replacement surgery and anterior cruciate ligament reconstruction.

Dr Pazit Levinger joined us in 2006 and has been collaborating with Dr Kate Webster and A/Prof Julian Feller investigating asymmetric knee loading during gait in patients with unilateral knee replacement. In 2007, Pazit was awarded a La Trobe Postdoctoral Fellowship to continue her research into the effects of knee replacement on balance and falls.

In September 2007, Jodie McClelland travelled to conferences in the United Kingdom and Greece to present work from her PhD which is evaluating the biomechanical outcomes of total knee replacement surgery.

In 2007 we also welcomed Dr Björn Barenius as a visiting orthopaedic fellow from the Karolinska Institute in Stockholm, Sweden. Björn assisted with several anterior cruciate ligament repair procedures with A/Prof Feller and conducted a research project assessing gait outcomes associated with the procedure.

### Grants

Levinger P, Menz HB, Begg R, Webster KE, Schache A, Feller JA. 2007. Arthritis Australia Grants-In-Aid: Foot function of patients with knee osteoarthritis: \$10,000.

Levinger P. 2007. La Trobe University Post-doctoral Fellowship: Gait, balance and falls risk in people with knee osteoarthritis before and after knee replacement: \$240,000.

### Publications

#### Journal publications

Dichiera A, Webster KE, Kuilboer L, Morris ME, Bach TM, Feller JA. Kinematic patterns associated with accuracy of the drop punt kick in Australian Football. *Journal of Science & Medicine in Sport* 2006;9:292-298.

Feller JA, Amis AA, Andrish JT, Arendt EA, Erasmus PJ, Powers CM. Surgical biomechanics of the patellofemoral joint. *Arthroscopy* 2007;23:542-553.



Visiting orthopaedic fellow Dr Björn Barenius

Levinger P, Gilleard W. Relationship between static posture and rearfoot motion during walking in patellofemoral pain syndrome: effect of a reference posture for gait analysis. *Journal of the American Podiatric Medical Association* 2006;96:323-329.

Levinger P, Gilleard W, Coleman C. Femoral medial deviation angle during a one-leg squat test in individuals with patellofemoral pain syndrome. *Physical Therapy in Sport* 2007;8:163-168.

Levinger P, Gilleard W. Tibia and rearfoot motion and ground reaction forces in subjects with patellofemoral pain syndrome during walking. *Gait & Posture* 2007;25:2-8.

McClelland JA, Webster KE, Feller JA. Gait analysis of patients following total knee replacement: a systematic review. *The Knee* 2007;14:253-263.

Siebold R, Webster KE, Feller JA, Sutherland AG, Elliott J. Anterior cruciate ligament reconstruction in females: a comparison of hamstring tendon and patellar tendon autografts. *Knee Surgery, Sports Traumatology, Arthroscopy* 2006;14:1070-1076.

Webster KE, Feller JA, Wittwer JE. Balance confidence and function after knee-replacement surgery. *Journal of Aging & Physical Activity* 2006;14:181-191.



PhD student Jodie McClelland

## Prosthetics and orthotics

The Prosthetics and Orthotics Group incorporates staff members from La Trobe's National Centre for Prosthetics and Orthotics and is headed by A/Prof Tim Bach. The major research questions being addressed by the group include how gait patterns can be optimised in amputees (particularly partial foot and transfemoral amputees), determining the optimal design for prosthetic sockets, and determining the optimal design of orthoses for the rheumatoid foot.

In 2006, an ANZ Medical Research and Technology in Victoria grant of \$19,000 was awarded to NCPO lecturer and MRC member Les Barnes to help his research into prosthetic ankle function. Les is currently doing a Professional Doctorate part time as well as his teaching duties. The topic of his ProfDoc is *Prosthetic Management of Ankle Motion During Walking*. Les commenced clinical trials involving amputee subjects in 2007.

The trials involve measurement of prosthetic ankle motion with force transducers fitted to a transtibial prosthesis. The proposed outcome of these trials is to identify and quantify suitable signals from the transducers that can be used as input to a computer control system for a prosthetic ankle joint. Later, other trials will be conducted on a prototype prosthetic



**Professional doctorate candidate Les Barnes**

ankle joint fitted to transtibial prostheses.

In August 2007 a large contingent of 6 staff and 2 higher degree candidates attended the 12th ISPO World Congress in Vancouver. A/Prof Tim Bach was the Chair of the Congress Scientific Program.

### Grants

Barnes L. 2006. ANZ Charitable Trust: Prosthetic Management of Ankle Motion During Walking: \$19,000.

### Publications

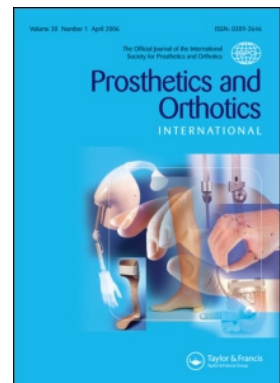
#### Journal publications

Dichiera A, Webster KE, Kuilboer L, Morris ME, Bach TM, Feller JA. Kinematic patterns associated with accuracy of the drop punt kick in Australian Football. *Journal of Science & Medicine in Sport* 2006;9:292-298.

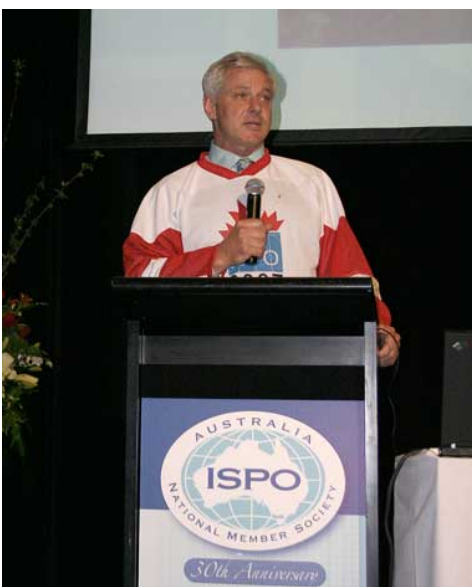
Dillon MP, Barker TM. Can partial foot prostheses effectively restore foot length? *Prosthetics & Orthotics International* 2006;30:17-23.

Dillon MP, Barker TM. Preservation of residual foot length in partial foot amputation: a biomechanical analysis. *Foot & Ankle International* 2006;27:110-6.

Keenan AM, Bach TM. Clinicians' assessment of the hindfoot: a study of reliability. *Foot & Ankle International* 2006;27:451-60.



**A/Prof Tim Bach joined the editorial board of Prosthetics and Orthotics International in 2007**



**A/Prof Tim Bach at ISPO**

# Editorships and peer reviewing

## Editorships

A/Prof Tim Bach

Member, Editorial Board, *Prosthetics & Orthotics International*

A/Prof Julian A. Feller

Member, Editorial Board, *Arthroscopy: the Journal of Arthroscopic & Related Surgery*

Dr Karl B. Landorf

Member, International Advisory Board, *The Foot*

Member, Advisory Committee, *Australasian Journal of Podiatric Medicine*

Member, Advisory Board, *Australian Editorial Base of the Cochrane Musculoskeletal Group*

A/Prof Hylton B. Menz

Editor (Australasia), *The Foot*

Contributing editor, *Journal of the American Podiatric Medical Association*

Member, International Advisory Board, *Physical Therapy in Sport*

Member, International Advisory Board, *Journal of Science & Medicine in Sport*

Dr Shannon E. Munteanu

Member, International Advisory Board, *The Foot*

Dr Anita Raspovic

Editor, *Australasian Journal of Podiatric Medicine*

Dr Kate E. Webster

Member, Editorial Board, *Journal of Sports Science & Medicine*

## Peer reviewing

MRC researchers have provided peer review of manuscripts for the following journals:

*Acta Biomaterialia*

*Age & Ageing*

*American Journal of Physical Medicine & Rehabilitation*

*American Journal of Sports Medicine*

*Archives of Physical Medicine & Rehabilitation*

*Arthroscopy*

*Australasian Journal of Podiatric Medicine*

*Australian Health Review*

*Australian Journal of Physiotherapy*

*Biochemica et Biophysica Acta*

*Biochemical Journal*

*BMC Musculoskeletal Disorders*

*Bone*

*British Journal of Sports Medicine*

*Cell and Tissue Research*

*Cellular & Molecular Life Sciences*

*Clinical Biomechanics*

*Clinical Journal of Sport Medicine*

*Clinical Orthopaedics & Related Research*

*Diabetes Care*

*Diabetic Medicine*

*Diabetologia*

Disability & Rehabilitation  
 European Journal of Applied Physiology  
 Experimental Brain Research  
 Foot & Ankle International  
 Gait & Posture  
 Inflammation Research  
 International Journal of Computational Intelligence & Applications  
 International Journal of Psychophysiology  
 Journal of Applied Physiology  
 Journal of Biological Chemistry  
 Journal of Endocrinology  
 Journals of Gerontology: Medical Sciences  
 Journal of Orthopaedic & Sports Physical Therapy  
 Journal of Orthopaedic Research  
 Journal of Rehabilitation Research & Development  
 Journal of Rheumatology  
 Journal of Science & Medicine in Sport  
 JAMA: Journal of the American Medical Association  
 Journal of the American Podiatric Medical Association  
 Journal of the Royal Society of Medicine  
 Knee Surgery, Sports Traumatology, Arthroscopy  
 Mechanisms of Aging & Development  
 Medical Science Monitor  
 Osteoarthritis & Cartilage  
 Physical Therapy  
 Physical Therapy in Sport  
 Physiotherapy  
 Physiotherapy Research International  
 Physiotherapy Theory & Practice  
 Prosthetics & Orthotics International  
 Research in Sports Medicine  
 Sports Medicine  
 The Foot  
 Tissue Engineering

MRC researchers have provided peer review of research applications for the following funding bodies:

Diabetes UK  
 Help the Aged (United Kingdom)  
 National Health & Medical Research Council of Australia  
 PP Charitable Foundation (United Kingdom)  
 Queensland Nursing Council  
 Research Grants Council of Hong Kong

## Grant income

MRC researchers attracted nearly \$3M in competitive research grant funding in 2006-2007. Of particular note was the group's increasingly high success rate in NHMRC funding, attracting one NHMRC Post-doctoral Fellowship / Career Development Award and three NHMRC Project Grants. In 2006-2007 the MRC continued to be supported by charitable organisations, government agencies and by competitive internal funding schemes.

<b>Source</b>	<b>Amount (\$)</b>
Alzheimer's Australia	10,000
ANZ Charitable Trust	19,000
Arthritis Australia Grants-in-Aid	10,000
Australian Podiatry Education & Research Foundation grants (4)	19,980
Australian Research Council Linkage Grant	54,555
La Trobe University Faculty of Health Sciences grants (12)	92,385
La Trobe University Central Large Grants Scheme (2)	50,000
Michael J. Fox Foundation for Parkinson's Research	866,325
MS Australia	90,000
NHMRC Post-doctoral Fellowship	63,500
NHMRC Career Development Award	89,000
NHMRC Project Grants (3)	1,429,175
Victorian Department of Human Services	11,000
<b>Total</b>	<b>2,804,920</b>

[www.latrobe.edu.au/mrc](http://www.latrobe.edu.au/mrc)