PRINCE OF WALES MEDICAL RESEARCH INSTITUTE

This Annual Report covers the scientific achievements of the Institute for the calendar year 2003
Financial information refers to the Financial Year ending 30 June 2004

PRINCE OF WALES MEDICAL RESEARCH INSTITUTE

CONTENTS

INTRODUCTION

About the Institute

The Prince of Wales Medical Research Institute was formally established on the signing of a Letter of Agreement between the then Eastern Sydney Area Health Service, the University of New South Wales, and the Institute's founding group of scientists, in December 1990. The Institute was officially opened on 8 November 1993 by the New South Wales and Commonwealth Health Ministers of the day (The Hon RL Phillips and Senator G Richardson). Research and development commenced under the auspices of the Institute that same year. POWMRI Limited was registered as a public company limited by guarantee under the Corporations Law of New South Wales on 4 August 1993.

Since its establishment, the Institute has grown significantly. It has undergone two capital works programs through funding from the NSW Government, the Commonwealth Government and its own fundraising activities. It currently has over 120 staff, making it the largest independent research institute in NSW working on the functions and disorders of the brain and nervous system.

The Institute conducts Australia's foremost research into human balance and coordination, including the major national program of research into the causes of falls in older people. The Institute houses a large 'brain bank' where the invaluable resource of bequeathed brains of patients with a range of conditions under study are held, together with complete clinical records of the patients themselves. The Institute has an established record of leadership in the area of nerve injury, degeneration and regeneration, and the Spinal Injuries Research Centre is being developed further to cover all aspects of this devastating condition. Major and highly distinguished research programs are also in place on pain mechanisms, on the brain's control of movement and balance; on child injury; on neurodegenerative disorders; on macular degeneration and blindness; and on neural regulation of autonomic function and breathing.

Location

The Institute is situated on the Randwick Hospital's Campus in the eastern suburbs of Sydney, adjacent to the main Kensington campus of the University of New South Wales and its Faculty of Medicine.

Institute Governance

The Institute is an independent non-profit company: ABN 94 050 110 346.

The Institute has formal affiliations with South Eastern Sydney Area Health Service and University of New South Wales. These two organisations are represented equally on the Institute's Board of Directors. There is also formal Board representation by the National Health and Medical Research Council, Australia's largest scientific funding agency. Other Board Directors are eminent leaders in diverse business fields and the community.

The Institute's Chairman, Hon Dr Don Grimes, AO, retired from the Board in February 2004 to accept an overseas posting. Board Members and staff expressed appreciation for his tireless leadership over the past two years, his knowledge of the health and research arena, and the unqualified support he has given the Institute.

Mr Paul Brassil, a long-standing Board Director, was appointed Interim Chairman. His contribution to the Institute continues to be significant. He is a Partner of PricewaterhouseCoopers, Chartered Accountants and Fellow of the Taxation Institute of Australia, specialising in advising local and international clients on income tax and related matters. He has been Interim Chair of the Board since February 2004 and Chair of the Audit Committee since 2003.

Professor Simon Gandevia MD PhD DSc FAA FRACP served as Acting Scientific Director during 2003 and the first half of 2004. In June 2004, the Board formally appointed Professor Peter Schofield PhD DSc (formerly of the Garvan Institute), Executive Director and Chief Executive Officer of the Institute. Professor Simon Gandevia was appointed Deputy Director. These new appointments take effect from 5 July 2004.

Funding Sources

NSW Health Infrastructure Grant

The Institute has been successful in securing funding of $1.47M per annum for the next triennium (2004-2006) from the NSW Health Department R&D Research Infrastructure Program. It qualifies as one of the six large independent institutes recognised under Stream 1 of the Program.

Research Grants

The Institute attracts competitive external grant funding from a number of national and international organisations every year. Total peer-reviewed funds for 2003 were $5.65M. The most significant funding body is the National Health and Medical Research Council. NHMRC funding to the Institute has increased steadily despite the competitiveness in acquiring such research grants. In 2003, NHMRC grants income was $4.28M. This income includes an NHMRC Program Grant for Experimental Neurology ($0.94M in 2003) and an NHMRC Partnership in Injury Grant (a total of $2.6M over the period 2001-2005).

While the NHMRC continues to be a major source of research funding, Institute researchers have also been active in seeking research funds from other sources, such as the Australian Research Council, Australian Brain Foundation, Motor Accidents Authority of NSW, Spinal Cure Australia, Clive and Vera Ramaciotti Foundation, Sylvia and Charles Viertel Foundation, Neurosurgical Research Foundation and the Spine Society of Australia. Funding from non-NHMRC sources has become more diverse over the last few years. Such funds play a very important role in the Institute's work and, in an increasingly competitive market, are vital to the support of our research.

Publications

The Institute continues to have a strong publications record, with a total of 116 publications in 2003. This figure does not include the Institute's extensive record of conference proceedings and abstracts, nor does it include works "in press".

Fundraising

As a not-for-profit company, the Institute holds an "Authority to Fundraise for Charitable Purposes". The incorporated body POWMRI Limited supports the Prince of Wales Medical Research Institute through its Board Finance Group, and various public relations and fundraising activities are conducted throughout the year.

For the Institute's work to proceed optimally, funding must be supplemented by donations from sources other than those mentioned above. Private donations are a key component of the Institute's funding.

Recognition of Board Members and Staff

The Institute currently has seven staff at professorial level and five at associate professorial level.

During 2003 there were two Fellows of the Australian Academy of Science on the Institute staff. One of the Institute's staff is a former President and one is current President of the Australian Neuroscience Society; two have been awarded the Ramaciotti medal recognising excellence in medical research; one of the Institute's senior scientists has been made an Officer in the Order of Australia (AO) for his service to neurological science and two of the Institute's senior scientists have been awarded Member of the Order of Australia (AM). Members of the scientific staff also occupy senior positions in national and international organisations concerned with nervous system function and dysfunction.

Training and Education

Senior scientific staff members of the Institute supervise postgraduate students from various schools of the Faculty of Medicine, University of New South Wales and the Faculty of Health Sciences, Faculty of Medicine, and the School of Aerospace, Mechanical and Mechatronic Engineering at the University of Sydney. This Institute actively supports both staff and students representing the organisation at relevant national and international conferences and symposia.

CHAIRMAN'S REPORT

The Board

Dr Don Grimes AO retired as Chairman of the POWMRI Board in February 2004 after 8 years' dedicated service to the Institute. In his role as Chairman of the Board of South Eastern Sydney Area Health Service, Don had represented SESAHS, a key stakeholder in the Institute's affairs. We are all grateful for Don's wealth of experience and commitment to the wellbeing of the Institute and medical research. On Don's departure, I was pleased to accept appointment as Chairman of the Board. I hope to continue Don's tradition of open dialogue with fellow Directors and Institute staff, and look forward to working as a cohesive group to provide the best environment for scientists at the Institute to generate advances in neuroscience.

Four new Directors have joined the Board. They are Ms Elizabeth Broderick, a Partner, Board Member and Head of the Legal Technology Group at Blake Dawson Waldron; Ms Judi Hausmann, Principal of Hausmann Communications; and Mr Philip Salter, Joint Managing Director of Salmat Limited. These eminent business people were invited to join the POWMRI Board as independent representatives.

In his capacity as Vice-Chancellor of the University of New South Wales, Professor Mark Wainwright AM was recently appointed as UNSW nominee to the POWMRI Board. We are pleased to have representation on our Board from the executive levels of both SESAHS and UNSW, major stakeholders in determining POWMRI's current and future interests. We expect to announce the appointment of other independent Directors and nominated representatives in the near future. The Board welcomes the new Directors, and appreciates their dedication and commitment, as well as the expertise they bring in their varied career paths.

We were sorry to lose the services of three other Directors during 2003-04. Mrs Andrée Milman, a founding, independent Director of POWMRI, resigned in December 2003 after 10 years' dedicated service. Ms Deborah Green, CEO of South Eastern Sydney Area Health Service until her resignation in July 2004, relinquished her position on the POWMRI Board as a nominee of SESAHS. Professor Rory Hume resigned as Vice-Chancellor of UNSW and accordingly resigned as UNSW representative on our Board in April 2004. We are grateful for the wise counsel of these Directors during their terms of service.

Friends of Neuroscience

This Board sub-committee was formed late 2003 to focus on fundraising and help determine future strategic marketing

plans for POWMRI. Judi Hausmann chairs the FONS committee, which comprises some 15 members who are either Board Members or eminent members of the business community. The committee meets regularly and liaises closely with the Board and Institute staff.

Executive appointments

Professor Peter R Schofield was appointed Executive Director and Chief Executive Officer of POWMRI on 5 July 2004. The Selection Committee undertook an extensive search for the best appointee and considered many high quality candidates. The reason for our final decision was Peter's eminence in neuroscience and his vision for the Institute's future.

Peter was previously Director of the Neurobiology Research Program at the Garvan Institute. His research interests centre on identifying genes that lead to disorders such as bipolar disorder (manic depressive illness) and Alzheimer's disease, and understanding how signalling in the brain occurs through studies of neurotransmitter receptors. Peter has worked in both the biotechnology industry and in academic medical research institutes in the US, Germany and Australia.

We also congratulate Professor Simon Gandevia on his appointment as Deputy Director, with effect from 5 July 2004. Board Members and Institute staff are most grateful to Simon for his outstanding role as Acting Scientific Director during the recruitment period for the Executive Director. Simon has worked tirelessly on behalf of the Institute, especially during this transitional period.

The future

The Board has given a mandate to build new facilities at the Institute to accommodate the changes associated with Professor Schofield's executive appointment and the relocation of his research team from the Garvan to POWMRI.

Peter Schofield's appointment will enhance the existing research programs at the Institute which have led to our prominent position and status in neuroscience and medical research in Australia and overseas. With a mandate to develop molecular, cellular and genetic neuroscience, we are now looking to make a significant expansion in the scale and scope of the Institute's work.

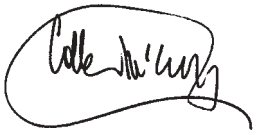
On behalf of the Board, I extend sincere thanks to POWMRI's scientists, administrative and operations staff, the Research Committee, Scientific Advisory Committee, and Friends of Neuroscience. I also thank the Institute's corporate and individual donors for their support throughout the year. Be assured that your dedication and generosity is always appreciated. The strength and scope of research into the brain and nervous system, not only at our Institute, but at associated locations, will open new opportunities for the benefit of science and humanity. Working closely together, we anticipate an exciting future for the Prince of Wales Medical Research Institute.

Paul Brassil
Chairman
Prince of Wales Medical
Research Institute

PATRON'S MESSAGE

Dr McCullough has been the Patron of the Prince of Wales Medical Research Institute since 1994. She is an internationally renowned novelist. Dr McCullough is also the Patron of The Gerontology Foundation of Australia, an Emeritus Consultant in Clinical Neurophysiology at Royal North Shore Hospital, and a former Chairman of the Norfolk Island Hospital Board.

Having been associated with the Prince of Wales Medical Research Institute since its inception, I have witnessed the many changes in and enormous growth of this splendid foundation for the neurosciences so dear to my heart. The news on all fronts is very exciting, and I look forward to its going from strength to strength with an eager pride born of a long and fruitful association. May I also take this opportunity to welcome Professor Peter Schofield to the helm, and wish him and his colleagues all the very best for the future.



Dr Colleen McCullough, Hon DLitt

THE BOARD OF DIRECTORS

A Mr Paul Brassil
BEc LLB ACA FTIA
Director, POWMRI Limited, 1997 – present. Chairman, POWMRI Limited, February 2004 – present. Chair, Audit Committee, POWMRI Limited, 2003 – present. Partner of PricewaterhouseCoopers, Chartered Accountants and a Fellow of the Taxation Institute of Australia, specialising in advising local and international clients on income tax and related matters.

B The Hon Dr Don Grimes AO
MBBS Hon FAFPHM FRACMA
Director, POWMRI Limited, 1996 – February 2004
Chairman, POWMRI Limited, 2002 – February 2004. Chair of Aus Health International and Director of the Australian Institute of Political Science. Currently on secondment to the health industry in Manama, Bahrain.

C Ms Elizabeth Broderick
BA(Computing Science) LLB
Director, POWMRI Limited, December 2003 – present
Member, POWMRI Board, 'Friends of Neuroscience' Committee Partner, Board member and Head of the Legal Technology Group at Blake Dawson Waldron. She is an acknowledged leader in the field of law and technology. In 2001, she won both the Telstra NSW Business Woman of the Year Award and the Telstra Australian Business Women's Award (Private and Corporate Category). In 2003 she was awarded the Centenary Medal for Service to Australian Society through Business Leadership.

D Professor Roger Dampney
BSc PhD DSc
Director, POWMRI Limited, 1995 – present
Professor of Cardiovascular Neuroscience at the University of Sydney and an Honorary Consultant Physiologist at Royal North Shore Hospital. He is also a member of a number of Societies and Advisory Committees and was previously a Member of NHMRC Regional Grants Interviewing Committees and Member of NHMRC Assigners' Panel.

E Professor Bruce Dowton
MBBS MD FACMG FRACP
Director, POWMRI Limited, 1998 – present
Dean of the Faculty of Medicine at the University of New South Wales, he is an honours graduate in Medicine and Surgery from the University of Sydney and has trained as a paediatric geneticist in the USA where he directed the Division of Medical Genetics at Washington University, and was Associate Vice Chancellor and Associate Dean for Medical Education.

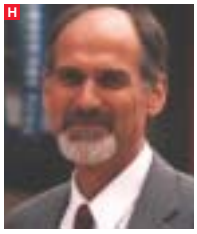
F Ms Deborah Green
BSocStud
Director, POWMRI Limited, 1997 – July 2004
Formerly Chief Executive Officer of South Eastern Sydney Area Health Service. Currently Chief Executive Officer Sisters of Charity Health Services.

G Ms Judi Hausmann
MPRIA
Director, POWMRI Limited, September 2003 – present
Chair of POWMRI Board 'Friends of Neuroscience' Committee. Principal of Hausmann Communications in Sydney, and a Member of the Public Relations Institute of Australia.












H Professor Wyatt (Rory) Hume
BScDent PhD DScDent
Director, POWMRI Limited,
2002 – April 2004
Previously Vice-Chancellor and President of the University of New South Wales. He recently resigned from this position.

I Mrs Andrée Milman
Director, POWMRI Limited,
1993 – December 2003
Previous appointments included executive positions and directorships of several major corporations in Australia and overseas.

J Mr Philip Salter
Director, POWMRI Limited,
June 2004 – present
Joint Managing Director of Salmat Limited, one of Australasia's leading direct customer communications companies. He is a member of the Company Directors Association of Australia and a former Director of the Australian Direct Marketing Association.

K Mr David Thomas
Director, POWMRI Limited,
1997 – present
Licensee and Proprietor in the hotel and hospitality industry and a Member of Royal Sydney Yacht Squadron.

L Professor Mark Wainwright AM
MAppSc PhD DSc
Director, POWMRI Limited,
August 2004 – present
Vice-Chancellor and President, University of New South Wales since July 2004. Professor Wainwright has served on the boards of a number of Co-operative Research Centres for various periods, and is currently a Director of UniSearch Limited.
In 2004, he was awarded an AM for his service to chemical engineering as a researcher and academic, and to tertiary education.

M Mr John Walton AM
MBA BEc FCPA FAIM
Director, POWMRI Limited,
1991 – present. Chairman of Walton Enterprises Pty Ltd, Deputy Chairman of the Australian Institute of Management, and a Director of Young & Rubicam Australia Pty Ltd, Capital Investments Pty Ltd, and Sydney Children's Hospital Foundation. He has also served as Chairman of a number of corporate and community boards, including the Eastern Sydney Area Health Service, Waltons Limited, and the Australian Retailers Association and the Sydney Committee Ltd.

N Professor Peter Schofield
BScAgr PhD DSc
Executive Director and Chief Executive Officer, POWMRI, July 2004 – present

O Mr Andrew Dermott
BEc CA
Company Secretary and Finance Manager, POWMRI

PROFESSOR PETER R SCHOFIELD

Executive Director & CEO's Report

I am delighted to have taken up my appointment as Executive Director and Chief Executive Officer of the Prince of Wales Medical Research Institute on 5 July 2004.

I come to this challenging position with over 20 years' experience from scientific and medical research institutes and the biotechnology industry, having undertaken training at the University of Sydney, the Australian National University and the University of New South Wales, and having worked in the USA, Germany and Australia. Most recently, I have been the Director of the Neurobiology Research Program at the Garvan Institute of Medical Research.

The Prince of Wales Medical Research Institute has an established international record of research leadership in spinal cord and nerve and impact injury, pain mechanisms, vestibular function and falls, neural regulation of autonomic function and breathing and neurodegenerative diseases. These are key strengths and I want to maintain and enhance these important research programs while, at the same time, leading the Institute into an exciting, new era of growth. This will include the expansion of POWMRI's neuroscience research to encompass genetics, cell biology and molecular neuroscience. These are areas that the Board and senior scientists have identified as important for POWMRI to maintain its prominent position and status in health and medical research, here in Australia and overseas. The broadening of the scope of our research endeavour will also serve to attract other leading scientists to join the Institute and allow us to make further contributions to understanding and relieving the huge burden that the many different forms of brain disorder place on our society.

I am grateful to the Board for giving me the opportunity to lead the Prince of Wales Medical Research Institute and to all of the staff, in particular Professor Simon Gandevia, for the support they have provided as the Institute seeks new challenges and opportunities.

Professor Peter R Schofield
PhD DSc
Executive Director and
Chief Executive Officer

OUR RESEARCH

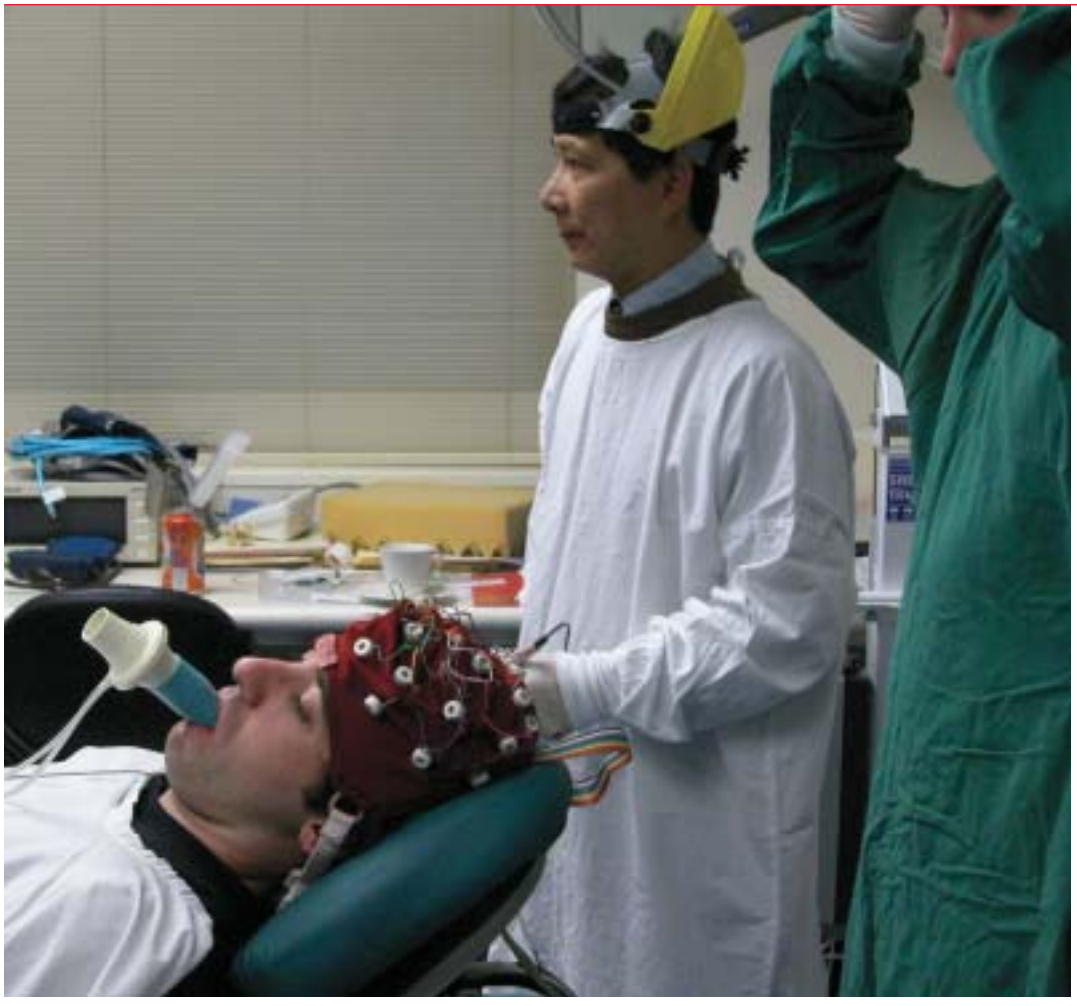
About the Institute

Much of the Institute's work is based on determining the basic principles underlying brain and nervous system function and where possible seeking to apply these principles directly to the relevant community.

The Prince of Wales Medical Research Institute's research falls under these major themes:

- Brain Mapping and Abnormalities
- Human Balance and Falls
- Injury
- Neural Control of Muscles
- Neural Control of Organs
- Parkinson's Disease, Dementia and Ageing
- The Sensory System

BRAIN MAPPING & ABNORMALITIES



Brain researchers, no less than geographers, need maps and coordinate systems to navigate the brain and communicate their observations to each other. On a map of the brain we can superimpose types of neurons, neurotransmitters, enzymes, and connectivity and functional data. We are continuing to develop and refine brain atlases of humans and experimental animals which are used internationally as the standard.

Major areas under investigation

Maps of human brain function
Utilising the Institute's new functional MRI facility, we are creating functional maps of the human brain. Subjects are given tasks that engage their sensory (e.g. visual), motor, cognitive or emotional system while their brain is imaged. This allows us to localise these functions within the brain.

Comparison between human and animal brains
Most neuroscientists work on the brain of rats and mice, often testing hypotheses inspired by human considerations, as for example when they model human illnesses. These scientists need to know what corresponds in the brain of animals and humans (homologies) so that they can relate their observations from animals to humans.

Improving radiation treatment of brain blood vessel abnormalities
Congenital arteriovenous malformations (AVMs) of the brain are abnormal collections of arteries and veins that are prone to causing stroke by rupturing into the brain or by affecting the flow of blood into normal brain. The high rates of death and disability associated with rupture are particularly devastating because AVMs affect predominantly young adults.

Vaughan Macefield Examining sites of the brain responsive to different types of pain
The majority of brain imaging studies in human subjects have examined the sites of activation associated with superficial pain, usually evoked by laser-induced local heating, but no studies have compared these sites with those evoked by deep somatic pain. In collaborative studies with Prof Richard Bandler and Dr Luke Henderson at the University of Sydney, Dr Vaughan Macefield and Prof Simon Gandevia have shown, for the first time, that different cortical sites are involved in the processing of deep and superficial pain, evoked respectively by intramuscular and subcutaneous injections of small amounts of hypertonic saline. These studies were conducted at the 3T MRI machine at the Mayne Clinical Research Imaging Centre. Despite similar pain intensity ratings, the superficial pain originating in skin caused significant increases in signal intensity in the anterior cingulate gyrus and decreases in the posterior cingulate, whereas deep pain originating in muscle caused a significant increase in activity in the posterior cingulate gyrus and a decrease in the anterior cingulate. We are now going on to examine sites of activity related to autonomic control of blood pressure and blood flow.

George Paxinos Correspondences between the brain of humans and experimental animals
Professor George Paxinos' laboratory is establishing the homologies (similarities) between the brain of humans and experimental animals. Scientists use experimental animals to test hypotheses inspired by human diseases and then need to relate their observations to humans. Knowing what are the brain homologies across species assists in transferring knowledge gained from experimental animals to humans. The Atlas of the Human Brain (Mai, Assheuer and Paxinos) was published in 2004, this publication is used by other scientists as a guide for their work. Three other books describing the human, rat and mouse brains were also published in 2004. Work that commenced in 2003 and will be completed in 2004 are maps of the rat and avian brains and 3D reconstruction of these works. The 3D atlases can become knowledge management environments for the storage of information now coming from molecular approaches of studying the brain.

Marcus Stoodley Molecular biology of arteriovenous malformations
Arteriovenous malformations (AVMs) are a major cause of stroke in young people. Current treatments aimed at preventing haemorrhage from AVMs include surgery and highly focused radiation ("radiosurgery"). The risks of surgery are related to the location of the AVM within the brain and the size of the lesion. Some AVMs are large and in locations that make surgery too risky. Radiosurgery is an option, but is generally limited to AVMs less than 3 cm in diameter. A further down side of radiosurgery is that it takes 2 – 3 years for the blood vessels in AVMs to occlude after the treatment. The mechanism of vascular occlusion after radiosurgery is not known. Our project is aimed at understanding this process so that strategies can be developed to increase the size limit of

treatable lesions and to reduce the latency period to cure. We have developed a model of AVM that mimics the cellular and molecular changes seen in the human condition. We are now using this model to study the molecular effects of radiosurgery and are trialing molecular thrombogenic strategies to enhance the radiosurgery effects.

HUMAN BALANCE & FALLS

Assoc Professor Stephen Lord,
NHMRC Principal Research Fellow

Control of balance is vital to everyday life. Maintaining balance involves highly complex processing of peripheral sensory information and precise coordination of motor responses. Our research aims to enhance understanding of human balance and involves investigations of sensory and motor contributions, particularly those from the vestibular system. Current studies are designed to investigate the physiology and biomechanics of standing, walking, stepping reactions, trips and slips. Fall risk factors and strategies for prevention of falls in different populations are being systematically examined in large-scale studies.

Major areas under investigation

Understanding human balance

Investigation of the role of different sensory and motor systems will enhance our understanding of how humans maintain balance. Studies are being conducted to explore the effects of vision, sensation and vestibular function on balance while standing and walking in different groups of people.

Predicting falls risk

Identification of factors which increase an individual's risk of falling is vital for prevention of falls and injuries. Epidemiological and physiological research is being conducted to enhance our understanding of these risk factors.

Preventing falls and injury

Fortunately, many falls can be prevented with appropriate intervention strategies. Research is underway to develop, implement and evaluate falls and injury prevention strategies for hospital patients and other groups of people known to be at an increased risk of falls.

Stephen Lord Differing risk factors for falls in nursing home and intermediate-care residents who can and cannot stand unaided

We conducted a study in 1000 people aged 65 to 103 years living in aged care facilities in Sydney to determine falls risk factors in nursing home and intermediate-care residents who can and cannot stand unaided. Fall rates were highest in those with fair standing balance, intermediate in those with the best standing balance and lowest in those with the worst standing balance. This non-linear pattern was even more striking when subjects were categorised according to their standing balance and ability to rise from a chair. Using this dual classification, fall rates were highest in those who could rise from a chair but could not stand unaided (81%), and lowest in those who could neither rise from a chair nor stand unaided (48%). In residents who could stand unaided, risk factors included increased age, male gender, higher care classifications, incontinence, psychoactive medication use, previous falls and slow reaction times. In contrast, quite different risk factors were evident in those residents who could not stand unaided, with a number of known fall risk factors (previous stroke, reduced ability to rise from a chair, slow reaction times) being associated with fewer falls. The findings indicate that there are different risk factors for falls for people living in residential aged care facilities who can and cannot stand unaided. These findings provide important information for developing falls prevention strategies and suggest that those who can stand unaided but have multiple falls risk factors comprise the highest priority group for such interventions. (J Am Geriatrics Society (2003) 51:1645-1650)

Catherine Sherrington New approaches to exercise after hip fracture

Hip fracture is a major cause of mortality and morbidity in older people. Many survivors do not regain their former mobility. In an attempt to maximise physical ability after hip fracture we have developed a novel program of exercises done in weight-bearing positions and conducted two randomised trials comparing this program with traditional bed exercises. Among 80 in-patients we found the weight-bearing program had no adverse effects and that strength and balance improved markedly for both exercise groups. However, people who

had undertaken the weight-bearing exercise program were more likely to learn to walk with a walking stick rather than a more supportive aid (such as a walking frame) after just 2 weeks of exercise. We suggest that people soon after hip fracture should undertake a combination of bed exercise and weight-bearing exercise. In the other trial of home exercise programs among 120 people who had completed usual post-hip fracture care we found greater improvements in balance and functional abilities in people who had done the weight-bearing exercises. We suggest that people will benefit from additional exercises in weight-bearing positions after standard care is complete. In 2005 we will complete the ongoing NHMRC funded multi-centre trial evaluating a "best-practice" intensive weight-bearing exercise program in both inpatient and home settings.

INJURY

Major areas under investigation

Dr Michael Green, Research Officer

Spinal Injuries

Spinal injury is a devastating condition, usually resulting in paralysis, loss of sensation and disruption of body functions. Our research ranges from development of preventative strategies to studies of treatments that improve the health and capacities of spinal patients.

Injuries from road accidents

Road accidents are the largest cause of serious injury to humans. Research is aimed at understanding how and why these injuries occur, and developing effective preventative strategies.

Pain after injury

Many trauma patients suffer from ongoing pain as a result of their injuries. Studies are being undertaken to determine how this pain arises from injury, and how it can be treated.

Mechanisms of injury and nerve damage

Nerves can be damaged as a result of medical disorders or trauma. Studies of the basic mechanisms of injury to nerves will shed light on treatment and prevention.

Injury is the leading cause of death for people under 45 years of age. Injuries to the nervous system, such as brain and spinal cord injuries, are particularly devastating – often leading to lifelong disability. Our research includes a range of studies from basic research into the mechanisms of injury, to developing improved treatments for injured people and to developing strategies to prevent injuries.

Lynne Bilston Impact injury research focuses on child safety

We have commenced major programs aimed at investigating injuries to children in car crashes. The first of these is a study of injuries sustained by children aged 2-8 in crashes. This is being done in collaboration with the Children's Hospital at Westmead and the Sydney Children's Hospital. So far, this study has shown that the majority of children in this age group are being restrained by adult seat belts, when they would be more appropriately restrained in dedicated child restraints or booster seats. This may be contributing to an increased risk of abdominal and spinal injuries. Another major study was investigating the performance of child restraints in side impact crashes, using the crash sled facility. This study has shown that child restraints and booster seats are not offering optimal protection to larger children within the recommended size range for the restraints, resulting in increased risk of head injury. Also, investigation of alternative restraint anchorage systems has shown that rigidly anchoring restraints to the car instead of using the conventional seat belt systems potentially offers great reduction of risk of injury to the head in side impact. Optimising restraint design is undergoing further study. In other work, our study of seat designs in whiplash injury has resulted in the development of a new car seat design that offers much improved protection for the neck in rear impacts. This design is currently being patented. We have also completed studies of the mechanical properties of rat spinal cord, bovine dura mater, and commenced work developing magnetic resonance elastography methods to measure in vivo human tissue properties. A study of the effect of controlled compression on human peripheral nerves, with Dr Vaughan Macefield and Dr Penelope McNulty showed that ectopic nerve discharges depend on both the magnitude and rate of mechanical stimulation.

James Brock and Elspeth McLachlan Abnormal control of blood pressure following spinal cord injury

The improved survival of spinally injured patients means that they can live in reasonable health for many decades. During this time, they have to learn to cope with dysfunction, not only of movement and sensation, but also of temperature regulation, and bladder, bowel and sexual function. In addition, quite commonly, patients experience periods of very high blood pressure that may result in stroke or death. This syndrome is known as autonomic dysreflexia and is triggered by normally painful stimuli which the patient cannot perceive. We have shown for the first time that, following spinal cord injury, arteries are much more readily activated by sympathetic nerve stimulation and that this change is likely to be the main cause of the exaggerated increase in pressure.

Elspeth McLachlan Consequences of spinal cord injury for nerve pathways below the lesion

What happens to the remaining nervous tissue below a spinal cord injury is largely unknown and most current experiments that seek to facilitate regeneration of descending pathways assume that the targets within the cord will remain. Our latest experiments have shown that this is not the case. Not only do many of the remaining circuits become reorganized when the descending nerve fibres disappear, but many of the nerve cells (neurones) which previously projected to the brain die. About half of the neurones that had their processes cut by a lesion many spinal segments away had disappeared after two months in experimental animals. These changes may also be responsible for the heightened reflexes after a spinal lesion that cause spasticity and autonomic dysreflexia. We have been examining the inflammatory response in the cord and in the associated dorsal root (sensory) ganglia to see if invading cells might be the potential killers. The results will lead to new proposals for therapy to preserve the neurones and their connections as close to normal as possible so that new treatments that assist regeneration have a greater chance of success.

Marcus Stoodley Pathophysiology of post-traumatic syringomyelia

Patients with spinal cord injury are at risk of developing cysts within the spinal cord (syrinxes) that further impair their neurological function. Treatment of these cysts with surgical drainage, shunting, or decompression is effective in less than half the cases. It is not known how the cysts form, and it is unlikely that better treatments will be developed until the fluid dynamics of cyst formation are understood. We have previously demonstrated that fluid flows into syrinxes from the subarachnoid space along perivascular spaces. Our current work is aimed at determining the forces driving the fluid flow and the effects of altering compliance and subarachnoid space pressure on CSF flow and syrinx formation. Our current project is specifically examining the role of traumatic scar tissue on the enlargement of syrinxes.

NEURAL CONTROL OF MUSCLES

Dr Peter Nickolls, Senior Research Officer

The motor cortex controls every voluntary movement made by the more than 600 muscles in the body. The precision of human movement is a hallmark of the evolution of primates. Damage to the neural pathways, as occurs in stroke, has devastating consequences including paralysis, loss of speech, impaired walking and other impairments of motor function. We are studying human movement – its initiation, its effects and its impairments in humans.

Major areas under investigation

Central nervous system control of muscle function

All muscles producing movements are critically driven by nerve pathways from the brain which travel through the spinal cord. We are using a range of techniques to explore how movements are controlled by the central nervous system.

Muscle properties

Muscles drive the skeleton and produce all our interaction. We are studying the properties of human muscles and tendons and the way single elements in the muscles respond in health and disease.

Muscles in respiration

Breathing is essential for life and breathing muscles have some unique controllers within the brain and spinal cord. We are examining the drive and actions of the breathing muscles in health and disease.

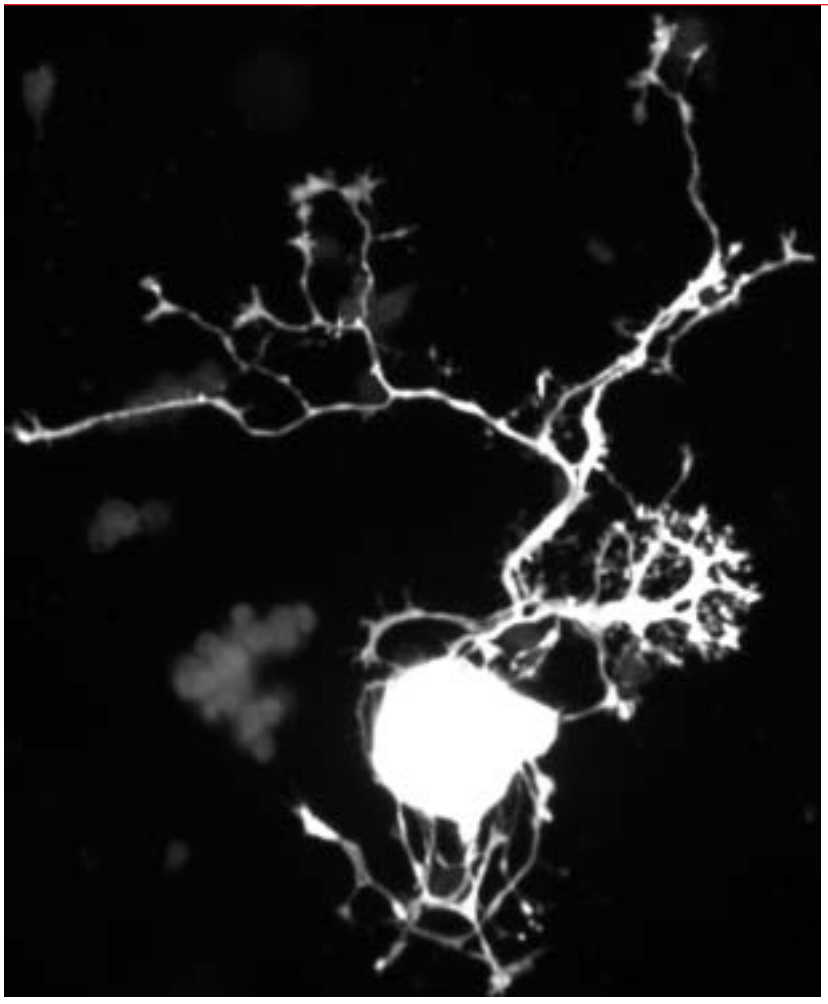
Jane Butler Reflex control of human respiratory muscles

In 2003, we published a paper in Respiratory Physiology & Neurobiology "Reflex Inhibition of Human Inspiratory Muscles in Response to Contralateral Phrenic Nerve Stimulation". We described, for the first time in conscious human subjects, an inhibitory reflex connection between the phrenic nerve afferents from the diaphragm with the respiratory muscles on the contralateral side. In contrast to animals we were able to demonstrate this at relatively low stimulus intensities. The major early effect of the phrenic nerve stimulus on contralateral inspiratory muscle activity is to reduce their activity. The major inhibitory effect of the stimulus on inspiratory muscles contrasts with that in the limb muscles, in which equivalent stimuli normally evoke excitatory responses. One possible function of the early inhibitory response to loading in inspiratory muscles may be that it reflexly prevents the inhalation of foreign objects further into the airway before an appropriate voluntary response can be made.

Simon Gandevia How does the brain drive fatigued muscles?

During sustained exercise, force produced by muscles often declines, that is, fatigue sets in. However, the effort required to keep performing the exercise increases. In recent years Janet Taylor, Jane Butler, Simon Gandevia and their colleagues have shown that some of this muscle fatigue occurs because of a failure to drive the output from the motor areas of the brain maximally. In a major paper published in the Journal of Physiology (551: 661-671, 2003), Gabby Todd with Janet and Simon developed a method based on stimulation of the brain to measure accurately the brain's drive to muscles. This uses transcranial magnetic stimulation of the brain while subjects make muscle contractions of different strength. Using this method, they then showed that it is applicable to measurement of the brain's failure to drive muscles fully when muscle fatigue develops. With further refinement, this method may offer novel insights into exercise performance and into neurological deficits in which fatigue is prominent.

NEURAL CONTROL OF ORGANS



Major areas under investigation

Nerve Growth and Regeneration
We are interested in the way that nerves grow in early life as their connections are being established and in the similarities with how injured nerves re-grow in adult life.

Control of urogenital system
Our experiments are aimed at understanding how the nervous system controls bladder function and male reproductive reflexes, such as penile erection. This will help us to understand why these reflexes can fail (e.g. urinary incontinence, erectile dysfunction), and how they may be restored.

Neural control of the heart
We are interested in the nerves that control heart rate, the chemicals released from the nerves and how they interact to modify heart rate. We are also interested in which nerve predominates in exercise and high blood pressure so that in future we can modify overactivity in one or both nerves.

Our research covers a broad range of body functions, from control of the heart and blood vessels, to bladder, bowel, reproductive and renal function. Many of the projects are aimed at understanding how these organs are controlled and coordinated in normal, healthy systems, so that we then devise ways of preventing or reversing problems that later occur due to injury or disease resulting in organ failure (eg uraemia – kidney failure).

Control of blood pressure and blood flow

We are studying the nerves that modify blood flow in small arteries in different parts of the body. We are examining the chemicals they release to increase or decrease blood flow and how blood flow is modified by these chemicals during exercise, high blood pressure and nasal congestion.

Janet Keast Plasticity of pelvic sensory and autonomic neurons

We are investigating the factors and mechanisms that help to maintain the normal structure and function of the nerves that control lower urinary tract and reproductive organs. This is also relevant to understanding some of the effects of injury and disease on these nerves. We have found that in male rats, testosterone has an important role at puberty to change the electrical properties of pelvic autonomic neurons (J Neurophysiol 89: 315-323). This group of experiments also showed that even after adulthood is reached, testosterone is still required to maintain some (but not all) of these properties. This has important implications for problems with bladder control and erectile dysfunction after various hormone (or hormone blocker) treatments, and for some effects of ageing. We have also recently discovered that in female rats many of the sensory neurons and pain-sensing neurons that innervate the urinary bladder express estrogen receptors (Auton Neurosci 95:90-100). This, along with our new experiments on signalling pathways in these neurons, suggests that estrogens can affect sensation, and may be relevant to improved treatments for bladder and other pelvic pain. We are also very interested in neurotrophic factors for pelvic parasympathetic neurons and have begun to study the development of these neurons in various type of knockout mice. To start these studies we first needed to characterise structurally and immunohistochemically the pelvic ganglia in normal mice, and this study has recently been completed (Cell Tissue Res 311: 175-185). We are now starting to study the neural growth and regeneration responses in different types of knockout mice and in tissue cultures of adult pelvic sensory and autonomic neurons.

Matthew Kiernan Nerve excitability and the pathophysiology of neurological disease

A particular focus in 2003 was the investigation of nerve dysfunction in renal failure (uraemia). Neuropathy is present in 60% of patients commencing haemodialysis and is a key factor in determining the required frequency of dialysis, and the need for renal transplantation. Despite the high incidence of neurological problems due to uraemia, the cause remains unknown. The studies commenced in 2003, attempting to identify aspects of nerve dysfunction that correlate with biochemical abnormalities in uraemic patients. Once identified, it is anticipated that management strategies will be developed to better target the prevention and treatment of neuropathy in uraemia. These studies are ongoing and form the focus of Dr Arun Krishnan's PhD thesis, for which he was awarded both the Young Investigator Award at the Australian Association of Neurologists Annual Scientific Meeting and the TOW Prize of the Prince of Wales Hospital Group. Collaborative studies with Prof Hugh Bostock FRS also continue at the Sobell Department, Institute of Neurology London UK investigating the painful symptoms of neuropathy. These studies have focused on dysfunction in small diameter unmyelinated sensory axons (e.g. tetrodotoxin-resistant Na+ channels). These currents were identified in small rat dorsal root ganglia neurones (Neuroscience 2003;119:653-660) and are likely to be functionally important in pain transmission. Dr Cindy Lin (CJ Martin Fellow POWMRI) is continuing this collaboration in London, developing a functional test for such channels in human nerves.

Erica Potter Neural control of the circulation

We have been looking at the role of the sympathetic co-transmitter neuropeptide Y in modulation of blood flow in different vascular beds in different species. The cocktail of neurotransmitters supplying blood vessels in vascular beds throughout the body varies between vascular beds and the presence of neuropeptide can also vary between species. Neuropeptide Y has been shown to have direct vasoconstrictor effects in some vascular beds and to modulate the release of neurotransmitter in other vascular beds. We are using small arterial rings from different vascular beds to determine whether neuropeptide Y modulates release of noradrenaline and subsequent vasoconstriction from the sympathetic nerves supplying the blood vessels. In the mesenteric vascular bed we have shown that while the contractions in these vessels are due mainly to the release of noradrenaline and neuropeptide Y from the sympathetic nerves, neuropeptide Y does not inhibit release of either noradrenaline or neuropeptide Y. In the renal vascular bed however, contractions are due mainly to the release of noradrenaline from the sympathetic nerve and neuropeptide Y can inhibit the release of noradrenaline by acting on presynaptic or Y2 neuropeptide Y receptors. We are continuing to look at such variations in other vascular beds and in different species.

PARKINSON'S DISEASE, DEMENTIA & AGEING

Professor Glenda Halliday,
NHMRC Principal Research Fellow

Our research at POWMRI is to understand how the brain ages, both successfully and unsuccessfully. We are particularly interested in age-related neurodegenerative diseases because these are now major health problems due to increased life expectancy being a flow-on from the decreasing impact of infectious and systemic diseases.

Major areas under investigation

Dementia

One of the most feared diseases in society. In general, dementias are caused by changes involving most of the cortex, while movement disorders are caused by changes deep inside the brain. At POWMRI, we are performing different types of research involving large numbers of people, families and individuals, tissues donated for research, as well as animal and cellular models of neurodegeneration and test-tube experiments on different molecules. It is necessary to use a variety of techniques and to study people carefully as the mechanisms of neurodegeneration are still unclear, and it is not yet known when irreversible damage occurs. Because the underlying mechanisms causing dementia are poorly understood, there are no disease-modifying treatments available to halt these neurodegenerative disorders. We are studying the cellular causes of these dementias, and developing methods to identify patients with different types of dementia.

Alzheimer's disease is the most common form of dementia, caused by specific brain changes for which there is no known cure. The clinical symptoms of Alzheimer's disease include forgetfulness (recent events, activities or names) and difficulties with simple maths and other activities. The brain abnormally accumulates a protein called beta-amyloid destroying the delicate connections between cells, and another protein called tau which disrupts normal cellular activity. These changes cause a curious inflammatory reaction in the brain. We are studying the interactions between these processes to determine the best targets for treatment, and working on determining better ways to diagnose people for targeted treatments.

Dementia with Lewy bodies is the second most frequent cause of dementia, which, like Alzheimer's disease, is caused by specific brain changes for which there is no known treatment. Some of the nerve cells of the brain abnormally accumulate a protein called alpha-synuclein in structures called Lewy bodies. We are working on determining the toxicity of this problem and its role in the disease. We are also working on developing a way of scanning the brain to better diagnose this type of dementia in life.

Frontotemporal dementia is a degenerative condition which predominantly affects the front part of the brain (previously known as Pick's disease or frontal lobe dementia). Unlike other neurodegenerative conditions, people with frontotemporal dementia can have a variety of underlying cellular changes in this part of the brain. We are working on understanding why some people get one type of dementia rather than another, and whether the type of cellular change matters for treatment.

Movement Disorders

Parkinson's disease is the most common movement disorder with an estimated 80,000 Australians living with this disease. While symptomatic treatments are available for Parkinson's disease, there is no cure. We are developing tools to identify people early so that therapies targeting the neurodegeneration can be used. Patients with Parkinson's disease are slow to move (bradykinetic), have rigid limbs with a tremor at rest, and difficulties with gait and balance that predispose them to falls. It has been known for some years that dopamine neurons degenerate in the brains of patients with Parkinson's disease, and we are working towards a new blood test that can detect the loss of these neurons with certainty, possibly even before people get symptoms.

Ageing

To determine the impact of brain diseases particularly in the elderly, normal ageing must be studied. We have been carefully studying a group of elderly people in Sydney for over 10 years. Initially, over 600 people agreed to participate in these studies and the majority who are still alive remain independent in the community, many now being over 90 years old. International research suggests that potentially damaging cellular changes occur in the brain with age, although this is one of the areas we know the least about – what are the cellular brain changes that occur with normal ageing? It is difficult to know how much the brain can be affected before some decline is noticed. For this reason, it is extremely important to study the brains of people without brain diseases. In Sydney there is a specific program designed for this purpose called Using our Brains (http://www.braindonors.org/default.asp).

Glenda Halliday

Understanding more about frontotemporal dementia

Until recently it was thought that frontotemporal dementia was a really rare dementia syndrome. This was because different cellular causes can give the same type of dysfunction and dementia syndromes were previously classified according to their cellular causes. Classification of this syndrome is now broader reflecting the functional deficits and the pattern of overall brain degeneration. We have performed several studies on frontotemporal dementia. In studies concentrating on the cellular changes, we have shown that changes in glia are important early events that occur

in the brain and that these changes are potentially treatable (published in the journal Brain 126:827-840). To perform this work we had to devise a method for staging frontotemporal dementia (published in the journal Neurology 60:1005-1011), a method we are now validating for use in clinical practice. In addition, by analysing a large group of people with pathologically confirmed frontotemporal dementia we were able to describe what people could expect during the course of the disease, as well as describe how long patients survived with this disorder (published in Neurology 61:349-354). We believe that this information will greatly assist both clinicians, patients and their families with their treatment and life planning.

Glenda Halliday Degeneration of the brain in Alzheimer's disease

Most people know that Alzheimer's disease causes a severe dementia syndrome because of brain degeneration. However, the disease is very selective as to which part of the brain it affects with most people having little physical disability. We performed a careful analysis of the degree of atrophy over the entire brain throughout the entire course of Alzheimer's disease (published in Neurobiology of Aging 24:797-806). This analysis showed that only certain brain regions were affected at all, and within the affected regions two types of damage could be seen. Some brain regions had a similar degree of mild atrophy that related to the deposition of an insoluble protein called amyloid. Atrophy in these regions was not progressive. Regions with significant brain atrophy had a similar unstoppable progression of degeneration that resulted in up to 50% tissue loss and related to the cellular deposition of the protein called tau. One region (the fusiform gyrus) had more rapid but slightly delayed degeneration than the other degenerating brain region. This data provides a clear picture of the progression of this disease identifying the need for early intervention.

Antony Harding The left human speech-processing cortex is thinner but longer than the right

It is well known that the dominant, usually the left, auditory cortex processes speech signals, which the non-dominant cortex cannot do to the same extent. We set out to find why, by examining the brain regions responsible for speech processing in detail in 21 individuals. The length, depth, volume and surface area of the planum temporale was determined revealing that although the left and right volumes were similar (a well known fact), there were distinct differences in surface area, and also the thickness and the length of the cortex between the left and the right sides. The left cortex was thinner but longer than the right. A model of this was developed in collaboration with H.L. Seldon of Monash University to help explain these findings and how they may result in the dominant function of the left cortex. With increased surface area, the columns of neurons which form functional groups can accommodate a greater number of connections. These differences were thought to result in more independent activity of cells and cell groups on the left side and could be an anatomical factor in the usual dominance of the left hemisphere for speech perception. This study was recently published in the journal: Laterality: Asymmetries of body, brain and cognition.

Wayne Reid Longitudinal study of dementia in Parkinson's disease

Neuropsychological, clinical and neuropathological data from the 15 year follow-up study of patients from the Sydney Multicentre study of Parkinson's disease was analysed. A draft of the paper on the outcome was started. The results show that these patients have a significant decline in their cognitive abilities compared with controls. The decline is small and relatively stable for the first ten years at which time there is a more dramatic decline, often leading to dementia. A new finding of great importance, is that patients who develop Parkinson's before the age of 50 years appear protected from dementia compared with patients whose disease onset is after 60 years. Our work has also shown that we are now able to identify in the early stages of disease, what clinical symptoms predict dementia and poor prognosis. Clinicopathological correlations suggest coexistent pathologies including cortical Lewy bodies, Alzheimer's and cerebrovascular diseases are likely to be responsible for the dementia in Parkinson's disease and the greatest impact of these diseases occurs late.

Yue Huang Assessing familial Parkinson's disease

About 15-20% of Parkinson's disease patients have blood relatives also affected with Parkinson's disease, although the genetic cause of the disease in most families is unknown. Changes in seven genes have been identified in some families with many patients with Parkinson's disease. In these families with clearly identified genetic causes, the clinical and neuropathological manifestations of Parkinson's disease vary according to the mutated genes and transmission mode. We are beginning to collect and analyse data from families with Parkinson's disease to find additional causative genes and predict the trends of disease progression.

Linda Cheung Genotyping in Parkinson's disease

While the exact causes for Parkinson's disease in most cases are not well understood, it is recognised that genetics plays a potentially important part in the development of this disabling movement disorder. This project was initiated in an attempt to find genetic markers to aid the pre-symptomatic detection of Parkinson's disease in at risk individuals. DNA is the genetic material that serves as the blue print for all bodily functions. It has been demonstrated that DNA sequences vary in the population. Some of these variations have been shown to have physiological significance, in particular the tau, a-synuclein and ApoE genes have been individually shown to affect the development of the disease. We have been collecting blood specimens and extracting DNA to examine the sequence variations in these genes and expect to complete analyses in 2005.

Kay Double Neuromelanin pigment can bind iron and induce iron-mediated neurodegeneration

One aim of our research is the identification of the mechanisms by which brain cells die in Parkinson's disease. A major part of this research focuses upon the role of neuromelanin, a pigment found in the neurons most vulnerable to neurodegeneration in Parkinson's

disease. Recently we showed that neuromelanin is an effective iron binder (Double et al, Biochemical Pharmacology, 66, 489-494). This is significant as it is known that the brain iron levels are increased in Parkinson's disease. We suggested that binding of iron to this pigment may lead to an enhanced oxidative capacity in the parkinsonian brain. Further, we were able to show that neuromelanin ladened with iron induced substantial neurodegeneration when injected into an animal model (Double et al, Experimental Neurology, 184, 530-535). This work supports the hypothesis that a neuromelanin/iron interaction may be important in explaining the especial vulnerability of the pigmented dopamine neurons in Parkinson's disease. In addition, the focus of the clinical work from our laboratory is the development of new methods to enable Parkinson's disease to be diagnosed earlier and more accurately than is currently possible. It was known that patients with Parkinson's disease suffer olfactory dysfunction early in the disease. We were able to show that while most patients with Parkinson's disease have hyposmia (a reduced ability to identify smells), this deficit does not affect all smells equally but is evident in specific pattern of fragrances, while the ability to identify other fragrances remains unaffected (Double et al, Archives of Neurology, 60, 545-549). It is hoped that this specific deficit may be useful to diagnose Parkinson's disease earlier and more accurately and to assist in differentiating Parkinson's disease from other disorders with similar motor symptoms.

Olivier Piguet The impact of emotions on memory

As part of his NHMRC Neil Hamilton Fairley postdoctoral fellowship, Olivier Piguet has been working in the Department of Brain and Cognitive Sciences at the Massachusetts Institute of Technology for the past 15 months. In collaboration with Prof Suzanne Corkin and her colleagues, he is investigating how memory performance is influenced by the emotional content of the information being learnt and how the impact of the emotional content on memory changes as we get older. Numerous previous studies have demonstrated that individuals tend to remember emotionally loaded information better than neutral information. This phenomenon has been labelled "emotional enhancement". We also know that declarative memory, which is the ability to recall specific events or pieces of information, tends to decline with age. However, how the emotional enhancement evolves and changes as we get older remains to be fully understood. This research project attempts to address this issue by combining behavioural (memory and cognitive) testing with structural and functional imaging investigations. This comprehensive approach allows us to study the levels of brain activation in specific brain areas known to contribute to memory and emotion (for example the hippocampus, the amygdala and the prefrontal cortex) during memory tasks, as well as to measure the volumes of these structures. In order to investigate the effects of ageing, changes in the strengths of the associations between memory performance, volume measurements and brain activation levels between young and older adults are also compared. So far, 35 young adults (aged in their 20s) and 35 older adults (aged in their 70s) have been enrolled in this research project and have undergone a structural brain MRI and a first series of memory tasks outside the scanner. The data collection for the functional imaging component of the study is currently under way. Preliminary findings indicate that young adults show a memory enhancement for emotional information that becomes stronger as time between encoding and retrieval increases. In contrast, this enhancement appears to be transient in older adults, perhaps because of inadequate cognitive control processes during encoding, mediated by prefrontal circuits.

Tony Broe Sydney Older Persons Study (SOPS)

The Sydney Older Persons Study continues as an active, ongoing research and analysis project. During 2003 a further eight articles based on SOPS data were either published or accepted for publication and further articles are in development. Currently, preliminary research is being developed using functional MRIs to further investigate links between gait disorders and brain ageing. This is a developmental project and the findings so far are very encouraging in terms of supporting the research methodology. The SOPS data is also being utilised in partnership with the NSW Department of Disability, Ageing and Home Care to develop an aged care services planning instrument for departmental planners and managers. This involves the other key objective of the SOPS study, which is to use the clinical and social data collected to inform our responses to population ageing in Australia. Links have been made with Professor Ken Rockwood at Dalhousie University in Canada to incorporate the SOPS data into a meta-analysis project looking at ageing and frailty data from a number of combined studies. Professor Rockwood has already begun producing useful results from this analysis and plans to publish the findings soon.

Bill Brooks

Familial dementia studies

Families with inherited forms of Alzheimer's disease and related conditions are rare, but have the potential to throw light on the biological basis of these diseases, since they have a known cause, namely a genetic mutation. We are now following a number of families with known genetic causes for their condition; most have Alzheimer's disease as their main clinical and pathological diagnosis, but some have mutations in the tau gene and have more in common with the frontotemporal types of dementia. In 2003 we visited Tasmania and the Northern Territory to carry out progress clinical and neuropsychological assessments on members of several large families with the help of Dr Olivier Piguet and Dr Hayley Bennett. Papers reporting the clinical, pathological and genetic features of several families have been published (Brooks et al, Brain 126:783-791, 2003; Stanford et al, Brain 126:814-826, 2003; Kwok et al, Journal of Biological Chemistry 278(9):6748-6754, 2003; Miklossy et al, Neurobiology of Aging 24:665-62, 2003).

THE SENSORY SYSTEM

Dr James Brock,
NHMRC Senior Research Fellow

Sensory receptors reside in virtually every part of the body. They are responsive to different stimuli and provide the brain and spinal cord with information about our internal environment and about the world around us. We are using a range of techniques to understand how the sensory system works, how it affects the motor output from the brain, and how it gives us an accurate 'sensory' map of the external world. Our research aims to understand the changes in the sensory pathways after injury and other pathologies, including the involvement of the immune system in inflammation, leading to sensory disturbances such as hypersensitivity and spontaneous pain. Strategies to help patients with these conditions are being studied.

Major areas under investigation

Pain

Everyone will experience pain at some time. Usually this is short lasting (acute pain), but sometimes it persists long after healing of the injury (chronic pain) and its cause is difficult to determine. Work at the Institute is aimed both at improving treatment of acute pain and in understanding the causes of chronic pain.

Sensation

Nerve endings throughout the body respond to particular stimuli and send critical messages to the spinal cord and brain. Using these signals, the brain develops 'a map' of the external world which is used for every movement that we make.

Elspeth McLachlan

Neuropathic pain – inflammation in dorsal root ganglia

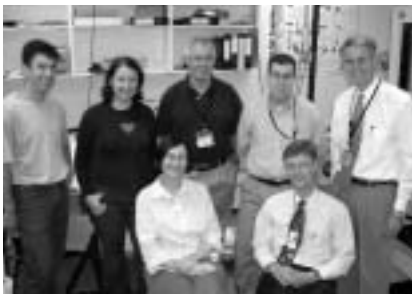
We have continued our studies of the role of inflammation in dorsal root (sensory) ganglia in neuropathic pain (chronic pain after nerve injury). We have published two important results. The first is that pain sensing nerve cells (neurones) that supply the skin are selectively vulnerable when the nerve is injured. Many of these neurones died even if their axons (processes that extend to their targets) were not damaged by the injury. This seems to be due to some factor (possibly a cytokine) that is released near their cell bodies within the sensory ganglia. Invading T-lymphocytes or immune cells may be responsible. The second result arose from a new technique which allowed us to stain for two markers of macrophages (cells that migrate to sites of inflammation) at the same time. By using different combinations of antibodies and identifying the macrophages by their shape, we were able to identify six types of macrophage in dorsal root ganglia after nerve injury. Two of these types were phagocytic - i.e. they engulfed the remnants of dying nerve cells. We are currently analysing the lesser inflammation that follows an injury that readily allows the damaged axons to regrow. We hope to identify the factors responsible for inflammation so that targeted drug therapies can be developed for unrelenting chronic pain conditions that develop in a proportion of people after injury.

James Brock

Activity in sensory nerve endings

The mechanisms that control the excitability of the fine nerve endings of 'pain' sensing neurons remain poorly understood. In Dr Brock's laboratory they are using a novel technique to directly record electrical activity from these sensory nerve endings in the surface of the eye. Using this approach recent work has focused on the mechanisms by which chemical agents and manipulations (e.g. changes in temperature) activate these sensory neurones. In addition, the sensitising effects of chemicals released in inflamed tissues are being investigated. This sensitisation makes these neurons respond to stimuli that are normally innoxious and contributes to the pain associated with diseases such as arthritis.

VISITORS 2003-04



Dr Stephanie Behnke University Hospital, Homburg, Germany spent 2 months at the Institute in 2003 with Dr Kay Double collaborating on a clinical trial looking at the ultrasound features on MRI with patients with parkinsonian disease.

Professor Charles Watson Curtin University of Technology, continued his long collaboration with Professor George Paxinos, working of the 5th edition of the Atlas of the Rat Brain. **Dr Marina Penner**, University of Cologne, Germany, also visited the Institute at this time collaborating with Professor Paxinos on the Atlas of the Mouse Brain.

Professor Mikael Elam University of Goteborg, Sweden, visited the laboratories of Dr Vaughan Macefield in 2003 to analyse nerve recordings done in spinal patients. **Dr Mikael Sander**, Copenhagen Muscle Research Center, Copenhagen, Denmark, visited Dr Macefield's laboratories in early 2004 to set up experiments looking at the role of nitric oxide in renovascular hypertension. Dr Sanders visit coincided with the visit by **Professor Gunnar Wallin**, University of Goteborg, Sweden who collaborated with Dr Macefield analysing urodynamics material collected from spinal patients.

Professor James Vickers and Dr Tracey Dickson from the University of Tasmania visited the Institute to discuss possible collaborative projects with Dr Claire Shepherd and Professor Glenda Halliday.

Dr Mika Palvanen UKK Institute, Tampere, Finland, visited with Assoc Professor Stephen Lord re assessment of visual function in older people.

In February 2004 the Institute hosted several overseas visitors. **Professor Borge Bjelke**, Karolinska Institutet, Sweden, visited various laboratories and presented a seminar entitled "Magnetic resonance imaging: focus on brain damage and repair"; **Professor Felix Viana**, Universidad Miguel Hernandez, Spain, visited various laboratories and presented a seminar entitled "Feeling cool: cellular mechanisms of cold temperature transduction in mammalian sensory neurons"; and **Professor Juergen Reichenbach**, Kinikum der Friedrich-Schiller-Universitat, Germany, visited various laboratories and presented a seminar entitled "Principle and recent advances of susceptibility-weighted imaging (SWI)".

Dr Hylton Menz La Trobe University, continued his close association with the Institute, working with Assoc Professor Stephen Lord and Dr Cathie Sherrington on a revised edition of the book, 'Falls in Older People'. **Dr Jacqueline Close**, Kings College Hospital, London, also visited the Institute in early 2004 to work on the new edition of this book.

Dr Nicky Hayes Kings College Hospital, London, visited with Assoc Professor Stephen Lord to collaborate on falls prevention strategies in older people when in hospital.

Dr Kim Delbaer University Hospital, Ghent, The Netherlands, visited with Assoc Professor Stephen Lord to discuss falls risk assessment in older people.

Professor Doug Stuart University of Arizona, Tucson, Arizona, visited with Professor Simon Gandevia in March 2004 and presented a seminar "Paths of discovery in movement neuroscience: Mario Weisendanger on the motor homunculus".

Dr Nicolas Petersen University of Copenhagen, Denmark, visited with Professor Simon Gandevia and colleagues to collaborate on investigations into the excitability of human motoneurones during voluntary contractions.

Dr Richard Hall University of Leeds, visited the laboratories of Assoc Professor Lynne Bilston developing new experimental methodologies to investigate the properties of the three membranes that protect the spinal cord tissue and hence develop accurate models of the injury mechanism.

Dr Peter Cripton University of British Columbia, Canada, and his PhD student Shannon Reed visited with Assoc Professor Lynne Bilston, learning how to make silicone spinal cord surrogates for spine testing for a collaborative research project.

STUDENT PRIZES & AWARDS

Gillian Gregory	Merck Sharp and Dohme poster prize for the poster entitled “Familial Alzheimer’s disease differs from sporadic in the severity of degeneration”.
Arun Krishnan	Australian Association of Neurologists Young Investigator Prize (best platform presentation) – “Differential susceptibility of lower limb motor axons to an ischaemic insult”. Tow Prize (Open Junior Division) – “Understanding the length-dependent nature of peripheral neuropathy”. The American Association of Electrodiagnostic Medicine 2004 Golseth Young Investigator Award for the manuscript, “Excitability differences of lower limb motor axons exposed to an ischemic insult”.
Elizabeth Kyriakou	Tow Prize for the best visual poster
Julian Saboisky	Best Honours thesis in Human Movement Studies Unit at Charles Sturt University
Carolyn Orr	Australian Association of Neurologists Young Investigator Award for the poster entitled “Evidence for early neuronal immune changes in the substantia nigra of patients with idiopathic Parkinson’s disease”.

RESEARCH FUNDING 2004

Research Grants and Fellowships for January – December 2004

National Health and Medical Research Council

Bilston LE, NHMRC Senior Research Fellowship A (2004-2008), 2004 amount $99,250

Brock JA, NHMRC Senior Research Fellowship A (2000-2004), 2004 amount $99,250

Brock JA, Peripheral mechanisms involved in autonomic hyper-reflexia, NHMRC Project Grant (2002-2004), 2004 amount $70,000

Brock JA, Mechanisms controlling the excitability of corneal nociceptor nerve terminals, NHMRC Project Grant (2000.-2004), 2004 amount $135,919

Burke D, Gandevia S, Potter E, McKenzie D, Macefield VG, Fitzpatrick R, Taylor J, Experimental neurology, NHMRC Program Grant (2000-2004), 2004 amount $945,862

Butler J, Studies of motor control in health and disease, NHMRC RD Wright Fellowship (2004-2008), 2004 amount $83,500

Colebatch JG, Assessment of vestibular function and balance in humans, NHMRC Project Grant (2004-2006), 2004 amount $72,250

Double K, Cellular functions of human neuromelanin, NHMRC Project Grant (2002-2004), 2004 amount $65,000

Double K, NHMRC RD Wright Fellowship (2001-2004), 2004 amount $75,000

Double K, Rowe D, Development of a novel diagnostic test for the death of neuromelanin-containing dopamine neurons in the human brain, NHMRC Development Grant (2002-2004), 2004 amount $100,000 (indexation for 2004 to be advised)

Fitzpatrick RC, Lord SR, Butler J, Sturnieks D, Gandevia SC, Dual Codamotion system, NHMRC Equipment Grant, 2004 amount $30,000

Gandevia SC, NHMRC Senior Principal Research Fellowship (2000-2004), 2004 amount $130,000

Halliday GM, NHMRC Principal Research Fellowship (2000-2004), 2004 amount $115,000

Halliday GM, Glia and Parkinson's disease, NHMRC Project Grant (2003-2005), 2004 amount $162,500

Halliday GM, What contributes to regional vulnerability in neurodegenerative diseases? A study of familial cases, NHMRC Project Grant (2000-2004), 2004 amount $74,079

Halliday GM, Harding A, Brooks W, Kwok J, White L, Alzheimer's disease and dementia with Lewy bodies: How different are they?, NHMRC Project Grant (2004-2006), 2004 amount $190,750

Keast JR, NHMRC Senior Research Fellowship B (1999-2004), 2004 amount $109,750

Keast JR, Mechanisms of testosterone action on the male pelvic autonomic nervous system: the role of estrogens, NHMRC Project Grant (2004-2006), 2004 amount $136,750

Lin C, Membrane properties of functionally identified C fibres in human and rat skin, NHMRC CJ Martin Fellowship (2003-2006), 2004 amount $95,747

Lord SR, Principal Research Fellowship (2002-2006), 2004 amount $115,000

Lord S, Kerr G, Anstey K, Broe A, Cameron I, Cumming R, Fitzpatrick R, Steele J, Wood J, Prevention of injuries in older people, NHMRC Health Research Partnerships in Injury (2002-2006), 2004 amount $521,046.20

Macefield VG, NHMRC Senior Research Fellowship A (2000-2004), 2004 amount $95,000

McLachlan EM, Immune-mediated inflammation in dorsal root ganglia after peripheral nerve injury and in sensory neuropathies, NHMRC Project Grant (2003-2005), 2004 amount $120,000

McLachlan EM, Gandevia SC, Macefield VG, Brock JC, Neurosensory analyser, NHMRC Equipment Grant, 2004 amount $30,000

Paxinos G, NHMRC Principal Research Fellowship (2001-2005), 2004 amount $115,000

Paxinos G, Human hypothalamic homologues to autonomic control nuclei identified in the rat and monkey (2001-2005), 2004 amount $70,000

Piguet O, Structural, functional and neuropathological correlates of normal and pathological cognitive ageing, NHMRC Neil Hamilton Fairley Fellowship (2003-2006), 2004 amount $95,747

Potter EK, NHMRC Senior Principal Research Fellowship (2000-2004), 2004 amount $130,000

Summary information on competitive peer reviewed research grants, fellowships and scholarships, and other sources of external research grant income, awarded for expenditure through the calendar year 2004.

Purves-Tyson T, Effect of estrogen on signalling mechanisms of the pelvic autonomic nervous system, NHMRC Biomedical (Peter Doherty) Fellowship (2004-2007), 2004 amount $63,500

Shepherd C, Geczy C, Raftery M, Halliday G, Targeting inflammatory mechanisms in Alzheimer's disease, NHMRC Project Grant (2004-2006), 2004 amount $132,000

Taylor JL, NHMRC Senior Research Fellowship A (2003-2004), 2004 amount $99,250

Australian Research Council

Bilston LE, Gandevia SC, Ehman RL, Development of new methods to measure in vivo properties of human body tissues, ARC Discovery Project (2004-2007), 2004 amount $150,000

Burke D, Kiernan MC, Connor MA, Resurgent sodium currents in peripheral nerve axons and sensory neurons, ARC Discovery Project (2004-2006), 2004 amount $90,000 (administered through University of Sydney) POWMRI subcontract amount $12,207

Foley PB, Encephalitis lethargica in the 1920s (and afterwards): the forgotten epidemic, ARC Discovery Project and Australian Postdoctoral Fellowship (2004-2006), 2004 amount $80,000;

Forgas J, Paxinos G, Affective influences, social thinking and behaviour: A social neuroscience approach, ARC Discovery Project (2004-2006), 2004 amount $65,000

Keast JR, Neurotrophic factors for pelvic autonomic neurons: the role of neurturin, ARC Discovery Project (2004-2006), 2004 amount $75,000

NSW Department of Health

Lord SR, Kerr G, Anstey K, Broe A, Cameron I, Cumming R, Fitzpatrick R, Steele J, Wood J, Prevention of injuries in older people, NSW Health Department (2002-2006), 2004 amount $50,000

Other funding bodies

Bilston LE, Reconstruction of real world crashes involving child occupants, Motor Accidents Authority of NSW, 2004 amount $57,544

Bilston LE, Review of paediatric spinal injuries, Motor Accident Authority of NSW, 2004 amount $41,384

Colebatch JG, A study of cortical activation by sensory stimulation using functional Magnetic Resonance Imaging (fMRI), Brain Foundation, 2004 amount $10,000

Foley P, The forgotten catastrophe: the mystery of the “sleeping sickness” and its aftermath, UNSW Vice Chancellors Postdoctoral Fellowship, 2004 amount $56,745

Foley P, Encephalitis lethargica c.1915-1925: the forgotten epidemic, Clive and Vera Ramaciotti Foundation, 2004 amount $29,998

Gandevia SC, Nickolls P, Treadmill for neurological studies, Clive and Vera Ramaciotti Foundation, 2004 amount $30,000

Halliday GM, Developing strategies for clinically differentiating Alzheimer’s disease and dementia with Lewy bodies, Anonymous, 2004 amount $185,000

Keast J, Remodelling of lumbosacral autonomic pathways after spinal injury: the role of semaphorins and neutrins, Spinal Cure Australia (Formerly Australasian Spinal Research Trust), 2004 amount $50,000

Kiernan MC, Pathophysiology of neuropathy in renal failure patients, Clive and Vera Ramaciotti Foundation, 2004 amount $30,000

Koutcherov Y, UNSW NewSouth Global Postdoctoral Research Fellowship (2003-2005), 2004 amount $64,368

Lord SR, Prevention of injuries in older people, NRMA Insurance Limited contribution to Program grant, 2004 amount $50,000

Lord SR, Prevention of injuries in older people, UNSW Faculty of Medicine contribution to Program grant, 2004 amount $25,000

McNulty PA, Macefield VG, Neurophysiological investigation of single motor unit properties and sensorimotor integration and control in subjects with spinal cord injury, Spinal Cure Australia Kelly McCann Postdoctoral Fellowship (2004-2006), 2004 amount $41,245

Purves-Tyson T, Signaling mechanisms in pelvic autonomic neurons underlying bladder and erectile dysfunction in diabetes, Clive and Vera Ramaciotti Foundation, 2004 amount $27,700

Reid W, Neuropsychological changes in Parkinson’s disease (PD): A longitudinal study, Brain Foundation, 2004 amount $15,000

Stoodley M, Investigations of cerebrospinal fluid flow in post-traumatic syringomyelia, UNSW Faculty Research Grant Program, 2004 amount $20,000

Stoodley M, Jones N, Role of inflammation and apoptosis in the initiation of post-traumatic syringomyelia, Neurosurgical Research Foundation, 2004 amount $20,000

Stoodley M, Watling A, Jones N, The role of inflammation and apoptosis in the initiation of post-traumatic syringomyelia, Depuy Spinal Fellowship for Ms Amy Watling, Spine Society of Australia, 2004 amount $50,000

Wanigasekara-Mohotti YY, Investigation of the mechanisms of aberrant sensory afferent neuron sprouting causing autonomic nervous system dysfunction after spinal cord injury, Spinal Cure Australia Fellowship (2004-2005), 2004 amount $40,000

Scholarships

Amanat N, Department of Education Science and Training Australian Postgraduate Award, 2004 amount $18,484

Cheng S, UNSW Postgraduate Award, 2004 amount $18,484

Chew JZZ, Department of Education Science and Training Australian Postgraduate Award (2004-2006), 2004 amount $18,484 + UNSW top up scholarship $2,000

Clarke E, Department of Education Science and Training Australian Postgraduate Award (2004-2006), 2004 amount $18,484 + University of Sydney top-up scholarship $13,016

Gregory G, Department of Education Science and Training Australian Postgraduate Award, 2004 Amount $18,484

Krishnan A, NHMRC Medical/Dental Postgraduate Scholarship (2004-2005), 2004 amount $29,489

Orr C, UNSW International Postgraduate Research Scholarship, 2004 amount $18,000

Potts H, Department of Education Science and Training Australian Postgraduate Award, 2004 Amount $18,484 + UNSW Medical Faculty 'top-up" $4,391

Saboisky J, Department of Education Science and Training Australian Postgraduate Award (2004-2006), 2004 amount $18,484

Schofield E, NHMRC Dora Lush (Biomedical) Postgraduate Scholarship (2004-2006), 2004 amount $20,484

Storer K, NHMRC Medical/Dental Postgraduate Scholarship, 2004 amount $6,929

Yuen M, Department of Education Science and Training Australian Postgraduate Award, 2004 amount $18,484

Grants Administered at other Institutions

Cameron ID, Sherrington C, Moseley AM, Lord SR, Enhancing mobility after hip fracture, NHMRC Project Grant (2002-2004), 2004 amount $69,525 (Administered by the University of Sydney)

Hodges P, Lord SR, Physiology and pathophysiology of trunk control mechanisms, NHMRC Project Grant (2001-2005), 2004 amount $33,000 (Administer by the University of Queensland)

Dunn W, Brock JA, Wilson VG, McLachlan EM, Sympathetic neurotransmission in the resistance vasculature, The Wellcome Trust (2003-2005), 2004 amount £5,840 (Administered by the University of Nottingham)

Kril J, Creasey H, Halliday G, Understanding the variation in frontotemporal dementia, NHMRC Project Grant (2004-2006), 2004 amount $136,750 (Administered by University of Sydney)

Sherrington C, Physical ability and falls: addressing gaps in the evidence base. NHMRC Australian Research Training Fellowship (Part-time), (2004-2007), 2004 amount $63,500 (pro rata) (Administered by University of Sydney)

McNulty PA, Neurophysiological investigation of motor pathways in subjects with stroke. NHMRC Biomedical (Peter Doherty) Fellowship (2004-2007), 2004 amount $63,500 (Administered by University of Sydney)

Van Helden D, Keast J, Brock J, et al, High speed confocal microscope live cell recording system, ARC Linkage - Infrastructure, Equipment and Facilities, 2004 amount $274,692 (Administered by University of Newcastle)

Kendig H, Bartlett H, Boldy D, Browning C, Gibson D, Healy J, Luszcz M, Richardson S, Saunders P, Anstey K, Broe GA, et al, Ageing well research network, ARC Network Seeding Fund, 2004 amount $30,000 (Administered by University of Sydney)

2003 PUBLICATIONS

Emma Kettle,
Research Assistant

Books

1. **Foley PB**, Beans, roots and leaves: The history of the pharmacological therapy of parkinsonism, Marburg (Germany): Tectum-Verlag (ISBN 3-8288-8496-2), 2003

Journal Articles

2. Arnold JJ, **Sarks JP**, Killingsworth MC, **Kettle EK**, **Sarks SH**, Adult vitelliform macular degeneration: a clinicopathological study, EYE, Volume 17:717-726, 2003

3. Barnett A, Smith B, **Lord SR**, Williams M, Baumann A, Community-based group exercise improves balance and reduces falls in at-risk older people: a randomised controlled trial, Age and Ageing, 32:407-414, 2003

4. **Bennett HL**, Gustafsson J-Å, **Keast JR**, Estrogen receptor expression in lumbosacral dorsal root ganglion cells innervating the female rat urinary bladder. Autonomic Neuroscience: Basic and Clinical, 105:90-100, 2003

5. **Bennett HP, Piguet O**, Grayson DA, Creasey H, Waite LM, **Broe GA**, **Halliday GM**, A 6-year study of cognition and spatial function in the demented and non-demented elderly: the Sydney Older Persons Study, Dementia and Geriatric Cognitive Disorders, 16:181-186, 2003

6. **Bilston LE**, Fletcher DF, **Brodbelt AR**, **Stoodley MA**, Arterial pulsation-driven cerebrospinal fluid flow in the perivascular space: A computational model, Computer Methods in Biomechanics and Biomedical Engineering, 6:235-241, 2003

7. Borgland SL, Connor M, **Osborne PB**, Furness JB, Christie MJ, Opioid agonists have different efficacy profiles for G protein activation, rapid desensitisation, and endocytosis of Mu-opioid receptors, Journal of Biological Chemistry, 278:18776-18784, 2003

8. **Brodbelt AR**, **Stoodley MA**, Syringomyelia and the arachnoid web, Acta Neurochirurgica, 145:707-711, 2003

9. **Brodbelt AR**, **Stoodley MA**, Post-traumatic syringomyelia: a review, Journal of Clinical Neuroscience, 10:401-408, 2003

10. **Brodbelt AR**, **Stoodley MA**, **Watling A**, Rogan C, Tu J, Brown CJ, Burke S, Jones NR, The role of excitotoxic injury in post-traumatic syringomyelia, Journal of Neurotrauma, 20:883-893, 2003

11. **Brodbelt AR**, **Stoodley MA**, **Watling A**, Tu, J, Burke S, Jones NR, Altered subarachnoid space compliance and fluid flow in a model of post-traumatic syringomyelia, Spine, 28:E413-E419, 2003

12. **Brodbelt AR**, **Stoodley MA**, **Watling A**, **Tu**, **J**, Jones NR, Fluid flow in an animal model of post-traumatic syringomyelia, European Spine Journal, 12:300-306, 2003

13. **Broe M**, Hodges JR, **Schofield E**, **Shepherd CE**, Kril J, Halliday GM, Staging disease severity in pathologically confirmed cases of frontotemporal dementia, Neurology, 60:1005-1011, 2003

14. **Brooks WS**, Kwok JBJ, Kril JJ, **Broe GA**, Blumbergs PC, Tannenberg AE, Lamont PJ, Hedges P, Schofield PR, Alzheimer's disease with spastic paraparesis and "cotton wool" plaques: two pedigrees with PS-1 exon 9 deletions, Brain, 126:783-791, 2003

15. **Butler JE**, McKenzie DK, Gandevia SC, Reflex inhibition of human inspiratory muscles in response to contralateral phrenic nerve stimulation, Respiratory Physiology & Neurobiology, 138:87-96, 2003

16. **Butler J**, **Taylor JL**, **Gandevia SC**, Responses of human motoneurons to corticospinal stimulation during maximal voluntary contractions and ischemia, Journal of Neuroscience, 23:10224-10230, 2003

17. **Cappelen-Smith C**, **Lin CSY**, **Burke D**, Activity-dependent hyperpolarization and impulse conduction in motor axons in patients with carpal tunnel syndrome, Brain, 126:1001-1008, 2003

18. Caramins M, **Halliday G**, McCucker E, Trent RJ, Genetically-confirmed clinical Huntington's disease with no observable cell loss, Journal of Neurology, Neurosurgery and Psychiatry, 74:968-970, 2003

19. Carr RW, **Pianova S**, Fernandez J, **Fallon JB**, Belmonte C, **Brock JA**, Effects of heating and cooling on nerve terminal impulses recorded from cold-sensitive receptors in the guinea-pig cornea, Journal of General Physiology, 121:427-439, 2003

20. **Butler JE**, Thomas CK, Effects of sustained electrical stimulation on the excitability of motoneurons innervating paralyzed and control muscles, Journal of Applied Physiology, 94:567-575, 2003

21. De Troyer A, **Gorman RB**, **Gandevia SC**, Distribution of inspiratory drive to the external intercostal muscles in humans, Journal of Physiology, 546:943-954, 2003

22. Donaldson MG, Khan KM, **Lord SR**, Delivery of optimal falls prevention in community-dwelling people (Invited article), Geriatrics and Aging, 6:26-30, 2003

23. **Double KL**, Gerlach M, Schünemann V, Trautwein AX, Zecca L, Gallorini M, Youdim MBH, Riederer P, Ben-Shachar D. Iron binding characteristics of neuromelanin of the human substantia nigra. Biochemical Pharmacology, 66:489-494, (2003)

24. **Double KL**, **Halliday GM**, **Henderson J**, **Griffiths FM**, Heinemann T, Riederer P, Gerlach M, The dopamine receptor agonist lisuride attenuates iron-mediated dopaminergic neurodegeneration. Experimental Neurology, 184:530-535, 2003

25. **Double KL**, Rowe DB, Hayes M, Chan DKY, Blackie J, Corbett A, Joffe R, Fung VS, Morris J, **Halliday GM**, Identifying the pattern of olfactory deficits in Parkinson's disease using the Brief Smell Identification Test, Archives of Neurology, 60:545-549, 2003

26. Dunn WR, **Hardy TA**, **Brock JA**, Electrophysiological effects of activating the peptidergic primary afferent innervation of rat mesenteric arteries, British Journal of pharmacology, 140:231-238, 2003

27. Edelbrock D, Waite LM, **Broe GA**, Grayson DA, Creasey H, The relation between unpaid support and the use of formal health services : the Sydney older persons study, Australasian Journal of Ageing, 22:2-8, 2003

28. Elam M, Sverrisdottir YB, Rundqvist B, McKenzie D, Wallin BG, **Macefield VG**, Pathological sypathoexcitation: how is it achieved? Acta Physiologica Scandinavica, 177: 405-411, 2003

29. **Fitzpatrick RC**, More pulsating movement (Invited Perspective), Journal of Physiology, 551:4, 2003

30. **Foley P**, Beans, roots and leaves: A short history of the chemical therapy of parkinsonism, Würzburger medizinhistorische Mitteilungen, 22:215-234, 2003

31. **Gandevia SC**, Ethics and research participation, The Medical Journal of Australia, 178:298-299, 2003

32. Gerlach M, **Double K**, Arzberger T, Leblhuber F, Tatschner T, Riederer P, Dopamine receptor agonists in current clinical use: comparative dopamine receptor binding profiles defined in the human striatum, Journal of Neural Transmission, 110:1119-1127, 2003

33. Gerlach M, **Double KL**, Ben-Shachar D, Zecca L, Youdim MBH, Riederer P, Neuromelanin and its interaction with iron as a potential risk factor for dopaminergic neurodegeneration underlying Parkinson's disease, Neurotoxicity Research 5:35-44, 2003

34. Gerlach M, **Double K**, Reichmann H, Riederer P, Arguments for the use of dopamine receptor agonists in clinical and preclinical Parkinson's disease, Journal of Neural Transmission Supplement, 65:37-53, 2003

35. Gerlach M, **Foley P**, Riederer P, The relevance of preclinical studies for the treatment of Parkinson's disease, Journal of Neurology, 250:I31-I34, 2003

2003 Publications continued

36. **Halliday GM**, **Double KL**, **Macdonald V**, Kril JJ, Identifying severely atrophic cortical subregions in Alzheimer's disease, Neurobiology of Aging, 24:797-806, 2003

37. **Harasty J**, Seldon HL, **Chan P**, **Halliday G**, **Harding A**, The left human speech-processing cortex is thinner but longer than the right, Laterality: Asymmetries of Body, Brain and Cognition, 8:247-260, 2003

38. Hassiotis M, **Paxinos G**, Ashwell KWS, The anatomy of the cerebral cortex of the echidna (Tachyglossus aculeatus), Comparative Biochemistry and Physiology Part A, 136:827-850, 2003

39. **Henderson JM**, Lu Y, Wang S, **Cartwright H**, **Halliday GM**, Olfactory deficits and sleep disturbances in Parkinson's disease: a case-control survey. Journal of Neurology, Neurosurgery and Psychiatry, 74:956-958, 2003

40. **Henderson JM** and **Watson S**, Convulsive and postural effects of lesioning the mid-substantia nigra pars reticulata in naïve and 6-OHDA lesioned rats, Brain Res. Bulletin, 60:179-185, 2003

41. **Henderson JM**, **Watson S**, **Halliday GM**, Heinemann T, Gerlach M (2003) Relationships between various behavioural abnormalities and nigrostriatal dopamine depletion in the unilateral 6-OHDA-lesioned rat, Behavioural Brain Research, 139:105-113, 2003

42. Herbert RD, **Sherrington C**, Moseley AM, Maher C, Elkins M, Evidence-based physical therapy, Journal of the Japanese Physical Therapy Association, 30:431-439, 2003

43. Hodges JR, Davies R, Xuereb J, Kril J, **Halliday G**, Survival in frontotemporal dementia, Neurology, 61:349-354, 2003

44. Hodges PW, Moseley GL, Gabrielsson A, **Gandevia SC**, Experimental muscle pain changes feedforward postural responses of the trunk muscles, Experimental Brain Research, 151:262-271, 2003

45. Hodges PW, Pengel HM, **Herbert RD**, **Gandevia SC**, Measurement of muscle contraction with ultrasound imaging, Muscle and Nerve, 27:682-692, 2003

46. Hortabagyi T, **Taylor JL**, Petersen N, **Russell G**, **Gandevia SC**, Changes in segmental and motor cortical output with contralateral muscle contractions and altered sensory inputs in humans, J Neurophysiology, 90:2451-2459, 2003

47. **Hu P**, **McLachlan EM**, Selective reactions of cutaneous and muscle afferent neurons to peripheral nerve transaction in rats, Journal of Neuroscience, 23:10559-10567, 2003

48. **Hu P**, **McLachlan EM**, Distinct functional types of macrophage in dorsal root ganglia and spinal nerves proximal to sciatic and spinal nerve transactions in the rat, Experimental Neurology, 184:590-605, 2003

49. Jamieson J, Boyd HD, **McLachlan EM**, Simulations to derive membrane resistivity in three phenotypes of guinea-pig sympathetic postganglionic neuron, Journal of Neurophysiology, 89:2430-2440, 2003

50. Janu M, Creasey H, Grayson D, Cullen JS, Whyte S, **Brooks WS**, Waite LM, **Broe GA**, Laboratory results in the elderly: the Sydney Older Persons Study, Annals of Clinical Biochemistry, 40:274-279, 2003

51. **Kanjhan R**, **Osborne PB**, Ouyang M, **Keast JR**, Postnatal maturational changes in rat pelvic autonomic ganglion cells: a mixture of steroid-dependent and independent effects, Journal of Neurophysiology, 89:315-323, 2003

52. **Kiernan MC**, Motor neurone disease - a Pandora's box (invited editorial), Medical Journal of Australia, 178:311-312, 2003

53. **Kiernan MC**, Baker MD, Bostock H, Characteristics of late Na+ currents in adult rat sensory neurones, Neuroscience, 119:653-660, 2003

54. **Koutcherov Y**, Mai JK, **Paxinos G**, The hypothalamus of the human fetus, Journal of Chemical Neuroanatomy, 26:253-270, 2003

55. Kwok JBJ, **Halliday GM**, **Brooks WS**, Dolios G, Laudon H, Murayama O, Hallupp M, Badenhop RF, Vickers J, Wang R, Naslund J, Takashima A, Gandy SE, Schofield PR, Presenilin-1 mutation L271V results in altered exon 8 splicing and Alzheimer's disease with non-cored plaques and no neuritic dystrophy, Journal of Biological Chemistry, 278:6748-6754, 2003

56. Little DG, Smith NC, Williams P, Briody J, Smith EJ, Cowell CT, **Bilston LE**, Zoledronic acid prevents osteopenia and increases bone strength in a rabbit model of distraction osteogenesis, Journal of Bone and Mineral Research, 18:1300-1307, 2003

57. Loo CK, Mitchell PB, Croker VM, Malhi GS, Wen W, **Gandevia SC**, Sachdev PS, Double-blind controlled investigation of bilateral prefrontal transcranial magnetic stimulation for the treatment of resistant major depression, Psychological Medicine 33:33-40, 2003

58. Lopez de Armentia M, Leeson AH, Stebbing MJ, Urban L and **McLachlan EM**, Responses to sympathomimetics in rat sensory neurones after nerve transection, NeuroReport, 14:9-13, 2003

59. **Lord SR**, Preventing falls to prevent fractures (Invited article), Osteoblast, Autumn/Winter:5-6, 2003

60. **Lord SR**, Vision, balance and falls in the elderly, Geriatric Times 4:9-10, 2003

61. **Lord SR**, Castell S, Corcoran J, Dayhew J, Matters B, Shan A, Williams P, The effect of group exercise on physical functioning and falls in frail older people living in retirement villages: a randomised controlled trial, Journal of the American Geriatrics Society, 51:1685-1692, 2003

62. **Lord SR**, March LM, Cameron ID, Cumming RG, Schwarz J, Zochling J, Chen C, Makaroff J, Sitoh YY, Lau TC, Sambrook PN, Differing risk factors for falls in nursing home and intermediate-care residents who can and cannot stand unaided, Journal of the American Geriatrics Society, 51:1645-1650, 2003

63. **Lord SR**, **Menz HB**, **Tiedemann A**, A physiological profile approach to falls risk -assessment and prevention, Physical Therapy, 83:237-252, 2003

64. **Macefield VG**, Cardiovascular and respiratory modulation of tactile afferents in the human finger pad, Experimental Physiology, 88:617-625, 2003

65. **Macefield VG**, Elam M, Why do human postganglionic neurones primarily only fire once during a sympathetic burst? Acta Physiologica Scandinavica, 177:247-253, 2003

66. **Macefield VG**, Johansson RS, Loads applied tangential to a fingertip during an object restraint task can trigger short-latency as well as long-latency EMG responses in hand muscles, Experimental Brain Research, 152:143-149, 2003

67. **Macefield VG**, Sverrisdottir YB, Wallin BG, Resting discharge of human muscle spindles is not modulated by increases in sympathetic drive, Journal of Physipology, 551:1005-1011, 2003

68. Maher CG, **Sherrington C**, Herbert RD, Moseley AM, Elkins M, Reliability of the PEDro scale for rating quality of randomised controlled trials, Physical Therapy, 83:713-721, 2003

69. **McKenzie DK**, Frith PA, Burdon GJW, Town GI, The COPDX plan: Australian and New Zealand Guidelines for the management of chronic obstructive pulmonary disease, Medical Journal of Australia, 178 (Supplement): S1-S40, 2003

70. **McLachlan, EM** Transmission of signals through sympathetic ganglia - modulation, integration or simply distribution? Acta Physiologica Scandinavica 117, 227-235, 2003

71. **Menz HB**, The influence of geriatrics education on the knowledge, attitudes and career aspirations of podiatric medical students, Journal of the American Podiatric Medical Association, 93:124-130, 2003

72. **Menz HB**, **Lord SR**, **Fitzpatrick RC**, Age-related differences in walking stability, Age and Ageing, 32:137-142, 2003

73. **Menz HB**, **Lord SR**, **Fitzpatrick RC**, Acceleration patterns of the head and pelvis when walking are associated with risk of falling in community-dwelling older people, Journal of Gerontology: Medical Sciences, 58:M446-M452, 2003

74. **Menz HB**, **Lord SR**, **Fitzpatrick RC**, Acceleration patterns of the head and pelvis when walking on level and irregular surfaces, Gait and Posture, 18:35-46, 2003

75. **Menz HB**, **Tiedemann A**, **Kwan MMS**, **Latt MD**, **Sherrington C**, **Lord SR**, Reliability of clinical tests of foot and ankle characteristics in older people, Journal of the American Podiatric Medical Association, 93:308-387, 2003

76. Miklossy J, Taddei K, Suva D, Verdile G, Fonte J, Fisher C, Gnjec A, Ghika J, Suard F, Mehta PD, McLean CA, Masters CL, **Brooks WS**, Martins RN, Two novel presenilin-1 mutations (Y256S and Q222H) are associated with early-onset Alzheimer's disease, Neurobiology of Aging, 24:655-662, 2003

77. Mille ML, Rogers MW, Martinez K, Hedman LD, Johnson ME, **Lord SR**, **Fitzpatrick RC**, Thresholds for inducing protective stepping responses to external perturbations of human standing, Journal of Neurophysiology, 90:666-674, 2003

78. Moseley GL, Hodges PW, **Gandevia SC**, External perturbation of the trunk in standing humans differentially activates components of the medial back muscles, Journal of Physiology, 547:581-587, 2003

79. Nasseri S, **Bilston LE**, Tanner R, Lubricated squeezing flow: a useful method for measuring the viscoelastic properties of soft tissues, Biorheology, 40:545-551, 2003

80. Petersen NT, **Taylor JL**, **Butler JE**, **Gandevia SC**, Depression of activity in the corticospinal pathway during human motor behaviour after strong voluntary contractions, Journal of Neuroscience, 23:7974-7980, 2003

81. **Piguet O**, Grayson DA, Creasey H, **Bennett HP**, **Brooks WS**, Waite LM, Broe GA, Vascular risk factors, cognition and dementia incidence over 6 years in the Sydney Older Persons Study, Neuroepidemiology, 22(3): 165-171, 2003

82. **Piguet O**, Ridley L, Grayson DA, **Bennett HP**, Creasey H, Lye TC, Broe GA, Are MRI white matter lesions clinically significant in the "old-old"? Evidence from the Sydney Older Persons Study Dementia and Geriatric Cognitive Disorders, 15:143-150, 2003

83. Ribot-Ciscar E, **Butler JE**, Thomas CK, Facilitation of triceps brachii muscle contraction by tendon vibration after chronic cervical spinal cord injury, Journal of Applied Physiology, 2358-2367, 2003

84. Refshauge KM, Collins DF, **Gandevia SC**, The detection of human finger movement is not facilitated by input from receptors in adjacent digits, Journal of Physiology, 551:371-377, 2003

85. **Schofield E**, **Kersaitis C**, **Shepherd C**, Kril J, Halliday GM, Severity of gliosis in Pick's disease and frontotemporal lobar degeneration: tau-positive glia differentiate these disorders, Brain, 126:827-840, 2003

86. Sharma MR, **Stoodley MA**, Corpus callosum lipoma - how universal the 'universal tumour' is. Report of a case and review of literature, Journal of Society of Surgeons of Nepal, 6:47-49, 2003

87. **Sherrington C**, **Lord SR**, Herbert RD, A randomised controlled trial of weight-bearing versus non-weight-bearing exercise for improving physical ability in inpatients after hip fracture, Australian Journal of Physiotherapy, 49:15-22, 2003

88. **Sherrington C**, **Menz HB**, An evaluation of footwear worn at the time of fall-related hip fracture, Age and Ageing, 32:310-314, 2003

89. Shirley D, Hodges PW, Eriksson AEM, **Gandevia SC**, Spinal stiffness changes throughout the respiratory cycle, Journal of Applied Physiology, 95:1467-1475, 2003

90. Sitoh YY, Lau TC, Cameron ID, Cumming RG, **Lord SR**, Zochling J, Schwarz J, Trube A, March LM, Sambrook PN, Proxy assessment of health related quality of life in the frail elderly (Letter), Age and Ageing, 32:459, 2003

91. **Smith-White MA**, Iismaa TP, **Potter EK**, Galanin and neuropeptide Y reduce cholinergic transmission in the heart of the anaesthetised mouse, British Journal of Pharmacology, 140:170-178, 2003

92. Snyder AW, Mulcahy E, **Taylor JL**, Mitchell DJ, Sachdev P, **Gandevia SC**, Savant-like skills exposed in normal people by suppressing the left fronto-temporal lobe, Journal of Integrative Neuroscience, 2:1-10, 2003

93. Stanford PM, **Shepherd CE**, **Halliday GM**, **Brooks WS**, Schofield PW, Brodaty H, Martins RN, Kwok JBJ, Schofield PR, Mutations in the tau gene that cause an increase in three repeat tau and frontotemporal dementia, Brain, 126:814-826, 2003

94. Sullivan EV, **Harding AJ**, Pentney R, Dlugos C, Martin P, Parks MH, Desmond JE, Chen A, Pryor MR, De Rosa E, Pfefferbaum A, Disruption of frontocerebellar circuitry and function in alcoholism, Alcoholism: Clinical and Experimental Research, 27:301-309, 2003

95. Thomas CK, Griffin L, Godfrey S, Ribot-Ciscar E, **Butler JE**, Fatigue of paralyzed and control thenar muscles induced by variable or constant frequency stimulation, Journal of Neurophysiology, 89:2055-2064, 2003

96. **Todd G**, Petersen NT, **Taylor JL**, **Gandevia SC**, The effect of a contralateral contraction on voluntary activation and central fatigue in elbow flexor muscles, Experimental Brain Research, 150: 308-313, 2003

97. **Todd G**, **Taylor JL**, **Gandevia SC**, Measurement of voluntary activation of fresh and fatigued human muscles using transcranial magnetic stimulation, Journal of Physiology, 551:667-671, 2003

98. Uglow MG, Hile MS, Briody JN, **Bilston LE**, Peat RA, Smith EJ, Little DG, Low intensity ultrasound stimulation in distraction osteogenesis in rabbits, Clinical Orthopaedics and Related Research, 417:303-312, 2003

99. **Wanigasekara Y**, Kepper ME, **Keast JR**, Immunohistochemical characterization of pelvic ganglia in male mice, Cell Tissue Research, 311:175-185, 2003

100. **Wardman DL**, Day BL, **Fitzpatrick RF**, Position and velocity responses to galvanic vestibular stimulation in human subjects during standing, Journal of Physiology, 547: 293-299, 2003

101. **Wardman DL**, **Taylor JL**, **Fitzpatrick RC**, Effects of galvanic vestibular stimulation on human posture and perception while standing, Journal of Physiology, 551:1033-1042, 2003

102. Wilcox RK, **Bilston LE**, Barton DC, Hall RM, Mathematical model for the viscoelastic properties of dura mater, Journal of Orthopaedic Science, 8:432-434, 2003

Book Chapters

103. **Brodbelt AR**, **Stoodley MA** and Jones NR. Syringomyelia. In Clark CR (Ed), The Cervical Spine, 4th Edition, Lippincott-Raven, Philadelphia, 2003

104. **Broe GA**, Population ageing, human lifespan and neurodegenerative disorders: A fifth epidemiologic transition. In: Sachdev P, (Ed), The Ageing Brain. The Netherlands: Swets & Zeitlinger (ISBN 90 265 1943 5), 2003.

105. **Burke D**, **Gandevia SC**, Skeletal muscle: structure and function. In: Stålberg E, (Volume Editor), Daube JR, Mauguière F (Series Editors): Handbook of Clinical Neurophysiology, Vol 2, Clinical Neurophysiology of Disorders of Muscle and Neuromuscular Junction, Including Fatigue, Elsevier: Amsterdan, pp. 7-26, 2003

106. **Burke D**, **Gandevia SC**, **Macefield VG**, Microneurography and motor disorders. In: Hallett M, (Ed), Handbook of Clinical Neurophysiology, Volume 1 Movement Disorders, Elsevier Science, Chapter 11:153-162, 2003

107. **Double KL**, Jellinger K, Zecca L, Youdim MBH, Piederer P, Gerlach M. Iron, neuromelanin and alpha-synuclein in the neuropathogenesis of Parkinson's disease. In: Zatta P (ed.), Metal ions and neurodegenerative disorders. London, World Scientific Publishing, pp 343-364, 2003

108. **Double KL**, Zecca L, Ben-Shachar D, Youdim MBH, Riederer P, Gerlach M. Neuromelanin may mediate neurotoxicity via its interaction with redox active iron. In: Storch A and Collins MA (Eds): Neurotoxic factors in Parkinson's disease and related disorders. New York: Kluwer Academic/Plenum, pp. 211-218, 2003

109. **Gandevia SC**, **Butler JE**, Petersen NT, **Todd G**, **Taylor JL**, Assessment of neural factors in maximal voluntary performance. In: Gantchev N, (Ed), From basic motor control to functional recovery III, Sofia: St. Kliment Ohridski University Press, pp. 345-352, 2003

110. **Kiernan MC**, Impulse conduction. In: Aminoff M, Daroff R (Eds), Encyclopedia of the Neurological Sciences. San Diego: Academic Press, Vol 2: 639-643, 2003

111. Kril JJ, Patel S, **Harding AJ**, **Halliday GM**, Hippocampal neuron loss in vascular dementia and Alzheimer's disease. In Vellas B, Fitten LJ, Feldman H, Giacobini E, Grundman M, Winblad B (Eds.): Research and practice in Alzheimer's disease and other dementias, Vol. 7. Paris: Serdi. pp. 198-203, 2003

112. **Lord SR**, **St George R**, Neurophysiological and sensory changes with ageing. In: Sachdev P (Ed), The ageing brain. The neurobiology and neuropsychiatry of ageing. Swets & Zietlinger, Lisse, 2003

113. Morris JGL, Hely MA, **Halliday GM**, Parkinsonism and ageing. In Sachdev P (Ed.): The ageing brain: The neurobiology and neuropsychology of ageing, Swets & Zeitlinger, Lisse. pp. 275-282, 2003

114. **Stoodley MA,** Weir BK, Surgical Treatment of Middle Cerebral Artery Aneurysms. In: Le Roux PD, Winn HR (Eds) Management of Cerebral Aneurysms, W.B. Saunders, Orlando, pp 795-807, 2003.

115. **Stoodley MA**, Weir BK, Pregnancy and Aneurysms. In: Le Roux PD, Winn HR (Eds) Management of Cerebral Aneurysms, W.B. Saunders, Orlando, pp 347-355, 2003.

116. **Stoodley MA**, Primary Intracerebral Hemorrhage. In: Aminoff MJ, Daroff RB (Eds), Encyclopedia of the Neurological Sciences. Academic Press, San Diego, pp 689-697, 2003.

SERVICE TO THE SCIENTIFIC COMMUNITY

Professional service to the scientific community and related organisations:

Lynne Bilston

- Chair, IEAust National Panel on the Biomechanics of Impact Injury, 1996 - 2002
- Member, IEAust National Panel on the Biomechanics of Impact Injury, 1995 -
- Board Member, College of Biomedical Engineers, IEAust. (also CBME Board executive committee) 1998 -

James Brock

- Treasurer, Australian and New Zealand Microcirculation Society, 1999 -

Tony Broe

- Council Member, Australian Association of Gerontology, 1990 - 2003
- President-elect, Australian Association of Gerontology, 2001 - 2003

Simon Gandevia

- Chair, Section on Exercise & Work Physiology for the International Union of Physiological Sciences, 2002 -
- Member, Working Party on Electrical Techniques, American Thoracic Society and European Respiratory Society, 1996 - 2002
- Co-Convenor of Exercise Group, Australian Physiological and Pharmacological Society, 1999 -
- Research Committee Member, Spinal Cord Society Research Institute of Australia, 1996 -
- Member, UNSW Committee on Experimental Procedures involving human subjects, 2002
- Member, UNSW Faculty of Medicine Resources Subcommittee, 2002
- Member, Australian Academy of Science: Europe Committee, 2002
- Member, Australian Academy of Science: Selby Committee, 2002

Glenda Halliday

- Member, Scientific Advisory Board, Victorian Movement Disorders Collaborative Research Group, 1998 - 2002
- Member, Organising Committee for the 2002 Annual Meeting of the Australian Neuroscience Society, 2000 - 2002
- Member, Research Committee, Faculty of Medicine, University of New South Wales, 1999 - 2002
- Member, Management Council, Parkinson's NSW Inc, 2000 - 2002
- Executive Director, Brain Bank, POWMRI and Parkinson's NSW Inc, 1993 - 2002
- Council Member, International Basal Ganglia Society, 2001 - 2004
- Member, IBRO Adhoc Committee on Memberships and Partnerships, 2001 - 2002
- Member, Finance Committee, Faculty of Medicine, UNSW, 2001 - 2002
- Member, Scientific Board Member, International Consortium on Dementia with Lewy bodies, 2000 - 2002

Antony Harding

- Member, National Board, Transplant Australia, 1999 -

Janet Keast

- Member of Executive Committee, International Society for Autonomic Neuroscience, 1999 -
- Core Reviewer, BMC Physiology 2001 -
- NSW/ACT representative, National Association of Research Fellows 2001 -

Matthew Kiernan

- Board Member, Australian Brain Foundation, 2002 -

Stephen Lord

- Vice President, International Society for Posture and Gait Research, 2001 -
- Member, Strategic Discussion Group, NSW Physical Activity Task Force to promote physical activity in NSW, 1997 - 2002
- Member, Osteoporosis Australia Medical and Scientific Committee
- Member and Scientific Advisor, New South Wales Falls Prevention Network

EDITORSHIPS

Vaughan Macefield
- NSW State Representative for the Australian Neuroscience Society, 1999 - 2002

Elspeth McLachlan
- Member, Nuffield Foundation Medical Fellowships Committee, 1999-
- Member, IBRO Asian-Pacific Regional Committee, 1999-
- Member, Advisory Committee, Parkinson's NSW Inc, 2002-
- AVCC Representative, AVCC/NHMRC/ARC Committee to revise Joint Statement on Scientific Practice, 2003-.
- NSW Regional Coordinator, Australian Academy of Science, 2004-

Shirley Sarks
- Director, Gerontology Foundation of Australia

Marcus Stoodley
- Member, Scientific Advisory Board, Cure for Life Foundation.
- Member, Quality Committee, Institute of Neurological Sciences, Prince of Wales Hospital.
- Member, Patient Care Review Committee, Prince of Wales Private Hospital.
- Examiner, medical student clinical examinations, UNSW
- Contributor, RACS neurosurgery curriculum development
- Member, Brain Foundation NSW Committee.
- Member, Prince of Wales Hospital Research Ethics Committee.
- Member, Interventional Neuroradiology Committee, Greater Metropolitan Transitional Taskforce.
- Member, Information Management Committee, Greater Metropolitan Transitional Taskforce.
- Member, Education and Resource Development Committee, Postgraduate Medical Council of NSW.
- Director, Brain Foundation of Australia Pty Ltd.
- Committee Member, University of Queensland Alumni Association, Sydney Chapter.

Lynne Bilston
Computer Methods in Biomechanics and Biomedical Engineering

James Brock
Autonomic Neuroscience: Basic and Clinical

Richard Fitzpatrick
Journal of Physiology

Paul Foley
Books Editor – Journal of the History of the Neurosciences (01/01/2004)

Simon Gandevia
Acta Physiologica Scandinavica (International Receiving Editor)
Journal of Applied Physiology
Clinical and Experimental Pharmacology and Physiology
Australian Journal of Physiotherapy

Glenda Halliday
Neuroscience Letters

Janet Keast
Autonomic Neuroscience: Basic and Clinical

Stephen Lord
Journal of Gerontology: Medical Sciences

Elspeth McLachlan
Clinical and Experimental Pharmacology and Physiology
Clinical Autonomic Research

George Paxinos
NeuroImage
Neuroscience and Biobehavioural Reviews
Journal of Chemical Neuroanatomy

Marcus Stoodley
Pediatric Neurosurgery

FUNDRAISING AND COMMUNITY EVENTS

Our Thanks

The Institute is indebted to the many corporations, organisations and individuals who gave significant financial support over the past year. Thank you also to the numerous companies and individuals who generously donated their services and products to ensure the success of our events. This support is invaluable.

Events

Vice Regal Book Launch
The NSW Governor, Professor Marie Bashir, launched two books by senior scientists at the Institute which cover the diverse field of neuroscience. "The Human Nervous System" by Professor George Paxinos and "Beans, roots and leaves, A History of the Chemical Therapy of Parkinsonism", by Dr Paul Foley.

The Human Nervous System gives a detailed account of the structure of the human brain. The task of describing all parts of the nervous system from a modern structural and functional perspective would be overwhelming for a single scientist.

"Beans, roots and leaves" explores the colourful and sometimes alarming history of the attempts to provide at least some relief from the symptoms of Parkinson's disease, commencing with interesting reports from ancient India and medieval Europe and continuing until the present time.

Bridge for Brain Research Challenge
The Institute's Bridge for Brain Research Challenge received outstanding support from Bridge players throughout NSW and the ACT.

More than 70 Bridge Clubs from all over NSW and the ACT supported the inaugural Challenge raising funds to support the Institute's research into Alzheimer's disease and dementia.

The 2004 Challenge offered great prizes to players and fundraisers including a holiday in Cairns cruising through the Barrier Reef on a Captain Cook Cruise ship, Nokia mobile phones and a year's supply of morning tea products from Starbucks Coffee to the highest fundraising Bridge Club.

The overwhelming response from the inaugural Challenge augurs well for a national Challenge in 2005.

10th Anniversary Public Lecture
Research launched to mark the Institute's 10th anniversary shows that developments in cures and prevention of systemic diseases that affect the body, such as cancer, heart and lung diseases, have resulted in people living longer.

While historically the brain has generally outlived the body, it is now unable to cope as more and more humans live beyond 85 years.

The Institute's Professor Tony Broe presented his findings at a Public Lecture at the Ritchie Theatre, University of New South Wales.

Through his research Professor Broe believes healthy ageing is achievable as loss of neurones which cause brain diseases is definitely not inevitable.

Professor Broe discussed protective factors for a healthy ageing brain which include aspirin, non-steroidals, oestrogens, folate, anti-oxidants and moderate alcohol use.

His lecture was followed by a panel discussion, mediated by the ABC's Dr Norman Swan, with members comprising well known septuagenarians and researchers including food and nutrition expert and National Living Treasure, Margaret Fulton and June Dally-Watkins. Other panel members were the Institute's Professor Glenda Halliday and Associate Professor Stephen Lord.

ASX-Reuters Charity Foundation Supports Parkinsons's Research
Dr Kay Double, Professor Glenda Halliday and Professor Tony Broe and their teams completed an experimental project on the development of new ways to diagnose Parkinson's disease which was funded by the ASX-Reuters Charity Foundation. The Institute sincerely thanks the ASX-Reuters Charity Foundation for support with this important project which takes researchers a step closer to the development of a new method of diagnosis for Parkinson's disease.

Individual and Corporate Giving

With your help…
Our health tomorrow depends on the discoveries from medical research today.

But fighting disease and injury is not just the responsibility of researchers. It takes all of us. From the person who donates time or money, to the patient who participates in a research study - our research is a challenge that requires support from everyone.

Our ability to continue to help ensure the health of future generations is critically dependent on our base of support. Private contributions play a vital role in helping to fill in the gaps and provide funding for new research avenues, the latest and most advanced equipment, launching the careers of young scientists, and providing a productive environment for researchers.

Please consider making a gift to the Institute, and become a part of something really important - the prevention and eventual cure of some of the world's major diseases and disabilities. While the challenges are daunting, solutions are attainable – with your help.

Gifts of $2·00 or more are tax-deductible.

The Prince of Wales Medical Research Institute is a not-for-profit organisation. There are many ways that you can support the work at the Institute.

Make a tax-deductible donation:
Gifts of all sizes are important. You can make a gift at any time by sending a cheque, phoning us with your credit card details, or make an online donation by using our secure server at www.powmri.edu.au.

Become a Corporate Sponsor:
Companies can assist the Prince of Wales Medical Research Institute's fundraising efforts through relationship marketing, sponsoring an event partially or wholly, and offering their professional expertise on a pro-bono basis. By sponsoring a boardroom luncheon for 18–20 people, companies can also introduce us to major clients as a way of sourcing additional corporate support. Contact us on to discuss a donation plan.

Make a pledge:
Make a commitment to give a series of payments to the Institute over a period of time. Phone us to receive a pledge card.

Workplace Giving:
Workplace Giving is designed to bring a strong sense of community into the workplace and encourage employee involvement. Employees can make a regular, tax-effective donation to the institute from their pre-tax pay. It's simple yet effective, in that funds are pooled and one contribution per pay, or per month, is sent from the employer to the Institute. The Institute can provide you with forms and promotional material to help initiate a payroll giving program at your workplace.

Workplace Giving strengthens staff morale and builds loyalty – staff members know they're working for an organisation that cares about their community.

Employers can also match employee donations – doubling the effect of the employee's dollar and the overall program.

For more information on the benefits of workplace giving visit the Australian Charities Fund website www.australiancharitiesfund.org.au.

Leave a bequest:
Sometimes called the 'ultimate gift', contributing to the Institute through a bequest allows you to retain full use of your assets during your lifetime and still make a significant gift to the Institute. Your solicitor is the best person to advise you on the legal aspects of your bequest. If you do not have a solicitor, the Institute can assist you with free legal advice on your bequest.

Give in memoriam:
Make a gift to the Prince of Wales Medical Research Institute in lieu of flowers to honour a loved one, colleague or member of staff who has passed away.

Gifts in kind:
Don't overlook the benefits of gifts in kind. Ask your tax advisor or solicitor to help you make the best plan for you.

Celebration gifts:
Looking for the ideal way to celebrate a birthday, honour an anniversary, wedding, or other special occasion, or commemorate festive times such as Christmas? Making a gift to help fight disease and disability is a considerate and sensitive way to pay tribute to your friends, loved ones and special occasions. Your contribution will be acknowledged with a hand-addressed card sent to the recipient.

Hold a Fundraising Event:
It is an exhilarating and satisfying experience to enrich people's lives. What better way to do it than through a fundraising event where friends, family or staff members can share the knowledge that they play an important role in helping to make the world a better place.

Have some fun-raising while fund-raising for research. Whether you are a corporation, community group, social club or an individual, make the Prince of Wales Medical Research Institute the recipient of proceeds from an event.

Mailing address for donations:
PO Box 82
ST PAULS NSW 2031
Contact phone number:
02 9399 1075

THANK YOU

A

Aldar Asset Management P/L
Alexander, Ms M
Allam, Mr P
Allara, Mrs C
ARV, Hopetoun Village Bridge Club
Astridge, Ms H
ASX-Reuters Charity Foundation Ltd
Jensen AM, Mr D
Atkins, Ms B
Atkinson, Ms M
Atkinson, Ms N
Abbenbroek, Ms L

B

Balgowlah-Dee Why Bridge Club
Ballina Seniors Bridge Club
Barker, Ms J
Barker, Mr & Mrs M
Barker, Mr P
Barker, Mr R
Barker, Ms S
Bennett QC, Mr D
Benson, Mr R
Bertevicly, Ms M
Bilston, A/Prof L
Bingham, Mr H
Birrell, Mr R
Blake Dawson Waldron
Blanch, Ms T
Blunt, Mr G
Bolton, J
Kiely, Mr M
Booth, Mrs H
Bourke, P
Bowen, E
Bowles, Mr S
Bracka, Mr M
Braid, Mr J
Braun, P
Brent, L
Bridge at Club Willoughby
Orange Bridge Club
Brock, Dr J
Broderick, Ms E
Brodribb, Mrs A
Brooks, Mrs E
Brooks, Mr J
Brooks, Dr W
Brown, Mr B
Brown, Ms J
Brunswick Valley Bridge Club
Bryans, Mr B
Buck, Mrs No
Buffier, Ms M
Burges, K & A
Burns, Mrs A
Burns, Mr S
Butler, Mr R
Buttenshaw, M
Buxton, Ms A

C

Callaghan, R
Calvert, Ms D
Cameron, Mr J
Campbell-Wilson, Mr & Mrs C
Canberra Bridge Club
Carapiet, Ms S
Carnarvon Bridge Club
Cartwright, Mr I
Castell, Ms S
Castronini, Mr & Mrs J
Cessnock Bridge Club
Chapman-Woods, Mrs B
Charley, Mr & Mrs R
Chatswood Golf Club Duplicate Bridge
Cheltenham Bridge Club
Cherry, Mr A
Clark OAM, Ms C
Clarke, A & M
Clarke, Ms B
Clarke, Mrs J
Cleary, Mr D
Coffs Harbour Bridge Club
Cohn, Mrs L
Collingwood-Smith, Mr J
Collyer, Ms A
Colorado Products P/L
Condobolin Bridge Club
Coonabarabran Bridge Club
Cooper, Ms R
Corporate Countdown
Cox, Ms E
Craig, Ms C
Craine, Ms D
Curran, Mr J
Curran AO, Mr C
Curtis, Ms C
Cusack, Ms G
Cusack, J & A
Czimeth, Mrs M

D

Dalmeny Bridge Club
Daum, Ms P
Davids, Mr H
Davie, Mr R
Davies, Mr J
Davis, Mr E
Debus, Mr R
Dee Why School for Seniors
DeGroot, Mr H
Denn, C
DFF Investments
Dickison, Mrs B
Dillon, L
Distinguished Vineyards
Dixon, R
Donaghy, Mrs D
Doumani, Mr J
Dowton, Prof B
Dubbo Bridge Club
Dwyer, Dr R

E

Ebsary, Mrs P
Eldershaw, Mr J
Ellicott QC, Mr R
Elphick, Ms E
Ergos, Mr P
Millar, Mr J
Evans, Mr W

F

Fairfax, Mr J
Farmoz
Farrell, Mr F
Fay, Ms A
Fegent, Mr J
Ferguson, K
Fitch, Mr L
Fitzmaurice, Mrs M
Fitzpatrick, Dr R
Flemming, Ms M
Foster, Mr P
Fragomeni, Ms M
Fraser, B
Frederick, S
Frish, Mrs I
Frish, Mr S
Fromer, Mr J
Fuller, Mrs N
Fyfe, Mrs S

G

Gall, Ms D
Gandevia, Prof S
Gardener, Mr J
Garrard, Mr B
Garvin, Ms J
Gaunt, Ms M
Gavagna, Mr R
Gifford, Mr P
Gilmore, Ms D
Gilmore, Ms F
Gilmore, Ms L
Glen Bridge Club
Goff, Ms J
Goldrick, Ms E
Goldsworth, Ms J
Gordon Bridge Centre
Goulburn Bridge Club
Graduates Garden Club
Grafton Bridge Club
Graham, Ms A
Graham, Mr R
Green, J
Greencorp Magnetics
Gregory, Ms G
Greig, Miss M
Greyling, Mrs S
Grimes AO, Dr D
Gross, Dr M
Guest, Ms S
Guiffe, Ms A
Gunnedah Bridge Club
Gursel, Ms J

H

Habe Garments Pty Ltd
Hain, Ms L
Hales, Mr J
Hampson, Rev'd C
Harding, Dr A
Harkness, D & E
Harland, Mr L
Harrow Productions
Hausmann, Ms J
Hausmann Communications
Hawker, Ms J
Hawks Nest Golf Club Bridge Club
Hayata P C Australia
Hayim, Mr S
Haynes, Mr M
Heath, N
Heiman, Mrs T
Hellenic Club
Hemphill, Mr G
Hennessy, Ms B
Hickson Lawyers
Hilton, Ms L
Hocking, P
Hogarth, Mr A
Holden, Mr F
Hoyland, Ms J
Hrassnig, Mr J
Hughes AO QC, The Hon T
Hui, W & R
Hume, Prof W
Hunt, Ms P
Hunter, C
Hunter, C & B
Huxley, B
Huxley, G
Huxley, L

I

Inverell Delvyn Bridge Club
Ioannidis, Ms S
Isherwood, Mr K
Isherwood, Mr P

J

J S O'Brien & Associates
Jackson, Ms J
Jaitco Pty Ltd
Janssen-Cilag
JAP World Spares
Jobbod, Mr B
John Swire & Sons
Johnson SC, Mr P
Jones, Mrs J
Jones, Mr J
Jory, C
Joy, Mr I
Joye, Mr C

K

Karacanta, Mr O
Karcher, E
Kaye, P & J
Keast, Dr J
Keating, Ms D
Kempsey Chinese Restaurant
Kennington, Mr D
Kerr, P & M
Khan, Mrs K
Kiama & District Bridge Club
Kintominas, P
Knight, Ms E
Kukovec, T

The Prince of Wales Medical Research Institute thanks

all our supporters for 2003-04 including:

L

Laidlaw, Mr T
Lalor Park Senior Citizens Club
Langridge, J
LaTella, Mr F
Law, Ms M
Lawrence, Ms Coral
Lee, Mr W
Leeton Soldiers Bridge Club
Lenban, Mr N
Levy, Mr G
Lewis, P
Lions Club of East Maitland
Little, R
Logan, Ms A
Lohan, Y
Lonergan, Mrs N
Long, W & R
Lord, Miss D
Love, Ms A
Lowe, Mr E
Luckey, Mrs
Lynch, Ms A

M

Macarthur Collegians Bridge Club
Macefield, Dr V
MacKay, D & E
Mahoney, Ms J
Mailfert, N
Maitland Bridge Club
Mallarky, Dr & Mrs S
Malone, Mr & Mrs J
Maple-Brown, Mr & Mrs R
Marcellos, Mrs P
Marjason, Mrs M
Marley, Dr P
Marsh, Mr P
Marsim Corporation Pty Ltd
Martin, Mrs J
Martin, Ms J
Martin, Mr O
Martin, Mr P
Marx, Ms G
McCaskill, T & E
McDonnell, Mrs N
McFadzean, Ms J
McIlrath, Ms M
McIntosh, Mrs W
McKay, Ms D
McKay, Mr F
McKenzie, Ms D
McLachlan, Mr & Mrs C
McLaughlin, Ms E
McLennan, Ms J
McTaggart, Mr L
Melinda Groups P/L
Melville, Mrs J
Mercer, Ms M
Merewether Bridge Club
Metro Parking
Michlmayr, Mr J
Mid-Mountain Bridge Club
Miller, B & A
Millner, Mrs J
Mitchell, Ms Ol
Tween Bridge Club
Mobbs, Mrs C
Mollymook Bridge Club
Moon, Mr A
Mordo, M
Morgan, N
Morrison, Ms J
Morrison, T
Morrow, Mr D
Morton, J
Moss, Ms V
Mulholland, J
Mulholland, R
Musgrave, T
Muswellbrook Bridge Club
Muysken, Ms E

N

Nelson Bay Bridge Club
Newcastle Bridge Club
Newman, Mr R
Newton, Mrs A
Newton, Mr M
Newton, Ms P
Nickolls, Mrs R
Noonan, A
Norman, Ms A
Northey, B
Noss, Ms E
NSW Bridge Association
Nyngan Bridge Club

O

O`Grady, Mr B
Oitoole, R
Oksis, Mr G
Oxley Bridge Club

P

Pardoe, Mr & Mrs J
Parker, Mr R
Parker, Mr T
Parkes Bridge Club
Pennant Hills Bridge Club
Penrith RSL Bridge Club
Pepper, P
Perera, Mr G
Perkins, Mrs V
Perpetual Trustees Australia Limited
Petersen, L
Petrucco, Mrs I
Petrucco, Mr J
Pfizer
Phipps, Mrs C
Porges, Mrs
Port Macquarie Panthers Bridge Club
Porter, Mr T
Potter, Prof E
Pratt Foundation
Brassil, Mr P
Pride, Ms J
Proctor, Mr M
Pruden, Ms W
Puddick, Ms H
Pullen, Mr D
Purcell, R
Purves, Ms M
Pyne, Ms J

Q

Quinlan, Mrs V

R

Randwick Bridge Club
Rayward, F
Renfrey, Mr
Revesby Workers Bridge Club
Riesel, Mrs T
Ring, Mrs J
Ritchie, Mrs E
Robert, Dr & Mrs
Roberts, Dr & Mrs H
Robinson, Mrs D
Rolston, Mrs B
Romer, Ms D
Romer, Ms M
Romer, Ms S
Rosewall, Mr K
Ross-Smith, Mr M
Ross-Jones, B & J
Rowe, Mrs M
Russ, Ms J
Russell, Ms K

S

Sankey, Mrs J
Sapphire Coast Bridge Club
Sarks, Drs J & S
Saunders, Mr W
Schultz, Mr B
Secombe, Ms H
Sheath, Mrs M
Shenstone, A
Shenstone, Mr D
Shepherd, Dr C
Sherrington, Mrs C
Shields, Mr J
Shmith, Mr D
Sholler, Mr H
Simms, J
Simons, Ms P
Simpson, Dr S
Smith, Ms P
Smith, Mrs R
South Canberra Bridge Club
Southwell, Ms B
Sowey, Ms A
Spight, Mr I
Spranc, Mrs E
Sprang, Mr J
Springwood Bridge Club
Sproule Marion
St George Bridge Club
St George Budapest Bridge Club
St Marys Bridge Club
Stein, Ms K
Stevenson, Mr B
Stoodley, A/Prof M
Stracey, Ms L
Stuerz, Ms A
Sturnieks, Dr D
Sullivan, M
Summers, Mrs C
Sutherland, Ms L
Sweeney, Ms E
Sweetland, Ms G
Sydney Chinese Bridge Club

T

Tan, Ms L
Tate, Mrs J
Taylor's Wines (NSW) Pty Ltd
Tenterfield Bridge Club
The Grange Bridge Group
The Macquarie Bank Foundation
Thompson, Mr A
Thomson, J
Thomson, M
Thorpe, Mr J
Toben, Mr D
Tosi, Mr A
Tradies; Bridge Basics Club
Trebartha Apartments
Trumps Bridge Centre
Tumut Bridge Club
Turton, Mrs C
Tweed Heads Bridge Club
Twin Towns Services Bridge Club

U

UBS Warburg
United Services Union
Uttley, Mr C

V

van Dort, Ms R
Van Reeken, Mr J
van Zeist, Mrs A
Varga, Ms D
Vercoe, Mrs M
Versluis, Mrs R

W

Walkinshaw, Mr T
Walton AM, Mr J
Wang, K
Ward, D & C
Warden, Mr & Mrs
Watson, Mrs A
Webster, B & H
Weir, Ms C
Wenban, Ms J
Whatham, F
Whirlpool
White, Beryl
White, Ms V
Whitlam, Hon A
Wicks, Mr J
Williams, J
Willis, Miss N
Winning, Mr B
Thomas, Mr & Mrs D
Wintour, Mrs E
Withey, A
Wollstonecraft Bridge Club
Woodward, M
Wyatt, R & R
Wyner, Ms I

Y

Yee, Mrs P
Yeoh, Ms M
Young, Mr K
Young, Mr P

Z

Zamel, Mr G

OUR PEOPLE 2003-04

Executive Director & CEO
Prof Peter Schofield BScAgr(Hons) PhD DSc
[from July 2004]

Deputy Director
Prof Simon Gandevia BSc(Med) PhD MD DSc FAA FRACP [from July 2004]

Director, Clinical Research and Head, Neurology, Prince Henry/Prince of Wales Hospitals
Assoc Prof James Colebatch PhD MD FRACP

NHMRC Senior Principal Research Fellows
Prof Simon Gandevia BSc(Med) PhD MD DSc FAA FRACP
Prof Erica Potter BSc PhD DSc

Pro Vice-Chancellor (Research), UNSW
Director, Spinal Injuries Research Centre, POWMRI
Prof Elspeth McLachlan DSc FAA

NHMRC Principal Research Fellows
Prof Glenda Halliday BSc(Hons) PhD
Assoc Prof Stephen Lord BSc MA PhD
Scientia Prof George Paxinos BA MA PhD DSc AO

NHMRC Senior Research Fellows
Assoc Prof Janet Keast BSc(Hons) PhD [to June 2004]
Dr James Brock BSc(Hons) DPhil
Dr Vaughan Macefield BSc(Hons) PhD
Dr Janet Taylor MBiomedE MD

Head, Respiratory Medicine, PHH/POWH
Assoc Prof David McKenzie MBBS BSc(Med) PhD FRACP

Neurosurgeon (PHH/POWH), Senior Lecturer (UNSW)
Assoc Prof Marcus Stoodley, MBBS(Hons) PhD FRACS

Consultant Neurologist (POWH), Senior Lecturer (UNSW)
Dr Matthew Kiernan MBBS(Hons) PhD FRACP

Senior Scientists
Assoc Professor Lynne Bilston, BE(Mech)(Hons) MSE(BioEng) PhD

NHMRC R Douglas Wright Research Fellows
Dr Kay Double BSc(Hons) PhD
Dr Jane Butler, BSc(Hons) PhD

Postdoctoral Research Fellows
Dr Paul Foley BSc(Hons) PhD (UNSW Vice-Chancellor's Fellow)

Overseas Postdoctoral Research Fellows
Dr Cindy Lin MEngSc BE PhD (CJ Martin Fellow)
Dr Olivier Piguet BPsych MA(ClinNeuropsych) PhD (Neil Hamilton Fairley Fellow)

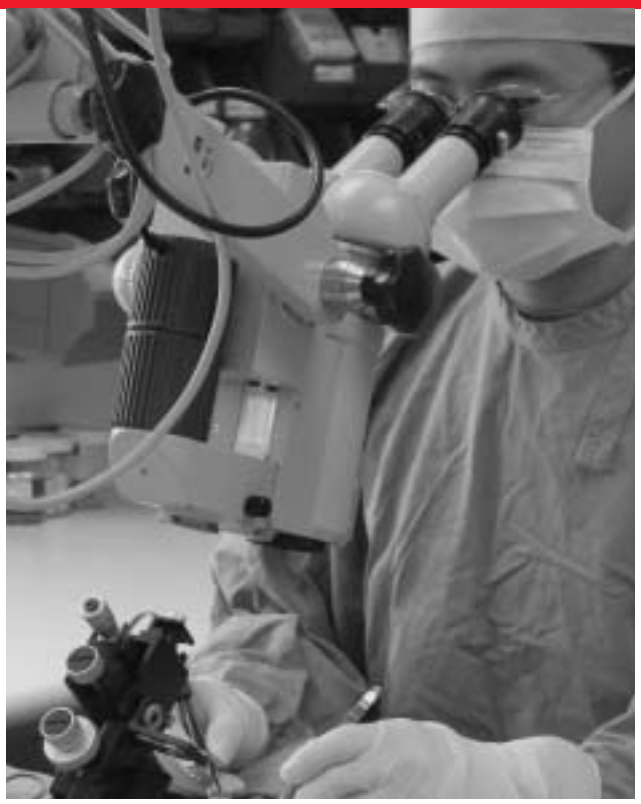
Visiting Fellows
Dr Leah Bent BSc MSc PhD

Senior Research Officers
Assoc Prof Wayne Reid BA(Hons) MPsychol PhD
Dr William Brooks, BA MBBS MPH
Dr Richard Fitzpatrick BSc(Hons) MBBS PhD
Dr Antony Harding BSc(Hons) PhD
Dr Yuri Koutcherov BSc(Hons) PhD
Dr Peter Nickolls MBBS BSc BE(Elec) PhD
Dr Claire Shepherd BSc(Hons) PhD

Research Officers
Dr Hayley Bennett BA(Hons) MA MSc PhD
[to Dec 2003]
Dr Melissa Broe BSc(Hons) PhD
Dr Linda Cheung BSc (Hons) PhD MSc
Dr James Fallon BScBE(Hons)PhD
Dr Yue Huang BM PhD MSc
Dr Sarah McKay BSc(Hons) MSc DPhil
Dr Penelope McNulty BHMS(Hons) PhD
Dr Tertia Purves-Tyson BSc(Hons) MSc PhD
[to June 2004]
Dr Catherine Sherrington BAppSc(Phty) MPH PhD
Dr Daina Sturnieks BAppSc(Hons) PhD
Dr Joy Tan BSc(Hons) PhD
Dr Yewlan Wanigasekara-Mohotti BMedSc(Hons) PhD
[to July 2004]

Senior Hospital Scientists
Dr James Tu MBBS(China) MSc PhD

Research Assistants
Ms Mehreen Arshi BMedSc [from Feb-June 2004]
Ms Heather Campbell BSc(Hons) [to June 2004]
Ms Francine Carew-Jones BSc(Med)
Ms Julie Brown BSc
Ms Heidi Cartwright BSc
Mr Michael Cartwright BSc
Ms Kirsten Chapman BA BSc
Mr John Chew BE
Ms Anurina Das MEpidemiol [to Dec 2003]
Mr Robert Gorman BE
Mr Stephen Hicks BSc(Hons)
Mr Ping Hu BMed MM
Mr Paul Kelly BTech [to May 2004]
Ms Emma Kettle BAppSc GradDip(Epidemiol)
Ms Marcella Kwan BSC GradDip(Biotech) GCHSM MPH
Ms Suelyn Lai-Smith BScPsych(Hons)
Mr Billy Luu BSC(Hons) [from Jan 2004]



Ms Linda MacDonald BMedSc [to June 2004]
Ms Heather McCann DipHlthSci
Ms Susan Murray DipRGRT MGerontol
Ms Teresa Orr RN MN
Ms Sandra O'Rourke BMedSc(Hons)
Ms Svetlana Pianova MSc
Mr Farid Rahimi BSc(Hons) [from Feb 2004]
Ms Tonia Russell [from May 2003]
Ms Christine Song BSc(Hons)
Ms Kate Stark BA(Hons) Psychology
Ms Rebecca St George BSc(Hons) BA
Ms Anne Tiedemann BSc GradDipBiomedSci
Ms Gabrielle Todd BSc(Hons)
Ms Diana Tripovic BSc(Hons)
Ms Sharla Vijayaratnam BSc MSc [to Jan 2004]
Dr Connie Vogler MBBS(Hons) FRACP
Ms Hongqin Wang MBBS (China)
Ms Lolita Warden BSc [to Oct 2003]
Ms Amy Watling BSc
Mr Mark Weeden BSc [to Nov 2003]
Ms Melanie Yeoh BPsySc

Technical, Field and Laboratory
Ms Adeline Akkari
Ms Rachael Brown RN
Mr Bob Bryans
Mr Hilary Carter
Ms Marcelle D'Ugo
Ms Rebecca Gee RN [to Dec 2003]
Ms Joanne Irons
Mr Francesco La Tella
Mr Lajos Weisz
Mr Collin Yeo
Ms Kerrie Atkins RN
Ms Catherine Kirkham

Administration
Ms Deborah McKay BHlthAdmin
Ms Annie Butler BA(Tourism Mgmt)
Ms Ursula Daniels
Ms Rosalie Dworjanyn BSc GradDipInfoMgmt
Mrs Karen Gobbe
Mrs Lee Hilton

Finance
Mr Andrew Dermott BEc CA, Company Secretary
Mr John Dayton ANIA [to Dec 2003]
Ms Ruby Wang [from Jan 2004]

Information Technology
Mr John Hales BSc MBiomedE
Mr Chris Uttley [to June 2004]

Public Relations and Marketing
Ms Anne Graham RN
Ms Stephanie Barker BA (Communications)

Scientific Support
Ms Roslyn Nickolls BA DipEd
Ms Polly Smith [to March 2004]

Students
Dr Athula Karunanayaka, PhD
Dr Arun Krishnan, PhD
Dr Mark Latt, PhD
Dr Jack Liao, PhD
Dr Carolyn Orr, PhD
Dr Kingsley Storer, PhD
Negin Amanat, PhD
Cynthia Ashley, PhD
Gang Cheng, PhD
Shaokoon Cheng, PhD
Svetlana Cherepanoff, PhD
John Chew, PhD
Heidi Federow, PhD
Eva Feredoes, PhD
Robert Gorman, PhD
Gillian Gregory, PhD
Phu Hoang, PhD
Cndy Kersaitis, PhD
Elizabeth Kyriakou, PhD
Gila Lepar, PhD
Peter Martin, PhD
Jasmine Menant, PhD
Julian Saboisky, PhD
Emma Schofield, PhD
Anne Tiedemann, PhD
Gabrielle Todd, PhD
Connie Vogler, PhD
Alex Voukelatous, PhD
Philippa Williams, PhD
Vanessa Young, PhD
Michael Yuen, PhD
Julie Brown, MSc
Rachael Brown, MSc
Annie Butler, MSc
Stephen Duma, BE(Elec)/M BioMedEng
Marianne Huot, MEng
Julianne Lim, M BioMedEng
Amy Watling, MSc
Amr Alaved, Hons
Emily Barling, Hons
Alex Burton, Hons
Elizabeth Clarke, Hons
Eric Han, Hons
Jhonny El Khoury-Maroun, Hons
Billy Luu, Hons
Marianne Matheson, Hons
Catalina Palma, Hons
Michael Seitz, Hons
Tana Tan, Hons
Mark Weeden, Hons

FINANCIAL SUMMARY

Balance Sheet	**2000** $000	**2001** $000	**2002** $000	**2003** $000	**2004** $000
Current Assets	2,571	3,641	5,535	5,096	5,163
Property, Plant & Equipment	6,280	6,294	6,375	7,220	6,945
Total Assets	8,851	9,935	11,910	12,316	12,108
Current Liabilities	143	177	1,576	1,351	885
Provisions	0	1	5	112	225
Total Liabilities	143	178	1,581	1,463	1,110
Retained Surplus	5,058	6,107	6,679	7,203	7,348
Reserves	3,650	3,650	3,650	3,650	3,650
Total Net Funds	**8,708**	**9,757**	**10,329**	**10,853**	**10,998**

Financial information was extracted from the audited Financial Statements of POWMRI Limited, the statutory entity of the Prince of Wales Medical Research Institute, for the year ending 30 June 2004 and is included here for information purposes only. A full copy of the audited Financial Statements, including Notes to the Financial Statements and the Audit Opinions, can be obtained free of charge on request to the Finance Manager, Prince of Wales Medical Research Institute, Barker Street, Randwick NSW 2031.