We would like to thank the following for contributing to the costs of producing this Annual Report.

Edited by Patricia Armati and Ariel Arthur.
Production by Pat Woolley, Wild & Woolley, Sydney.
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Highlights

Below are Highlights from 2007 from both the Nerve Research Foundation and the Institute of Clinical Neuroscience

- The NSW Government provided a grant of $500,000 to establish a Multiple Sclerosis Brain Bank at the University of Sydney. This initiative is strongly supported by Multiple Sclerosis Research Australia. Professor Simon Hawke has been appointed as Director.

- Professor John Prineas gave the invited keynote lecture on the Pathology of Multiple Sclerosis at the European Council for Treatment and Research Initiatives in Multiple Sclerosis (ECTRIMS), the major international conference on Multiple Sclerosis.

- Professor Michael Halmagyi and the Hearing and Balance Unit at RPAH acquired a state of the art fully motorized 3D human rotator with video monitoring system which will facilitate diagnosis, management and research into disorders of balance. This is the first such equipment of its type in Australia.

- Dr Swee Aw of the Hearing and Balance Unit was awarded both an NHMRC postgraduate Fellowship and a Research Project Grant. This outstanding achievement will permit Dr Aw to continue her important work in positional vertigo — one of the commonest neurological disorders.

- Professors Burke and Pollard together with Drs Mathey and Ng were awarded NHMRC grants worth over 1 million dollars over the next three years.

- Associate Professor Patsy Armati and Dr Roberta Chow were awarded an NHMRC complementary and alternative medicine grant of $326,000 for two years to continue their research into the pain relieving mechanism of laser acupuncture. Ass. Professor Armati also edited the internationally authored Biology of Schwann Cells published by Cambridge University Press and was also awarded a Whitely Commendation for Marsupials with Profs Dickman and Hume for the best Zoological Textbook in 2007 in Australia, also published by Cambridge University Press.
**President’s Report**

**Nerve Research Foundation**

It is an honour for me to have been elected as President of the Nerve Research Foundation in 2008. This gives me an opportunity to build on the good work that has been done by many of the supporters of the Foundation since its inception in 1986.

The primary purpose of the Foundation is to increase the resources available to the important ongoing research work by the researchers and clinicians involved with the Nerve Research Foundation.

For many years the Nerve Research Foundation has made important contributions to research at the University of Sydney and Royal Prince Alfred Hospital.

Foundation Funds were used to purchase equipment and consumables for research. The Funds also provided salaries for young research workers and their travels to relevant international conferences and visits to leading overseas laboratories.

Sydney University has formalized the restructuring of all its Foundations with the view of improving governance and accountability. Our Foundation Council will work with the Office of General Counsel of the University to increase the resources of the University in relationship to research, education and scholarship in the field of neuroscience through the Faculty of Medicine and the Brain and Mind Research Institute.

I will work closely with Council Members and supporters of the Foundation to look at new strategies of engagement with the various communities that can enhance the resource base of the Foundation so that more support could be given to important work in Multiple Sclerosis, Motor Neuron Disease, Peripheral Neuropathy, Pain and Dementia.

**Benjamin Chow, AO**
Directors’ Report

Nerve Research Foundation

We are pleased to present this Annual Report for 2007. The Research Reports, Presentations and Publications show how important the research is and how wonderful the support of our donors both individual and corporate has been. Without the support of our benefactors this research would not be possible.

We are also delighted to have Mr Benjamin Chow AO as our new President of the Nerve Research Foundation. Mr Chow, an engineering graduate of the University, has an outstanding record of service to the community through intercultural activities to promote economic and employment opportunities and social interaction. Mr Chow chaired the Council for Multicultural Australia, is a member of the Council of the National Museum of Australia and is on the Council of Bond University. He is also Vice President of the Ethnic Communities Council of NSW and a Life Member of the National Parks and Wildlife Foundation of NSW. We warmly welcome Mr Chow’s appointment.

THE 14TH Annual Nerve Research Foundation RIKKI O’NEILL LECTURE was given by Professor Klaus V. Toyka, MD, FRCP W rzburg, Germany entitled Immunomodulatory treatments in MS. The lecture was held at the Conservatorium, Sydney and following the lecture Professor Toyka then gave a chamber music recital of Mozart and Brahms.

We hope you will continue to support our important research into chronic neurological diseases. The President and all of our dedicated researchers join us in thanking you.

Professor J D Pollard, Co-director
Associate Professor P J Armati, Co-director
Chairman's Report

Institute of Clinical Neurosciences,
Royal Prince Alfred Hospital

The last twelve months have seen many changes in neurosciences, and it has been an honour and a privilege to once again serve as Chairman of the Neurosciences management committee. Overall there has been significant forward momentum in many aspects of our service adding even more optimism to the work we can do and the care we can bring to our patients in the future.

The intraoperative MRI scanner is now in operation. This is the first such unit in the country, and offers a great advance in the treatment we can offer for patients suffering from brain tumours and other pathologies. Plans are underway to hold a Seminar in iMRI at RPAH later this year targeting neuroscience professionals with an interest in this field.

A fifth neurosurgeon has joined our ranks this year, and it was a pleasure to welcome back Dr Brinda Shivalingam. Brinda spent some of her registrar training at RPA, and subsequently has completed a Neuro-oncology Fellowship in the UK. On a sadder note, Professor Michael Besser has announced his plans for retirement in 2008. Michael has been a fixture at RPA for many decades and has certainly left his mark on the Department and Hospital in general. His retirement represents a real changing of the guard.

Plans for the installation of a focused radiosurgery machine are going ahead, and we hope to see the beginnings of works in 2008. This will represent another major coup for RPA and will add significantly to the treatment options for patients with a wide range of illnesses. Very likely it will attract interest from patients and their doctors from all over the State. We look forward to the appointment of a new neurosurgeon (bringing our total number back to five) and a new radiation oncologist who will be primarily responsible for getting the service up and running now and into the future.

The RPAH Neurosciences Tumour Board chaired by Michael Fulham continues to meet every two weeks and helps plan a multi-disciplinary approach to some of our more challenging cases. We have welcomed Michael Jackson who has now alternated with Mo Mo Tin in providing radiation oncology services.

Much work has been done by our nursing staff with regard to smooth transitions between ICU and the ward, preserving our
An envious record of resource utilisation and patient flow. The times were patients or procedures are cancelled due to bed issues are rare enough to be notable, despite the increasing demand from both the operating theatres and interventional neuroradiology. Skills are being improved and training fostered. We welcomed back Karin Bowen as Nursing Unit Manager who has extensive experience in neuroscience nursing as well as administration, and look forward to her positive influence on the ward to build on Tina’s efforts so far.

The management of stroke, the treatment of afflicted patients and its prevention remain priorities of care. Changes include the appointment of a new stroke fellow, a Stoke CNC and equipment up-grade including the purchase of a new stroke chair to aid in the early rehabilitation of patients.

Interventional neuroradiology services at RPAH continue to provide a leading role in this evolving and exciting area of treatment. Patients from the SSWAHS and from across the state continue to be referred for treatment for these often complex problems.

These are only some of the developments over the last twelve months. The level of moral and sense of accomplishment remains high, and all those who have contributed to the Institute over the last twelve months are too many to be acknowledged. Thanks to all we can look forward to the next year with optimism and confidence that the care we deliver will remain high.

Jeffrey Brennan
Chairman, ICN Management Committee
Members of the Nerve Research Foundation

Council
- Professor Marie Bashir AC, Chancellor, The University of Sydney
- Professor Gavin Brown AO, Vice Chancellor, The University of Sydney
- Professor Don Nutbeam, Provost & Deputy Vice Chancellor, The University of Sydney
- Professor Bruce Robinson, Dean, Faculty of Medicine, The University of Sydney
- Mr Benjamin Chow AO, President
- Assoc. Professor Patsy Armati, Vice President and Co-Director
- Professor John Pollard AO, Co-Director
- Professor Robert Ouvrier AOM
- Dr Ruth Kerr
- Mr J Armati AOM
- Mr Ross Low
- Mr David Jacobs
- Mr John Baker
- Mr R Wallace
- Mr S Carroll AO
- Mr S Parry
- Mr Roy Melick

Scientific Committee
- Professor John Pollard AO
- Associate Professor P Armati
- Professor R Ouvrier OAM
- Professor Bruce Robinson

Honorary Governors
- Mr J Armati, AOM
- Ms R O Neill

Honorary Life Members
- Mr DL Jacobs
- Ms R O Neill
- Dr R Kerr
- Mr J Armati AOM
- Mr S Carroll AO
PERIPHERAL NEUROPATHY

Inflammatory Neuropathies

Inflammatory Neuropathies, which are the commonest treatable neuropathies in the Western World, have been a focus of Nerve Research Foundation researches since the Foundation was conceived. Over that time, there have been major advances in the understanding and treatment of these conditions through basic and clinical research.

CLINICAL FEATURES OF INFLAMMATORY NEUROPATHIES

These disorders cause paralysis and sensory loss. They consist of an acute condition, the Guillain-Barre Syndrome (G.B.S.) and a chronic illness, chronic inflammatory demyelinating neuropathy (C.I.D.P.). Careful analysis of patients with G.B.S. & C.I.D.P. has shown each condition is comprised of different subtypes with different pathologies. Recognition of homogeneous groups has facilitated an understanding of disease pathogenesis. Another chronic disorder, Multifocal Motor Neuropathy with conduction block (MMN) is also regarded as an inflammatory neuropathy. This disease presents with muscle wasting without sensory loss and can be confused with Motor Neuron Disease.

DISEASE MECHANISMS IN INFLAMMATORY NEUROPATHY


Nerve fibres to some extent resemble electrical cables and like these, are insulated. The insulating material, myelin, surrounds the central nerve fibre (axon) except at regularly occurring regions, the nodes (of Ranvier). At each node, many specialised structures and molecules are arranged, including the ion channels (Sodium & Potassium) which give rise to the current which is transmitted along the nerve. The inflammatory neuropathies G.B.S. & C.I.D.P. are also known as demyelinating neuropathies, since pathologically they are characterised by myelin loss from intact axons. Until recently, research attention focussed on myelin loss as the central problem in these neuropathies, which were all regarded as autoimmune diseases in which myelin was the target of immune attack. Recent studies from our laboratory and others have shown that impaired impulse conduction at the nodes may be a more important mechanism of disease production.

Supported by NH&MRC, The Nerve Research Foundation and the Philip Bushell Foundation.
THE ROLE OF ANTI-GANGLIOSIDE ANTIBODIES
M. David, J. Spies, P.J. Armati, K. Sheik, J.D. Pollard

Gangliosides (a form of glycolipid) are an important constituent of neural membranes and are concentrated in nerve in the region of the node. They are known to be the binding site of bacterial neurotoxins such as cholera toxin and antibodies to such toxins have been used to label the nodal region of nerves histologically. Antibodies to certain gangliosides are found in some subtypes of G.B.S. and in MMN. Monique David performed experiments in which the effect antiganglioside antibodies on nerve function and structure was tested. These studies showed certain antibodies, particularly anti GD1a had a very powerful effect on blocking nerve transmission. The effect was reversible and appeared to result from the antibodies’ ability to bind in the nodal region where they may affect the clustering of sodium channels, which are necessary for the generation of the nerve impulse.

Supported by NH&MRC and The Philip Bushell Foundation.

ANTIBODIES TO NEUROFASCIN
E. Mathey, D. Burke, J.D. Pollard

Neurofascins are other molecules found in the nodal area which play an important role in maintaining the structure of this region, connecting specialised regions of the Schwann cell to the axon. Neurofascins occur in nodes of both central and peripheral nervous system fibres, which share many common features despite the differences between myelinating Schwann cells and oligodendrocytes. Emily Mathey, during her post doctoral studies, made the important finding that antibodies to neurofascin could be demonstrated in some patients with progressive Multiple Sclerosis. When tested in animal models of M.S., antineurofascin antibodies bound to CNS nodes and caused conduction block. The antibodies also bind to Peripheral Nervous System nodes in an animal model of inflammatory neuropathy and in current studies their action on nerve conduction and structure is being studied. The clinical significance of these findings is important for several reasons. First they suggest that myelin is not simply a passive insulator of axons, but that Schwann cells and their specialised regions play an active role in impulse conduction, particularly in their contribution to ion channel arrangements and function at the node. Moreover, they provide an explanation as to why patients with inflammatory neuropathies may improve following therapy over a time course of hours or days. These patients presumably have not remyelinated demyelinated fibres but rather unblocked axonal conduction.

Supported by NH&MRC and The Philip Bushell Foundation.
THE MECHANISM OF ACTION OF INTRAVENOUS IMMUNOGLOBULIN
S.S. Lin, J. Spies, M.X. Wang, J.D. Pollard

Dr. Lin, a visiting Taiwanese Neurologist, was awarded her Ph.D for studies on the mechanism of action of intravenous immunoglobulin (IVIg) in Neuropathy. IVIg is the treatment of choice for G.B.S., C.I.D.P. and MMN worldwide and yet its mechanism of action remains unknown. IVIg is very expensive and we have studied its potential mechanisms in an animal model of G.B.S. so that more effective and/or affordable therapy may be developed. Dr. Lin showed that the efficacy of IVIg can be reproduced by the constant region (Fc component) of the immunoglobulin molecule rather than the variable (Fab) component. This finding in itself is important, since it should be possible to manufacture large quantities of this protein by molecular means. Studies by a Canadian group published in the prestigious journal, Nature Medicine, in a bleeding disorder which also responds to IVIg, found that this Fc component reacted with particular receptors on dendritic cells (DCs — the major antigen presenting cell) and that relatively few treated DCs could achieve the same efficacy as large quantities of expensive IVIg. We are now collaborating with this leading Canadian laboratory, to repeat these studies in the neuropathy model.

Supported by The Philip Bushell and Nerve Research Foundations.

CLINICAL NEUROPHYSIOLOGY

D Burke

Axonal excitability has been studied in normal subjects to document further the properties of the sodium channel isoform on large myelinated axons in peripheral nerve (Nav1.6) and to improve current procedures for studying internodal channel properties in human subjects. In addition, we have found that, in motor axons in the median nerve of patients with a hemispheric stroke, there is diminished activity of the internodal HCN channel responsible for limiting hyperpolarising changes in membrane potential. This axonal change occurs presumably as a result of changes in excitability of the parent motoneurons in the spinal cord due to disturbances to their descending inputs. As such it represents a "transcriptional channelopathy" (i.e., the change in function of a non-mutated channel).

The role of propriospinal circuits in the control of upper limb movement has been studied in healthy human subjects. In different upper limb tasks, we have found that differences in the function of the forearm flexor muscle, flexor carpi radialis, in the different upper-limb tasks (e.g., grasping, pointing). Evidence was presented that the changes in reflex function were due to modulation of
transmission in propriospinal neurons located in the high cervical spinal cord, above the segments for FCR motoneurones. These findings represent further evidence that the cortical command for movement involves not only direct monosynaptic projections from motor cortex but also indirect, synaptically relayed projections. These pathways may play a role when the direct projection is interrupted by stroke, and could be important in rehabilitation.

_Funding: NHMRC_

**K Ng**

The research achievements in 2007 were primarily in publication of work completed in London, Queen Square. Undertaken with internationally renowned collaborators, these were in 2 areas. Firstly, an exploration of evoked potentials in the assessment of patients with movement disorders, particularly dystonia and myoclonus, revealed its clinical usefulness in the assessment of these conditions with a commonly applied neurological investigation. Secondly, the first comprehensive assessment of peripheral nerve changes in chronic liver disease with techniques including novel excitability testing showed that this common and usually mild neuropathy may have nerve ischaemia as the underlying pathogenic process. Work with excitability testing continues exploring peripheral changes in central disorders. An interesting case report of an unusual cause of paralysis was also presented.

_Funding: Australian Neuroscience Research; NHMRC_

**PAIN MANAGEMENT AND LASER ACUPUNCTURE**

*R Chow, P.J. Armati,*

Chronic pain is common and costs $10 billion dollars per year in Australia. Drugs are widely used but have serious side effects. Patients actively seek non-drug treatments and laser acupuncture is one of the most commonly sought therapies for chronic pain. However, how laser works is not well understood.

We propose that laser therapy reduces pain by direct effects on nerves. This alters how pain signals are transmitted to the brain. We previously studied how infrared laser affected nerve cell cultures and found that laser temporarily interrupts the nerve transport system. This monorail system provides energy for all nerve functions. We propose that temporary interruption of this system by laser disrupts the conduction of pain signals along the nerve. This results in relief of pain for conditions such as arthritis and chronic pain.

Our future research will focus on identifying how different
wavelengths of laser affect nerves, what are the optimal doses of laser and how this alters the acupuncture and pain signalling pathways. Understanding the effects of different wavelengths of laser at different doses on nerves will increase the acceptance of this therapy as a cost-effective, safe, non-invasive form of treatment which will improve the quality of life in individual patients and reduce the economic burden of chronic pain in the community. We will continue this work in 2008 funded by an NHMRC grant.

Peripheral nerve cells in culture before and after laser treatment

MULTIPLE SCLEROSIS

GENE EXPRESSION IN MULTIPLE SCLEROSIS
A. T Arthur, PJ. Armati, J.D. Pollard

Dr Arthur continued her research into gene expression in multiple sclerosis throughout 2007 due to the very generous support of Mr Stephen Ainsworth and the Nerve Research Foundation. The Ainsworth MS research project has involved the investigation of gene expression in the peripheral blood of relapsing remitting (RR) MS patients, with a focus on mild MS disease, compared to healthy controls. This research has generated a comprehensive profile of gene expression in RRMS during relapse, remission and in patients with very mild disease. A journal article reporting some of this work will be published in BMC Medical Genetics in 2008. Furthermore, in collaboration with an MS research group at Harvard, some of this data has also been submitted to the journal Nature Medicine for publication. Dr Arthur has also been working with Dr Simon Hawke at the Brain and Mind Research Institute to examine gene expression in blood vessels obtained from MS brain tissue, which has complemented her work in MS peripheral blood. Preliminary results were presented as a poster at the Multiple Sclerosis Research Australia conference in Melbourne, November.

Supported by the Nerve Research Foundation and the Ainsworth Multiple Sclerosis Project
THE IMMUNOPATHOLOGY OF MULTIPLE SCLEROSIS
J.W. Prineas, J.D.E. Parratt, M.H. Barnett, A Henderson

Work completed during 2007 were studies of immune complexes in newly forming MS lesions (MH Barnett and JW Prineas)
Distribution of immunoglobulins and complement in MS lesions Submitted Annals of Neurology) and a major study, with A Henderson, MH Barnett, JE Parratt and JW Prineas, of the role of T and B lymphocytes in myelin destruction in MS. Part of the latter study, now in preparation for submission to Annals of Neurology, was presented at a recent meeting at The Walter and Eliza Hall Institute of Medical Research, Melbourne. The findings add to previous reports from this laboratory that the experimental model used in MS research, namely experimental allergic encephalomyelitis, does not closely model the human disease and that a new paradigm is required.

Funding: Multiple Sclerosis Research Australia to procure and set up a state of the art multiple photon immunofluorescence facility which will be key to work proposed for 2008; Biogen IDEC and the Nerve Research Foundation

ALCOHOL RESEARCH
C Harper, I Matsumoto

The Neuropathology Unit and the New South Wales Tissue Resource Centre (NSW TRC) are based in the Discipline of Pathology. The NSW TRC is a facility for the collection, storage and distribution of well characterised fixed and frozen human brain tissue for neuropsychiatric research (with a focus on schizophrenia and alcohol related disorders).

The NSW TRC is jointly supported by the University of Sydney, Sydney South West Area Health Service, the National Institute of Alcohol Abuse and Alcoholism, the Schizophrenia Research Unit, the NH&MRC and the Rebecca Cooper Foundation.
Funding: Human brain tissue collection has been made possible through the Departments of Forensic Medicine (DOFM) and the Australian Brain Donor Programs (ABDP). The ABDP include; the Gift of Hope, (for major psychiatric illnesses), Using our Brains (for those without neuropsychiatric illness) and a program for those with neurodegenerative illnesses. In 2007 we have successfully collected 31 brains for use in research. In the 2006-07 evaluation period, tissue has been requested from 34 research groups for 54 different projects.

Assoc. Prof. Matsumoto has returned to Japan after four years with us in Sydney. The proteomics laboratory that he helped to develop
continues its excellent work under the direction of Dr Irina Dedova. They are looking at changes in protein expression in human postmortem brain tissues of schizophrenia and alcohol cases. Using a combination of Laser capture microscopy and PCR the expression of NMDA receptor subunits has been studied in specific cell populations of the brain in cases with schizophrenia and alcohol use disorders.

The Annual Australian Postgraduate Neuropathology Course was also conducted — 36 attendees and lecturers from Brisbane and Sydney attended.
Research 2007  
Royal Prince Alfred Hospital  

NEUROPSYCHOLOGY

MEMORY AND MEMORY IMPAIRMENTS  
L Miller  
Memory Training: In 2007, we continued to run a six-week memory training program for neurological outpatients as well as single training days for their carers. In these sessions, a team of neuropsychologists and students guided participants through memory exercises and taught them about external memory aids and life style factors that affect memory. To test the effectiveness of the training, patients were assessed before and after the program using objective memory tests as well as questionnaires about everyday memory. Preliminary results indicate gains in memory functioning in moving from the pre to the post-training assessments. We are interested in examining whether factors such as aetiology, ongoing seizures, site of brain lesion, IQ, attentional skills and/or age affect the successfulness of the training. By examining participants in longer term follow up, we are also evaluating the longevity of the training effects.

Olfactory Studies: Via collaboration with staff and students at Macquarie University, we are investigating the contributions made by the medial dorsal nucleus of the thalamus and the insular cortex to the chemical senses (i.e., smell and taste). We are testing how a focal stroke in one of these regions affects the ability to discriminate, identify and appreciate qualities of smells and tastes by comparing patients to each other and to control subjects.

The Role of the Frontal and Temporal Lobes in Memory and Emotion: In four different projects, we are looking at the impact of lesions in the frontal or temporal lobes on the ability to conjure memories of the past, to remember new material and to understand emotions conveyed in facial expressions. In some of these projects we are exploring whether an inability to remember the past is linked with a poor ability to process information pertaining to emotions.

NEURO-OTOLOGY

3D ROTATOR IN THE DIAGNOSIS AND TREATMENT OF BENIGN POSITIONAL VERTIGO  
S T Aw, L McGarvie, R Yavor, G M Halmagyi  
Benign paroxysmal positional vertigo is one of the most debilitating and common causes of vertigo and imbalance in the elderly. Dizziness and disequilibrium due to the disease often results in high morbidity from falls and its ensuing complications. Our research published in Neurology has been successful in identifying the
uncommon types of benign paroxysmal positional vertigo that are refractory to treatment.

The Balance Disorder Clinic, Institute of Clinical Neuroscience has now acquired a state-of-the-art fully motorised 3D human rotator with video monitoring system (VESTICON, USA) which is shown below. It is the first such equipment in Australia. It will enable us to diagnose, treat and further our research in this disorder. This device will allow us to effectively and reliably treat the refractory variants of benign paroxysmal positional vertigo using a positional nystagmus-based diagnostic strategy.

EVOKE POTENTIAL TESTING OF VESTIBULAR FUNCTION
I Curthoys, M Welgampola, A Burgess, G M Halmagyi
Objective testing of inner ear balance (vestibular) function is fundamental to the assessment and therefore treatment of balance disorders. One of our main projects in 2007 has been the development and evaluation of electrical potentials that can be recorded from skin electrodes placed around the eyes in response to sound or vibration stimulation of the balance part of the inner ears. Five years ago we were the first to find these potentials in response to sound in patients with inner ear hypersensitivity due to abnormal openings in the ear’s bony case (superior canal dehiscence). Since then we have shown that all normal subjects also have these potentials in response to skull vibration rather than in response to sound and that this can form the basis of a simple test for the gravity sensors of the inner ears—the otoliths. We are now testing patients with known inner ear disorders to define how these ocular vestibular evoked myogenic potentials are altered in disease and how this might be useful in the diagnosis and assessment of gravity sense in patients with undiagnosed balance disorders.

IMPULSIVE TESTING OF VESTIBULAR FUNCTION
K Weber, S Pratap, G M Halmagyi
Another of our major projects in 2007 has been the refinement of a test of balance function we first reported 20 years ago—eye movements in response to rapid unpredictable head movements, the head impulse test. Dr Konrad Weber, has been focusing on the
corrective rapid eye movements — the catch-up saccades. He has found that some individuals with severe loss of balance on one side are able to make these catch-up saccades in less than 1/10th of a second, about half the normal voluntary reaction time. This suggests that there might be some direct pathways in the lower parts of the brain (the brainstem) that allow these express responses and it is possible that their presence somehow aids the recovery of balance after damage to the inner ear.

GALVANIC TESTING OF VESTIBULAR FUNCTION
ST Aw, M Todd, G M Halmagyi
Measurement of eye movement responses to electrical stimulation were first proposed as a test of inner ear nerve function over 100 years ago. While constant electrical stimulation will give consistent responses with repeated testing in any individual subject, there are large variations between responses of different individuals limiting the use of electrical testing for diagnosis. We have recently found that short (1/10th of a second) electrical pulses produce exactly the same eye movements in different individuals making electrical testing potentially useful for diagnosis. We have now studied patients with total loss of inner ear function due to loss of inner ear hair cells from antibiotic toxicity. These patients had, surprisingly, no responses to electrical stimulating suggesting that the historic assumption that electrical pulses stimulate the inner ear nerve rather than the inner ear receptor cells is wrong. These results have major implications for the development of a vestibular implant — which would in the same way as a cochlear implant restores hearing, restore balance.

NEUROSURGERY

HYDROCOIL ANEURYSM OCCLUSION & PACKING STUDY (HELP)
M Besser, A Davidson, B Shivalingam, J McMaster
Endovascular repair of ruptured and unruptured intracranial aneurysms provides an alternative management option to microsurgery. The Hydrocoil is a platinum spiral-shaped coil with a coating made of hydrogel (an acrylic polymer). When exposed to water, hydrogel expands. The HELP Study is a prospective, randomised, international multicentre trial comparing the results of Hydrocoil with standard bare platinum coils. Completion of Year II of the HELP study occurred in 2007. This is the first large scale randomised controlled data on coiling since the international subarachnoid aneurysm trial. Twelve enrolments were completed in 2007 to add to the total number of 500 recruited internationally. The conclusion, so far, indicated that hydrocoils can be used in the majority of aneurysms presented for coiling with evidence that coiling has improved since the ISAT study. Immediate efficacy appears equivalent to the bare coil group.
## Research grants

<table>
<thead>
<tr>
<th>TITLE</th>
<th>GRANTING BODY</th>
<th>$2007</th>
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<tbody>
<tr>
<td>Clinical and biological markers of disease presentation and progression in early frontotemporal dementia (Piguet, Hodges, Rose, Miller)</td>
<td>NHMRC</td>
<td>$487,500</td>
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<td>Changes in motoneurone properties distal to the lesion in stroke patients (Jankelowitz, Burke)</td>
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<td>Plastic peripheral nerve changes of axonal excitability in multiple sclerosis, and other central disorders. (Ng, Burke, Pollard)</td>
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<td>Neural plasticity following lesions of the central nervous system in Multiple Sclerosis (Burke, Pollard, Ng)</td>
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<td>Mechanisms of autoantibody mediated axonal injury in inflammatory demyelinating neuropathies (Pollard, Mathey, Burke)</td>
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<td>Research Fellowship (Dr. Konrad Weber)</td>
<td>GP &amp; RW MF</td>
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<td>Frequency analysis of the vestibulo-ocular reflex (VOR) in central and peripheral vestibular disorders Travelling Fellowship to Dr. Miriam Welgampola</td>
<td>NHMRC</td>
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<td>The neural basis of clinical vestibular testing by bone conducted sound (Curthoys, Halmagyi)</td>
<td>NHMRC</td>
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<td>Equipment Grant (Pollard, Prineas, Parratt, Barnett)</td>
<td>R F</td>
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<td>The targets of granzyme B expressing cytotoxic CD 8 T-cells in Multiple Sclerosis (Pollard, Prineas, Parratt)</td>
<td>MSRA</td>
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<td>T-lymphocytes in Multiple Sclerosis. A morphological and phenotypic study (Pollard, Prineas, Parratt)</td>
<td>NHMRC</td>
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<td>A DNA Bank for Motor Neuron Disease (Pamphlett, Laing, Trent, Yu)</td>
<td>NHMRC</td>
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<td>Somatic mutations in Motor Neuron disease</td>
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<td>(Pamphlett)</td>
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<td>Glial and Neuroinflammatory mechanisms of neural degeneration and</td>
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<td>regeneration (Pollard, Prineas, Banarti and Bennett)</td>
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<td>Brain Tissue Resource Center for Alcohol Research. To establish a</td>
<td>NIH/NIAAA</td>
<td>$600,000 (2004-2009)</td>
</tr>
<tr>
<td>brain bank of fixed and frozen tissues to provide to researchers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>for alcohol-related biomedical research (Harper)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To establish a national network of brain banks in Australia which</td>
<td>NHMRC</td>
<td>$210,000 (2003-2008)</td>
</tr>
<tr>
<td>links six banks in five states of Australia (Harper)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northern Sydney Central Coast Health Douglas Piper Fellowship</td>
<td>RACP</td>
<td>$15,000</td>
</tr>
<tr>
<td>GSK Fellowship in Neurobiology (Ng)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rehabilitating at-risk Youth and Young Offenders Through Service</td>
<td>ARC LG</td>
<td>$195,000 (2008-2011)</td>
</tr>
<tr>
<td>Learning Programs. (Lennings, Kenny, Armati &amp; Riley)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investigation of neural mechanisms of 670 and 830nm laser</td>
<td>CAMRG</td>
<td>$326,000 (2008-2010)</td>
</tr>
<tr>
<td>acupuncture in pain relief using rat peripheral nerve tissue models</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Armati &amp; Chow)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benign positional vertigo Postdoctoral Fellowship (Aw)</td>
<td>NHMRC</td>
<td>$537,500 (2008-2012)</td>
</tr>
<tr>
<td>Electrodiagonosis of vestibular diseases (Aw)</td>
<td>NHMRC</td>
<td>$411,000 (2008-2010)</td>
</tr>
</tbody>
</table>

**GRANTING BODIES**

<table>
<thead>
<tr>
<th>ABF</th>
<th>Australian Brain Foundation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANRG</td>
<td>Australian Neuroscience Research Grant</td>
</tr>
<tr>
<td>ARC LG</td>
<td>Australian Research Council Linkage Grant</td>
</tr>
<tr>
<td>GP &amp; RW MF</td>
<td>Garnertt Passe and Rodney Williams Memorial Foundation</td>
</tr>
<tr>
<td>MSRA</td>
<td>Multiple Sclerosis Research Australia</td>
</tr>
<tr>
<td>NIH/NIAAA</td>
<td>National Institutes of Health USA</td>
</tr>
<tr>
<td>NHMRC</td>
<td>National Health &amp; Medical Research Council</td>
</tr>
<tr>
<td>NSWH</td>
<td>New South Wales Health</td>
</tr>
<tr>
<td>RACP</td>
<td>Royal Australasian College of Physicians</td>
</tr>
<tr>
<td>R F</td>
<td>Ramaciotti Foundation</td>
</tr>
<tr>
<td>CAMRG</td>
<td>NHMRC Complementary and Alternative Medicine Research Grant</td>
</tr>
</tbody>
</table>
# The University of Sydney
## Nerve Research Foundation

### Income Statement for the year ended 31 December 2007

<table>
<thead>
<tr>
<th></th>
<th>31 December 2007</th>
<th>31 December 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INCOME</strong></td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Grants and HECS</td>
<td>-</td>
<td>50,000</td>
</tr>
<tr>
<td>Scholarships/Donation/Bequests</td>
<td>66,990</td>
<td>180,800</td>
</tr>
<tr>
<td>Business &amp; Investment Income</td>
<td>101,737</td>
<td>107,089</td>
</tr>
<tr>
<td>Internal and Other Income</td>
<td>250,672</td>
<td>171,452</td>
</tr>
<tr>
<td><strong>Total Income</strong></td>
<td>419,399</td>
<td>509,341</td>
</tr>
<tr>
<td><strong>EXPENDITURE</strong></td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Salaries</td>
<td>343,930</td>
<td>314,093</td>
</tr>
<tr>
<td>Consumables</td>
<td>17,640</td>
<td>43,294</td>
</tr>
<tr>
<td>Equipment &amp; Repairs/Maintenance</td>
<td>180,722</td>
<td>8,163</td>
</tr>
<tr>
<td>Services and Utilities</td>
<td>33</td>
<td>514</td>
</tr>
<tr>
<td>Travel and Conferences</td>
<td>15,502</td>
<td>8,342</td>
</tr>
<tr>
<td>Other expenses</td>
<td>126,191</td>
<td>57,735</td>
</tr>
<tr>
<td><strong>Total Expenditure</strong></td>
<td>684,018</td>
<td>432,141</td>
</tr>
<tr>
<td><strong>SURPLUS/(DEFICIT)</strong></td>
<td>(264,619)</td>
<td>77,200</td>
</tr>
<tr>
<td><strong>Total Accumulated Funds as at 1 January</strong></td>
<td>1,915,630</td>
<td>1,838,430</td>
</tr>
</tbody>
</table>

**TOTAL ACCUMULATED FUNDS**  

<table>
<thead>
<tr>
<th></th>
<th>31 December 2007</th>
<th>31 December 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td>1,651,011</td>
<td>1,915,630</td>
</tr>
</tbody>
</table>

## Notes to the Financial Statements for the year ended 31 December 2007

1. **Statement of significant account policies**
   a. These accounts have been prepared on cash basis and amounts are stated at historical cost.
   b. Income tax is not applicable to activities of the Foundation.
   c. All fixed assets are expensed in the year of purchase.

2. **Growth Fund Investment**

<table>
<thead>
<tr>
<th></th>
<th>31 December 2007</th>
<th>31 December 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td>259,435</td>
<td>255,803</td>
</tr>
</tbody>
</table>
### Balance Sheet as at 31 December 2007

<table>
<thead>
<tr>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASSETS</strong></td>
</tr>
<tr>
<td><strong>Current Assets</strong></td>
</tr>
<tr>
<td>Investment-Cash Balance</td>
</tr>
<tr>
<td>Total Current Assets</td>
</tr>
<tr>
<td><strong>Non-Current Assets</strong></td>
</tr>
<tr>
<td>Growth Fund Investment Pool</td>
</tr>
<tr>
<td><strong>Total Non-Current Assets</strong></td>
</tr>
<tr>
<td><strong>Total Assets</strong></td>
</tr>
</tbody>
</table>

| **NET ASSETS** | 1,651,011 | 1,915,630 |

| **EQUITY** |
| Accumulated Funds | 1,651,011 | 1,915,630 |

| **TOTAL EQUITY** | 1,651,011 | 1,915,630 |

I certify that the Income Statement and Balance Sheet of the Foundation have been prepared in accordance with the University’s accounting practices and procedures. These Foundation accounts form part of the University of Sydney’s financial reports which have been audited by the Auditor-General, New South Wales.

Mark Easson BCom CA MBA
Finance Director
Faculties of Health
May 29, 2008
Published Conference Proceedings and Abstracts 2007

Arthur, A., Hawke, S.
A comprehensive profile of gene expression in Multiple Sclerosis cerebral blood vessels. Multiple Sclerosis Research Australia Annual Meeting, Melbourne

Aw, S.T., Todd, M.J., Halmagyi, G.M.,
Systemic gentamicin vestibulotoxicity causes impairment of the vestibulocular reflex evoked by pulsed galvanic stimulation. Society for Neuroscience 27th Annual Meeting. San Diego, USA.

Axonal excitability: From the corticospinal system to the peripheral nerve. Handout for the Digitimer Lecture, 18th ASM of American Society of Neurophysiological Monitoring, Chicago, Ill., 3-6 May, pp. 321-325.

Burke, D.
Changes in motor axon properties in central nervous system disorders. Rehabilitation Institute of Chicago, Chicago, USA, April 27.

Burke, D.
Channels and pumps in human axons. Proceedings of the IBRO World Congress of Neuroscience, Melbourne, Vic, July 12-17.

Dedova I, Garrick T, Sheedy D, Hank E, Hunt C, Dedov V, Harper C.


Hunt C, Dedova I, Garrick T, Sheedy D, Harper C.


Shores, E.A., Grayson, S.J., Miller, L.A.
Role of the Wada test in predicting cognitive outcome after temporal lobectomy. College of Clinical Neuropsychology Meeting, Queensland, Australia.

McNulty, P.A. & Burke, D.

Richardson, K., Say, M., Thayer, Z., Lah, S., and Miller, L.
Memory training for epilepsy patients: a preliminary investigation. 4-7 July, Bilbao, Spain, Journal of the International Neuropsychological Society, 13, Suppl. 2., 60.

Savage, S., Miller, L. and Homewood, J.
The cerebellum and executive functioning: Evidence for a dysmetria of thought? College of Clinical Neuropsychology Meeting, Queensland, Australia.

Sheedy D, Garrick T, Dedova I, Harper C.
Integration of clinical, pathological, neuropsychological and research data at the NSW Tissue Resource Centre. Alcoholism: Clinical and Experimental Research. 31(6) 72.
Invited Lectures and Seminars

Azizi, L., Garrick, T., NSW Health Ethics Training Day — Bereaved families and brain donation


Besser, M., International symposium on intraoperative MRI in neurosurgery — Houston, USA. July 6th to 8th 2007

Burke, D., Departmental Seminar, Rehabilitation Institute of Chicago and Northwestern University, Chicago: April 27, 2007: Changes in motor axon properties in central nervous system disorders

Burke, D., 17th Annual Scientific Meeting, American Society of Neurophysiological Monitoring, Chicago, USA, May 3-6, 2007: Digitimer Lecture: Axonal excitability: From the corticospinal system to the peripheral nerve

Burke, D., IBRO World Congress of Neuroscience, Melbourne, July 12-17, 2007: Chair, Symposium on Axonal Excitability; Invited talk: Channels and pumps in human axons

Burke, D., Northwest Neurological Meeting, Royal North Shore Hospital, Sydney, September 5, 2007: Invited Lecture: Peripheral nerve function in demyelinating disease

Burke, D., 12th Biennial Clinical Neurophysiology Workshop, Southport, Queensland, October 1-4, 2007: Invited talk Conduction block; Chair: Overseas Lecturer, and Session on Movement Disorders

Burke, D., Northwest Neurological Meeting, Royal North Shore Hospital, Sydney, September 5, 2007: Invited Lecture: Peripheral nerve function in demyelinating disease


Curthoys, I.S., Neural responses to bone-conducted vibration. Tokyo Medical and Dental University. Tokyo, Japan. May 2007

Halmagyi, G.M., Impulsive testing of vestibular function. Festschrift for the retirement of Prof K. Kaga. Department of Otolaryngology, Tokyo University February 2007


Harding, A., Senior's Week Presentation, Randwick — Brain donation for research

Harding, A., Caringbah View Club — Brain donation for research

Harding, A., Prince of Wales Hospital — Brain donation for research workshop

Harding, A., Westmead Hospital — Designated Officer Workshop


Pollard, J.D., Chronic Immune-Mediated Neuropathies, Mechanisms. Diagnosis and Management, Symposium on Human Immune-Mediated Peripheral Neuropathies — Oct 2007, Copenhagen, Denmark

Pollard, J.D., Update on CIDP. Asian and Oceanic Congress of Myology and Neuroscience — June 07, Penang, Malaysia

Pollard, J.D., Co-ordinator of MS Symposium ANZAN Annual Scientific Meeting — May 07, Alice Springs/Uluru, Australia

Pollard, J.D., The role of Nerve Biopsy in Neurologic Diagnosis — Pathology update, Royal Australasian College of Pathology, Darling Harbour, Sydney

Pollard, J.D., Sanofi-aventis Neurology Clinical Weekend — MS Experts Panel, July 2007. Melbourne, Australia

Pollard, J.D. Practical issues in management in CIDP and MS. North West Neurological Meeting North Shore Hospital, Sydney, September 5.
Refereed Publications


Elsevier, Amsterdam.


Jankelowitz, S.K., McNulty, P.A. & Burke, D. Changes in measures of motor axon


Lin, H.H., Wang MX, and Pollard JD. Effective Treatment of Experimental Autoimmune Neuritis with Fc Fragment of Human Immunoglobulin. Journal of Immunology. 186 (1-2):133-140,

Lin SS, Spies JW, Pollard JD. IV1g is effective therapy for experimental autoimmune neuritis in the Lewis rat. Journal of Neurological Sciences 256 (1-2):61-67,


Ng K, Lin CSY, Murray NMF; Burroughs AKB, Bostock H. Conduction and excitability properties of peripheral nerves in end-stage liver disease. Muscle and Nerve 2007;35:730-738.


Transcription PLoS ONE 2007; 26;2(9):e930.


Staff of the Nerve Research Foundation 2007

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- G Pallot

TECHNICAL STAFF
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- Ms Jiew

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- Dr E Mathey BSc(Hons) PhD

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- B Roediger BSc(Hons)

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- T Lin
- M Barnett
- P Spring

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- N Jufas
- D Raper
- V Arjunamani
- R Norrad

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- M David
- J Lu
- F Wang
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- M Abul Kashem

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- W Tham
- K Richardson
- M Say

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- N Caixeiro
- M Nesvaderani

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Royal Prince Alfred Hospital

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Ms A Green, BA Hon, Clinical Psychologist

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Mr S Kum Jew

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D H Kim MB BS

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Clin Prof MJ Fulham, MB BS, FRACP

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Dr J Burrell MB BS

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BSc(Med) PhD FRACP FAA
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Ms A White, RN
Ms A O’Connell, BN, CNS
Ms T Ottavio, BN, RN, NUM
Ms J Boserio, CNS
Ms N Reid, RN
Ms M Pereira, BN, RN
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Prof GAR Johnston PhD MSc FRACI
A/Prof Pj Armati, MSc, PhD
Dr T-L Chan Ling, M Optom, PhD, FAAO

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Clin A/Prof M Besser, Neurosurgery
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Sr F Hopkins, Nurse Unit Manager, ICU
Ms B Vale, Allied Health
Ms N Morely, Occupational Therapy

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Ms J Cohen, M Psych (Clin)
MAPS, Clinical Psychologist
Ms J Keller, RN

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FRACOG, Gynaecologist

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Ms I Menezes
Ms R Stojanovska
Ms H Mistry
Mr O Kudzu

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Mr A Cartwright, Computer Programmer
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Mr S Pratap, Technical Officer
Mr J Bryant, Technical Officer

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Dr K Morris MB BS, FRANZCP
Dr R White MB BS, FRANZCP
Dr M Jennings MB BS, FRANZCP
Dr G Barnes MB BS, FRANZCP
Dr S Naragratnam, MB BS, FRACR
Dr J Magnussen, MB BS, FRACR

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REHABILITATION MEDICINE
Dr P Henke, MB BS, DPRM, FACRM, Head
Dr A Aggarwal MB BS FRACP, FACRM
Dr C Winer, LLB, MB BS, FACRM,
MRCS, DRCOG, MLCOM, DPRM
Dr I Nair MB BS FACRM
Mr M O’Brien, BA,
DipRehabCouns, MapS, Psychologist

DEPARTMENT OF
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Senior Medical Staff
Dr G R Croxson, MB BS, FRACS, Clinical Head
Professor W P R Gibson, AM,
MD, FRACS, FRCS, Professor of Otolaryngology, Academic Head
Dr M Mendelsohn, MB BS, FRACS
Dr A Clifford, MB BS, FRACS,
VMO
Dr D Pohl, MB BS, FRACS,
Senior VMO

Senior Technical Staff
Dr H Sanli, PhD, Scientific Officer, Cochlear Implant Unit

Vocational Registrars in Training
Dr T Pincock
Dr D Novakovic

Visiting Fellows
Dr N Mansell/Dr P Valentine

Audiologists
Dr D Rockey
Dr C-S Tsang
Ms M Bray
Ms C Pearce

DEPARTMENT OF
RADIOLOGY
Neuroradiology
Dr Richard Waugh, Acting Director
Dr G Parker, MB BS, FRACR
Dr E Thompson, MB BS, FRACR
Dr J Soper, MB BS, FRACR
Dr R Doss, MB BS, FRACR
Dr Richard Waugh, Acting Director
Dr G Parker, MB BS, FRACR
Dr E Thompson, MB BS, FRACR
Dr J Soper, MB BS, FRACR
Dr R Doss, MB BS, FRACR

DEPARTMENT OF
NURSING E7

Mr J O’Sullivan, Clinical Manager, ICN
Ms V Sutherland, RN, MN, Clinical Nurse Consultant, ICN
Ms N Moorley, RN, Nursing Unit Manager
Ms A O’Connell, RN
Ms R Grenenger, RN
Ms D Kirkley RN, Nursing Unit Manager, Intensive Care Unit
Ms J Sherlock
Ms J Raftesath

ALLIED HEALTH
Ms K Eu, BEc, BSoc Admin, Director
Ms B Vale, BAppSc(OT), Assistant Director
Ms R Ray, BAppSc(OT), Occupational Therapist
Ms K Williams, BAppSc(Phys), Physiotherapist
Ms M Lam, BAppSc(Phys), Physiotherapist
Ms J Young, BAppSc(Phys), Physiotherapist
Ms K Garvey, BAppSc(SpPath), Speech Pathologist
Ms R Manusu, BAppSc(SpPath), Speech Pathologist
Ms M Doctor, BSW, MSW, Social Worker
Ms C Robinson, BSW, Social Worker
Ms E Frigg, BSc, MND, Dietitian
With Special Thanks to our benefactors and supporters in 2007

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- Dr R Chow
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- Mr and Mrs Ainsworth
- Mrs P Kiriakos
- Mr and Mrs John Anderson
- Mr and Mrs A Yeomans
- Mr J Armati AOM

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- Novartis
- Merck Serono

Please send to: The Nerve Research Foundation, Blackburn Building, D06
University of Sydney NSW 2006.
Tel No: (02) 9351 3385 - Fax No. (02) 9351 4018

All donations over $2 are allowable deductions for taxation purposes

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2. Please debit my: Bankcard / MasterCard / Visa

Account number: __________ __________ __________ __________

Expiry Date: _____ / _____ / _____

Signature: ___________________________________________________________________________

Name: ________________________________________________________________________________

Address: ______________________________________________________________________________

____________________________________________________________________________________ Postcode: ____________________________