Mission Statement

To be the centre of excellence in Australia in medical research (biological, clinical and service delivery) into the causes and consequences of ageing and its social accompaniments.

We aim to achieve this by:

Conducting research into all aspects of the biology of ageing, including, but not limited to, the cause, prevention and cure of disease, and the relief of suffering, associated with ageing.

Conducting and promoting research and inquiry into the provision and effectiveness of clinical care, health services and technologies provided to the aged.

Conducting and promoting research into the health status and health needs of the aged.

Developing the highest academic standards of study and practice in medicine as it relates to the aged.

Providing and promoting education concerning ageing by the expansion, advancement and dissemination of knowledge concerning all aspects of ageing.

Board Members

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President's Report

The past year has seen substantial growth at the National Ageing Research Institute, a major achievement when it is realised that most elements of the healthcare system have had to struggle with the dual problems of financial stringency and structural reorganisation during this same period of time.

The aged care sector was no exception to this turmoil, despite the obvious need for growth to meet the demands of a rapidly ageing Australian community. That growth has occurred is a tribute to the Board of Management of NARI, who wisely invested time and effort in constructing a strategy plan for development in the year preceding the work reported here, and the director, Professor Rob Helme, and his team, who set it in train and brought it to fruition.

This team has now been expanded to include Dr Anna Howe, who has been appointed as Deputy Director of the Institute. Dr Howe has been prominent in Aged Care in Australia for many years, including a term as foundation Director of the Office for the Aged in the Commonwealth Government. She brings to NARI a vast experience of public health issues that affect older people that will complement the biomedical and educational skills that we already possess.

The most obvious outcomes associated with these changes are the structural re-organisation of NARI into three major divisions of activity, and the expansion of floorspace to include the two buildings adjacent to the main wing which were made available to the Institute by North West Hospital during this past year. This extra space accommodates Dr Howe and her team which now becomes the Public Health Division of the Institute, and the Aged Care Education Division which is lead by Dr Peteris Darzins and Ms Jenny Gough. Dr Darzins is a consultant physician in Geriatric Medicine who has undertaken extensive postgraduate study in Canada at McMaster University which is world renown for its innovative educational programs, and Ms Gough is an educationalist with extensive experience in the TAFE sector. Ms Gough is responsible for developing our extramural education programs. We have also incorporated a new seminar room accommodating 65 people into this space.

The third division is the Biomedical Division which remains under the direct control of the Institute Director , Professor Helme.

This growth is welcome and appreciated by those who know us and have access to our research findings and education programs. However, the current effort is clearly insufficient for the task at hand, which is to provide substantive guidance to governments and healthcare professionals so that they may help all older Australians to 'Age Well'. We need to substantially expand our health and educational services, and our research productivity, to bring about this goal.

To achieve this we need to be known and supported by our constituency, which includes older people and the healthcare industry. This will be part of the strategy in the year ahead. In 1997 we made our first appearance at Medical Research Week. During the coming year we plan to take advantage of other opportunities to bring our case to the community. We have been steadily accumulating a record of all those people who have accessed our services, nearly 10,000 in all, and we will be asking them to become proactive in supporting the Institute; Governments are committed in the present climate to a policy of self help.

In the final analysis the future of the Institute rests firmly with you; any reader of this report must be interested in ageing, and in what NARI is doing to address the individual and community needs associated with ageing in Australia. We need your help, and during the next year we will be asking for your personal commitment to the process.

Mr Russell Fynmore AO
President

Director's Report

Whether we like it or not change is the catchword of the last years of the millennium, and change management is the jargon which sustains the bureaucracy in many government departments, including those responsible for the health of the community. Healthcare systems in this country and overseas have undergone radical reorganisation over the last five years, with casemix, diagnosis related groups, streams of care, critical care paths, seamless care and managed care becoming the daily terminology of governments, hospital administrators and healthcare providers from all disciplines.

Through all this turbulence, however, older patients have remained the same. There is little change in the spectrum of disease, disability and handicap amongst older people in developed countries; their needs require careful individual analysis and treatment. The big issues are still dementia, incontinence, immobility, sensory impairment and pain.

Early in the year it was a salutary lesson for me to hear an experienced healthcare bureaucrat in the USA freely acknowledge that change was being implemented even though valid measures of functional outcome were not available; change was demanded even expected, and over-rode all other considerations. Otherwise the belief was that the healthcare system might become financially bankrupt.

It is the task of seasoned academic institutions, however, to keep their head whilst all around seem to be losing the plot; to continually demand that proper evaluation of change measures be undertaken using valid instruments, despite any unpopularity that may result. This is no easy task, especially when funding is largely derived from the same government sources driving change, and they set the evaluation agenda based on political rather than health criteria.

The National Ageing Research Institute has also changed substantially during the past year. I believe many of our long standing supporters would fail to recognise either the plant or the staff if they visited us at the Parkville site. The most obvious change is the establishment of our Division of Public Health under the leadership of Anna Howe in the building south of the old Institute building. She has brought a new and experienced voice to our Health Services Research Unit headed by Robyn Smith. NARI has slowly and carefully built up expertise in many areas of healthcare delivery to older people in recent years through Robyn's activities. Together with representatives from the field, she has examined many aspects of respite care, rehabilitation in the home, and the function of community rehabilitation centres (day hospitals), and will shortly be looking at the operation of specialised multidisciplinary outpatient facilities. To this may now be added studies of Home and Community Care undertaken by Anna Howe in conjunction with Len Gray from the Bundoora Extended Care Centre. We would expect that continued development of collaborative studies, and success in obtaining and completing government consultancies, will allow us to slowly set more of the agenda for governments rather than having to follow their policy directives. We hope to further this objective through the establishment of a health policy unit and a data resource centre, so that we might offer independent research opportunities to all interested parties, including the private sector.

Another substantial change has been the development of our Aged Care Education Division under the leadership of Dr Peteris Darzins and Ms Jenny Gough. Jenny has worked with North West Hospital to bring our joint venture, Education Enterprise, to fruition. There have been seminars on common problems faced by healthcare professionals in the field such as pain management, dementia care, respite and rehabilitation. In addition we have recognised previously unmet demand for instruction in quality assurance and research methods for clinicians, and addressed ethical issues such as restraint, euthanasia and resuscitation. An important milestone was the presentation of our first seminar in a rural centre. A full description of these activities are reported in this annual report. Dr Darzins has the task of bringing our fledgling research and development in computer based instruction to a practical reality. He is working with Dr Paul Andrews (computer science expertise), and Drs Sam Scherer and Kim Taubman (clinical expertise) to develop interactive computer learning packages and clinical decision support systems that

provide a better base of instruction for the field, especially for those who are unable to undertake regular continuing education programs. The challenge is to understand the behaviours of healthcare providers that underlie successful integration of this technology into their professional lives. We are looking to invest considerable time and energy in this task over this coming year as it represents the future of health practice into the next century, the era when medicine will be dominated by healthcare of older people.

On the north side of NARI we have renovated the old infectious disease ward to accommodate the staff involved in medication trials for Alzheimer's Disease and Vascular Dementia, the graduate students, and a seminar room suitable for education sessions involving up to sixty five people. This area is fondly referred to as Siberia in distinction to Public Health's Patagonia on the South side.

The Biomedical Division has remained comparatively stable during the last year. The pain research team was well represented at the seventh World Congress of the International Association for the Study of Pain in Vancouver, where I delivered a plenary lecture on pain as it affects older people. A number of key researchers in pain are expected to visit NARI during the next twelve months as a result of our interactions in North America this year. Mr Keith Hill has been appointed co-director of the Falls and Balance Clinic, and now that he has completed his doctoral studies we expect him to provide leadership in developing this area of study. Experimental studies on dementia diagnosis are also proceeding well under the guidance of Dr Jane Pierson who joined us from the UK earlier in the year. Jane is an experimental psychologist who earned her PhD from Monash University. Dr Zeinab Khalil continues to lead the biology laboratory team in studies of wound healing, with important insights gained on the influence of age and diabetes on this process. Details are contained in the text of this annual report.

All up, our staff, including scientists, students and administration, now exceed sixty people, well on the way to a critical mass which we estimate to lie between 100 and 150. This has introduced some previously unknown challenges in regard to the preservation of uninterrupted communication between staff members; something which we value highly at NARI. We have maintained our tradition of meeting in the tea room for social events; the introduction of e-mail has served as a useful communication medium; we have set times for staff question and answer sessions after the regular weekly research seminars; and we have the Siberian and Patagonian Times as our monthly internal newsletter. Our Institute policy committee is also working to introduce an effective appraisal system for staff over the next few months. These are all important new measures to preserve our unique interactive multidisciplinary environment; where biological and social sciences can feed off clinical practice and research and vice versa. It is a feature of NARI that is highly appreciated by our growing number of visiting overseas scientists and students, and it will be of increasing importance as we grow to critical mass over the next several years.

Part of the change scene at NARI is the introduction of a professional face to our volunteer and fund-raising activities. Our activities officer, Sharon Hillman has become an important player in NARI's public face. We find ourselves in an increasingly competitive environment seeking support from the private sector as Government reduces its input into vital medical research. We need to convince our constituency, older people, of the value to them if they support research at NARI. It is incumbent upon us to explain the things we do and the benefits that flow now, in terms of a more highly trained workforce, and in the future, in terms of new and improved treatments for older people. We are here because we believe a better quality of life is available to older people if the research outlined in this report is undertaken and its findings implemented. We must convince older people, the corporate sector and governments to become more generous funders if we are to realise our objective to help all Australians 'Age Well'.

Professor Robert Helme
Director

Our People and Partnerships

Director

Professor Robert D Helme MB BS (Hons) PhD FRACP

Deputy Director

Dr Anna Howe BA(Hons) MA(Hons) Dip Ed PhD

Administration

Ms Lynette Bon BHA (Administrative Assistant)
Ms Felicity Fairbairn BA (Receptionist)
Ms Jenny Gough BA DipEd (Education Co-ordinator)
Ms Sharon Hillman BBT MFIA (Development Officer)
Mr Dale Ingamells BSc (Hons) DDA TPTC MAPS (Manager)
Mr Tim Mattingsbrooke BBus Dip Office Admin Dip Ed (Education / Administrative Assistant)
Mrs Fay Maxey (Secretary to the Director)
Mr Arthur Wells FCPA (Accountant)

Senior Lecturers

Dr Peteris Darzins BM BS PhD FRACP FRCPC Spec Cert Comp Ger Med
Dr Leon Flicker MB BS (Hons) G Dip Epid PhD FRACP

Research Fellows

Dr Paul Andrews BSc (Hons) PhD Grad Dip Comp Sci MACS
Dr Stephen J Gibson BBSc (Hons) PhD MAPS
Dr Zeinab Khalil MB BS (Hons) MSc PhD
Dr Jane Pierson BSc (Hons) PhD MAPS
Ms Robyn Smith BAppScOT Grad Dip Geront

Research Nurses

Mr Mark Bradbeer BSc (Hons) MSc RN
Miss Roslyn Cook RN BaPH
Mrs Aileen Kalogeropoulos RN BAppScNs

Clinical Research Fellows

Dr Dina LoGiudice MB BS FRACP
Dr Eric Seal MB BS FRACP
Dr Mark Yates MB BS FRACP
Dr Kim Taubman MB BS FRACP

Research Assistants

Ms Maryam Bassirat BSc (Hons)

Ms Gabrielle Fraser
Ms Ingrid O'Connell BBSc
Ms Anna Laffy RN BApp Sc Nursing
Ms Vanessa Mayhew BA BLitt (Hons - Psych)
Ms Catherine Niven Advanced Certificate in Veterinary Nursing
Ms Jane Panaccio
Ms Sally Richardson BEd Grad Dip CommHlth
Ms Claudia Trasancos

Research Pharmacist

Ms Karen Clark

Research Students

Mr Jonathan Bruce Barber BEd MEd
Ms Mary Christine Chakour BSc (Hons)
Mr Trevor M Corran BA (Hons) MA (Clin Psych) MAPS
Mr Michael Farrell BAppScPhty Grad Dip Gerontol MGerontol
Mr Keith Hill BAppScPT Grad Dip Physio
Dr Ngaire Kerse BHB MBChB Dip ABFP MRACGP
Mr Francis Kung Prof Dip OT Grad Dip Hlth Adm MHlthSc OTR
Ms Andrea Kyriacou BSc (Hons)
Dr Andyda Meliala Dra Med
Mr Merhi Merhi BSc (Hons)
Ms Helen Poliviou BSc (Hons)
Mr Daniel Quin
Ms Phi-Van Tran BAppSc OT Grad Dip Geront Mgeront
Dr Maria Widagdo BMed
Dr Zhen (Jane) Zheng BMed ACU

Associates of the Institute

A/Prof David Ames MB BS MD MRCPsych FRANZCP
Mrs Jenny Callaghan BPhrm PHC Grad Dip Comm Pharm Grad Dip Ger MGer MPS
Dr Christopher Driver BSc(Hons) Dip Ed PhD
Dr Benny Katz MB BS FRACP
Prof Hal Kendig AB MPI PhD FASSA
Dr Ngaire Kerse BHB MBChB Dip ABFP MRACGP
Dr Sam Scherer MB BS DGM
Dr Jenny Schwarz MB BS Grad Dip Ed FRACP
Dr Phillip Street MB BS FRACP
Mr Geoff Sussman JP PhC MPS AF AIPM MSHP MSMA MAWMA
Dr James Tulloch MB BS FRACP

Visiting Scientists and Students

Ms Asa Granath BPharmacy MSC
Ms Camilla Hansson MSC
Ms Christel van Hintum BSc (Hons)
Dr Lin Yan BMed
Dr Ying Fai Mak MB BS MRCP (Edin)
Ms Marie Olsson BPharmacy MSC

Consultants to the Institute

Glenda Banks and Associates Pty Ltd
Corporate Publishing, Media Management
Michael Gorman and Associates Pty Ltd
Consulting Biomedical Engineers
O'Keefe & Partners Pty Ltd
Financial Resource Development, Management and Communication

North West Hospital Special Clinical School

Prof R Helme (Chairman)
Dr J Adams
Dr D Ames
Dr M Brignall
Dr A Chamberlain
Dr M Chou
Dr P Darzins
Dr L Flicker (Co-ordinator)
Dr M Giles
Dr J Hurley
Dr S Joseph
Dr B Katz
Dr E Kipen
Dr D LoGiudice
Dr F Moss
Dr M Murray
Dr M Ponsford
Dr S Scherer
Dr R Scholes
Dr J Schwarz
Dr E Seal
Dr P Street
Dr J Tulloch
Dr S Warmington
Dr M Whishaw
Dr R Whiting
Dr M Yates
Dr D White
Mr T Mattingsbrooke (Admin Support)

Pain Clinic

Prof R Helme (Dircetor)
Dr B Katz (Co-Director)
Mr M Bradbeer (Research Nurse)
Ms C Bridson (Occupational Therapist)
Mr T Corran (Psychologist)
Mr M Farrell (Physiotherapist)
Ms J Gnepp (Psychologist)
Mr S Malkin (Psychologist)
Ms A Morrieson (Community Nurse)
Mr M Neufeld (Physiotherapist)
Mrs V Roux (Pharmacist)

Falls and Balance Clinic

Mr K Hill (Co-Director / Physiotherapist)
Dr J Schwarz (Co-Director)
Dr E Seal
Ms N Toohey (Physiotherapist)
Dr J Tulloch
Mrs A Kalogeropoulos (Research Nurse)
Ms D White (Occupational Therapist)
Dr Ramon Mocellin (Registrar)

Memory Clinic

Dr L Flicker (Co- Director)
A/Prof D Ames (Co-Director)
Dr D LoGiudice
Ms J Buttigeig (Occupational Therapist)
Ms E Clifford (Social Worker)
Ms B Moorhouse (Speech Pathologist)
Ms A Unkenstein (Neuropsychologist)
Miss R Cook (Research Nurse)

Clinic Secretary

Ms Marlene Tupper

NARI Policy Committee

Prof R Helme (Chairman)
Mrs F Maxey (Secretary)
Dr P Andrews
Dr P Darzins
Dr L Flicker
Dr S Gibson
Ms J Gough
Dr A Howe
Mr D Ingamells
Dr A Khalil
Ms R Smith

NARI / NWH Education Enterprise Committee

NARI
Dr P Andrews
Ms J Gough
Mr D Ingamells
NWH
Ms K Gallaugher
Ms M Kammerman
Ms F McKinnon
Prof R Nay
Dr J Schwarz
Ms M Tonuma
Ms J McGrory

Clinical Research

The aim of clinical research is to improve our understanding of health and disease by investigating the complex interactions between physical, psychological, social and environmental factors. Research questions come directly from the issues and problems which arise in everyday clinical practice, although new discoveries from basic animal research are also adapted and tested in human volunteers in real world situations. The clinical laboratory at NARI is ideally positioned in this regard and we have established ongoing research programs into the problems which most commonly affect older persons; falls and balance failure, memory impairment, pain and suffering, and osteoporosis. There has been an emphasis on the development of more objective measurement tools which can be used to explore the basic mechanisms of disease and also increase the accuracy of routine clinical assessment. Advanced studies into normal age related change forms a core part of the research program as this provides the background information necessary for early diagnosis and treatment of progressive disease states. Finally, we have been investigating novel intervention strategies which aim to reduce disease impact and retard the progression of osteoporosis and problems with falls, memory and pain. This combination of studies should ultimately benefit all older Australians by reducing the occurrence of preventable disease and by improving the quality of life in those individuals who do suffer chronic illness and disability.

- Pain
- Falls, balance and mobility
- Dementia
- Osteoporosis

Pain

Chronic pain from diseases like arthritis, osteoporosis and shingles is extremely common in older people and can become a major source of suffering and disability. The pain laboratory at NARI has established one of the most comprehensive research programs in the world researching pain as it affects older people.

Over the past 12 months we have undertaken a number of new and innovative studies aimed at identifying the physiological basis of age differences in pain perception and report. Age changes in skin sensitivity to touch, heat and vibration are most pronounced in the hands and feet. One of the favoured theories to explain this decline involves the progressive loss of sensory nerve fibres in the distal extremities. If similar mechanisms operate in the peripheral pain pathways then one might expect more pronounced age differences in pain sensitivity at the feet when compared to the back or arms. Whilst undertaking studies for her PhD, Andyda Meliala has shown that older people require higher levels of stimulation in order to report just noticeable pain. However, this difference is of equal magnitude regardless of the body site tested. These findings argue against the notion of a differential loss of peripheral pain fibres and in contrast to other types of sensation, it appears that with advancing age, pain perception may be relatively preserved at distal body sites. Another series of studies has examined pain states which more closely mimic ongoing clinical pain. Hyperalgesia is one of the most important symptoms of disease and injury, and is characterised by soreness and increase pain sensitivity around the site of tissue damage. Zhen Zheng, a PhD student, has been using a chemical irritant called capsaicin in order to induce a temporary state of increased sensitivity, or hyperalgesia, in young and older volunteers. The main findings indicate that older persons take longer to respond to capsaicin but eventually develop the same degree of hyperalgesia as indexed by altered sensitivity to mechanical and heat stimuli. Hyperalgesia mediated by a sensitisation of peripheral pain receptors was found to decrease over time in both young and older persons but the sensitisation of the spinal cord was maintained for a much longer time period in older volunteers. These findings suggest important age differences in the maintenance of hyperalgesic states and may contribute to a greater risk for ongoing pain following an acute injury. Work is now underway by Ms Zheng and Daniel Quin, a Science honours student, to further define the nature of age related changes in the spinal cord response to painful information.

Our studies on hyperalgesia have also been extended to include patients suffering from osteo-arthritis. Osteo-arthritis is the most common cause of chronic pain in older persons although there is little relationship between the severity of pain and the extent of bone change on Xray. As part of his PhD, Mike Farrell has been examining mechanisms of peripheral and spinal cord sensitisation following exercise of an arthritic joint. Patients with incident pain during movement showed no evidence of hyperalgesia whereas those with continuous pain aggravated by movement demonstrated heightened pain sensitivity mediated by a sensitisation of peripheral pain receptors. This highlights the heterogeneous and dynamic nature of pain mechanisms in osteo-arthritis and has important implications for tailoring specific pharmacological treatments.

The clinical assessment of pain and suffering requires accurate measurement tools. Unfortunately, most questionnaires have been developed in young adult populations and then applied to older persons without formally establishing the reliability and validity of the instrument within this group. Whilst undertaking his Science honours year, Ian Stokes examined two commonly used measures of coping. Only the Coping Strategies Questionnaire was found to be useful and older persons adopted the same underlying dimensions coping as previously found in young adult samples. Mike Farrell has demonstrated the utility of the Human Activity Profile as a measure of pain impact on daily activity and Trevor Corran is completing his PhD studies on older chronic pain patients by examining the McGill Pain Questionnaire. When combined with our earlier work on the Profile of Mood States and Health Locus of Control Questionnaire, these instruments provide a comprehensive assessment of pain, mood and disability which can be used with confidence in older persons who suffer from persistent pain.

Estimates of pain prevalence and particularly the extent of pain and suffering within community dwelling

samples provide important information for planning future health care services. In collaboration with the Lincoln Gerontology Centre, Prof Helme, Dr Flicker, research nurse Mark Bradbeer and Mike Farrell have completed a study of 1000 older persons living in the Melbourne metropolitan area. Almost 57% of the sample reported experiencing some pain and 40% of older persons described their pain as regular and bothersome. Women were more likely to suffer from daily chronic pain, although having a lack of paid employment history and a lower educational standard appeared to account for this relationship, rather than some attribute of gender, itself. Only a very small proportion of the sample (6.3%) had severe persistent pain which interfered with daily activity and affected self reported mood state. These findings clearly demonstrate that while chronic pain is very common in older adults, it is not invariably associated with negative life consequences. Future research will focus on the reasons why some older individuals show profound impact from pain whereas others appear to remain relatively unaffected.

The other major treatment approach under investigation at NARI involves the use of electrical nerve stimulation via the skin (TENS). At present this methodology is under-utilised and it is difficult to predict those individuals who will show clear benefit. In an extensive series of experiments for her PhD, Mary Chakour has been investigating the optimal stimulation parameters and the underlying mechanisms of action of TENS. When high intensity TENS is used there is a large increase in pain threshold and a marked reduction in ongoing pain sensations. Moreover, by increasing stimulation intensity it is possible to elicit a TENS response in individuals who previously showed no benefits. This effect occurs within 5 minutes of stimulation onset and operates regardless of stimulation frequency. A differential nerve fibre block suggests that high intensity TENS works by maximal stimulation of large sensory fibres thereby inhibiting the pain signal at the level of the spinal cord. These studies will help refine the properties for effective TENS use and given that this is an inexpensive treatment with no major side effects, it should ultimately benefit all older persons who suffer from a persistent pain complaint.

Falls and Balance

Balance problems in older people result from a wide variety of causes, but have the common end point of making the older person prone to falls. When an older person experiences an event which affects their balance system, such as dizziness, visual dysfunction, neuropathy, or stroke, they often also suffer secondary problems such as fear of falling and reduced activity level. These secondary problems can result in further problems in the balance system if not addressed. Research at NARI has focused on early identification of those at risk of falls, so that treatment strategies can be implemented at an early stage, as well as evaluation of several clinical groups with established balance problems.

Mr Keith Hill is completing his PhD studies which investigated balance problems and falls in several groups. The major study evaluated a group of healthy, active women 70 years of age and over. A comprehensive series of tests was used, including static and dynamic force platform measures of balance, simple clinical measures of balance, tests of walking, leg muscle strength, vision, as well as several questionnaires of activity, depression, anxiety and fear of falling. This group scored very well on all measures. Surprisingly though, half of this group fell during the subsequent 12 months. On remeasurement 12 months after the initial assessment, most measures showed a small deterioration in performance. Accuracy of prediction of fallers was of limited success, however. The results of this study have enabled the refinement of balance assessment procedures for clinicians, as well as identifying the high falls risk in active healthy older women, who generally have not been targeted in falls prevention programs. A grant has been received from the Felton Bequests Trust fund to develop and disseminate an education package targeting this group. This package is currently being developed.

A similar series of tests were conducted on women aged 70 years or more who had Parkinson’s Disease, or a stroke at least 6 months earlier. These investigations identified the global dysfunction of balance in these two groups, and the impact of the physical problems on anxiety, depression fear of falling and reduced activity level. Further men and women are required for these studies. A 12 month followup is planned for this group.

NARI, in conjunction with the Lincoln Gerontology Centre, LaTrobe University, conducted a comprehensive survey of health issues in a large randomly selected sample of people over 65 years of age. Analysis of the falls related components of this survey investigated the complex relationship between attitudes to exercise and health with activity levels, fear of falling and recent falls history. Importantly, although 70% of the sample acknowledged physical activity as being very important for the health of older people, far fewer people were actually participating regularly in any form of energetic physical activity. Fear of falling was common in this sample, and was often associated with reduced activity level.

Ms Phi-Van Tran is continuing her PhD studies evaluating the effect of an activity program on a range of physical, psychological, and quality of life measures in a group of hostel residents. One of the important outcome tools to be used in her studies is the Uptimer, a small computerised device developed at NARI which measures "uptime", an activity measure indicating the time a person spends standing or walking. Preliminary studies using the Uptimer have shown that it is reliable and valid in several diverse samples of older people.

Hostel residents have a range of physical and functional limitations which may impact upon their activities and quality of life. This program aims to provide a stimulating, enjoyable, and active program for residents, with the aim that any improvements achieved through participation in this type of program may be continued even after the formal program concludes. Perceptions of staff and residents at the participating hostels on a range of issues will be added to the objective measures utilised.

By further developing research programs targeting innovative assessment procedures and approaches to management of mobility and balance problems in a variety of settings, NARI aims to make a significant contribution in reducing the magnitude of the problem of falls in older people. Achievement of these

goals will ultimately assist in the maintenance of functional independence and quality of life of older people in the community, as well as in residential care.

Dementia

The prevalence of dementia is rapidly increasing in developed countries, where growing numbers of people survive into old age. Thus, dementia constitutes a significant public health problem which requires intensive research into its causes, diagnosis and management. Our current research is yielding a number of promising findings, with major implications for dementia diagnosis and provision of services for those affected by dementia.

Accurate differential diagnosis of dementia is difficult at present. However, improvement in the accuracy of early diagnosis is vitally important, as new drugs are being developed which show promise in arresting or slowing decline in those with Alzheimer's disease. The maximum benefit of these treatments is likely to be derived if they are commenced early in the course of the illness. Other benefits of improved early dementia diagnosis include increased time for families to come to terms with the situation, and better identification of reversible causes of cognitive impairment, such as delirium and depression. We are conducting a number of studies using quantitative electroencephalography (QEEG) which allows non-invasive recording and quantification of the brain's electrical activity. Our studies aim to determine if QEEG has potential in improving differential diagnosis of early dementia.

Dr Eric Seal and Ms Christel van Hintum are assessing the utility of QEEG for differentiating between Alzheimer's disease and vascular dementia, which are the two major types of dementia in older people. They have recorded the EEG while people engage in a number of tasks, including odour detection and identification. They found that the QEEG measures for this task allowed highly accurate differentiation between people with the two types of dementia. Dr Seal is validating and extending these initial findings as part of his Ph.D. project. He aims to establish the paradigm as a tool for differential diagnosis of early dementia.

Another Ph.D. student, Ms Andrea Kyriacou, has just finished collecting data for her longitudinal study. Over the past three years, she has tested a large group of older, community-based volunteers at one yearly intervals. She is aiming to identify QEEG changes which may appear before the onset of clinically-evident dementia. This research is also providing information about brain activity changes associated with healthy ageing. Such information is needed to allow QEEG changes, which may be markers of incipient dementia, to be considered with reference to an established normative pattern. Age-related brain activity changes have also been examined in a preliminary study by Dr Maria Widagdo, who will soon commence a Ph.D. project to investigate these changes in more detail.

Use of the QEEG technique is not limited to the study of brain activity changes associated with ageing and dementia. Mr Bruce Barber is completing a Ph.D. using QEEG to study brain activity in response to music. He has found that QEEG measures distinguish reliably between musicians and non-musicians, suggesting that intensive and specific training results in neurological changes. Mr Barber is now seeking to refine knowledge of musical cognition with a new study which aims to examine brain activity associated with cognitive processes in highly-trained musicians.

In the future we will conduct a variety of further studies using QEEG, and develop other paradigms for examining cognitive deficits associated with dementia. One such paradigm will be used to study abnormalities of visuo-spatial attention which may appear very early in the course of Alzheimer's disease. Mr Michael Gorman provides continued bio-engineering support for our research.

Services for those with dementia need to assist both sufferers and their carers, who often experience high levels of stress and feelings of burden. Dr Dina LoGuidice and her colleagues, Dr Leon Flicker and Ms Wendy Waltrowicz, have just completed a project which assessed services provided for older people with dementia. They measured the prevalence of dementia and associated carer stress in a group of people referred to an Aged Care Assessment Team (ACAT). The impact of dementia on the health care costs of this group was also elucidated. The utility of a memory clinic in providing education and reducing

psychological morbidity of carers was evaluated using a randomised clinical trial. The tools used for the assessment of those with dementia and the instruments used to assess carers' psychological morbidity, feelings of burden and quality of life were evaluated for both the ACAT and memory clinic groups.

Dr LoGuidice has recently commenced a study which examines differences between people of Italian and English speaking backgrounds who present at a memory clinic. The study also aims to evaluate the accuracy of diagnosis, using standardised psychometric instruments, for the Italian and English speaking groups. Ms Jane Panaccio is assisting with this research.

Osteoprosis

Osteoporosis or brittle bones is one of the most common problems older people face. Almost 50% of women in Australia and 25% of men will have a fracture, or broken bone, due to osteoporosis during their lifetime. The burden of this condition falls disproportionately on older women and for this reason Dr Leon Flicker has been involved in studies of this group of people, in collaboration with researchers from the Department of Medicine and Public Health at the University of Melbourne. An initial finding was that within older women, the variation in bone density, is largely due to genetic factors. This study was performed in a group of female twins over the age of 60 recruited through the Australian National Health and Medical Research Council Twin Registry.

Another important finding from this study was that an increased amount of lean tissue, which is mostly muscle, is associated with greater bone density. The length of the neck femur, the part of the hip that breaks in older women, has also been shown to be determined largely by genetic factors by studying these twins. Researchers in North America have demonstrated that the bigger that the neck of the hip, the more likely that the hip will fracture. Despite that fact that genetic factors determine both the strength of bone density and the length of the neck of femur, the tendency for hip fractures to run in families is by no means totally explained, with over half of the familial tendency to hip fractures completely unexplained. This raises the question as to whether the risk of falling, the other reason why people break bones, may also run in families. Follow-up of this group of twins has demonstrated that the change in bone density in older women is due to the change on fat mass rather than lean mass suggesting that the effect of lean tissue is manifest earlier in life, possibly in adolescence.

Another area in osteoporosis which has received a lot of attention worldwide has been the development and refinement of medications for women with the condition. Dr Flicker has completed a study investigating two drugs used commonly worldwide, the anabolic steroid nandrolone decanoate, and intranasal calcitonin, a naturally occurring hormone that has a specific action to decrease the amount of bone being taken up. Although both agents had benefits at the lumbar spine, only the nandrolone decanoate had benefits at the hip. An unusual finding from this study was the tendency for the two drugs to cancel out any benefits when used together, suggesting the continuing need to test combinations of medications despite the fact that individual medications may have already demonstrated benefits. Another medication currently being tested is Risedronate, which is a bisphosphonate, which are a promising class of medications for osteoporosis. This is being tested in women over the age of 70 years with osteoporosis, the greatest advantage of this type of medication is that they have few effects outside bony tissue and over the next 5 years risedronate and medications like it, may well become the mainstay of treatment for older women with osteoporosis.

Important developments have resulted from work in collaboration with Sam Scherer, NARI Associate and Medical Director of the Freemasons Homes. Firstly, over 50% of residents in both a hostel and nursing home have been found to have malnutrition of vitamin D. The majority of an individual’s vitamin D comes from the body’s own manufacture through exposure to sunlight. Following these initial studies funding has been received from the NH&MRC Public Health and Research Development Committee and the Victorian Health Promotion Foundation to further develop this work. Studies are in progress to test the idea that it may be best to give vitamin D supplementation to all women in hostels and nursing homes so as to prevent falls and fractures.

Biology Research

Over the past year, the Biology Laboratory Team provided a range of new and exciting data in research activities related to a number of health problems associated with age. Our research focus was directed towards providing better understanding of disease mechanisms. As most age-related diseases are multifactorial, it was essential for us to undertake a reductionist approach in our investigation. We have focused our studies on examining the changes with age in the microvasculature and the factors contributing to these changes under physiological and pathological conditions. Our greatest achievement was in the area of delayed tissue healing where we were able to bridge the gap between basic science and clinical medicine. We have taken an advantage of the unique environment provided to us by our Institute whereby we have an ideal interface between clinical medicine and laboratory science and for the first time, we were able to provide evidence to support the notion that the use of complementary animal and human skin models leads to a better understanding of how sensory nerve function is modulated during ageing. The pathophysiological implications of these changes are likely to be highly conserved between species. We showed that the predictability of the effects of treatments for delayed tissue healing will be greatly enhanced by a better understanding of these changes using such complementary models. We have advanced our research in the area of wound healing as we are currently utilising a non-invasive technique that we have developed to improve the repair process with age. In addition, we have continued our achievements by providing new exciting data on the vascular mechanisms that contribute to the pathology of Alzheimer's disease, the development of chronic pain due to nerve injury as well as the development of diabetic vascular disease. Particular emphasis was directed towards the role of free oxygen radicals and glycosylated proteins in the development of vascular pathology in these diseases. All these diseases have more significant sequelae in our elderly population. The prevention and treatment of these diseases are, therefore, major health priorities. The recent findings from the Biology Laboratory will help in setting up new initiatives in the research effort in the area of geriatric medicine and will ultimately help design improved therapies for the above mentioned diseases.

- Pathology of Alzheimer's disease
- Delayed wound healing with age
- Chronic pain
- Vascular disease in older people
- Vascular mechanisms in diabetes
- Collaborative research
- Promoting medical research

Pathology of Alzheimer's disease

Our most recent studies in this area revealed that the b-amyloid protein, implicated in the pathology of the disease is capable of releasing a vasoconstrictor substance called endothelin. The release of this substance could contribute to neuronal death associated with the disease. The significance of this finding is that it provides clues to support the growing belief in the possibility that vascular mechanisms could contribute to the pathology of Alzheimer's disease.

It is well known that Alzheimer's disease is characterised by deposition of b-amyloid in brain and cerebral blood vessels. Our study is the first to provide evidence that b-amyloid interacts with the endothelial cells at the level of microvasculature to release the potent vasoconstrictor peptide, endothelin.

Our evidence is particularly relevant when taken together with the recent report that previously increased blood pressure may increase the risk for dementia by inducing small-vessel disease and white-matter lesions. It is possible that the vasoconstrictor effect of endothelin is amplified in vessels where endothelial synthesis of nitric oxide (a potent vasodilator) has been reduced because of hypertension.

We believe that our recent results may shed some light on the potential functional effects of b amyloid protein via the release of endothelin. In support of our proposition, recent studies provided evidence that ET-1 like immunoreactivity in the brains of Alzheimer's disease patients was significantly increased in frontal and occipital cortex compared to those in aged-matched controls. These results may explain the clinico-radiological findings of decreased cerebral blood flow in these patients. Our results offer a possible mechanism that underlies this phenomenon.

Most recently Miss Helen Poliviou, a PhD student in our laboratory provided evidence for the involvement of free oxygen radicals in the vascular damage induced by b-amyloid protein. These results strengthen the current believe that antioxidants (e.g. vitamin E) could delay the progress of AD. We propose that our studies on skin microvasculature could be useful for further examining the functional effects of b amyloid protein and its significance in AD.

Delayed wound healing with age

Considerable progress has been made in this area of research. We have previously documented an age-related decline in sensory nerve function associated with impaired tissue healing. This is attributed to the fact that initiation of inflammation and subsequent tissue repair is dependent on intact sensory innervation. We previously reported that the use of exogenously applied sensory peptides can accelerate wound healing with age and that the interaction between these peptides can influence their ability to accelerate the healing process. Subsequent research led us to the discovery of new electrical stimulation parameters which can be used in a non-invasive manner to activate the aged nerves (with limited reserve) to release substances with growth promoting effects in order to accelerate the healing process.

In a recent study we showed that non-invasive transcutaneous electrical stimulation can be used to activate terminals of primary afferent sensory nerves thus improving the local effector functions of ageing sensory nerves despite the deteriorating effect of age. We subsequently utilised this non-invasive technique to improve the repair process with age. This work will provide a research focus to the Institute and we are working towards identifying the potential market for improving tissue healing with age.

Chronic Pain

Our most recent research in this area led to two new discoveries:

First, Mr. Merhi Merhi, a PhD student in our laboratory reported that neuronal Nitric Oxide increases with age. This molecule is beneficial in small amounts for the maintenance of homeostasis and the control of vascular tone. At high concentrations, however, it has been implicated as one of the transmitters that may contribute to the development of chronic pain. Our discovery raises the question of whether or not the increase in neuronal NO with age could be one of the mechanisms underlying the prevalence of chronic pain in our elderly population.

Second, our extended collaboration with visiting Scholars from China namely Dr. Tao Liu who joined our laboratory recently to undertake his PhD resulted in exciting information regarding the involvement of free oxygen radicals in modulating the inflammatory response after nerve injury. This is a very important findings as it could provide us with potential target for therapeutic interventions. This new data not only strengthens our ongoing and fruitful collaboration with our Chinese colleagues but will also help to further our understanding of the link between the biochemical changes that occur at the site of nerve injury and the development of chronic pain.

Vascular disease in older people

Research was directed into two important areas first to examine the effect glycation products on microvascular blood flow and second to examine the differential effects of various vasoactive substances on different compartments of skin microvasculature.

Miss Camilla Hansson, Miss Asa Granath and Miss Marie Olsson are three pharmacists from Department of Pharmaceutical Biosciences, Uppsala University, who joined us to undertake their Masters degree of pharmacy. Their research projects involved the above mentioned research areas.

Miss Camilla Hansson, investigated the effects of glycation products, early (Amadori) and late (AGEs) products on microvascular blood flow. These products increase significantly with age and are enhanced in diabetes and correlate with the development of diabetic complications and vascular disease with age. The results suggest that Amadori on their own are capable of modulating microvascular function and that short term exposure to AGEs induces changes in vascular responses that are qualitatively different from those reported after long term exposure to AGEs. Evidence is also provided for the involvement of superoxide anions in this modulation and for differential effects of AGEs on the microvasculature during early and late phase of acute inflammation. The most intriguing observation was that short term exposure of diabetic microvasculature to Amadori could provide a respite relief to these blood vessels by increasing microvascular blood flow. results also showed that Amadori and AGEs enhanced the vasodilatation response and that the plasma extravasation response was partially impaired during the post stimulation period. This observation is rather intriguing as it raises the argument of possible differential effects of early and late glycosylated proteins on microvascular blood flow during diabetes.

It is anticipated that our results will shed some light on the short term effects of AGEs and Amadori products on microvascular function. This is important as the data currently available only reflect the long term effects of these glycated proteins after the development of vascular complications. Understanding the mechanisms underlying the early changes in endothelial cell function in particular those induced by Amadori products could be of clinical significance, providing new therapeutic strategies to overcome the vascular complications associated with ageing and diabetes.

Miss Asa Granath and Miss Marie Olsson examined the differential effects of various vasoactive substances on different compartments of skin microvasculature. The results of their studies showed that most vasodilators act at the superficial capillary level. On the other hand, while short acting vasoconstrictors (e.g. noradrenaline) act mainly at the capillary level, long acting vasoconstrictors (e.g. neuropeptide Y) acts mainly at the deeper vessels. The most intriguing observation was that you can selectively use different frequency of electrical stimulation to modulate microvascular blood flow at different compartments with lower frequency producing dilators that preferentially increase blood flow at the capillary level and higher frequency producing vasodilators that affect both the superficial and deeper vessels. We are currently investigating the changes with age in the preferential response of different compartments of the microvasculature to these substances. These information are essential to improve our understanding of the control of skin blood flow and this of utmost importance to tissue repair.

Vascular mechanisms in diabetes

Diabetic vascular disease (diabetic angiopathy) can lead to renal failure, coronary heart disease and blindness. These complications have even more significant sequelae in our elderly population due to limited cardiovascular reserve. The prevention and treatment of diabetic micro- and macro-angiopathy are, therefore, major health priorities.

Hyperglycaemia plays a key role in vascular damage. Basic research into the underlying mechanisms of vascular damage is likely to provide therapeutic insights, but the complexity and number of factors that appear to be involved in diabetic angiopathy make this a considerable challenge. We have established the time course of changes in microvascular blood flow with diabetes we endeavor to determine the associated changes in different factors that regulate microvascular blood flow. Miss Maryam Bassirat, a PhD student has recently shown that part of endothelial cell function could be attributed to endothelin as well as free oxygen radicals. We are hoping that our research in this area will help provide new treatment strategies for diabetic vascular complications.

Collaborative research

Recently, we have started a collaborative study with Dr B. Livett, Reader & Deputy Head, Department of Biochemistry, University of Melbourne. This study will examine the mechanisms by which SP actions on cell receptors are mediated intracellularly. SP is a neuropeptide which exhibits a variety of biological activities including vasodilation, contraction of smooth muscle, stress-induced catecholamine release and stress-induced immunomodulatory effects. It is well established that SP is involved in the modulation of cytokine production in chromaffin cells and monocytes. Both cell types are activated in stressful inflammatory conditions. We have recently shown that SP modulates signal transduction in chromaffin cells and monocytes resulting in the elevation of MAP kinase (mitogen-activated protein kinase). However, the signal transduction pathway by which SP activates MAP kinase in chromaffin cells and monocytes has not been identified. The significance of this work is that it will provide insight into a functional role for MAP kinases in human disease states as the activation of MAP kinase is associated with the release of cytokines which can act systemically and locally to promote the healing process.

We have previously collaborated with Dr Livett in studying the role of fragments of the beta-amyloid protein in modulating microvascular blood flow.

We are continuing our collaboration with Dr G. Dusting, Department of Physiology, University of Melbourne, in studying the role of endothelium-derived relaxing factor (NO) and neuronal NO in neurogenic inflammation as well as age-related changes in this role.

We are also collaborating with Professor Philip Nagley, Department of Molecular and Cell Biology, Monash University in investigating possible mitochondrial deletions in dorsal root ganglia with age. This collaborative study is complementary to our research in the area of tissue healing.

On the international front, our extended collaboration with Professor Fred Nyberg, Department of Pharmaceutical Biosciences, Uppsala University, resulted in a visit by Miss Camilla Hansson, Miss Asa Granath and Miss Marie Olsson who joined us to undertake their Masters degree of pharmacy. Later in the year we will be joined by two new pharmacy students from the same University to receive their post graduate research training in our laboratory.

Promoting medical research

We are continuing to promote medical research in the community, the Biology Laboratory directs part of its training program towards Secondary School students who have an interest in pursuing a career in the science field. Our training strengthens the interest of these students in a science/medical profession in the future with special emphasis on the importance of research into ageing.

Information technology program

The information technology section of NARIs Education arm has focused on two main areas over the past year; learning packages for students and materials for General Practitioners.

There has been further development of the interactive computer learning programs that medical students use during their two week course in Geriatric Medicine. New material is developed by geriatric medicine registrars working at North West Hospital. There is potential for growth in this area as the Faculty of Medicine, Dentistry and Health Sciences of the University of Melbourne will introduce a new curriculum towards the end of this century. The new curriculum will have a problem-based learning philosophy and it is expected information technology will be used to provide some of the learning opportunities in it. Members of the information technology group have presented a case study to the Faculty about the process NARI went through in developing the Dementia Learning Course which was produced last year for Aged Care Assessment Teams.

The other main area of activity has been the development of teaching materials and diagnostic support systems that will be made available to general practitioners via the Internet. This project was funded as a pilot study by the Department of Human Services of the Victorian Government. The latest fashionable concept among the medical fraternity and health-service administrators is "Evidence-based medicine". It means that health-care should follow the best practice; that it should be informed by and be consistent with current knowledge. The difficulty for practitioners is to find out what are the current best practice standards. NARI believes information technology and electronic communications may be a way to provide this information to general practitioners (GPs). NARI is particularly keen to see such practice in the area of geriatric medicine.

During the course of the year a GP reference group was formed to aid the development of, and to provide feedback about, the programs. The group included GPs from both metropolitan and rural areas. They were provided Internet connections if they did not already have these. Programs developed this year included a teaching program about dementia, a diagnostic assistance system for the preliminary assessment of dementia, and a combined learning program and diagnostic assistance program dealing with Falls and Balance. Whilst the programs were generally well received, technological limitations (e.g. narrow bandwidths which hamper data transfer) limit their utility in the clinical situation. In addition, at present, computer based ‘clinical assistants’ do not readily match GPs’ practice styles and behaviours. NARI will be working with communications companies in the private sector to address the technology problems, and will continue to develop programs together with GPs that address the perceived difficulties in using communication technologies to optimise health care.

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Visitors to NARI

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Mr Wayne Miller
Herald & Weekly Times Ltd
Melbourne Vic

Ms Jan Williamson
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Mr Robert B Grice
Pfizer Pty Ltd
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Mr Dennis Swift
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Mr Kem Mayberry
The Jack Brockhoff Foundation
Melbourne Vic

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Mr Geoff Sussman
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Pratt Foundation
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Ms Monica Gould
Shadow Minister, Aged Care, Parliament House
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Dr Michael Fett
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Mr Tony Walsh
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Dr Richard Gracely
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Dr Fancu Park
Georgetown University Medical Centre, MD USA

Dr Lucas Meliala
GADJAH MADA Univ
Yogyakarta, Indonesia

Mr Jun Nishimura
Consul, Japanese Consulate
Melbourne, Vic

Prof Birgitta Lindquist
School of Occupational Therapy, La Trobe University
Carlton, Vic

Invited Speakers

NARI Seminars

Dr Gary Egan
Austin and Repatriation Medical Centre
Research into brain function using PET

Dr Heather Wheat
Department of Anatomy and Cell Biology, The University of Melbourne
Neural mechanisms underlying tactile acuity

Dr I Roos
Management Department, Faculty of Business & Economics, Monash University
Strategic management of Research Institutes

Ms Leonie Segal
National centre for health program evaluation
Diabetes and funding issues

Dr Kerrie Way
Pharmacology Research Group, Department of Medical Laboratory Science, Royal Melbourne Institute of Technology
Diabetes and nitric oxide in nerves

Dr Bob Crosthwaite
Hawthorn Institute of Education
Adult learning

Dr Richard Rosewarne
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Dementia and challenging behaviour

Dr Carole Delaney
International Diabetes Institute
Diabetic Neuropathy

Dr Joanne Stevenson
Department of Physiology, Monash University
Nicotinic mechanisms in Diabetes Mellitus

Ms Colleen Tenni
Operations Manager BECC and Manager of Psychiatric Services NEAC, Bundoora Extended Care Centre
Designing a better environment for the aged

Dr Susan Brain
Pharmacology Department, King's College, London
The neurogenic component in inflammation

Dr Donald MacPhee
Department of Microbiology, La Trobe University

Intrinsic mutagenesis & Ageing: a new approach

Dr Bruce Livett
The Russell Grimwade School of Biochemistry and Molecular Biology, The University of Melbourne
Beauty and the beast: Molecular prospecting for novel drugs from the sea

Dr Rosalie Aroni
School of Public Health, La Trobe University
Nature of qualitative research: utilities for Ageing research.

Dr Luc Letenneur
Institute National de Sante et Recherche Medicale, France
The EURODEM European concerted action on dementia: Estimation of the incidence of AD & the role of educational level

EDUCATION ENTERPRISE SEMINAR SPEAKERS

Education Enterprise relies on the support of seminar speakers. Our thanks are extended to all who have participated in this important program.

Ms Jennie Allen
North West Hospital

Professor David Ames
North West Hospital

Ms Janis Baker
North West Hospital, Greenvale Campus

Ms Anna Bayley
The Peter James Centre

Ms Julie Bernhardt
North West Hospital

Mr Mark Bradbeer
National Ageing Research Institute

Ms Deborah Burns
Caulfield Aged Care Assessment Team

Ms Jan Champlin
Aged, Community and Mental Health Division, Department of Human Services

Ms Monica Clemow
North West Hospital

Ms Jeanette Conway
Consultant

Ms Keren Day
Western Continence Service, Western Hospital

Dr Helen Dewey

Austin and Repatriation Medical Centre

Mr Michael Farrell
National Ageing Research Institute

Dr Leon Flicker
National Ageing Research Institute

Dr Stephen Gibson
National Ageing Research Institute

Dr Don Gorman
LaTrobe University

Prof Robert Helme
National Ageing Research Institute

Mr Keith Hill
National Ageing Research Institute

Ms Melanie Kammermann
North West Hospital

Dr Benny Katz
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Ms Jackie Kearney
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Dr Dina LoGiudice
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Mr Stephen Malkin
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Ms M Mitton
North West Hospital

Prof Rhonda Nay
La Trobe University / North West Hospital

Ms Alison Oakley
North West Hospital

Dr Jane Pierson
National Ageing Research Institute

Dr Jenny Schwarz
North West Hospital

Ms Robyn Smith
North West Hospital

Mr Colin Steel

North West Hospital, Greenvale Campus

Ms Bronwyn Stephens
Wahroonga Friendship Village

Ms Jane Panaccio
North West Hospital

Prof Annette Street
La Trobe University

Dr Bernard Street
Extended Care and Community Services, Bendigo

Ms Marie Stickland
The Queen Elizabeth Centre, Ballarat

Ms Jenny Verbeek
Royal District Nursing Service

Dr Michael Whishaw
North West Hospital

Dr Mark Yates
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