

**Parliamentary Inquiry into
International Research Collaborations**

Submission by the National Health & Medical Research Council

February 2010

Introduction

Good health and wellbeing is something we wish for. If we do become ill, we want the health system to provide us with the best possible care. Overall, Australians experience good health, but we still suffer from the major health burdens of the developed world (e.g. cancer, heart and vascular disease, mental illness, bone and muscular diseases, obesity and diabetes).

The NHMRC is Australia's peak body for supporting health and medical research; for developing health advice for the Australian community, health professionals and governments; and for providing advice on ethical behaviour in health care and in the conduct of health and medical research.

Australia faces many health problems, all of which we share with the rest of the world. We need research to overcome the problems, to lead to improved health here, and to contribute our fair share of research to world-wide advances in health.

One of the NHMRC's strengths is that it brings together and draws upon the resources of all components of the health system, including governments, medical practitioners, nurses and allied health professionals, researchers, teaching and research institutions, public and private program managers, service administrators, community health organisations, social health researchers and consumers.

The NHMRC offers the following comments against the Inquiry's Terms of Reference.

TOR 1 - The Nature and Extent of Existing International Research Collaborations

Many Australian health and medical researchers are engaged in international research collaborations. Additionally, the NHMRC engages in a number of agency-based international partnerships on behalf of Australian researchers.

Individual Research collaborations

For individuals, these collaborations are mostly informal, straightforward intellectual or practical collaborations, perhaps around a specific methodology (e.g. gene sequencing, or a specific assay developed by one party). This collaboration can usually be encompassed within the existing research support for the team, and NHMRC allows funds to be used outside Australia, provided they are administered by an Australian research institution registered with NHMRC, and the research is conducted in compliance with Australian requirements.

Research teams may also engage in more formal collaborations where such collaborations are a requirement of NHMRC funding schemes and other international bodies (e.g. the Wellcome Trust, the Bill and Melinda Gates Foundation, or US National Institutes of Health (NIH)).

In 2004 NHMRC funded a number of international research projects in partnership with the New Zealand Health Research Council and the UK Wellcome Trust (the International Collaborative Research Grant Scheme).

It is common for NHMRC-funded research to have international collaborations. Between 2002 and 2006, 37% of all NHMRC-supported research outputs had one or more international authors.

Australians are also successful in gaining grants with US collaborators through NIH schemes. Since 2003, 439 Australian grants were successful, and attracted over US\$140m in funding. Of these grants, 70% were awarded to NHMRC-funded researchers. See [Attachment A](#).

NHMRC believes that health and medical researchers benefit greatly by working overseas early in their careers. Thus, we support a unique set of postdoctoral fellowship schemes (the CJ Martin, Neil Hamilton Fairley and Sidney Sax Fellowships) that support early career researchers to undertake two years of postdoctoral research internationally, followed by guaranteed salary support for two more years back in Australia. We have supported such schemes for decades and believe that they have been an important means of achieving high quality Australian health and medical research as well as building important, often life-long, collaborations with international researchers.

Currently, the NHMRC is supporting 187 researchers on these Fellowships overseas.

NHMRC Collaborations

As the leading health research agency for the country, NHMRC collaborates with a range of international bodies and participates in many international research fora including:

- NHMRC Australian membership of:
 - the Human Frontier Science Program (HFSP), an international cooperation between the leading basic research countries to support frontier science (NHMRC pays Australia's membership fee);
 - the International Cancer Genome Consortium (ICGC), an international collaboration of leading health research countries studying the genomics and transcriptomics of the world's 50 most important cancers; and
 - the Global Alliance for Chronic Diseases (GACD), a group of the world's leading research countries tackling the main causes of chronic disease, especially in developing countries (eg. hypertension, indoor pollution, tobacco).
- NHMRC cooperates with European Union Seventh Framework Programme (FP7) to assist Australasian researchers to participate in EU research programs;
- NHMRC collaborates with New Zealand and Canada in the International Collaborative Indigenous Health Research Partnership scheme;
- NHMRC also participates in international research fora such as:

- Global Science Forum (GSF);
- International Stem Cell Forum (ISCF); and
- Heads of International Research Organisations (HIROs).

Further information can be found at [Attachment B](#).

- Currently, NHMRC also is in discussions about collaboration with a number of governmental bodies in other countries, with large international charitable funders of medical research, and is participating in discussion about other internal consortia similar to the International Cancer Genome Consortium.

TOR2 – The benefits to Australia from engaging in international research collaborations

The benefits include:

- access to knowledge, equipment and methodology;
- ensuring that Australians are working at the leading edge intellectually and technically;
- ability to influence international medical research direction; and
- ability to influence international health, through involvement with WHO and other peak international bodies.

In an analysis of 2163 NHMRC end-of-grant reports (2003-2007, total value \$951.5m), 803 grants reported leveraging international funds worth \$136.3m - this represents leveraging of 14c from international sources for every dollar invested by NHMRC.

Our health faces many challenges, both familiar and new and emerging threats, and as the leading health research agency for the country, the NHMRC must fund the best and most relevant research to improve the health of all Australians and adopt the outcomes of health research conducted elsewhere around the world. We encourage Australian researchers to build international links and cooperation. As well, the world is facing many challenges that can benefit from being addressed from a world perspective including biosecurity, pandemic influenza and cancer.

To foster established relationships and forge new linkages, NHMRC regularly hosts delegations from other countries and funding institutions, to ensure Australia's commitment to the improvement of health throughout the world. During 2008-09 NHMRC has hosted delegations from China, Japan, Singapore and the United States, and established personal links with health and medical research leaders in Asia and showing support for Japan's generous funding of the Human Frontiers Science Program (HFSP). The CEO builds links through the biannual meeting of the Heads of International (Health) Research Organisations meeting.

NHMRC recognises the need to build and maintain strong relationships with international health research funding bodies in order to facilitate access to cutting edge technologies and new funding streams for Australian researchers, and NHMRC project funding provides one avenue for this research to occur.

In applying funding to promote international research collaboration, NHMRC provides funds through Australian institutions, and thus, Australia benefits from international collaboration in what is recognised as a global pursuit for better health outcomes.

In 2009, NHMRC awarded \$14.12 million to 14 Project Grants for research addressing an NHMRC Strategic Plan Initiative: *Global Health: Population Health issues in our region*. These projects addressed major health burdens in developing countries in South and South-East Asia and the islands of the Pacific.

Successful projects included studies on infectious and non-communicable diseases (laboratory and field based), as well as health services and health policy research, with the focus of work in the developing country, such as Thailand, Papua New Guinea, and Bangladesh.

This initiative was an extension of a collaborative program between NHMRC, the Wellcome Trust and the Health Research Council of New Zealand established in 2004 to address major health problems in the same region.

Internationally, health and medical research delivers new insights into the human condition and the processes that lead to ill health. Australia has contributed strongly to this international effort, and this has benefited both individual and community health here at home. Details of NHMRC international collaborative funding schemes and initiative programs are provided at [Attachment C](#).

It is a mark of the international standing of Australian health and medical researchers that 37% of all publications of research supported by NHMRC included at least one overseas researcher as a co-author.

Australian research is the third highest recipient of international NIH funding following Canada and the UK. A recent bibliometric study undertaken for NHMRC by the Research School of Sciences at the Australian National University¹ of the performance (in citations) of Australian health and medical research also confirms the outstanding international competitiveness of Australian researchers. See [Attachment D](#).

As a further indication of the international reputation of NHMRC, the following documents developed and supported by NHMRC are regarded as a leading set of research integrity and ethics guidance world wide:

- *Australian Code for the Responsible Conduct of Research* (2007).

¹ National Health and Medical Research Council, *Measuring up 2009* (Feb 2009), Linda Butler and Kumara Henadeera, Research Evaluation and Policy Project, Research School of Sciences, The Australian National University

- *Guidelines to Promote the Wellbeing of Animals used for Scientific Purposes* (2008).
- *National Statement on Ethical Conduct in Human Research* (2007).

TOR3 – The key drivers of international research collaboration at the government, institutional and researcher levels

Health and medical research is by its very nature collaborative, since it requires the collective skills and expertise of a diverse range of disciplines (from basic sciences through to clinical and public health research) to achieve breakthroughs in health and innovation. Health and medical research is also highly competitive, and with the comparatively small size of the Australian research community, researchers are highly motivated to seek collaboration with their international peers.

TOR4 – The impediments faced by Australian researchers when initiating and participating in international research collaborations and practical measures for addressing these

Impediments

Funding

NHMRC funds only the direct costs of research. Other countries have differing arrangements that vary widely. These can impede straightforward collaboration between researchers. Australian researchers may need to find additional funding to meet such costs when pursuing international research collaborations.

Access

For Australian scientists, extensive travel is an essential part of international collaboration. It is expensive for Australians to travel to establish and maintain collaborations, and NHMRC and other funding bodies do not usually support travel to international meetings or for collaborative meetings. Travel is proportionally more expensive for Australian than other countries, due to distances to the main research centres in Europe and North America. This can disproportionately affect earlier career researchers, who in fact may benefit most from establishing international collaborations. However, the rapid growth in research quality and quantity in eastern Asia will have an effect on this, since Australian researchers will be able to pursue effective collaborations closer to home. Furthermore, continuous advancements in IT are also making it easier for Australian researchers to develop and maintain international collaborations.

Clinical researchers can also find it hard to travel overseas frequently due to clinical commitments, as they have the costs incurred of being away as well as the cost of finding their clinical replacement. Researchers with family commitments also find it difficult to travel, as few schemes offer support to assist families (travel away for many means large increases in child care costs that can double travel costs).

The exchange rate can have serious funding consequences for researchers, particularly travelling to countries like the USA which, at times, can cost one third more out of a

research budget from when a research application has been submitted to when the funds have been granted.

Building Capacity in developing countries

Access to funding for international collaborations between prestigious organisations for equipment use or high quality research in developed countries appears to be more readily available. In contrast, one of the greatest impediments to research is obtaining funding for international collaborations in developing countries that involve capacity building or field work.

Greater benefits can be obtained from international collaborations by focussing on solving global problems and aligning funding for building capacity (education and research capacity) in developing nations. This could have a major impact on training and educating researchers and thus expand international collaboration.

Practical Solutions

Fostering international fellowships and scholarships

In order to give access to a small number of outstanding scientists to international opportunities early in their careers, NHMRC provides postdoctoral training fellowships, and overseas training fellowships. NHMRC also provides international exchange fellowships to promote collaboration with the best international researchers. More detail is provided at [Attachment C](#).

Establishing collaborative partnerships between funding bodies

NHMRC has engaged in a number of international partnerships and fora in order to facilitate access by Australian health and medical researchers to collaborations with their international peers (see [Attachment B](#)) and other government research funding bodies can establish international research collaborations, in accordance with national legislation. The International Cancer Genome Consortium is a good model, where nations support research within their own country, but this is coordinated and initiated internationally through an Executive Committee and a range of agreements about processes and priorities.

TOR5 – Principles and strategies for supporting international research engagement

NHMRC has included in its draft Strategic Plan (2010 – 2012), its reasons and roles in supporting international research, our contribution to improving health world-wide and doing our fair share of discovery and applied health research as a good international citizen. In particular, we will actively promote collaborative research opportunities through strategic international partnerships, with a particular focus on Eastern Asia and our region

Australia is an international leader in health and medical research and has an obligation to share and participate in improving research practices, including ethical

behaviour in health and medical research worldwide. The NHMRC will continue to develop close alliances with other international health and medical research organisation as a vital mechanism in strengthening Australia's international reputation in health and medical research and promote Australia's role in improving health within our region, and globally.

International research engagement also means that Australian researchers will constantly be benchmarked against our international counterparts and receive every opportunity to access new avenues of research support through international channels.

Pragmatically, international collaboration is also a means of leveraging into Australian health and medical research international funds, public, charitable and private sector.

Conclusion

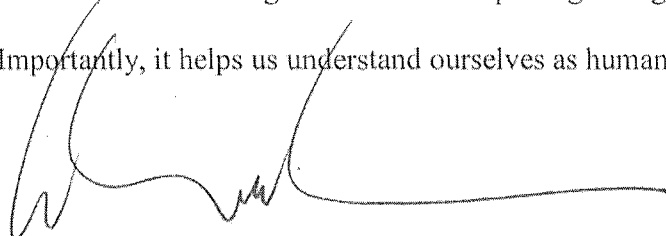
As Australia's premier agency for health and medical research, health advice and the promotion of ethical standards in research, NHMRC has a responsibility to participate and provide leadership in a number of international fora.

Our health system is unique and often faces unique challenges. It is a combination of public, private and community-based health care and relies on many different professions. It extends from primary care to tertiary hospitals, from dense inner-urban to remote low density locations. It needs to provide care to all members of our community from the very young to the very old, address the health needs of both sexes, the chronically ill, and people from diverse backgrounds and places of origin. Individuals have widely differing expectations of the system.

The health care system, perhaps our single largest industry, relies on health research to develop, expand and improve. Research provides the evidence base to improve prevention, treatment and the effectiveness of health care. It leads to innovations that transform diagnosis and treatment, and generates the growth of new industries.

International interactions facilitate access by Australian researchers and health professionals to international knowledge needed to achieve the best care for patients and the best provision of health services, and also brings sources of international funding and to the best collaborative networks, facilities and equipment. They provide an opportunity for Australia to be involved in developing international policies and initiatives in research governance and exploring emerging fields of research.

Importantly, it helps us understand ourselves as human beings.

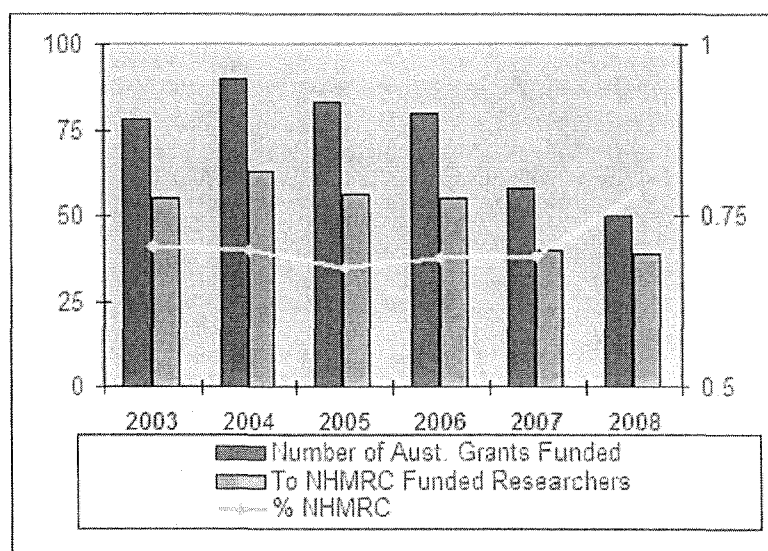


Professor Warwick Anderson, AM
Chief Executive Officer
National Health & Medical Research Council

22 February 2010

Australian and NHMRC researchers winning funding in the USA

| Year | Number of Aust. Grants Funded | To NHMRC Funded Researchers | % NHMRC | Aust Researchers \$US |
|------|-------------------------------|-----------------------------|---------|-----------------------|
| 2003 | 78 | 55 | 71% | \$20.2m |
| 2004 | 90 | 63 | 70% | \$30.9m |
| 2005 | 83 | 56 | 67% | \$28.6m |
| 2006 | 80 | 55 | 69% | \$31.1m |
| 2007 | 58 | 40 | 69% | \$18.2m |
| 2008 | 50 | 39 | 78% | \$14.7m |



NIH Funding to Foreign Researchers 2008 Top Ten Recipient Countries

| Country | Value \$US) | No of Awards | % |
|------------------|----------------------|--------------|--------------|
| CANADA | \$42,579,751 | 177 | 22.3% |
| SOUTH AFRICA | \$27,299,343 | 29 | 14.3% |
| UNITED KINGDOM | \$24,724,348 | 90 | 13.0% |
| AUSTRALIA | \$14,679,020 | 50 | 7.7% |
| GERMANY | \$9,392,338 | 20 | 4.9% |
| SWITZERLAND | \$6,495,968 | 16 | 3.4% |
| FRANCE | \$6,447,213 | 16 | 3.4% |
| BRAZIL | \$6,182,323 | 18 | 3.2% |
| INDIA | \$5,525,842 | 16 | 2.9% |
| ISRAEL | \$4,620,465 | 27 | 2.4% |
| Top Ten | \$147,946,611 | 459 | 77.6% |
| Total | \$190,586,074 | 647 | |

International Collaborative Fora

The following list comprises international fora of peak bodies and entities of which Australia participates through the NHMRC.

Human Frontier Science Program (HFSP)

The HFSP is an international funding scheme supporting innovative, interdisciplinary and international basic research focused on the complex mechanisms of living organisms. It emphasises support for novel collaborations that bring together biologists with scientists from fields such as physics, mathematics, chemistry, computer science and engineering to focus on problems at the frontier of the life sciences.

The Japanese government contributes half the funding, with the most advanced countries such as the European Union and Australia participating. Australia is a member through the NHMRC and joined the HFSP in 2004, and since that time Australian researchers have successfully attracted HFSP grants with almost \$6 million being awarded to our researchers. Our membership enables Australian researchers to continue to successfully compete for \$70 million in research funding annually and provides unprecedented opportunities for Australian researchers to pursue research careers as part of leading high quality, international research times around the world.

In 2009, three Australian researchers received these prestigious awards. Since Australia joined the HFSP in 2004, Australian researchers have been successful in winning grants to a total value of well over twice the cost of Australia's membership.

During 2008-09, NHMRC's involvement also included the nomination and acceptance of Professor Suzanne Cory to the HFSP's Council of Scientists, the nomination of scientists for HFSP review panels and membership on the HFSP Board of Trustees. Further information on HFSP Australian Awardees is provided at [Attachment E](#).

The CEO also chairs an Intergovernmental Working Group that is preparing for the next triennial HFSP Intergovernmental meeting which will be held in Australia (Canberra) in 2010. Ministers and their delegates from the 36 member countries will be invited to attend this meeting.

International Cancer Genome Consortium (ICGC)

The ICGC is an international consortium which provides a forum for member countries to 'launch and coordinate a large number of research projects that have the common aim of elucidating comprehensively the genomic changes present in many forms of cancers that contribute to the burden of disease in people throughout the world' (ICGC website www.icgc.org/home). The ICGC's primary goal is to generate comprehensive genomic abnormality catalogues in tumors from 50 different cancer types and/or subtypes with a clinical and societal importance, and to make this data available to the research community.

The NHMRC is represented on the ICGC Executive by the CEO, and other researchers and academics are represented on various subcommittees and working groups of the ICGC.

Current membership includes institutes and government bodies including Australia, Canada, China, France, Germany, India, Japan, Spain, USA and UK. The Chief Executive Officer of the NHMRC is a permanent ICGC Executive member.

The Minister for Health and Ageing has approved funding of \$27.5M over five years from July 2009 to support the international effort on cancer genome analysis. The University of Queensland is the administering institution for this grant.

The project will undertake a comprehensive range of genomic analyses on 350 samples of pancreatic cancer with a team led by Professor Sean Grimmond from the Institute for Molecular Biosciences (IMB) at The University of Queensland and Associate Professor Andrew Biankin from the Garvan Institute in Sydney. As part of the project, 150 samples of ovarian cancer will also be analysed at the IMB. The ovarian cancer work will be led by Professor David Bowtell at the Peter MacCallum Cancer Centre in Melbourne.

There is close to \$20 million leveraged funding associated with this grant, including \$5 million from the Queensland Government. Other cash and in-kind contributions are being provided by The University of Queensland, The NSW Cancer Council, Applied Biosystems and Silicon Graphics.

An integral aspect of the work of the ICGC is the international collaboration that will result. For instance, the Australian consortium will be collaborating directly with the Ontario Institute for Cancer Research on pancreatic cancer. A feature of ICGC-related research is that the results of the genomics analyses will be in the public domain and available to researchers world-wide.

Global Alliance for Chronic Diseases (GACD)

In June 2009, NHMRC joined four of the world's foremost health agencies, collectively managing an estimated 80% of all public health and medical research funding, in a landmark alliance to collaborate in the battle against chronic, non-communicable diseases. The GACD was created to support clear priorities for a coordinated research effort that will address the growing health crisis caused by cardiovascular diseases, cancer, chronic respiratory conditions and Type 2 diabetes.

The major national research funding agencies include:

- Australia's National Health and Medical Research Council;
- Canadian Institutes of Health Research;
- Indian Council of Medical Research;
- Chinese Academy of Medical Sciences;
- United Kingdom's Medical Research Council; and
- USA's National Institutes of Health – National Heart, Lung and Blood Institute and Fogarty International Center.

The key purpose of the GACD is to coordinate research activities addressing the prevention and treatment of chronic non-communicable disease on a global scale. The GACD represents a major step towards implementation of the goals developed by the Oxford Health Alliance,

which outlined the prioritised six goals, 20 Grand Challenges and 39 steps which had been synthesised from world experts in population health.

International Collaborative Indigenous Health Research Partnerships

NHMRC is collaborating with partner agencies in New Zealand and Canada to advance Indigenous health research internationally. The Tripartite Agreement, first signed in April 2002, involves the Canadian Institutes of Health Research (CIHR), the Health Research Council (HRC) of New Zealand and the NHMRC. In entering into the agreement, the partner agencies recognise the disparities in health between Indigenous and non-Indigenous peoples in their respective countries and Indigenous peoples' desire for research to be undertaken on terms acceptable to them.

In 2009, NHMRC and its Tripartite partner agencies each committed \$5 million to enable the second round of research under International Collaborative Indigenous Health Research Partnership (ICIHRP) program. These grants will support multidisciplinary research and research translation focused on reducing the burden of disease and inequalities in health caused by chronic disease in Indigenous people.

International Stem Cell Forum (ISCF)

The ISCF is a collaboration of 14 national and private research funding organisations to support international collaboration in stem cell research.

NHMRC was a founding member in 2003 and facilitates Australian involvement in projects sponsored by the ISCF. This includes the International Stem Cell Initiative, the International Stem Cell Banking Initiative and the ISCF Ethics Working Party.²

Organisation for Economic Cooperation and Development (OECD)

NHMRC participated in the development of the OECD Global Science Forum guide *Investigating research misconduct allegations in international collaborative research projects: a practical guide*, published in April 2009. The focus of the guide is to produce practical recommendations and tools to help in the investigation of possible cases of research misconduct in international research collaborations.

Heads of International Research Organisations (HIROs)

The NHMRC is represented by CEO, Professor Warwick Anderson, on this group which meets every six months to consider and discuss significant issues facing all funding bodies around the world. Most major national and private funding bodies are represented at HIROs, including NIH, the UK Medical Research Council, the Wellcome Trust, the Pasteur Institute and the Bill and Melinda Gates Foundation. In addition to broader discussions within the meeting, this is an ideal opportunity for CEO's to talk one-on-one with global counterparts.

Principal issues for consideration at previous meetings have been:

- World Health Organization Research Strategy;
- Grand Challenges in Chronic Non-Communicable Diseases;
- Peer review reform, focussed on the review of the US NIH peer review system;

² International Stem Cell Forum website (www.stemcellforum.org)

- Ongoing activities around avian and pandemic influenza; and
- Publication outcomes of research in open access journals.

NHMRC International Collaborative Funding Schemes and initiative programs

NHMRC project grants with international collaborators

The Project Grants funding scheme is NHMRC's main avenue of support for individuals and teams of researchers undertaking biomedical, clinical, public health and health services research in Australian universities, medical schools, hospitals or other research institutions.

The primary objective of the Project Grants scheme is to support individual researchers and research teams to conduct the highest quality research across all fields of research relevant to health, on projects chosen by researchers. The scheme also aims to provide opportunities for early career researchers to gain funding for high quality projects.

Examples of NHMRC project grants with international collaborators

Apical membrane proteins as targets for a schistosomiasis vaccine (Grant ID 613668)

Dr Alex Loukas, Queensland Institute of Medical Research
Commencing in 2010, \$472,116
Collaborating with Department of Microbiology, Immunology and Tropical Medicine, George Washington University

Schistosomiasis is a chronic neglected tropical disease for which there is currently no vaccine. A vaccine is sorely needed to control this parasite. This proposal seeks to identify molecules from the outer surface of the parasite which are recognised by the immune system of people from Brazil who are resistant to schistosomiasis. Molecules identified in this manner will be tested as vaccines in an animal model of schistosomiasis, and ranked based on their performances to enter human trials.

Studying the molecular basis of schizophrenia in a large, globally competitive Indian sample (Grant ID 631406)

Prof Bryan J Mowry, University of Queensland
Commencing in 2010, \$963,530
Collaborating with Schizophrenia Research Foundation, India and Department of Human Genetics, University of Utah School of Medicine

This study will attempt to identify genetic factors contributing to the development of schizophrenia, a severe mental illness which causes an immense burden on families. In India, there are 7-8 million sufferers, with approximately 30-40% untreated, especially in rural areas. We aim to recruit over 2000 people with and 3000 without schizophrenia, and analyse DNA to identify schizophrenia susceptibility genes. This may lead to better treatments and earlier diagnosis.

Postdoctoral Training Fellowships

These four year Fellowships are for early career researchers who have less than two years of postdoctoral experience. These Fellowships enable researchers to undertake further training either in Australia or overseas. They are offered to a limited number of persons of outstanding ability who wish to make research a significant component of their career.

Overseas Training Fellowships include:

- CJ Martin Fellowship
- Neil Hamilton Fairley Fellowship
- Sidney Sax Fellowship

International (Exchange) Fellowships

INSERM

INSERM Exchange Fellowships aim to provide training in basic clinical or public health research within the biomedical sciences in France and Australia.

Australia-China Exchange Fellowship Program

In April 2008, NHMRC announced a new grants program that enables Australian health researchers to study in China. In 2009, seven grants totalling \$1.83 million were provided to support research under the Australia-China Exchange Fellowship Program.

The program aims to increase collaboration between Australian and Chinese health and medical researchers by supporting exchange between the two countries. It will give Chinese postdoctoral researchers an opportunity to spend two years in Australian research institutions to build their capacity and expertise. The program will also give Australian postdoctoral researchers an opportunity to expand their capacity and expertise in a Chinese research institution for two years, supported by a further two years in Australia.

The exchange program offers an excellent opportunity for Australian researchers to broaden and develop their experience in an emerging research market. It also allows Australia to further develop links with China in the health and medical research field.

Further information on the outcomes of the 2008 funding rounds for overseas fellowships is at [Attachment F](#).

European Molecular Biology Laboratory (EMBL)

EMBL is a leading international research institution with a mission to conduct basic research in molecular biology, provide high-level training of molecular and cell biologists, develop new instrumentation for biological research, and promote technology transfer. Australia's Associate Membership at EMBL commenced in March 2008.

A key aspect of the Associate Membership is the Faculty Development Program which provides for an NHMRC-supported Group Leader position each with their own research

group, at EMBL's network of five basic research laboratories in Europe (Grenoble France, Hinxton UK, Monterotondo Italy and Heidelberg, Germany).

The successful applicant is expected to deal with interdisciplinary biological research from the molecule to the organism, bioinformatics, gene expression, cell biology and systems biology.

The Group Leaders are located at EMBL in Europe for up to five years, followed by a further four years at an Australian institution. NHMRC support is contingent on the relevance of the successful candidate's research to human health and prospects for academic and scientific engagement between EMBL and Australian researchers.

NHMRC-European Union Collaborative Health Research Grants

NHMRC-European Union (EU) Collaborative Health Research Grants program aims to assist Australian researchers to participate in projects with international researchers that have been selected for funding under the Seventh Framework Programme of the European community for research and technology development (FP7). The Framework Programme is the EU's main instrument for funding research and development. Research areas of interest to NHMRC are genomics and biotechnology for health.

In the 2008 funding round 7 awards totalling \$3,438,526 was granted under this program.

National Institute of Clinical Studies (NICS) Visiting Experts Program

The Visiting Experts Program was established by NICS to ensure access to Australian and international experts in knowledge translation for NICS Fellows and Scholars, healthcare professionals, NHMRC staff and other key stakeholders in their field. During the last financial year, international visitors included Professors Richard Grol, Trisha Greenhalgh, Jonathan Lomas and Dr Paul Murphy.

The Wellcome Trust

The UK-based Wellcome Trust, in partnership with Australia's National Health and Medical Research Council and the Ministry of Research, Science and Technology and Health Research Council of New Zealand, launched a major program in 2002, focusing on the health problems of developing countries in South and South East Asia and the Pacific.

The A\$31.8 million (£12m) scheme concentrates on major health issues of countries in the Asia Pacific region and promotes collaborative research and training in these regions with Australia and New Zealand.

The Wellcome Trust contributes £6 million, which is matched by the NHMRC and the government of New Zealand, through their Health Research Council. The scheme funds major five-year programs that are judged on their scientific excellence, significance to relevant health problems, high-level training and complementarity of research groups. Two such examples are:

Research and training to reduce morbidity and mortality from malaria in Papua (Indonesia) and Papua New Guinea

Total grant: £1,270,000 (AUD \$3,127,286)
Wellcome Trust component: £600,000 (AUD \$1,477,458)
NHMRC component: £670,000 (AUD \$1,649,828)
HRC component: Nil

Principal Applicants: Professor Nicholas Anstey, Dr Emiliana Tjitra
Co-Applicants: Ric Norman Price, Isi Kevau, Peter Sly, Paul Harijanto
Institutions of Principal Applicants: Menzies School of Health Research; Ministry of Health (Indonesia)
Institutions of Co-Applicants (if different): University of Papua New Guinea; University of Western Australia; Bethesda Hospital (Indonesia)
Administering Institution: Menzies School of Health Research, Darwin, NT

Malaria kills many thousands of people each year in Indonesia and PNG. This project will look at better ways to treat and prevent malaria. The team will examine whether using new combinations of drugs in clinics can reduce the amount of severe malaria seen in Papua. The team will examine whether giving people with severe malaria *arginine*, a naturally occurring amino acid, can increase molecules that may protect against severe malaria. Finally it will examine how lung damage occurs in people with severe malaria and whether this can be predicted.

Reducing deaths from pesticide poisoning: Establishing a regional toxicology research centre

Total grant: £1,250,000 (AUD \$3,078,038)
Wellcome Trust component: £950,000 (AUD \$2,339,309)
NHMRC component: £300,000 (AUD \$738,729)
HRC NZ component: Nil

Principal Applicants: Professor Nicholas Buckley, Professor Nimal Senanayeka
Co-Applicants: Andrew Dawson, Rezvi Sheriff, David Henry, Ravindra Fernando
Institutions of Principal Applicants: Australian National University; Peradeniya University, Sri Lanka
Institutions of Co-Applicants (if different): University of Newcastle; University of Colombo (Sri Lanka); University of Newcastle
Administering Institution: Australian National University

The World Health Organization estimates suggest nearly half a million people die from acute pesticide poisoning in the Asia-Pacific region each year. The Sri Lankan project will be the first attempt to systematically test whether a range of strategies can reduce long-term neurological damage and deaths from pesticides. The Australian-Sri Lankan Collaboration will, over the next five years, aim to improve assessment of sub-acute and long-term morbidity; promote 'evidence-based' treatment; develop new antidotes (and assess their cost effectiveness), and see if pesticide regulation can reduce the rate of severe or fatal poisoning. If successful, this program may become a model for the region as to how to substantially reduce this largely hidden tragedy.

Attachment D

NHMRC Collaboration patterns for journal articles 2002-2006

| Sector | National | | International | | Total |
|-----------------------------------|----------|------|---------------|------|-------|
| | No. | % | No. | % | |
| NHMRC – Career Development Awards | 938 | 56.7 | 606 | 36.7 | 1653 |
| NHMRC - Programs | 3043 | 58.2 | 1970 | 37.7 | 5225 |
| NHMRC - Projects | 3416 | 52.2 | 2266 | 34.6 | 6550 |
| NHMRC - Research Fellows | 3104 | 53.2 | 2266 | 38.8 | 5836 |
| NHMRC | 7042 | 52.4 | 4916 | 36.6 | 13444 |
| CRCs | 405 | 68.4 | 192 | 32.4 | 592 |
| Other Government | 1933 | 69.6 | 842 | 30.3 | 2778 |
| Other Hospital | 6187 | 61.2 | 2957 | 29.2 | 10115 |
| Other University | 9386 | 39.1 | 9333 | 38.9 | 24002 |
| Research Institutes | 6464 | 65.8 | 3925 | 40 | 9818 |

37% of all NHMRC supported research outputs for the period 2002-2006 have one or more international authors

Human Frontier Science Program Australian Awardees

| Human Frontier Science Program Australian Awardees | | | | | | | | | | |
|--|--|--|-------------------------|--|--------------------|------|------------------|------------------|------------------|-----------------------|
| Australian Researcher | Institution | Project Title | Award Type | Amount for Australian Researcher for Duration of Award (USD) | Conversion (AUD) * | Year | Duration | USD | AUD | Aust Contribution AUD |
| Dr Tatyana Chtanova | University of California, Berkely, USA | Identifying the mechanisms of thymocyte migration using multiphoton imaging | Long Term Fellowship | \$135,000 | \$174,117 | 2005 | 3 years | | | |
| Dr Craig MacFarlane | University of Western Australia | The impact of alternative respiratory pathways on plant growth efficiency | Short Term Fellowship # | \$10,000 | \$12,897 | 2005 | 2 weeks-3 months | | | |
| Professor Patrick Sexton | Monash University | Computational methods to develop predictive molecular models of class II G protein-coupled receptors | Short Term Fellowship # | \$10,000 | \$12,897 | 2005 | 2 weeks-3 months | | | |
| Total funding for 2005 | | | | | | | | \$155,000 | \$199,911 | \$620,047 |
| Dr Guy Wallis | University of Queensland | Mechanisms of associative learning in human perception | Program Grant | \$337,500 | \$460,817 | 2006 | 3 years | | | |
| Dr Brietta Pike | Dept. of Eigenetics, Friedrich Miescher Institute for Biomedical Research Basel, Switzerland | Live cell analysis of chromosome and gene positioning in a multicellular organism | Long Term Fellowship | \$135,000 | \$184,327 | 2006 | 3 years | | | |
| Dr Ryan Lister | Plan Biology Lab, The Salk Institute for biological studies, La Jolla, USA | Regulation of gene expression by DNA methylation: genome-wide extent and control mechanisms | Long Term Fellowship | \$135,000 | \$184,327 | 2006 | 3 years | | | |

| Human Frontier Science Program Australian Awardees | | | | | | | | | | |
|--|--|--|--------------------------|--|--------------------|------|------------------|--------------------|--------------------|-----------------------|
| Australian Researcher | Institution | Project Title | Award Type | Amount for Australian Researcher for Duration of Award (USD) | Conversion (AUD) * | Year | Duration | USD | AUD | Aust Contribution AUD |
| Dr Nicholas Price | Dept. of Neurobiology, Harvard Medical School, Boston, USA | The influence of centre-surround effects, motion strength and atention on direction discrimination | Long Term Fellowship | \$135,000 | \$184,327 | 2006 | 3 years | | | |
| Dr Kieran Harvey | Peter MacCallum Cancer Centre | Regulation of cell growth and number by the salvador/warts/hipp pathway | Career Development Award | \$300,000 | \$409,615 | 2006 | 3 years | | | |
| Dr Paul Baldock | Garvan Institute | The role of peripheral beta adrenergic signalling in the central regulation of bone mass by leptin | Short Term Fellowship # | \$10,000 | \$13,653 | 2006 | 2 weeks-3 months | | | |
| Dr Rita Machaalani | University of Sydney | Proteomic mapping of brain circuitry in SIDS: development of post mortem SELDI-MS tissue analysis | Short Term Fellowship # | \$10,000 | \$13,653 | 2006 | 2 weeks-3 months | | | |
| Total funding for 2006 | | | | | | | | \$1,062,500 | \$1,450,719 | \$652,543 |
| Professor Robert Parton | University of Queensland | Physical and biochemical mechanisms of membrane deformation in lipid-mediated endocytosis | Program Grant | \$337,500 | \$408,774 | 2007 | 3 years | | | |
| Professor Paul Curmi | University of New South Wales | A modular protein design route to exploring the operating principles of molecular motors | Program Grant | \$337,500 | \$408,774 | 2007 | 3 years | | | |
| Dr Sarah Russell | Peter MacCallum Cancer Centre | Testing the role of cell polarity during thymocyte development | Program Grant | \$350,000 | \$423,914 | 2007 | 3 years | | | |

| Human Frontier Science Program Australian Awardees | | | | | | | | | | |
|--|---|---|----------------------|--|--------------------|------|----------|--------------------|--------------------|-----------------------|
| Australian Researcher | Institution | Project Title | Award Type | Amount for Australian Researcher for Duration of Award (USD) | Conversion (AUD) * | Year | Duration | USD | AUD | Aust Contribution AUD |
| Professor Min Gu | Swinburne University of Technology | Testing the role of cell polarity during thymocyte development | Program Grant | \$350,000 | \$423,914 | 2007 | 3 years | | | |
| Dr Madeleine Beekman | University of Sydney | Optimization in natural systems: ants, bees and slime moulds | Program Grant | \$337,500 | \$408,774 | 2007 | 3 years | | | |
| Dr Mark Shackleton | Center for Stem Cell Biology, Ann Arbor in the United States of America | Cancer stem cells and melanoma pathogenesis at the Center for Stem Cell Biology, Ann Arbor in the United States of America | Long Term Fellowship | \$135,000 | \$163,509 | 2007 | 3 years | | | |
| Dr Nicholas Huntington | Cytokines and Lymphoid Development Institut Pasteur Paris | Humanised mouse models for the study of human natural killer cell development and function at the Cytokines and Lymphoid Development Institut Pasteur Paris | Long Term Fellowship | \$135,000 | \$163,509 | 2007 | 3 years | | | |
| Total funding for 2007 | | | | | | | | \$1,982,500 | \$2,401,168 | \$609,060 |
| A/Prof Alpha Yap | University of Queensland | Spatial organization of cadherin junctions by dynamic microtubules: an integrated model. | Program Grant | \$337,500 | \$361,000 | 2008 | 3 years | | | |
| A/Prof Geoffrey Goodhill | University of Queensland | Self-organized wiring of the cerebral cortex through thalamocortical growth cones: an integrated approach. | Program Grant | \$337,500 | \$361,000 | 2008 | 3 years | | | |
| Dr Ian George Barr | WHO collaborating center for reference and research on influenza | Integrating the antigenic, genetic and epidemiological analyses of antigenically | Program Grant | \$270,000 | \$289,000 | 2008 | 3 years | | | |

| Human Frontier Science Program Australian Awardees | | | | | | | | | | |
|--|--------------------------------------|--|-------------------------------|--|--------------------|------|----------|--------------------|--------------------|-----------------------|
| Australian Researcher | Institution | Project Title | Award Type | Amount for Australian Researcher for Duration of Award (USD) | Conversion (AUD) * | Year | Duration | USD | AUD | Aust Contribution AUD |
| | MELBOURNE VICTORIA | variable pathogens. | | | | | | | | |
| Dr Katharina Gaus | University of NSW | Olfactory receptor neurons – linking membrane organization to neuronal functionality. | Young Investigator Grant | \$375,000 | \$401,000 | 2008 | 3 years | | | |
| Dr Abd-Krim Seghouane | Australian National University | Spontaneous and evoked cortico-cortical functional connectivity: hemodynamic and neuronal signals. | Young Investigator Grant | \$375,000 | \$401,000 | 2008 | 3 years | | | |
| Dr Victor Anggono | Childrens Medical Research Institute | The role of stargazing and TARP phosphorylations in synaptic plasticity. | Long Term Fellowship | \$135,000 | \$144,000 | 2008 | 3 years | | | |
| Dr Joseph Hughes | Australian National University | Primary molecular mechanisms in a water-soluble chlorophyll-binding protein. | Long Term Fellowship | \$135,000 | \$144,000 | 2008 | 3 years | | | |
| Dr Max Cryle | University of Queensland | Structural characterisation of the interactions of cytochromes P450 with substrate carrier proteins. | Cross-Disciplinary Fellowship | \$135,000 | \$144,000 | 2008 | 3 years | | | |
| Total funding for 2008 | | | | | | | | \$2,100,000 | \$2,245,000 | \$640,193 |
| A/Prof Martin Lackmann | Monash University | The molecular dynamics and imaging of Eph receptor-guided cell positioning in tissue assembly | Program Grant | \$345,000 | \$480,750 | 2009 | 3 years | | | |
| Dr Keith Shearwin | University of Adelaide | Quantitative analysis of the DNA loop-domain model for long range regulation of transcription | Program Grant | \$345,000 | \$480,750 | 2009 | 3 years | | | |

| Human Frontier Science Program Australian Awardees | | | | | | | | | | |
|--|---------------------|--|----------------------|--|--------------------|------|----------|--------------------|--------------------|-----------------------|
| Australian Researcher | Institution | Project Title | Award Type | Amount for Australian Researcher for Duration of Award (USD) | Conversion (AUD) * | Year | Duration | USD | AUD | Aust Contribution AUD |
| Dr James Vince | La Trobe University | Identifying novel regulators of innate immune signalling | Long Term Fellowship | \$135,000 | \$187,700 | 2009 | 3 years | | | |
| Total funding for 2009 | | | | | | | | \$825,000 | \$1,149,200 | \$678,556 |
| | | | TOTAL | \$6,125,000 | \$7,445,998 | | | \$6,125,000 | \$7,445,998 | \$3,200,299 |

Total Benefit \$4,245,699

* 2005 - 2008 currency conversions completed April 30 of the year the grant is awarded. Currency exchange rate is at the time of award. 2009 currency conversions at 15 April (1USD = AUD1.39)

Annual Average Benefit \$849,139.80

Short Term Fellowships are between 2 weeks and 3 months in duration. Usually reimbursement of travel and daily allowances on average it is \$10,000.

Attachment F

Training Fellowships (Overseas) Totals for 2008-09

| Funding Activity | Grant Type | Grant Sub Type | No of Awards | Total Commitments |
|----------------------------|---------------------------------------|-------------------------------------|--------------|-------------------|
| Building Capacity – People | Training Fellowships (Overseas) | Australia-China Exchange Fellowship | 7 | \$1,838,343 |
| | | CJ Martin Fellowship | 34 | \$11,504,579 |
| | | INSERM | 1 | \$307,477 |
| | | Neil Hamilton Fairly Fellowship | 4 | \$1,389,483 |
| | | Sidney Sax Fellowship | 3 | \$1,146,903 |
| | Training Fellowships (Overseas) Total | 49 | \$16,186,785 | |

NHMRC Annual Report 2008-2009