

**AN INTERNATIONAL PERSPECTIVE ON THE NATIONAL
HEALTH AND MEDICAL RESEARCH COUNCIL'S
RESEARCH STRATEGIES**

**REPORT BY THE INTERNATIONAL NHMRC
REVIEW PANEL
28-30 JANUARY 2008**

FINAL REPORT

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Acknowledgements

The International National Health and Medical Research Council (NHMRC) Review Panel of:

- Dr. Elias Zerhouni, Director, U.S National Institutes of Health, Washington D.C.
- Professor Sally C. Davies, Director General of Research, Department of Health, London
- Professor Edward W. Holmes, Executive Chairman, National Medical Research Council, Executive Deputy Chairman, Biomedical Research Council, A*STAR, Singapore

met to consider NHMRC medical research funding and strategies between 28 and 30 January 2008. The Panel and Growing Your Knowledge, Pty Ltd (GYK) would like to acknowledge and thank Professor Warwick Anderson AM, CEO of NHMRC, and key members of his staff for their assistance in providing information and arranging meetings with the Chairs of NHMRC Research Committee and the NHMRC Council, and with representatives of the Group of 8 Universities, Research Australia, the Australian Society for Medical Research (ASMR) and the Australian Association of Medical Research Institutes (AAMRI).

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EXECUTIVE SUMMARY

The CEO of the National Health and Medical Research Council (NHMRC), Professor Warwick Anderson AM, convened an International NHMRC Review Panel (INRP) in January 2008 to consider the broader future vision of NHMRC and its role as a national medical research funding organisation.

The INRP acknowledges the outstanding record of research achievement of the Australian health and medical research community and recognises the critical leadership role that the NHMRC plays in supporting this research and its translation to better health.

The NHMRC is now undergoing transformation into an organisation which can more effectively facilitate medical research and foster the development and translation of new knowledge into improved healthcare and health outcomes. Professor Anderson, is challenged with the management of re-engineering and modernising an NMHRC with a larger scope of responsibilities and accountability whilst sustaining its current functions. The willingness of the CEO and the NHMRC to evaluate itself through national and international reviews is commended.

The INRP supports the recommendations of the previous Independent Review Panel Report in 2007¹ which, if adopted, will strengthen NHMRC structurally and will ensure that it is positioned to achieve world's best practice in research funding processes. This Report recommended actions to support strategic direction setting, strengthen and clarify the roles of the NHMRC Council and existing NHMRC Committees, bolster knowledge translation, improve the peer review processes and build a better and more skilled NHMRC organisation.

The INRP notes that progress has been achieved in the areas of ethics policy and oversight, the transparency and rigor of the peer review process, establishment of a management advisory committee, the development of plans for recruitment of scientists

¹ Bernstein Alan, Scarpa Toni and Sleigh Merilyn. Independent Review of the NHMRC Research Funding Process, 2007. (Bernstein Report, 2007)

to improve the internal staff scientific capabilities of NHMRC and the implementation of a transitional re-organisation.

Success of the NHMRC will rely on further developing the NHMRC as a leader both nationally and regionally. The INRP has identified the following major strategic pathways which the NHMRC should follow to achieve a position where it provides outstanding national leadership:

- Strategic partnerships should be developed with other nations in the region, particularly China and India.
- Regional relationships should be leveraged to create a national policy for health diplomacy in the region.
- NHMRC should lead a strategic initiative to better integrate research programs at universities and free standing research institutes with the health sector, ensuring that adequate government funds (state and Commonwealth) are made available to support patient-based research in hospitals with the goal of creating at least a few Australian centres of world class excellence in modern translational and clinical research.
- NHMRC should further develop its strategies to develop a robust local biotechnology and pharmaceutical industry linked to national and international funding opportunities to assist in the translation of research outcomes through creation of Australian private companies and enhancement of public-private partnerships.
- NHMRC should continue to invest in health policy development and the dissemination of evidence-based improvements in clinical practice.
- NHMRC should continue to play a leadership role in human research ethics.
- NHMRC should ensure that it becomes the most trusted Australian site for medical research and health information and communications.

The INRP identified several key steps which must be taken by the CEO in order to achieve a successful transformation:

- Refine the organisational structure to better match its expanded and specific functions and responsibilities;
- Develop a different organisational chart for NHMRC's research function following appropriate consultation with the relevant advisory committees and receipt of external management advice. Research management and funding functions should be brought together under one division, separate to the regulatory, health evidence and advice and the policy and practice functions;
- Appoint experienced program directors for the research division from current staff or by new recruitments as appropriate;
- Appoint a Deputy Director with strong scientific credentials and prior relevant management experience to assist the CEO in the day to day implementation tasks relating to the transition and the maintenance of current operations.

Goals for NHMRC moving forward should include:

- Becoming the leader in developing a health and medical research agenda for Australia and its region;
- Enabling greater synergies between life sciences research and health across the full interdisciplinary spectrum of basic and applied physical and biological sciences;
- Enhancing partnerships between funders, research institutions, universities and the healthcare system;
- Promoting partnerships with industry to gain improvements in health, as well as the development of new products and services; and
- Raising its public profile particularly in health and medical education, information and communication.

The INRP recognises that some of the challenges it has identified are more appropriately tackled at multiple levels and that various state and Commonwealth institutions will need to work together across traditional boundaries. The goals of such a national health alliance should include:

- The development by the Australian government of health and science diplomacy;
- The commitment of dedicated funds to hospitals to support them as partners in translation of research with the goal of developing at least a few vanguard and forward looking, more fully integrated academic health centres with proper alignment between health delivery and medical research;
- Addressing in a more transparent and systematic way the real problems of funding for research infrastructure and overhead costs, perhaps as a key component of the current Review of the National Innovation System;
- Enhancement of the scientific workforce through investment in education and overcoming obstacles to collaboration;
- The development of Academic Health Sciences Centres of Excellence to seamlessly deliver research, healthcare and education.

The INRP also noted that to attain this vision, NHMRC will require a strong and sustained government commitment and a temporary budgetary increase to support the re-engineering of the organisation as NHMRC will need to manage a transition while sustaining current operations and functions. To ensure accountability, this temporary funding increase needs to be based on a specific implementation plan with timelines and outcomes that can be measured including the requirement to review current work processes so as to streamline and reduce the cost of operations in the long run.

PREAMBLE

Over the years, Australia has made remarkable contributions to medical research and innovation in general. Australians have earned several Nobel Prizes and Australia has established a worldwide reputation for excellence. The Australian government's strong support for life science and medical research over the years and the recent increase in funding have created a platform which gives the NHMRC a real opportunity to play a greater regional and global role in health care and life sciences.

The International NHMRC Review Panel (INRP) recognizes unique research strengths in particular disciplines and areas of deep expertise such as Immunology, Cancer, Infectious Diseases and Neurosciences. Australian research is recognized as very competitive internationally. For example, Australia is the third highest recipient of international NIH funding following Canada and the UK. However, continuous progress will depend on the development of an adaptive and proactive NHMRC given the very rapid pace of change in the life sciences worldwide. Achieving more will also depend on facilitating the Commonwealth and the states with their respective institutions in working together across their traditional boundaries to create proactive strategies in discovery and translational research.

Greater coordination and integration between discovery research, innovation and translational research are now central to scientific success due to the increasing scope and complexity of science which increasingly requires "unconventional" interdisciplinary efforts. Integrating the various national, state and local health systems and drawing together the essential components for success, i.e., universities, medical schools, research institutes, hospitals and research funders will be a significant challenge for Australia as it has been for our countries.

The panel is pleased to learn that the Government is undertaking an in-depth review of Australian innovation ("The Review of the National Innovation System"). This will be critical in addressing legacy issues that hamper, in our opinion, better collaboration. There is a particularly acute need to address the lack of a coherent policy regarding funding the indirect costs of research such as infrastructure costs. A more streamlined and straightforward process of properly accounting for and funding these necessary

costs and sustaining large scale modern research may substantially benefit Australia in the long run. There is also a significant challenge for NHMRC, as now structured, in analysing and understanding the national health and medical research portfolio strengths and weaknesses and being able to act on emerging issues. Taken together, this makes it difficult for NHMRC to confidently determine critical areas of future investment. The effectiveness of NHMRC will require increasingly rigorous, high level, professional and regular strategic analysis of its scientific portfolio opportunities and gaps in order to guide research more strategically. This, however, should not be done at the expense of investigator-initiated research which provides the fundamental underpinning of scientific advances.

Given its underlying strength in research, Australia can capture significant economic growth and further develop its health sector by linking translational research to the development of innovative healthcare products and services. Such products and services could be disseminated worldwide but this will require a greater strategic commitment. It is expected that the health sector globally will continue to develop and expand in future years. At this time, Australia also appears to be devoting insufficient resources to developing international health and research relationships. There are real regional opportunities for Australian medical research to develop multi-level relationships with major players in the region, particularly China and India, and become a regional leader.

NHMRC itself is an organisation in transition in its structure, processes and staffing. The transformation of NHMRC is a major opportunity for Australia. While it will be challenging to implement, the transformation represents an opportunity to reach a new stage of development both nationally and internationally. This will require strong leadership of and by NHMRC with consistent, long term government support of novel strategies that will demand greater collaboration across the many relevant institutions of Australia.

THE REVIEW PROCESS

An independent review of the NHMRC medical research funding and strategies was initiated by a panel including international experts and chaired by Professor Alan Bernstein at the request of the CEO, Professor Warwick Anderson, in late 2007. The Independent Review Panel (IRP) met in October 2007 and delivered its report “The Independent Review of the NHMRC Research Funding Process” (the Bernstein Report) to NHMRC in December 2007.

A second international panel was invited by Professor Anderson to visit Australia in January 2008 to consider the Bernstein Report, the NHMRC Research Committee’s response to the Report and the broader future vision for NHMRC. The purpose of this International Review was “To ensure that Australia has the highest quality health and medical research effort and that it gains maximum benefit”.

The International NHMRC Review Panel (INRP) consisted of:

- Doctor Elias Zerhouni, Director, U.S. National Institutes of Health, Washington D.C.
- Professor Sally C. Davies, Director General of Research, Department of Health, London
- Professor Edward W. Holmes, Executive Chairman, National Medical Research Council, Executive Deputy Chairman, Biomedical Research Council, A*STAR, Singapore.

Brief biographies of the panel members are provided in Appendix A.

The panel convened in Sydney on January 28 and sat again in Canberra on January 29 where they met with the Minister for Health, the Honourable Nicola Roxon, and afterwards addressed senior executives from the Department of Health and Ageing. They also interviewed Chairs of the NHMRC Council and Research Committee and senior executives from NHMRC. The panel convened in Melbourne on January 30 where they met with a number of key stakeholders. Professor Davies addressed the National Summit on Research and Health Care, convened by the Bio21 Cluster while Dr Zerhouni addressed the Governor and leading medical researchers at Government House in Melbourne.

The full list of persons consulted by the panel is provided in Appendix B. The documents viewed by the panel are listed in Appendix C.

STRATEGIC DIRECTIONS

The panel, having reviewed the papers and carefully considered the personal briefings and consultations with experts, formed the view that there are short and long term opportunities for NHMRC to take significant steps towards achieving an exciting vision that not only meets its statutory obligations but provides a platform for national leadership. To develop strategically, the NHMRC should explore the following major strategic pathways:

1. International Leadership of the Research Agenda
2. Development of an Australian Health Diplomacy Policy
3. Fostering Translational Research
4. Support of Industry Partnerships
5. Its role as a key site for the public to access health information and medical education and communication
6. Leadership in medical ethics and regulation

NHMRC will be unable to achieve its vision by following these pathways without government support for NHMRC and for the other relevant parts of the health sector in a sustained and long term commitment.

1. The Australian health and medical research community has an outstanding record of research achievement and has developed a body of expertise that provides a platform for Australia to become the leader in developing a research agenda for this region of the world. NHMRC should lead an effort to build strategic partnerships with other nations in this region, particularly China and India, with the goal of establishing collaborations that enhance the research potential not only of Australia but this entire region.
2. Success in building and leading a regional research agenda offers Australia the opportunity to leverage these relationships and to create a national policy in health diplomacy. NHMRC should seize this opportunity and collaborate with government agencies such as AusAID and other groups to forge a health diplomacy agenda for this region.

3. There is unprecedented potential in the 21st century, and a great need, to translate fundamental discoveries into new preventative and therapeutic interventions that will improve the health of Australians and people around the world. Success in realising this strategic objective will require effective and efficient transfer of discoveries made in medical research institutes and universities into the hospitals, clinics and community settings. NHMRC should lead an initiative to better integrate research programs across the continuum from basic to translational to clinical research. As part of this strategic objective, governments (state and federal) need to identify inadequacies and ensure that at least a few competitively selected hospitals have sufficient funds and a mission statement that also supports patient-based research rather than minimising current costs at the expense of long term transformation of health. This should include preclinical validation work as well as early clinical translation to large-scale prospective population studies and clinical trials.

4. Translation of basic research discoveries into new therapeutic interventions requires not only a strong partnership between research organisations and clinical delivery services, but also a robust local biotechnology and pharmaceutical research and development presence. NHMRC should be the catalyst for establishing creative national and international funding mechanisms that enhance the development of this important industry sector and foster partnerships between investigators and research institutes with entities in the private sector.

5. There is a national need for an Australian source of information and active communication (i.e. both a “pull” and a “push” strategy) that is both reliable and up to date regarding medical research, health information, and education of the public on health matters. This information service should become the most trusted site for Australians (medical investigators, clinicians, managers and the public) to access this type of information. NHMRC should undertake the development of one or more web sites that meet this national need. As a part of this strategic objective, NHMRC should develop a communication unit that enables the agency to develop and disseminate information on the progress of medical research and advances in health care as well as best practices.

6. The NHMRC should continue to provide its other functions. That is it should be a trusted source of advice and education on medical ethics. It should continue to develop its role as an effective regulator of research involving human reproduction and human embryos. And finally, it should be seen as the Australian source of evidence for policy and practice, including through issuing respected guidelines. It should further develop the dissemination of evidence-based improvements in clinical practice into health services, for example through the work of the National Institute of Clinical Studies (NICS).

If NHMRC is to be successful in leading these strategic objectives, it is essential that adequate and sustained funding be made available from, and coordinated across, multiple ministries of the Australian government with an interest in, and commitment to, health and life sciences research.

ADVICE AND RECOMMENDED ACTIONS

The INRP commends Professor Anderson for his leadership in the ongoing transformation of NHMRC over the past 18 months. NHMRC and Professor Anderson are uniformly highly regarded by the various stakeholders we have conferred with, all of whom recognise that this transformation is still a work in progress. All have expressed strong support for the progress to date. The willingness of the NHMRC to re-evaluate itself and its operations through rigorous national and international reviews is also to be commended. Great progress has been accomplished in the areas of ethics policy and oversight, improving the transparency and rigor of the peer review process, establishing the management advisory committee and developing plans for recruitment of scientists to improve the internal staff scientific capabilities of NHMRC and implementing a transitional re-organisation.

The INRP supports the recommendations of the previous Independent Review Panel (the Bernstein Report, 2007)² which, if adopted, will strengthen NHMRC structurally and will ensure that it is positioned to achieve world's best practice in research funding processes. The Report recommended actions to support strategic direction setting, to strengthen and clarify the roles of NHMRC Council and existing NHMRC Committees, to bolster knowledge translation, to improve the peer review processes and to build a better and more highly skilled NHMRC organisation.

Clearly, Professor Anderson is undertaking what is assuredly one of the most difficult tasks in management: re-engineering and modernising an organisation with a larger scope of responsibilities and accountability while sustaining its current functions. This will require, in our opinion, a temporary increase in transitional administrative resources such as an incremental budget for the period of re-engineering, subject to a specific implementation plan with clear endpoints following the advice of the Bernstein Report (Independent Review Panel Report, 2007) as well as that of various internal committees.

² Bernstein Alan, Scarpa Toni and Sleigh Merilyn. Independent Review of the NHMRC Research Funding Process, 2007. (Bernstein Report, 2007)

Successful Transformation of NHMRC

The INRP has identified several key steps which are critical to achieving the success of this transformation:

- The CEO needs to further refine the organisational structure of NHMRC to better reflect its different functions and responsibilities.
- Within the constraints of the budget and human resource management policies, we recommend that a different organisational chart for NHMRC's research functions be developed following appropriate consultations with the relevant advisory committees and receipt of external management advice. Specifically we recommend that the research management and funding functions be brought together under one division, separate to the regulatory, health evidence and advice and the policy and practice functions. Experienced program directors for the research division should be appointed from current staff or new recruitments as appropriate.
- Due to the scope of the task at hand, we strongly recommend that a Deputy Director with a strong scientific background and experience in having managed a similar size organisation be recruited soon to implement the operational aspects of the reorganisation once they have been defined by the CEO. Strong consideration should be given to obtaining advice from national or international consultants familiar with the best practices of similar organisations.

Among the priorities that need to be addressed within the planned reorganisation are the following issues:

- A specific review of internal work processes should be undertaken to streamline and clarify the activities of the various divisions by developing standard operating procedures with a view to increasing the efficiency and effectiveness of the organisation in harmony with current ongoing Information Technology (IT) developments.
- Stakeholders have also expressed the view that the grant mechanisms and application processes are unnecessarily complicated and "arcane". Clearly, as the planned IT system is developed it will be important to take this opportunity to re-evaluate the traditional funding strategy of NHMRC in terms of size, duration and type of grants

and the relationship of the funding mechanisms to the life cycle of investigators at each stage of their careers (with special attention to early and mid career transition stages). The goal should be to better reflect the needs of scientists with the size and composition of grants so as to reduce administrative complexity as well as the burden on applicants and their organisations.

- The panel believes that a more transparent and unified process that includes project, personnel costs and infrastructure needs based on realistic budgets should be evaluated and implemented.
- In periods of transition, new skills need to be acquired by the organisation and we recommend that a specific strategy for professional development and training of current staff should be undertaken, including short training periods to observe and assess best practices at similar organisations in other countries if necessary.

NHMRC Goals

The goals for the NHMRC moving forward should include the following:

- Develop the NHMRC to build on Australia's record of accomplishment and expertise to become the leader in the development of the medical health and clinical research agenda for the entire region through strategic partnerships with other nations, particularly China and India.
- Build the capabilities of the NHMRC and its leadership team as an effective promoter and enabler of national synergies between life sciences research and health.
- Enhance the partnerships between life science funders, universities, medical research institutes, the healthcare system and the public.
- Ensure that NHMRC actively promotes the integration of public investments in research with private development opportunities. Research should be enhanced by innovative partnerships with industry resulting in improvements in health, as well as new products and services with real economic returns.
- Develop a communications and public affairs strategy to raise the national profile of the NHMRC as the most trusted Australian source for advice on medical research and health issues as well as public health education through focussed investments in modern information and communication technologies as a priority.

Specific implementation plans should be drawn, including an Action Matrix, an example of which is provided as an Appendix to this report (Appendix 4). Such a Matrix takes account of the difficulty of the tasks and distinguishes between tasks of higher and lower difficulty. Timeframes should also be included in the matrix, i.e., short, medium and long term.

National Challenges

The panel acknowledged that some of the challenges it has identified are beyond the control and responsibility of NHMRC alone and that to realise the full opportunities for Australia in attaining a leadership role, the various state and Commonwealth institutions will need to work together across traditional boundaries. The NHMRC CEO should raise with governments the need to form a national health alliance to address key issues for Australia.

The goals of this national health alliance should include the following:

- To ensure dedicated long term resources are provided across multiple entities of the Australian government under the leadership of the health minister to accomplish the goals of health and science diplomacy, an increasingly important component of global leadership.
- To ensure that at least some key hospitals and health systems include in their mission and resource allocation a real commitment to Australian innovation by partnering with academia to ensure effective translation of knowledge into real benefits for the Australian public. Consideration should be given for a specific budgetary allocation to such hospitals from the Commonwealth health budget with matching requirements from other sources to create integrated such centres of translational excellence.
- To re-focus on the need for science education across universities, research institutes, funders and in the healthcare system to maintain and enhance the scientific workforce capabilities of Australia which will be essential for ultimate success.
- To build the right workforce, ensuring it is properly equipped and works collaboratively across boundaries in order to deliver the health research agenda of the future.

Infrastructure and Indirect Costs

The panel was made aware of real problems and inadequate funding for infrastructure (and overhead) funding in both the academic and health environments. This needs urgent review and rectification if Australia is to maintain its international competitiveness. It is clear that the health system needs to re-engage and invest seriously and on a sustained basis in infrastructure support for research within the health sector. Academia also needs a clear, adequately funded system to meet their research-associated infrastructure and overhead needs. A successful model is the A21 Directive process of the US, which is suggested as a possible template for this purpose. In the context of the upcoming government wide review of Australian innovation, we recommend that this issue be identified as a core topic. Given the scope, scale and complexity of modern science, no country can hope to sustain its innovation and competitive advantage over the long term without a clear strategy to sustain its basic research infrastructure and capacity. This can no longer be dependent on *ad hoc* support mechanisms that are not based on a realistic accounting system and allocated as a function of competitive principles related to the quality of the science to be funded.

Central to this vision will be the development and maintenance of shared modern health research infrastructure within both the academic and health environments. The panel were concerned at the apparent lack of modern Academic Health Sciences Centres delivering research, healthcare and education. The US has used this model successfully for decades and now the UK and Singapore are developing examples of institutions with shared governance between medical schools and teaching hospitals.

There is also a paucity of properly equipped Clinical Research Facilities in hospitals (for in depth studies in patients as well as phase I/II clinical trials) to facilitate translational research. Without the health sector co-investing in such facilities, supporting professional staff and clinician scientist time, the enterprise will fail. Modern supporting research networks are also urgently required to deliver large scale evaluations of interventions, for building evidence around improved health services and to provide clinical trials for industry.

The panel recommends that plans are drawn up for dedicated health sector research funding, rising to 1% of total health funding. This fund should support infrastructure and overheads as well as direct research of relevance to the health service and to the health aspirations of Australia.

Since the health sector funding is currently being assessed prior to the negotiation of the next round of Australian Health Care Agreements between the Commonwealth and state governments it may be possible to consider these key research infrastructure recommendations within the framework of those negotiations. The panel understands a National Health and Hospital Reform Commission is shortly to be established which may provide a suitable vehicle to examine the infrastructure costs of undertaking research and clinical trials in the health system.

Sustained Government Commitment

Continued support for the strong leadership from Professor Anderson, with his energy and openness to critique and change, will be central to delivering this vision. Most particularly, we stress again our sense that to implement the necessary changes typically requires a temporary increase in budget specifically tailored to the major re-engineering tasks of the organisation. To ensure accountability, this temporary funding increase needs to be based on a specific implementation plan with timelines and outcomes that can be measured including the requirement to review current work processes so as to streamline and reduce the cost of operations in the long run.

APPENDICES

- A. Biographies of International NHMRC Review Panel Members
- B. People Consulted
- C. Documents Provided to the Review
- D. Example of an Action Matrix

Appendix A: Biographies of International NHMRC Review Panel

Dr Elias Zerhouni

Director, National Institutes of Health, USA

Elias A. Zerhouni, M.D., is the Director of the National Institutes of Health (NIH), the nation's medical research agency. With a fiscal year 2007 budget of US\$29 billion, NIH supports peer-reviewed basic, clinical, and translational scientific research, nationally and internationally through 27 institutes and centres that support over 300,000 scientists and their personnel at over 300 institutions worldwide on the basis of competitive and independent peer review.

Dr. Zerhouni is a professor of Radiology and Biomedical Engineering and has spent his career providing clinical, scientific, and administrative leadership. Prior to joining the NIH in 2002, Dr. Zerhouni served as Executive Vice-Dean of Johns Hopkins University School of Medicine and Chair of its Department of Radiology and Dean for Research. Dr. Zerhouni earned his medical degree at the University of Algiers School of Medicine in 1975 and moved to the United States to pursue post graduate studies, completing his residency in diagnostic radiology at Johns Hopkins in 1978 as chief resident. He has won a Gold Medal from the American Roentgen Ray Society for CT research, two Paul Lauterbur Awards for (magnetic resonance imaging) MRI research, and the Special Presidential Award of the European Congress of Radiology. His research, focused on the quantitative imaging of biological processes led to advances in computerized axial tomography (CAT scanning) and MRI for cancer and cardio-pulmonary diseases. He is the author of 212 publications and holds 8 patents which led him to found or co-found several successful start up companies in the US.

Dr. Zerhouni served on the National Cancer Institute's Board of Scientific Advisors from 1998-2002. He was elected a member of the US National Academy of Sciences Institute of Medicine in 2000. In May 2002 he was named Director of the National Institutes of Health by the President of the United States and confirmed by the US Senate.

Professor Edward W. Holmes, M.D.

Executive Deputy Chairman, Biomedical Research Council

*Executive Chairman, National Medical Research Council A*STAR, Singapore*

Professor Edward W. Holmes was appointed a Howard Hughes Medical Investigator at Duke University School of Medicine in 1974 and later became the James B. Wyngaarden Professor of Medicine. He was recruited to the University of Pennsylvania School of Medicine in 1991 as the Chair of the Department of Medicine and the Frank Wister Thomas Professor of Medicine and Genetics. In 1997 he became the Joseph Grant Professor in the School of Medicine, the Senior Associate Dean for Research, Vice President of Translational Medicine and Clinical Research, and Special Counsel to the President of the University on Biomedical Research at Stanford University. In January 1999 Professor Holmes returned to Duke University as the Dean of the School of Medicine and Walter Kempner Professor in Medicine and Genetics. Professor Holmes was appointed Vice Chancellor for Health Sciences and Dean of the School of Medicine at the University of California, San Diego in the fall of 2000 and served in this role until October 2006. He is currently a Distinguished Professor of Medicine at the University of California, San Diego, and Vice Chancellor/Dean of Health Sciences, Emeritus at the University of California, San Diego. Professor Holmes became the Executive Deputy Chairman of the Biomedical Research Council and the Executive Chairman of the National Medical Research Council in Singapore in October 2006, and he also holds an appointment as the Lien Ying Chow Professor of Medicine at the Yong Loo Lin School of Medicine, National University of Singapore.

Professor Holmes has engaged in basic biomedical and clinical research throughout his academic career and his laboratory has focused on the molecular bases of human disease. Professor Holmes has served on the Council of Advisors for the National Institute for Diabetes, Digestive, and Kidney Diseases of the National Institutes of Health, and he currently serves as Chair of the Research Advisory Board of GlaxoSmithKline. He has received Distinguished Alumnus Awards from the University of Pennsylvania and Duke University. He has been elected to membership in the American Society for Clinical Investigation, the Association of American Physicians, Fellow of the American Association for the Advancement of Science, and a member of the Institute of Medicine of the National Academy of Sciences.

Professor Sally C. Davies

*Director General for Research and Development
Department of Health, UK*

Professor Sally C. Davies is the Director General (DG) of Research and Development for the Department of Health (DH) and the National Health Service (NHS). Professor Davies has been actively involved in NHS R&D from its establishment. As DG she developed the new government research strategy, *Best Research for Best Health* with a budget of over £775m, is now responsible for implementation of the National Institute of Health Research (NIHR) and is a Board member of Office for the Strategic Coordination of Health Research (OSCHR). The DH and NIHR fund applied, clinical and policy research, research infrastructure, research capacity development and support the NHS in its research activities. Key National Programmes include the internationally recognised 'Health Technology Assessment Programme, Service Delivery and Organisation' and 'Invention for Innovation'. New initiatives include the recently announced Biomedical Research Centres and Units, Experimental Medicine and Cancer Research facilities and the NIHR Centres for Leadership in Applied Health Research and Care.

Professor Davies led the UK delegation to the WHO Ministerial Summit November 2004, spoke on R&D at the World Health Assembly May 2005 on R&D, is a member of the WHO Global Advisory Committee on Health Research (ACHR) and is currently chairing the Expert Advisory Committee for the development of the WHO research strategy.

Her own research interests focus on Sickle Cell disease. She was a member of the steering groups for the Biotechnology Innovation and Growth Team, chaired by Sir David Cooksey, the Health Care Industry Task Force and the Health Innovation Council. In addition, she chairs the UK Clinical Research Collaboration Board.

Appendix B: People Consulted

Name	Position	Organisation
Professor Warwick Anderson AM	CEO	NHMRC
Professor James Best	Chair	NHMRC Research Committee
	Deputy Dean	Faculty of Medicine, Dentistry and Health Sciences, University of Melbourne
Niall Byrne	Science Communication Consultant	Science in Public
Phil Callan	Principal Executive Officer	CEO Unit, NHMRC
Professor Ian Chubb	Vice Chancellor	Australian National University
Michael Gallagher	Executive Director	Group of 8 Universities
Professor Maree Gleeson	Director	Hunter Medical Research Institute
Professor Michael Good	Chair	NHMRC Council
	Director	The Queensland Institute of Medical Research
Professor Stuart Hazell	Chief Operating Officer	PanBio Limited
Dr. Mark Hulett	President	Australian Society for Medical Research (ASMR) Department of Biochemistry, School of Molecular Sciences, La Trobe University
Rebecca James	Chief Executive Officer	Research Australia
Professor Garry Jennings	President	Australian Association of Medical Research Institutes (AAMRI)
	Director	Baker Heart Research Institute

Name	Position	Organisation
Tony Krizan	Executive Director	Program Management, NHMRC
Dr. Clive Morris	Chief Knowledge and Development Officer	Knowledge and Development Branch, NHMRC
Professor Elim Papadakis	Executive Director	Investment Branch, NHMRC
Hilary Russell	Chief Operations Officer	Operations Division, NHMRC
Donna Stephenson	Director	International and Systems Review, NHMRC

Appendix C: Documents Provided to the Review

Report:

Bernstein Alan, Scarpa Toni and Sleigh Merilyn. Independent Review of the NHMRC Research Funding Process, 2007. (The Bernstein Report, 2007)

NHMRC Public Documents:

NHMRC Strategic Plan 2007-2009

NHMRC Research Funding Facts Book

Ten of the Best

NHMRC Internal Documents:

Presentations from the NHMRC CEO

NHMRC Research Committee Draft Response to IRP Report (Bernstein Report, 2007)

Australian Investment in Medical Research

Research Investment Management and Evaluation System (RIMES)

Report from the Policy and Practice Options Working Group

Appendix D: Example of an Action Matrix

Timeframe	Short term	Medium term	Long term
<i>High Difficulty</i>	<ul style="list-style-type: none"> • Begin rigorous <i>portfolio analysis</i> internal and external to NHMRC • Adopt a regular <i>assessment</i> of the national Australian portfolio in relationship to regional and global opportunities and recognise strength and weaknesses on a regular basis to allow proactive opportunities program of portfolio review. • Recruit a <i>Deputy Director</i> • Incorporate more <i>medically-trained expertise</i>, advice and input into NHMRC strategies • Develop an <i>implementation plan</i> for change management and reorganise the structure and operations to fit with functions 	<ul style="list-style-type: none"> • NHMRC should prepare plans to coordinate health sector infrastructure funding, including competition for <i>Clinical Research Facilities</i> (CRFs), etc. • Establish world class CRFs with advanced world-class clinical pharmacology to attract and support biotechnology industry and improve interactions between research and hospitals • Performance-based research funding for hospitals and alignment of hospital CEO <i>performance assessment</i> with superior delivery of research outputs in health services • Allow NHMRC-funded researchers a greater degree of freedom to pursue <i>entrepreneurial</i> activities • Develop a regional framework for reciprocal international <i>peer review agreements</i> to meet needs of smaller research communities 	<ul style="list-style-type: none"> • Gain <i>long-term commitment and support</i> by government • Become the recognised medical research and health <i>leader</i> in the commonwealth and each state. • Make NHMRC the <i>centre</i> for communication and information on health and medical evidence • Make NHMRC a leader and potent enabler, promoter and integrator of partnerships and relationships (i.e. a <i>broker</i>) of national and international efforts to achieve goals and attract partners and investment • Build <i>world leadership</i> in one or two medical or health service research areas

Timeframe	Short term	Medium term	Long term
<i>Lower Difficulty</i>	<ul style="list-style-type: none"> • Establish strategy for NHMRC being the <i>most consulted website</i> for information and communication on health and evidence • Develop internal <i>public affairs</i> resources to improve communication to the public locally and internationally • Establish ‘public private’ partnerships with <i>biotechnology industry</i> • Identify and define <i>co-dependencies</i> of NHMRC with other agencies and organisations • Develop a strategy for NHMRC to drive <i>translation</i> of research into clinical outcomes • Scope the NHMRC role in <i>environmental health</i> research 	<ul style="list-style-type: none"> • Develop an international strategy to contribute to and engage with the region and become a <i>regional leader</i> • Work closely with the regional neighbours to understand how NHMRC can partner in developing <i>improved health</i> outcomes in our region • Following portfolio analysis, lead the development of research and <i>health management strategies</i> to meet the needs and emerging priorities • Streamline and rationalise <i>funding structures, grant mechanisms, processes and peer review</i>. 	<ul style="list-style-type: none"> • Develop <i>longstanding, sustainable relationships with regional partners</i> • Address the problem of research <i>infrastructure costs</i> to achieve grant funding appropriateness and transparency