
The Virtuous Cycle

Working together for health and medical research

Health and Medical Research Strategic Review
Summary

December 1998



Commonwealth of Australia

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Chairman's Foreword

Each year, Australia spends over \$40 billion in health care. Millions of patients are cared for by their local GPs, surgeons and other specialists in a myriad of public and private institutions. Lives are saved every day in this country through the provision of world-class health care, and thousands of people have their lives enhanced through medical intervention.

Supporting this frontline health care delivery is Australia's health and medical research sector – a community of researchers, industry and government working together to deliver an improved quality of life for all Australians and a cost-effective and equitable health care system.

To date, enormous achievements have been made in health and medical research in this country. With 0.3% of the world's population, Australia produces about 2.5% of the world's health and medical research output. Australian researchers, institutions and companies are at the cutting-edge of health and medical research. Over the past 50 years, Australian researchers have made major contributions to medical breakthroughs in penicillin, bionic ears, AIDS testings and SIDS (Sudden Infant Death Syndrome), melanoma and many other areas.

The link between our health and medical research capability and the delivery of health care is clear.

Yet continuation of Australia's strong and long-standing international reputation may be under threat. The challenge of the Health and Medical Research Strategic Review over the past nine months has been to identify the threats to our health and medical research sector, investigate the likely future opportunities and recommend the most appropriate strategy to deliver the best health outcomes for Australia.

We have considered past reports and international benchmarks, absorbed 220 thought-provoking public submissions and met with a wide range of stakeholders and experts in Australia and overseas. The members of the Committee have brought to the Review a wealth of experience covering a range of research disciplines, current and past experience with the National Health and Medical Research Council and its committees, industry and international perspective through the US and UK members.

What we have found is that the outlook of health and medical research lies not only in greater government investment, but also in establishing the links between public funding, research and the commercialisation of findings through industry.

Already in Australia, there exists a high level of commitment among those working in the health and medical research field. Indeed, the National Health and Medical Research Council is currently making important advances in the management of health and medical research in this country and is already pursuing some of the reforms outlined by the Review. This commitment, however, is being hampered by a number of structural issues that are putting the entire sector at risk.

These include:

- Difficulty in maintaining a skilled and motivated workforce in the face of low salary levels, job insecurity and uncertainty about the impact of research output;
- A greater need for research that contributes directly to the health of the population and a well-functioning, evidence-based health system;
- Barriers to Australia's ability to build an industry sector that mutually reinforces the contribution of research and government; and
- A lack of understanding of the returns to the community through appropriate levels of government investment in health and medical research.

Every issue we have addressed has moved us closer towards identifying the need for a 'virtuous cycle' of government, research and industry interaction to improve the delivery of health and medical research in Australia. It is our conclusion that such a cycle will result in:

- A more effective and efficient health and medical research sector built on high impact fundamental research and skilled, motivated workforce;
- Priority-driven research that contributes directly to population health and evidence-based health care;
- An industry sector that mutually reinforces the research sector; and
- Increased public investment in a well-managed research sector.

This Review makes a number of recommendations to achieve these outcomes – recommendations that are, by necessity, far-reaching. Total health expenditure in Australia is expected to double between 1995 and 2015, almost certainly outstripping growth in GDP. Health status differentials across socio-economic groups and Aboriginal and remote populations persist in spite of improvements in health care delivery to the general population. Infectious diseases and increasing antibiotic resistance threaten the future of our nation, while increasing knowledge of genetics is changing the face of health care.

To achieve better health outcomes at lower cost we need a vibrant health and medical research sector to fill in the gaps in our knowledge and to transfer that research knowledge into clinical practice. We also need to recognise the opportunities to develop the industry and grow employment through the commercialisation of research findings. The delivery of improved health to all Australians through health and medical research obviously has wide and profound implications for the entire community.

The implementation plan contained within the report is designed to maintain the considerable momentum created through this Review process and to coordinate the range of initiatives across the many organisations that would be responsible for their execution.

I commend this Report to the Minister for Health and Aged Care, The Hon. Dr Michael Wooldridge MP. It has been a pleasure to Chair this Review and I look forward to continuing to work with the members of the Committee and many others who have contributed towards a report that aims to improve delivery of health care to all Australians through health and medical research.

**Mr Peter J Wills AM
Chairman**

Investing in a healthier Australia

The Virtuous Cycle - a role for all

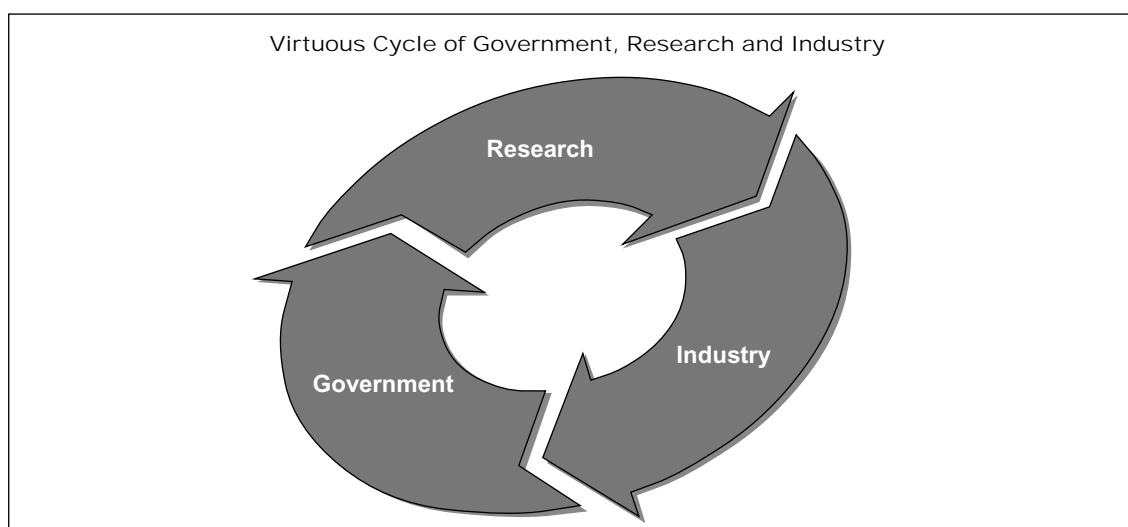
The delivery of health care for all Australians in a cost-effective and equitable way can only continue to improve through a secure and vibrant health and medical research sector. A sector focused on high-impact research, which increases knowledge and contributes directly to population health and evidence-based health care, can provide enormous benefits for Australia.

Certainly, the Australian public strongly supports health and medical research and views it as important to improving their quality of life. Yet half of those surveyed in a recent Newspann poll believed that there was too little medical research done in Australia.

This fear is borne out by the statistics that show that Australian support of health and medical research is low by OECD standards. In 1995, Australia spent 0.115% of GDP or \$28 per capita on health and medical research and development. The GDP-weighted OECD average for developed nations was significantly higher at 0.174% or \$66 per capita. Likewise, industry funding of health and medical research in Australia is very low by the standards of OECD countries.

When added to the salary and career concerns of those working in the research sector, emerging concerns of health inequities and in the steep increase in total health expenditure, it becomes clear that maintaining our proud tradition in health and medical research requires more than simple strategies.

Addressing the emerging threats to existing health and medical research, and overcoming the barriers preventing Australia from taking a leading role in the exciting developments in biotechnology, requires working together for a healthier and more prosperous future.






This Review recommends the development of mutually reinforcing actions by the Research community, Industry and the Government, with community support, in a “virtuous cycle” resulting in:

- An effective health and medical research sector built on high impact fundamental research, and world-class workforce and infrastructure;
- Priority-driven research that contributes directly to population health and evidence-based health care;
- An industry sector that reinforces the research sector; and
- Increased public investment in a well-managed research sector.

Meeting Australia’s health and medical research needs

The overriding question for Australian health and medical research is how a relatively small country like Australia, which produces 2.5% of the world’s health and medical research output, should allocate its scarce resources for maximum community benefit and contribution to knowledge. There are three categories of research defined by the World Health Organisation - fundamental research, strategic research, and development and evaluation research. This Review recommends that Australia should take specific approaches to both fundamental research that develops new knowledge, and to priority-driven strategic, development and evaluation research.

Type	Focus in the Australian Context	Examples
Fundamental Research ... 	<ul style="list-style-type: none"> • A broad coverage of research areas to ensure local exposure to, and capability to interpret and evaluate, new knowledge • Focussed particularly on areas where Australia can lead the world due to particular competencies built up through a history of excellence and/or access to unique populations or circumstances 	<ul style="list-style-type: none"> • Asthma • Hypertension • Cancer • Heart Disease • Immunology
Strategic Research... 	<ul style="list-style-type: none"> • Where Australia faces unique issues or issues that are significantly over-represented or more severe than in other developed nations - and as a result under-researched • Or where an integrated approach is required to an urgent problem 	<ul style="list-style-type: none"> • Aboriginal health • Asthma • Skin Cancer • HIV/AIDS • Health Service Problems
Development and Evaluation Research... 	<ul style="list-style-type: none"> • Assessing new knowledge, wherever generated, and taking the developmental steps necessary to drive it into policy and practice for the benefit of the community • Evaluating the performance of new health service interventions, their costs and the extent to which they deliver benefits 	<ul style="list-style-type: none"> • Development and evaluation of clinical interventions and public health and health promotion programs • Evaluation of evidence-based clinical guidelines • Vaccination

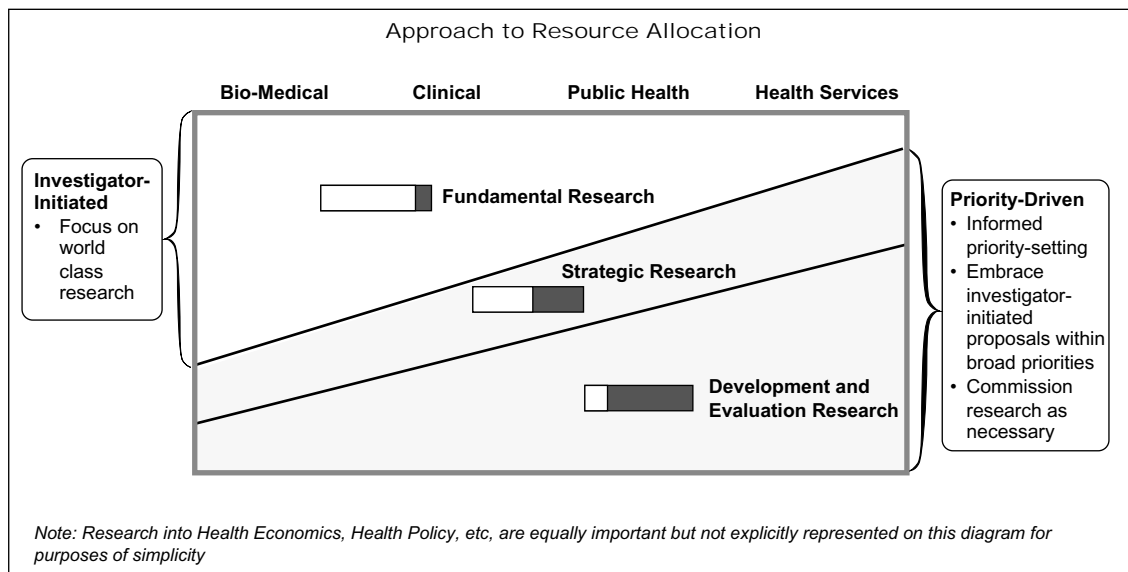
In **Fundamental Research**, a broad coverage of research areas is required to ensure local exposure to, and capability to interpret and evaluate new knowledge. Beyond this, Australia’s research effort should focus on areas where Australia can lead the world due to particular competence and a history of excellence (e.g. our strength in immunology, reproduction and hypertension), its access to unique populations (e.g. Australia’s

multicultural diversity or stable regional town populations) or unique circumstances (e.g. registries or databases).

The best way to identify research that satisfies these criteria is through competitive peer review of investigator-initiated proposals. Aligning research activity to, say, the burden of disease may make sense on a global scale but is inappropriate in the context of Australia’s global share of research output. Australia should allocate its resources where they can be most effective in contributing to the global research effort.

The Review has adopted the terminology “**Priority-Driven Research**” to refer to strategic, development and evaluation research that contributes directly, in the short to medium term, to population health and the effectiveness, efficiency and equity of the health system. These areas of research require a priority-driven research agenda, the commitment of a wide range of stakeholders, including Commonwealth and State health authorities and the capacity to integrate research-based knowledge into policy and practice.

Allocation of resources in priority-driven research may be through peer-review of investigator-initiated proposals within broadly defined priorities but may also be through responses to carefully formulated questions or commissioned research.



Strengthening fundamental and priority-driven research

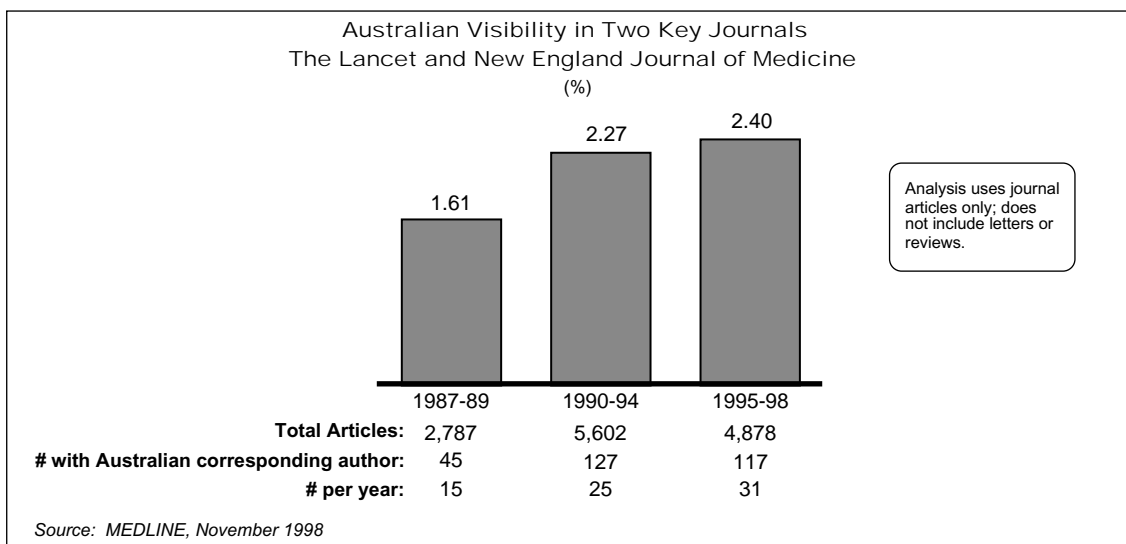
Current challenges

Australia has a proud tradition in health and medical research. With 0.3% of the world's population, Australia produces about 2.5% of the world's health and medical research output. Australian scientists have received four Nobel prizes for Medicine or Physiology, have been honoured by many other prestigious international awards and have been involved in many important medical breakthroughs.

Name	Award	Date	Field
Rob Baxter	Dale medal	1993	Endocrinology
MacFarlane Burnet	Nobel prize	1960	Immunology
John Byron	Volhard award	1976	Hypertension
John Chalmers	Volhard award	1998	Hypertension
John Coghlan	Dale medal	1987	Endocrinology
Suzanne Cory, Elizabeth Blackburn, Grant Sutherland	Australia Prize	1998	Molecular genetics
Peter Doherty	Nobel Prize	1996	Immunology
John Eccles	Nobel prize	1963	Neuroscience
Howard Florey	Nobel prize	1945	Penicillin
Colin Johnston	Volhard award	1992	Hypertension
Paul Korner	Volhard award	1982	Hypertension
Graeme Laver, Peter Colman, Mark von Itzstein	Australia Prize	1996	Pharmaceutical design
Barry Marshall	Lasker Award	1995	Gastroenterology
	Gairdner Prize	1996	Gastroenterology
Jack Martin	Chemofux prize	1988	Bone research
	Dale medal	1992	Endocrinology
	Neuman award	1994	Bone research
Don Metcalf	Bristol-Myers award	1989	Haematology
	Hammer prize	1988	Haematology
	Koch prize	1988	Haematology
	Wellcome prize	1988	Haematology
	Lasker award	1993	Immunology
	Gairdner prize	1994	Haematology
Jacques Miller	Kovalenko prize	1994	Haematology
	Gairdner prize	1966	Immunology
	Erlich prize	1974	Immunology
Gus Nossal	Saint Vincent award	1983	Immunology
	von Behring prize	1971	Immunology
	Rabbi Shai Shacknai prize	1973	Immunology
Vicki Sara	Ludovicus Hirschfeld medal	1989	Immunology
	Albert Einstein World award	1990	Immunology
	Rolf Luft medal	1993	Endocrinology

Source: DIST, <http://www.dist.gov.au/events/ausprize/ap98/index.html>; DIST, <http://www.dist.gov.au/events/ausprize/ap96/winners.html>, Stanley F et al (1994), *Research for a Healthy Society*, p25

Australian public health and clinical research continues to deliver high average citation rates and the rate of publication in leading clinical journals has been sustained.

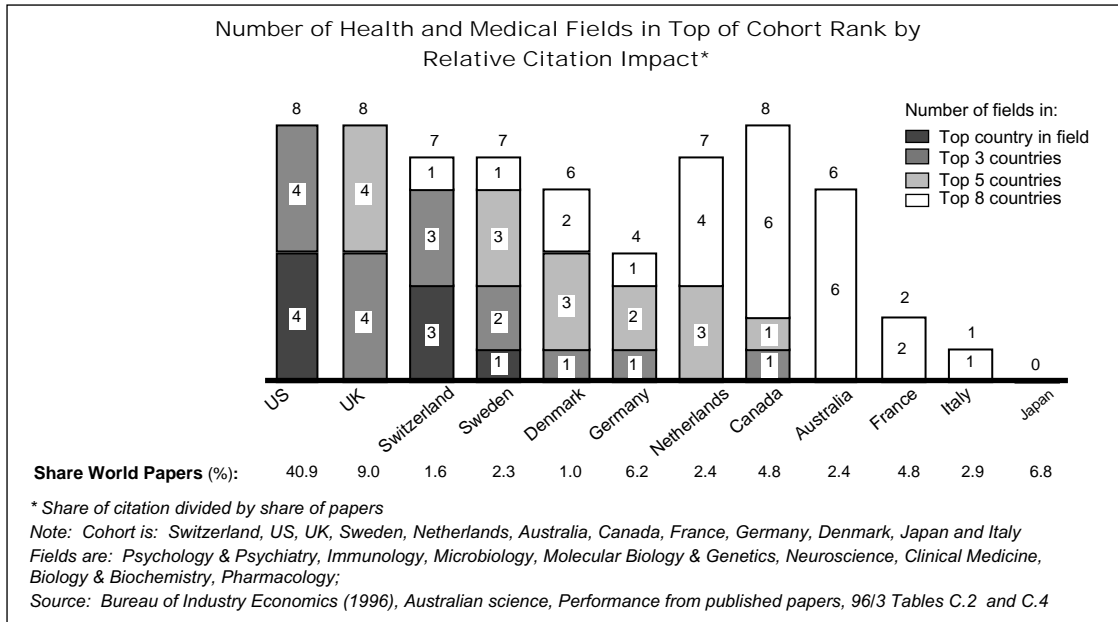


Such research provides a strong base on which to build Priority-Driven Research, capacities that are underdeveloped in Australia.

Priority-Driven Research is currently fragmented, lacks sufficient capacity, has no process for focussing on the highest priorities for the country, and shows unnecessary duplication between States. Much of this research is presently commissioned by health authorities without rigorous peer review which results in inconsistent quality. If this persists, it is likely that Australia will gain few of the benefits that research can offer for health outcomes and the effectiveness, efficiency and equity of health services.

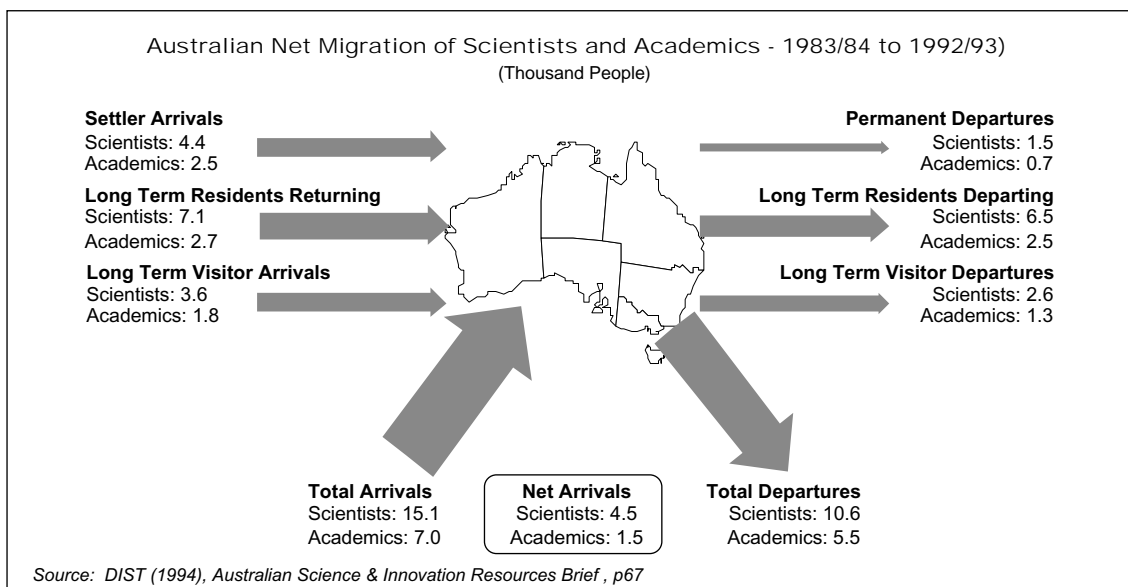
There are also early warning signs that Australia's ability to deliver improved health outcomes through health and medical research, and our strong and long-standing international research reputation, may be under threat.

An analysis of the relative citation impact across a range of Fundamental Research fields shows that Australia's research is strong in world terms. However, there is no cause for complacency. While the impact of Australia's research ranks consistently in the top eight countries across a range of fields, there is room for improvement compared with several countries including some of similar size. Furthermore, a number of countries have recently responded to the opportunities for health and medical research through large increases in their investment. Australia needs to act now to preserve and improve its reputation.



A number of factors are currently holding back Australian health and medical research: public investment in research is relatively low and as a result is spread too thinly; our processes and duration of grants may tend to encourage quantity of publications more than impact of publications; and our grant allocation systems may have impeded early movement into new sub-fields where international impact is high. If not addressed, these issues will threaten the fundamental science support essential for industrial development and for Australia's capacity to benefit from new knowledge.

Our health and medical research sector faces many other challenges, including international competition for the best researchers and concerns about salary levels and job security. Salaries are low in relation to the training, skills and time commitment required and in relation to what can be obtained in other countries or offered by other career paths.



A vision for the future

Australia needs a research sector where individual investigator-initiated, peer-reviewed research is supported and strengthened and supported as the core of the research effort. Through the implementation of new initiatives, it is necessary to have a talented and suitably skilled workforce sustained through effective recruitment, training and career development.

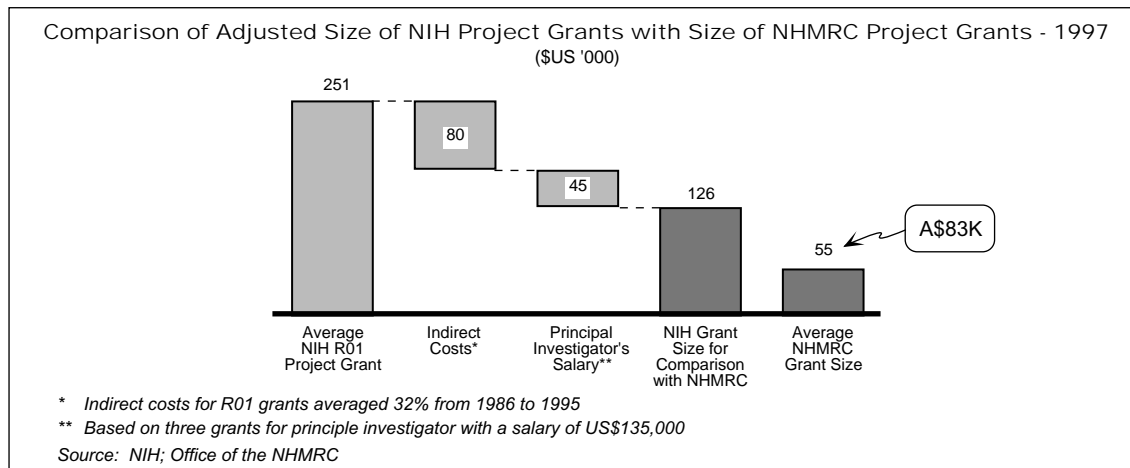
The thriving research sector of the future must also include a systematic process for developing a Priority-Driven Research agenda. This will enable investment in Priority-Driven Research to be more effective and efficient and will expand Australia's capacity to perform this research and routinely integrate the results into health policy and practice.

Fundamental research - What should be done?

The challenge for Australia is to attract intelligent, committed individuals to research; to develop their spirit of inquiry and their careers in stimulating, well-managed and productive research environments; to retain and reward the best and most productive researchers; and to capture the benefits of their research for the community. Achieving this requires a number of initiatives to address both education and workforce issues, as well as the structure of the health and medical research sector.

Research projects should be adequately funded to ensure that salary and on-costs are met. Grants and fellowships should be more portable to encourage collaboration of like minds in the most suitable environment. This would also entail a review of block funding arrangements to ensure effective competition for resources.

Larger, multi-disciplinary, investigator-initiated projects, research programs and networks should be encouraged to allow teams of researchers to work on projects. Currently the NHMRC grant size is well below that of the NIH and although grant holders often hold multiple grants, this is inconsistent with an effective team size of 5-12 working on one problem. These teams would also increase cross-disciplinary collaboration on issues that span a wide range of scientific disciplines.



The grant allocation process must be continually reviewed to ensure that the best, most relevant and independent peers review each application. Grant criteria should be set to fund world class, high impact research while promoting innovation, impact and accountability. Ideally, the criteria should be familiar to researchers around the world to encourage international peer review.

Critical mass in research institutions brings a range of benefits. International recognition and visibility is raised, equipment and facilities can be shared and professional management and support staff become financially sustainable. There is a range of organisational models that can capture these benefits, from virtual institutes to co-location to the large single institute model.

Advantages & Disadvantages of the Different Levels of Combined Research Activity				
1. Informal Collaboration	2. Formal Links	3. Virtual Institute	4. Co-location with shared management	5. Single Institute
Advantages		<ul style="list-style-type: none"> • Minimum requirement to establish professional management and governance • Cheap and flexible to set up • Maintain key staff inside universities and hospitals to breed the "next generation" 	<ul style="list-style-type: none"> • Combines autonomy with economies of scale in fixed costs and equipment 	<ul style="list-style-type: none"> • Strong shared vision • Consistent governance possible • Good economies of scale and support structures
Disadvantages		<ul style="list-style-type: none"> • More difficult to reap benefits of scale in equipment and support • May be difficult to hold together over time • Less daily interaction between researchers • Need to work harder to maintain links with universities and hospitals if not located together 	<ul style="list-style-type: none"> • Some models may limit investigator freedom and creativity • Need to guard against bureaucracy and hierarchy stifling innovation 	

Across the research community there is a range of systems and processes that can be shared. Ethical reviews can be streamlined and rationalised to reduce the burden of multi-centre trials, as can the proliferation of research registers. Expensive equipment and facilities can be shared to increase efficiency in a similar way to the Karolinska Institute in Sweden.

Shared Facilities at Karolinska Institute

- | | |
|---|---|
| <ul style="list-style-type: none"> • The Animal House at MTC • Animal Facilities at Soder Hospital • Experimental Animal Research, Karolinska Hospital • The Karolinska Institute MouseCamp • The Embryo and Genome Research (EGR) core facility • Cloning of Specific Peptides and Antibodies • DNA Sequence Analysis • DNA Sequence and Fragment Analysis • MRNA In Situ Hybridization • Substrate, Media, Buffer and Tissue Culture University • Biochemical Analyses on Blood and Spinal Fluid | <ul style="list-style-type: none"> • Large Scale Cultivation of Micro-organisms • Work with Micro-organisms at Biological Level 3 • Protein Analysis Center • Gnotobiology • Flow Cytometry Laboratory at MTC • KISAC Bioinformatics • Multimedia Development and Photographic Support • Symposium and Conference Co-ordination • The Swedish Twin Registry • Electron Microscopy • Human Centrifuge |
|---|---|

Source: Karolinska Institute, <http://www.ki.se/core/>

Improving the career structure and prospects in health and medical research must begin with education in schools and the community on the excitement and potential of science. Combined with the increased opportunities that the other initiatives proposed by this Review will deliver, this should raise the profile and appeal of a career in health and medical science.

Graduate training should be broadened and updated to produce more diverse and well-rounded graduates. The need for broader graduate training was identified in two areas:

- More rounded training, for example in patent law, finance, journalism, health management, to equip researchers to better develop the potential of their discoveries, to communicate about their profession to the community, and to prepare them for a range of career options.
- Strategic investment in a range of specialist capabilities for the post-genome era. The specialist capabilities that are currently in short supply and should be developed for the post-genome era include ethics, bioinformatics, mouse genetics, human genomics, genetic counselling and education, gene therapy, structural biology, protein chemistry, and gene array chemistry.

Australia should boost its stock of clinically trained in a range of disciplines. The combination of biomedical research with clinical research will be increasingly powerful in solving the mysteries of disease and developing better ways of managing it.

Two other areas, which submissions to the Review highlighted as being in need of capacity building, are indigenous health and research into emerging non-traditional therapies.

- Enhanced research in indigenous health is recognised as an important contributor to addressing the gross disadvantage in health status experienced by indigenous Australians. As with other aspects of indigenous health, participation and leadership by indigenous people in health research is an important requirement for this research to be effective in providing solutions to health problems.

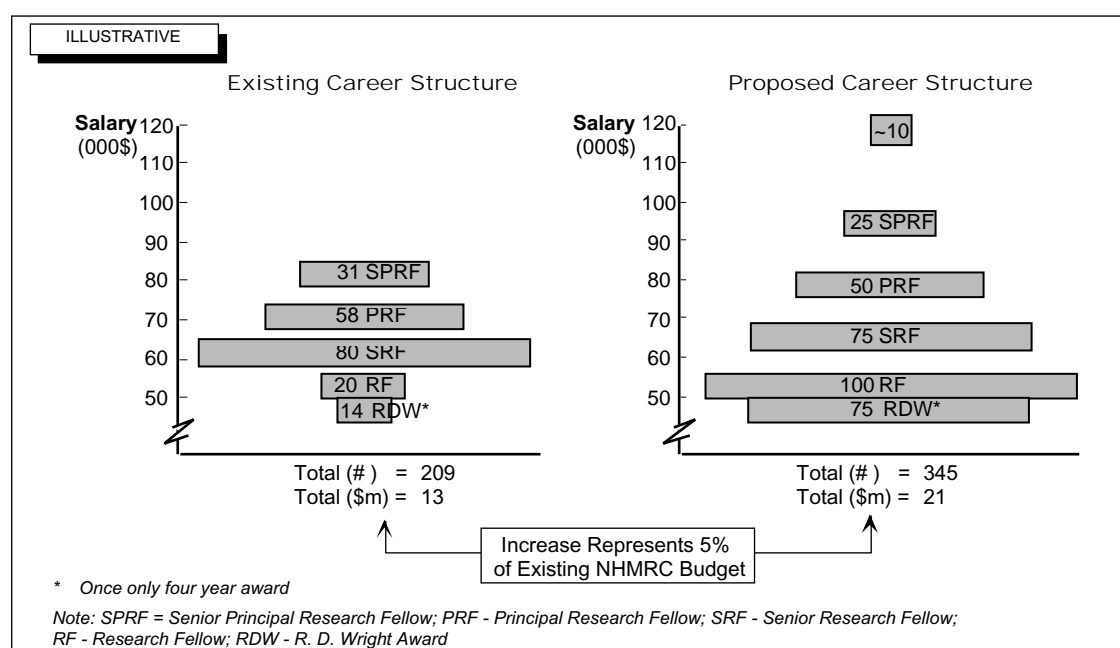
- The rapid growth and economic impact of non-traditional and complementary treatments provide sufficient justification for research in this area to be recognised as important.

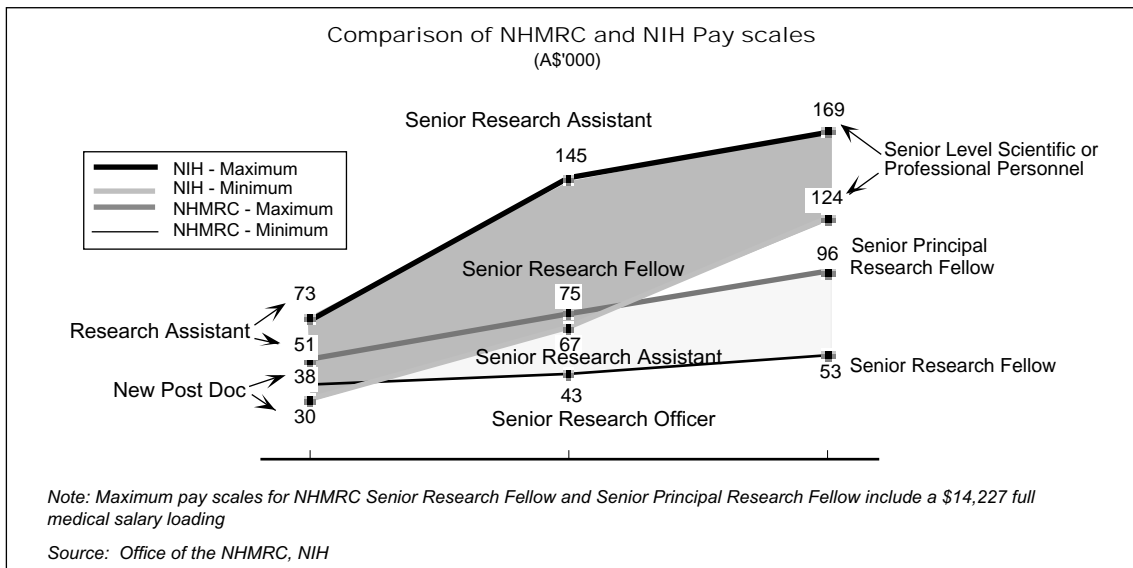
If Australian health and medical research is to attract intelligent, committed individuals to research, develop their spirit of inquiry and their careers and retain and reward the best and most productive researchers, then it must offer a career path that is both challenging and attractive to the best candidates. Australia must compete for the best researchers in a global market. It is assisted by the natural attractions of this country as a place to live, particularly for Australian-born researchers, but it must present a competitive offering.

Current career limitation on research assistants or research officers who do not wish to gain a PhD should be reduced, perhaps along the lines of the recent CSIRO scheme. New post doctoral researchers should not be discouraged from pursuing overseas appointments, but more structured exchange programs and offerings to foreign-based researchers would help attract and retain more of the best researchers at this level.

Developing researchers would benefit from a structured mentorship program. There should be realistic prospects of securing project grant support with a proportion of NHMRC funds quarantined for new researchers.

The current NHMRC fellowship scheme should be adjusted to allow more entry positions and create a more dynamic career structure. Simultaneously the pay scales should be steepened to allow Australia to adequately and competitively reward the very best researchers.





Fundamental Research – Recommendations and actions

1 An Effective Health and Medical Research Sector - Strengthen individual investigator-initiated, peer-reviewed research with effective team structures, grant allocation mechanisms, management and governance, and support from efficient shared systems

1.1 Reinforce individual investigator-initiated, peer-reviewed research, appropriately fund competitively selected research projects, and remove barriers to mobility of researchers and their funding between institutions, including block funded institutes

- Develop ongoing programs to promote investigator-initiated, peer reviewed research to stakeholders as the best approach for fundamental research (NHMRC)
- Appropriately fund research projects to cover average salaries and conditions negotiated through enterprise bargaining at host institutions including redundancy, and infrastructure (NHMRC, ARC, other funding bodies)
- Facilitate portability of fellowships and project and program grants in and out of institutions including block funded institutes (NHMRC)
- Restructure block-funding arrangements by increasing effective competition for a component of funds received by these institutions (NHMRC)

1.2 Where appropriate, encourage larger, multi-disciplinary, investigator-initiated projects, research programs and networks

- Direct real increases in government investment into larger projects and more programs, employing a variety of grant sizes and durations as appropriate for high impact research across all fields (NHMRC)
- Extend usual project grant duration from three to five years over a period of time (NHMRC)
- Create a portfolio of network grants, as proposed by the Research Committee, to promote cross-disciplinary collaboration (NHMRC)
- Develop mechanisms to fund research such as cohort studies that require long-term funding commitment (NHMRC)

Fundamental Research – Recommendations and actions (continued)

1.3 Continuously review the grant allocation system to ensure that the best, most relevant and independent peers review each application against internationally recognised criteria to identify and fund world-class, high-impact research

- Develop bilateral agreements with other countries to cooperate in peer review and use electronic communication to make greater use of international peers especially for program, network, centre and block grants and fellowships (NHMRC)
- Adopt grant assessment criteria that are internationally recognised, well developed and specifically address concerns about promoting innovation, accountability and international impact (NHMRC)
- Quarantine a portion of NHMRC grant funds for innovative, higher risk research (NHMRC)

1.4 Create incentives for researchers and groups to come together with stronger management and governance and to strengthen links with teaching and patient care

- Facilitate research units and institutions to find potential partners with whom to interact regularly and share infrastructure, fund raising, management and governance (NHMRC)
- Allocate new, short-term funding by a competitive process to introduce or build professional management in a number of research groups, preferably covering a variety of organisational forms, including virtual institutes, with at least 150 or more research staff (NHMRC)
- Develop explicit plans and coordinating mechanisms to strengthen links between centres of research excellence and centres of teaching and health care practice (Institutes, Universities and NHMRC)

1.5 Improve efficiency and effectiveness of shared systems and processes

- Develop a more efficient and effective ethics committee system particularly with respect to uniformity of application processes, quality of review and the handling of large, complex and multi-centre proposals (AHEC)
- Audit existing research registers and develop plans to simplify the process and reduce the load on researchers, while satisfying the needs of the users, and improving accuracy (NHMRC)
- Promote sharing of infrastructure such as registers, databases, research libraries, genetically modified mice facilities and expensive equipment (NHMRC)

2 Education and Workforce - Enhance recruitment, training, and development of a talented and suitably skilled workforce through a range of initiatives including an improved approach to career development

2.1 Attract students by exposing them to the excitement of science, presenting inspirational and well-rewarded role models and informing them of realistic career opportunities

- Develop programs for students from primary to tertiary levels to observe and participate in scientific research (NHMRC, AVCC, Academy of Sciences, ASMR)
- Actively promote a range of researcher role models (NHMRC, AVCC, Academy of Sciences, ASMR)
- Develop research components for undergraduate and graduate health and medical degrees including some in cooperation with external centres of research excellence (Universities, Research Centres and Institutes)

Fundamental Research – Recommendations and actions (continued)

2.2 Broaden and update graduate training to produce more diverse and well-rounded PhD graduates

- Promote broader training within health and medical research PhD graduates including, for example, patent law, finance, journalism, health management, research coursework, and early exposure to different laboratories (DETYA, NHMRC, Universities)
- Develop stronger links between universities and external centres of excellence to stimulate PhD and undergraduate training in developing fields and methods such as genetics, molecular biology and bioinformatics (Institutes, Universities)
- Encourage wider acceptance of the trend for universities to break down traditional departmental barriers to provide a more multi-disciplinary approach to research (NHMRC, DETYA)

2.3 Build capacity for quality research involving health practitioners of all kinds including those in under-researched areas such as alternative and complementary therapy

- Develop and promote training of clinician researchers by: encouraging combined MBBS/PhDs and MD/PhDs; offering NHMRC Fractional Fellowships to allow clinical fellows to continue to practice, and exposing clinicians to quality research through greater interaction with centres of research excellence (NHMRC, Universities)
- Ensure broad representation of research backgrounds on grant assessment panels including clinical, public health, and health services research expertise (NHMRC)
- Encourage partnerships between research scientists and health practitioners in applying for research grant support (NHMRC)
- Train and develop indigenous health workers as researchers (NHMRC, PHERP)
- Recruit and train researchers in a range of under-researched areas such as non-traditional and complementary treatments for which there is recognised tertiary training (NHMRC, Universities)

2.4 Improve research career development to create opportunities for, and reward the best researchers

- Develop ways for talented and experienced research assistants and research officers to develop their careers and remuneration beyond present limitations without doing a PhD (NHMRC, Research Institutions)
- Form bilateral agreements with other countries for exchange of early postdoctoral researchers (NHMRC)
- Create a strong culture of mentorship by developing a program to build mentoring skills amongst researchers and by embedding mentoring requirements into fellowship awards (NHMRC, Research Institutions)
- Quarantine a portion of NHMRC funds for three year project awards to new investigators, perhaps incorporating a mid-term review and mentorship requirements (NHMRC)
- Track Australian researchers overseas, maintain mentor contact, and assist the best to apply for returning fellowships (NHMRC, Research Institutions)
- Develop, in collaboration with research institutions, industry and private non-profit organisations, a number of generously funded fellowships to attract or retain the best 3-7 year postdoctoral researchers to Australia (NHMRC)
- Reinvigorate the NHMRC Fellowship scheme by: introducing more entry positions; steepening the pay scales; and adopting measures to ensure that the best researchers have a realistic opportunity to move through to the top of the scheme (NHMRC)

Priority-driven research - What should be done?

Effective strategic, development and evaluation research contributes directly to saving lives and improving quality of life for all Australians. This requires a priority-driven research agenda, the commitment of a wide range of stakeholders, including state health authorities, the capacity to do the research, and the capacity to integrate research-based knowledge into health policy and practice. It also requires a well-managed and well-resourced peak research body to drive the effort and minimise duplication.

A consultative priority program requires four major components. First, structure and information are required to help define the problems and provide input to the process. Second, a competent and adequately supported body must provide leadership. Third, the participation of researchers, health care providers and consumers is necessary to ensure that the priority issues are well formed, amenable to research, and have broad community support. Last, the full range of present and prospective issues around health and health care should be considered in seeking candidate areas for priority research.

Ideally, the funding for strategic, development and evaluation research would come from existing sources, that is, funds that are already spent on research in an uncoordinated and probably sub-optimal way by Government health authorities and health services around the country. This was, to a substantial degree, the approach adopted in the UK where 1.2% of National Health Service expenditure is now directed to health service research and development. Local conditions necessitate that a more phased approach would have to be undertaken with a comparatively small allocation initially, growing as results and benefits become clear.

There must be tailoring of the allocation mechanisms to the needs of this research program, given its focus on strategic issues. Solely investigator-driven initiatives will not meet the needs, given the close links to policy. However, there should be a role for investigator-initiated research in the program. This will ensure that maximum creativity is brought to bear in seeking research-based solutions to health service problems. In addition, it will help to recruit a broader range of investigators, and research methods, to this field of research and to keep investigators motivated and committed.

The issue-based nature of priority-driven research requires multi-disciplinary research teams, integrating social and behavioural sciences, economics, epidemiology, clinical and biomedical sciences to solve complex but tractable problems. The Review advocates a more substantial and sustained commitment to building several large, multi-disciplinary centres or networks of excellence with strategic, development and evaluation research capacity.

In a discussion paper on improving health research dissemination and uptake¹, two main problems were highlighted. First, researchers and decision-makers operate more or less independently and with limited understanding of each other's field of activity. Second, there is an over-emphasis in research on clinical decision-makers and a pre-occupation with practitioner behaviour change.

The review recommends a range of initiatives that were suggested in this report to help with the dissemination and uptake of research results.

Priority-Driven Research – Recommendations and actions

1 Developing Priorities - Develop a consultative priority-setting program, managed through an enhanced NHMRC, to establish priorities across the full array of health issues

1.1 Establish a consultative priority-setting process through a specific arm of an enhanced NHMRC including researchers, health care providers and consumers

- Specify a detailed priority-setting process in accordance with the strategic framework and estimate resources needed to operate the process (NHMRC & DHAC)
- Nominate and specify the role of an NHMRC committee to oversee the process, and determine its relationships with other bodies such as NPHP, AHMAC, private hospitals, health insurers, professional practitioner bodies and others (NHMRC & DHAC)

1.2 Specify and develop information to support the priority-setting process

- Specify in detail the information needed to inform the research priority-setting process and how it should be presented, request AIHW to take on the task of preparing this information and negotiate on the resources required (NHMRC, DHAC & AIHW)
- Develop technical capabilities within the Office of NHMRC to support the synthesis and analytical components of priority-setting (NHMRC)

1.3 Consult with researchers, health care providers, and consumers in setting priorities across the full range of health issues

- Adequately represent key research, health care and community stakeholders on the committee managing the research priority-setting process (NHMRC)
- Involve a broader range of participants at lower levels of the process, including consumers and people involved in day-to-day health care delivery, management and policy formation (NHMRC)
- Ensure that the priority-setting process is able to encompass the full range of health issues that will face the population in the future (NHMRC)

1.4 Build on the work of the Strategic Research Development Committee to address urgent research needs

- Strengthen the existing system, as developed by SRDC, to meet health system needs for urgent research (NHMRC & DHAC)

¹Jonathan Lomas (1997), Beyond The Sound of One Hand Clapping. A Discussion Document on Improving Health Research Dissemination and Uptake, University of Sydney Publishing Service

Priority-Driven Research – Recommendations and actions (continued)

2 Application of the Research Investment within these Priorities - Identify sources and efficiently and rigorously allocate and track funds devoted to priority-driven research

2.1 Identify initial funding and focus early research efforts on establishing a clear case for increasing investment over time in priority-driven research

- Negotiate national, cost-shared funding for a national program of priority-driven health and medical research (DHAC)
- Focus early research on areas with high potential for financial payback to facilitate increased investment over time (DHAC & NHMRC)
- Quantify health and health service improvements resulting from research outcomes and build the case for continued and increased funding (DHAC & NHMRC)
- Negotiate agreement to a nationally coordinated approach, process, instrument and minimum data set for an audit of health and medical research supported at health authority level and below (DHAC & NHMRC)

2.2 Adopt a range of funding tactics extending from investigator-initiated research targeted to priority areas to commissioned research on carefully formulated questions, and allocate funds by way of rigorous, scientific peer-review of competitive proposals

- Consider new grant structures that better suit the needs of strategic, development and evaluation research (NHMRC)
- Develop a mix of funding tactics that ensures a tight focus on the defined priorities and the best use of available research expertise (NHMRC)
- Include an iterative process involving a review committee of stakeholders and experts and the investigators in moulding research questions and proposals to the priority-driven research program's objectives (NHMRC)
- Include scientific peer review in processes for allocation of funds for priority-driven research (NHMRC)

3 Capacity to Execute this Research - Build capacity to execute strategic, development and evaluation research across the broad spectrum of research fields

3.1 Develop several multi-disciplinary centres of excellence for strategic, development and evaluation research as focal points for building capacity and visibility

- Develop a proposal and process for establishing and supporting several large multi-disciplinary centres, primarily based around public health, clinical practice, health services, health policy and health economics, to give scientific leadership to Australia's efforts in strategic, development and evaluation research (NHMRC)

3.2 Improve research training and mentoring for researchers and decision-makers to promote effective strategic, development and evaluation research across the full range of health issues

- Encourage review of the content of undergraduate and honours science and health science courses to give more options for those with an interest in strategic, development and evaluation research (DETYA)

Priority-Driven Research – Recommendations and actions (continued)

- Encourage, through competitive schemes similar to the ARC SPIRT Scheme, Special Research Centres or Cooperative Research Centres, development of capacity in research areas of deficiency such as clinical research, health services and health policy (DHAC, NHMRC, DETYA)
- Institute a scholarship scheme or other means of support, perhaps linked to a Special Research Centres program for trainee and early researchers in applied fields (NHMRC, DHAC, DETYA)
- Develop training for researchers and decision makers to improve identification and specification of research relevant to health service needs (DHAC, State and Territory health authorities)

3.3 Create career positions and pathways for practitioners of strategic, development and evaluation research

- Direct a proportion of Commonwealth funding to the States and to private health funds based upon performance agreements which specify the need for and impose contractual obligations to carry out development and evaluation research (DHAC)

3.4 Maintain support for existing shared resources and build new ones, exploiting information technology

- Continue support for the Australasian Cochrane Centre (NHMRC & DHAC)
- Increase ethically acceptable access to and linkage between large population health databases for research purposes (ABS, AIHW & DHAC)
- Assess the UK register's use and usefulness over the next two years with a view to implementing a clearing-house of work-in-progress in strategic, development and evaluation research supported by Commonwealth, State and Territory health authorities and local health services (NHMRC & DHAC)

4 Interface with Policy and Practice - Improve mechanisms for integration of research-based knowledge into policy and practice

4.1 Improve understanding and communication between researchers and decision-makers

- Develop ways of increasing communication between researchers and decision-makers at each step in the process of formulating, funding, doing, reporting and using the results of priority-driven research (DHAC, State and Territory Health Authorities & NHMRC)

4.2 Disseminate knowledge widely to practitioners, managers and the community to build understanding and bring pressure to adopt best practice

- Recognise research reports targeted specifically to decision-makers for the purposes of measurement of research performance (NHMRC & DETYA)
- Develop a strategy for early and effective dissemination of research results to practitioners, policy-developers, decision-makers and consumers in Australia (NHMRC & DHAC)
- Require applications for strategic, development and evaluation research to include transfer plans and commitments (NHMRC)
- Fund research transfer infrastructure within strategic, development and evaluation research organisations, including expertise in mass media, web sites and public relations (DHAC & NHMRC)

4.3 Develop methods and infrastructure to promote the uptake of new knowledge into practice, and prompt improvement where transfer is deficient

- Fund research into promoting the uptake of knowledge into practice and measuring research payback (NHMRC)

Priority-Driven Research – Recommendations and actions (continued)

- Develop capacity within health authorities and health services to identify relevant research and package and transmit it to decision-makers. This process would probably be assisted by the part time appointment of active researchers in State and Federal policy roles (DHAC, State and Territory health authorities)
- Train decision-makers in the techniques of research implementation, including skills in evidence-based decision analysis and critical appraisal, and incorporate research uptake into their job descriptions (NHMRC & DHAC, State and Territory health authorities)

4.4 Improve management of research and development at all levels of the health system

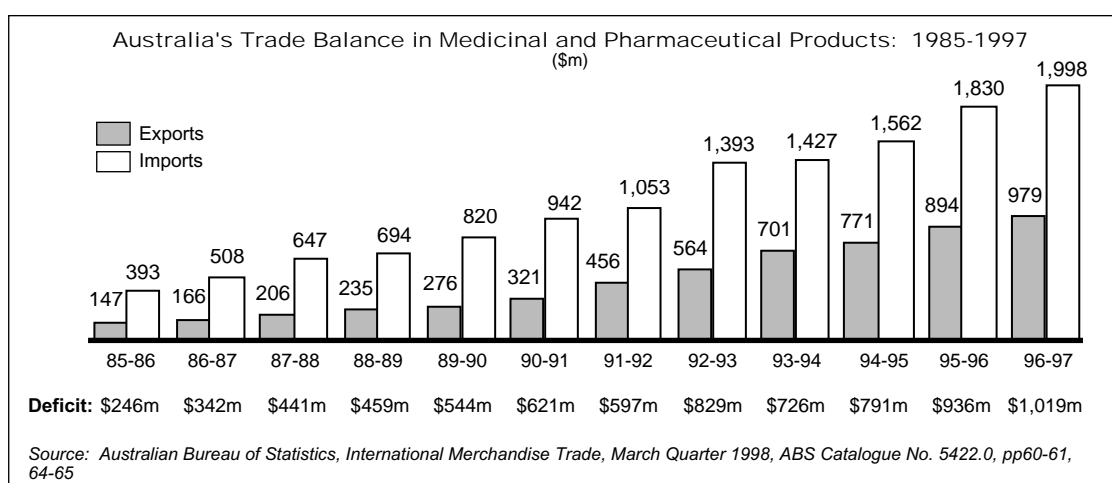
- Encourage appointment of R&D Directors in States and Territories that do not already have one (DHAC, State and Territory health authorities)
- Fund part salary of an R&D Director in area or regional health services and teaching hospitals, conditional on operation of the audit and accountability mechanisms and upward flow of a minimum data set on research conducted. Incorporate into Medicare Agreements (DHAC, NHMRC)
- Design a process by which health authorities, area or regional health services and teaching hospitals can better manage internal research activities with audit and accountability mechanisms (DHAC, State and Territory health authorities, NHMRC)
- Develop clinical epidemiology, biostatistics and research data management capacity in hospitals to assist in research, evidence-based policy development and quality management (DHAC, State and Territory health authorities, NHMRC)

The place for private industry

Current limitations

Present industry funding for health and medical research in Australia is low by international standards. While the Australian pharmaceutical industry has increased its research and development activity over six-fold to 6% of sales turnover (\$250 million) in the ten years to 1998, pharmaceutical industry R&D expenditure worldwide is 15% of sales turnover. Australian investment for new industries such as biotechnology is substantially less compared with that being made overseas.

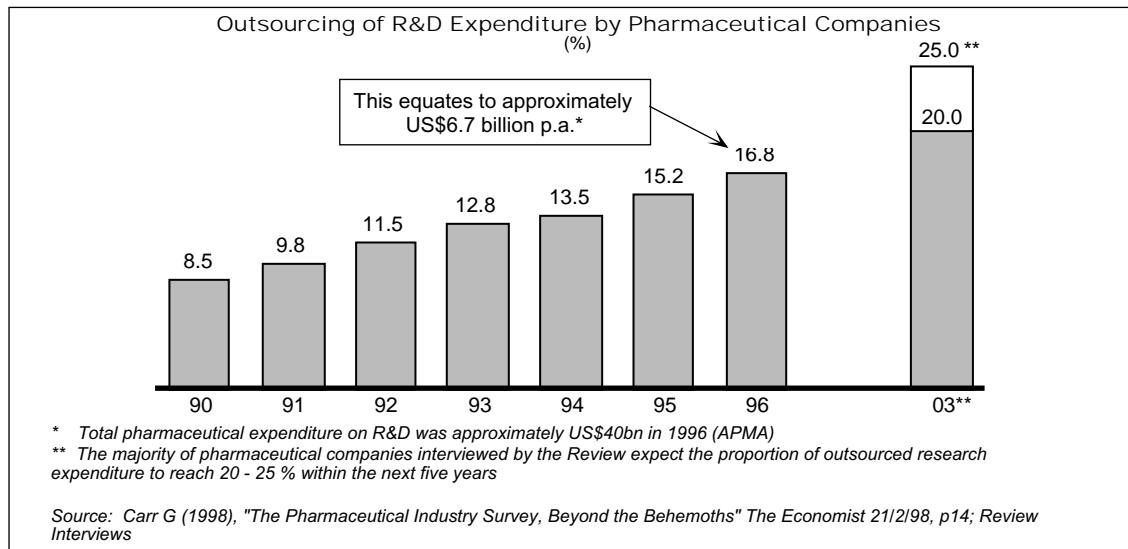
This lack of investment limits the opportunities for community benefits from health and medical research discoveries that benefit the entire community and reduces availability of career options that will attract young scientists to research. Currently, Australia has a growing \$1 billion negative trade balance in medical and pharmaceutical products and social trends make it very likely this will increase. An ageing population, combined with rising consumer expectations and the demand for new treatments all point to increased consumption, and hence imports, of medical products and technologies.



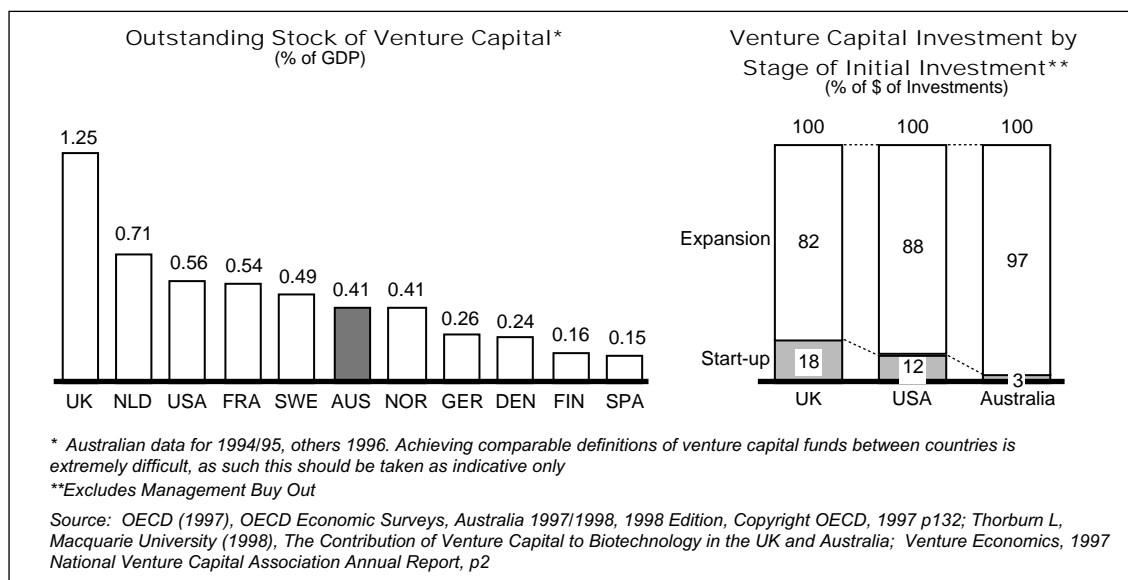
Although some government support schemes have promoted industry investment in Australia this now seems at risk as these schemes are scaled back.

Now is a critical time for industry investment, which has enormous potential to create wealth and knowledge-based jobs for Australia. Biotechnology is likely to be the next revolution beyond the information revolution and is gathering momentum. Australia has the beginnings of a biotechnology industry, but activity is still small relative to countries such as the US and UK, which are taking deliberate steps to promote further investment. The formation of new business enterprises is a key factor in successful commercialisation of research discoveries. Simultaneously, large pharmaceutical companies are increasing their

out-sourcing of research and development to academic research institutions and specialised biotechnology firms and opportunities abound.



But there are a number of factors limiting the formation of new biotechnology ventures in Australia, particularly lack of access to venture capital for start-up enterprises. Capital gains tax is a major barrier to the flow of capital into new business. Analysis suggests that the investment return for a hypothetical portfolio of biotechnology ventures would be 25% to 40% lower in Australia than in the US or UK, due solely to different tax regimes. In addition, some of the incentives for research and development (such as the 125% R&D tax deduction) are structured so that they cannot be passed on to investors pooling their resources through a professionally managed portfolio.



What could be achieved

A flourishing industry sector is critical to reinforce the contributions from the research and government sectors. The development of vibrant biotechnology and pharmaceutical industries through continued support for fundamental research, partnered by policies to foster investment, would go a long way to securing the future of health and medical research in this country.

Through a series of well-planned and structured initiatives, it is possible to create favourable conditions for the transfer of research-developed technology and the formation of new businesses around it.

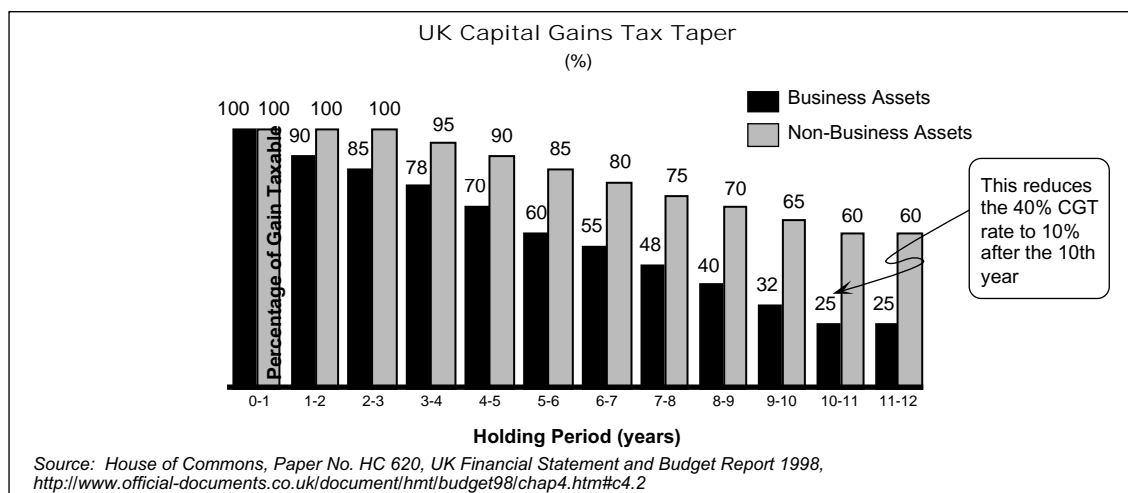
Setting priorities

Australia has traditionally been very good at research, but deplorably bad at capturing the value of its intellectual property. Increasing demand for improved health and medical outcomes means that Australia can no longer accept this condition and must adjust its culture and mechanisms urgently before the opportunities of the biotechnology and pharmaceutical industries pass us by.

The fundamental research endeavour must be complemented with a culture that captures the value of those discoveries once made. Success must be recognised and role models must be visible for researchers who are looking to commercialisation. As well, barriers to researcher involvement in commercial enterprises must be removed if discoveries are to be translated into health benefits for the Australian community.

Specialist management skills need to be made available to innovative enterprises by both local training and the attraction of expertise from overseas. Clusters of biotechnology industry would raise the industry's profile to better attract and concentrate valuable resources such as these.

Capital for new innovative enterprises can be created through targeted government programs such as the IIF and R&D START program and through the private capital market through changes to the capital gains tax system that encourage industry growth. One model for such a scheme is the capital gains tax taper that has been recently introduced in the UK. Here, long term investors supporting industry growth are rewarded with a reduced capital gains tax rate after several years of investment.



Established industries such as large pharmaceutical companies should also continue to be encouraged to invest in Australia. These industries are an integral part of the commercialisation of our medical discoveries and bring much needed technical expertise and commercialisation skills. A stable and competitive political, economic and tax environment is essential to their continued presence in this country.

Industry sector - Recommendations and actions

1 Technology transfer and new business formation - Develop the culture and management skills needed to support technology transfer and new business venture establishment

1.1 Develop a research culture that is positive toward commercialisation, transfer of researchers to industry, risk-taking and wealth accumulation

- Develop programs to reduce cultural barriers to risk taking and entrepreneurship such as incorporating measures of commercialisation like patents in assessment of track record, and promoting education programs for researchers (AVCC, NHMRC, DETYA)
- Build a network of role models and mentors from ranks of successful academic entrepreneurs and raise their visibility (Employer Groups, DISR)
- Investigate and remove any barriers for researcher involvement in new business enterprises, in particular ability to hold equity, accept directorships and move between academia and industry (AVCC, DISR)

1.2 Build management skills and approaches to maximise new venture success rates

- Develop skilled management for research enterprises and technology ventures, for example, by developing specialised courses within one or more leading management schools to cross-train scientists in management and managers in science, and by attracting expertise from overseas (DETYA)

Industry sector - Recommendations and actions (continued)

- Establish and publicise principles for maximising industry success in the development and management of biotechnology ventures, such as commercialising patentable discoveries rather than using investment funds for fundamental research; developing platform technologies versus single molecule drug candidates; employing independent international review of investment opportunities and independent scientific directors (DETYA, DISR)

1.3 Develop geographic clusters of biotechnology and research organisations

- Investigate ways to encourage geographic concentration of research efforts, particularly around potential biotechnology clusters (DISR, State Governments)
- Develop programs with State Development Departments and local government to remove barriers to growth of biotechnology clusters around existing centres (State Governments)

2 Capital for new business enterprises - Implement a competitive capital gains tax regime and increase new venture start-up support to ensure that there is an adequate flow of capital to new biotechnology ventures

2.1 Lower capital gains tax barriers to the flow of venture capital funds in Australia

- Make the capital gains tax regime internationally competitive, principally by clarifying that limited partnerships will be “looked through” for the purposes of assessing capital gains tax liability of superannuation and pension funds investing in new biotechnology ventures, i.e. US pension funds will face zero tax and Australian superannuation funds 15% (DISR, Federal Government)
- Reduce capital gains tax liability for long-term active investment in new biotechnology ventures along the lines of the recently introduced UK arrangements, and apply this to all investors including superannuation funds (DISR, Federal Government)

2.2 Continue existing early-stage assistance to new venture start-ups and monitor its effectiveness with biotechnology

- Continue the current CRC program (DISR)
- Monitor and evaluate the performance of the IIF and PDF programs in relation to the flow of early stage capital to biotechnology once venture capital initiatives are implemented. Monitor against expectations that at least \$50 million per year will be necessary from 2000 to support investment in development and commercialisation of research discoveries, and that further funds may be required (DISR, NHMRC)

3 Investment by established industries - Support and enhance the presence and research investment of established pharmaceutical and related industries

3.1 Achieve a world competitive basis for investment by major established firms such as pharmaceutical companies to reinforce other initiatives

- Develop an ongoing comparison of the relative value of incentives and tax treatment in Australia versus other competing countries in order to inform the policy process (DISR)
- Publicise these comparisons, and the role and value of established pharmaceutical and medical companies in Australia, to policy makers (DISR)
- Develop collaborative research grants for joint industry-researcher proposals based on the ARC SPIRT scheme (NHMRC)

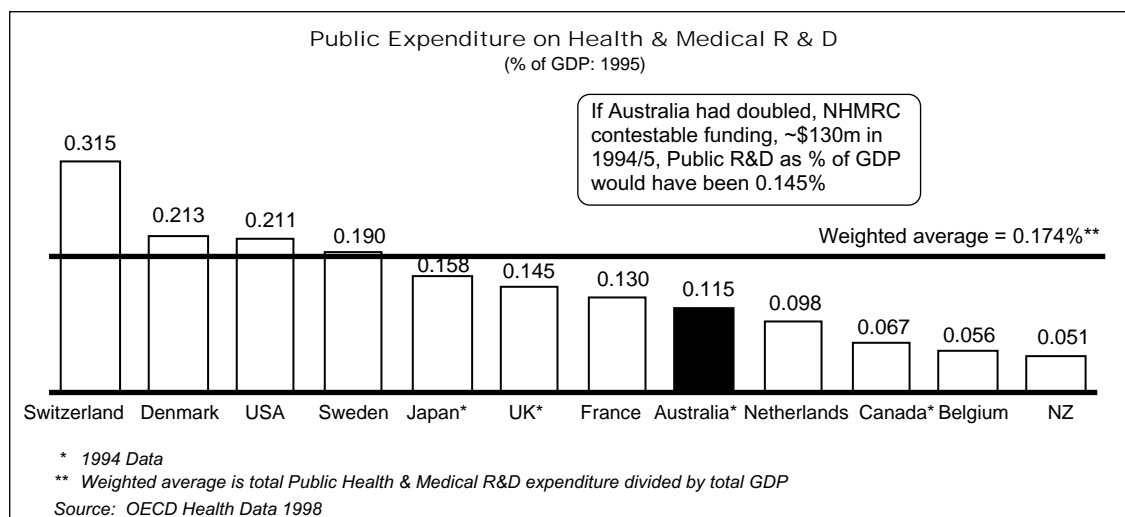
Maximising Government resources

Current situation

There are few areas where government investment can provide the range of benefits that can arise from public spending on health and medical research. Mortality rates from heart disease and stroke have decreased dramatically over the last 30 years, vaccines for hepatitis A and B have been developed and Australians live almost completely free of diseases such as polio, tetanus, smallpox, measles, mumps and rubella. Death rates from cancer have started to fall, strong public health policies on tobacco are in place and new antibiotics maintain our ability to cure life-threatening infections. Australian research has contributed to this quality of life in a number of ways.

The Australian public strongly supports health and medical research and believes in its benefits to quality of life. Health and medical research findings are amongst the most heavily covered issues in the Australian media, and charitable community support for health and medical research is widespread.

Yet, public investment in health and medical research is low by OECD standards. Other developed nations are rapidly expanding their investment in health and medical research to gain the anticipated health, health care and economic benefits.



The administrative funding and support to the NHMRC has become progressively weaker over the last two decades. An under-funded administration combined with the increasing size and complexity of the research sector has diminished the standing of the NHMRC amongst the professional and academic community on whom it depends for support.

The infrastructure required to support the Australian health and medical research is unsatisfactory. Infrastructure funding is low, and what there is is very poorly linked to the grants that are used to fund research projects.

Future directions

Turning this situation around will require a NHMRC that is properly structured and resourced to fulfil its brief as Australia's peak health and medical research and advisory body. An essential component of making this change will be the appointment of a full-time Chief Executive Officer to reshape the organisation and build its visibility and strategic potential.

By making these changes, it will be possible to further engage the community and involve a far-greater number of Australians as stakeholders in the research effort. There is an opportunity for the community to become more active and organised in advocating and supporting research to improve health outcomes, supported by the research sector better informing the community about the scientific process, its purposes, risks and results.

Government funding for health and medical research needs to be increased to a level that is consistent with other OECD countries. This would allow properly funded grants to be provided to 20%-30% of applicants and sufficient, well-allocated infrastructure and equipment for the funds to be invested efficiently. Large, potentially high impact research projects would be adequately funded in preference to increased numbers of lower budget, lower impact studies.

This increased Government investment should be monitored in terms of impact for both fundamental and priority-driven research and if outcomes don't eventuate then investment should be revised down to current levels.

The rationale for Government investment

Investment in health and medical research is a legitimate core role of Government. First, Federal and State governments, as primary providers of health services to the community, require research to continually improve the ability of these services to enhance quality of life for all Australians.

Second, research creates benefits that accrue to society rather than to the researcher or to the sponsor of the research. New knowledge generated by research is published in papers that can be freely read and expanded upon by anyone around the world with appropriate skills. Knowledge from a range of sources is combined and built upon, sometimes over many years or even decades, before tangible value is realised. Under these circumstances,

and without public support, individuals or private profit-oriented organisations would not invest sufficiently in research to create maximum benefit for society as a whole.

There are several reasons why the Australian government in particular should enhance its role as investor in health and medical research:

- Research can improve the health and quality of life of all Australians;
- Greater efficacy and efficiency in the delivery of health services can be achieved through medical advances, thereby reducing pressure on the health system;
- Australia has a valuable opportunity to build on its strong health and medical research base to develop an important biotechnology industry;
- Australia must retain the ability to interpret, synthesise and use knowledge and transfer technology into applied health care, wherever generated;
- Research offers Australia the potential to manage its financial exposure to the increasing cost of imported medical products and technologies. As medical technologies and new drugs evolve, Australia should develop its own intellectual property to balance its trade position;
- Australia's standing as a developed nation requires that it retain the skills and capacity to contribute to the scientific investigation and management of emergent global crises such as HIV/AIDS, drug resistant malaria and Hepatitis C;
- Research practice creates a high quality environment for teaching and health care delivery characterised by scientific rigour and continuous improvement;
- Health and medical research contributes to national pride, to a national self image as a developed, technologically advanced society and to the nation's culture;
- Full participation and international collaboration in research affords Australia the opportunity to influence the agenda of international forums.

Public sector - Recommendations and actions

1 The National Health and Medical Research Council - Enhance the organisation, management and resourcing of the NHMRC

1.1 Appoint as full-time Chief Executive Officer an eminent scientist with leadership and management skills to lead and reshape the NHMRC to realise its full potential as the peak body for health and medical research

- Prepare a position description and implement an international search for a full-time CEO of the NHMRC. The appointment should be made during 1999 (Minister for Health and Aged Care, NHMRC)

1.2 Support the major NHMRC functions with full-time senior managers with strong research or health care backgrounds and dedicated, research-literate secretariat staff while retaining the Office within the DHAC

- Define roles and appoint other senior managers in relation to each of the principal committees of the NHMRC (including the Priority-Driven Research Committee as recommended in Chapter 3) (NHMRC, DHAC)
- Define the relationship between the Office of the NHMRC and the Council and the Office of the NHMRC and the Secretary of DHAC (Minister for Health and Aged Care, DHAC, NHMRC)

1.3 Provide governance and advice needed in the context of these full-time management initiatives by recasting the roles and composition of the Council, the Council Executive and the Committees

- Develop guidelines for operation of the Council, its Executive Board and the Committees in recognition of the new full-time scientific management (NHMRC)
- Constitute a ten to twelve member Executive Board with broad representation including 3-4 State and Territory representatives and an eminent, experienced chairman (NHMRC)
- Review the composition of other committees to ensure adequate representation from users of research such as representatives from State and Territory health authorities and consumers on the Priority-Driven Research Committee (NHMRC)

1.4 Strengthen NHMRC obligations and linkages to the DHAC and other health departments and bodies through formal agreements

- Develop Memoranda of Understanding between NHMRC, DHAC and State and Territory health authorities to cover definition of roles and responsibilities, performance of services and delegated authorities (NHMRC, DHAC, State and Territory health authorities, etc.)
- Formally clarify relationships between NHMRC, AHMAC, NPHP, AIHW and ARC (NHMRC, AHMAC, NPHP, AIHW, ARC)

Public sector - Recommendations and actions (continued)

1.5 Assess NHMRC's administrative funding in the light of this reorganisation, the roles of the NHMRC envisaged by this Review, and relevant international benchmarks

- Determine the level of administrative funding and support required for the NHMRC under the new arrangements, and provide the funds (DHAC, NHMRC)

2 The Community - Engage and involve the community as stakeholders in the research effort

2.1 Involve the community in the research process and communicate about the role, benefits and results of research, consequences of new fields such as genomics, and ethical issues

- Involve the community in setting the agenda for priority-driven research (NHMRC)
- Consider whether grant conditions should require greater commitment to informing community participants in research about the purposes, risks and results of research in which they are involved (NHMRC)
- Promote public understanding and appreciation of research and "how science is done" through several initiatives such as organised direct communication by "citizen scientists" to the community; more public communication from NHMRC and its Committees; and programs like the CSIRO community education and participation schemes (NHMRC, community groups)
- Consider whether devices like disease, organ or patient group based streams within the NHMRC research administration processes should be adopted to raise the relevance of the research to the community (NHMRC)

2.2 Develop an effective, cohesive voice in the research sector for communication to politicians and policy makers

- Develop an ongoing program to inform politicians and policy makers about research (NHMRC)
- Form an umbrella researcher representative organisation, perhaps based on an existing organisation such as ASMR, to develop and communicate a clear consensus view on health and medical research issues to government (ASMR, Public Health Association)

3 Research Investment Levels, Priorities and Sources - Increase contestable public investment in health and medical research, fund priority-driven research initiatives, rationalise infrastructure funding, and explore ways to broaden the sources of funding

3.1 Increase government investment in contestable NHMRC funding by an average of 15% per annum over the next five years, under specific conditions, and invest immediately in several priority initiatives required to drive reforms

- Agree the list of investment priorities and secure acceptance of the package of measures by key bodies (Minister for Health and Aged Care, DHAC, NHMRC)
- Review initial estimates of costs and secure funding through the 1999 budget process (NHMRC, Minister for Health and Aged Care, DHAC)
- Agree economic development and health outcome objectives, and related measures, required to justify continuing higher investment levels as a proportion of GDP after five and ten years and develop performance review processes (NHMRC, DHAC, DISR)
- Build an endowment that guarantees stable investment levels (DHAC)

Public sector - Recommendations and actions (continued)

3.2 Develop funding for a national program of priority-driven health and medical research, building to 1% of government health expenditure over 5 to 10 years based on demonstrated financial benefits and improved health outcomes

- Negotiate national, cost-shared arrangements from existing or new funds to invest an initial \$50million in priority-driven research (DHAC, State and Territory Governments)
- Focus some \$20million to \$30million a year of this initial investment into several multi-disciplinary centres of excellence for strategic, development and evaluation research as recommended in Section 3.3.1 (NHMRC)
- Develop a long-term program, based on concepts recommended in Section 3.2.1 including a requirement to demonstrate benefits, to build this research investment to 1% of health expenditure over 5 to 10 years (DHAC, NHMRC)

3.3 Develop a coherent approach to infrastructure funding for research

- Negotiate to develop coherent and equitable mechanisms for infrastructure funding, preferably by way of attaching infrastructure funds to competitive peer reviewed grants (DETYA, DHAC, NHMRC, States, ARC)
- Encourage all States and Territories to provide research infrastructure support to independent medical research institutes and hospitals in a consistent manner proportional to peer reviewed grants, to the extent that these funds are not supplied through a coherent national mechanism (NHMRC, DHAC, AHMAC)

3.4 Broaden the funding base by facilitating international and cooperative opportunities, improving the tax environment for philanthropy and considering innovative funding ideas

- Develop a facilitation arm within NHMRC – perhaps with part-time representatives in US and other countries – to review NHMRC processes to enable jointly funded and executed research projects, to identify international opportunities, promote them to Australian researchers and advise Australian researchers on preparing applications (NHMRC)
- Remove a range of impediments to philanthropy in Australia as outlined in Section 5.3.4
- Negotiate bilateral agreements or alliances with other countries to cover fellowship exchanges, regular conferences of the countries' best young researchers, agreements on cooperating in peer review (NHMRC)
- Develop a strategic alliance with the US on particular disease issues where a combined approach may be beneficial and where Australia has special interest and skills relating to a problem or more ready access to populations (e.g. malaria, skin cancer) (NHMRC, DHAC)
- Negotiate with private hospitals and health insurers, the Health Insurance Commission and other private non-profit organisations to identify and support joint research funding interests (NHMRC)
- Amend tax arrangements for philanthropy to increase the level of philanthropic support for research (Federal Government)
- Explore alternative and innovative methods of raising funds for health and medical research (NHMRC, State Governments)

The way forward

Why invest in health and medical research

Improved health outcomes and quality of life

We should not take for granted the improvements to our quality of life that have arisen from health and medical research over recent times. There has been a dramatic improvement in mortality rates with many major illnesses almost completely removed from the Australian community.

Medical researchers are close to finding new ways to treat, diagnose, cure and even prevent a number of diseases and disorders that are of prime concern to Australians today. For example, more research is necessary to find ways of:

- Identifying men who are at risk of prostate cancer and women who are at risk of breast cancer;
- Identifying new, specific methods for diagnosing and preventing asthma and allergies before symptoms appear;
- Delaying and eventually preventing diabetes;
- Understanding the origins of schizophrenia so that safer and more effective medications can be developed;
- Discovering better drugs for heart failure and methods for preventing and treating heart disease;
- Identifying genes and environmental causes of Parkinson's disease;
- Reducing dependence on respirators for patients with spinal cord injuries, thus increasing mobility and decreasing pulmonary complications.

These advances will only be possible with continued and increased global support for health and medical research.

Reduced pressure on the health system

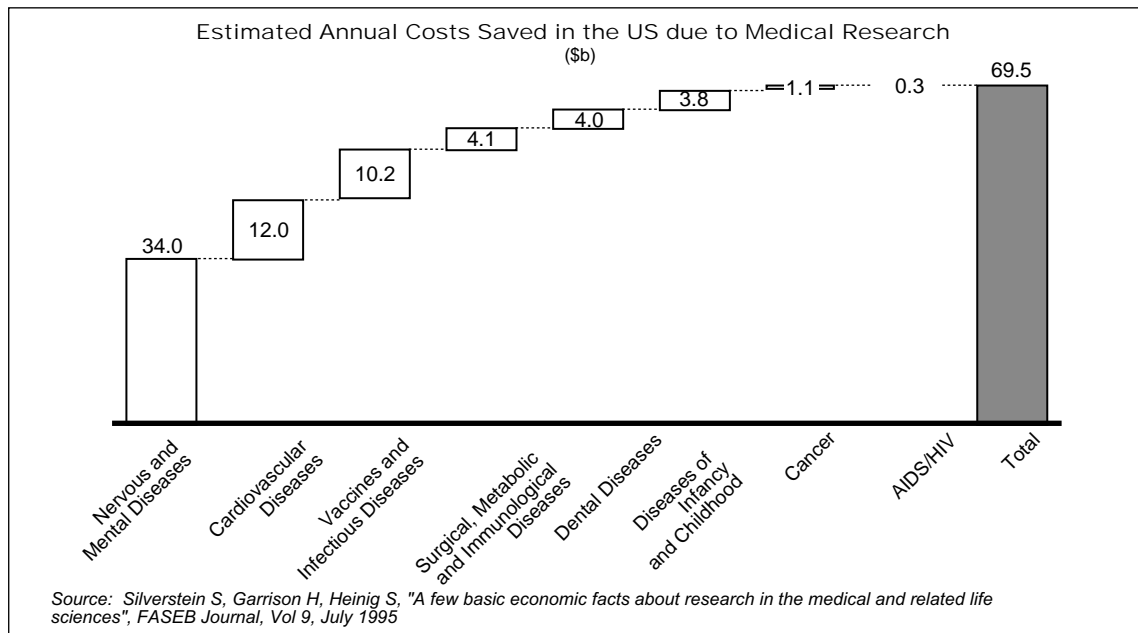
Improving national health and quality of life also has a positive impact on reducing the pressures and costs of the health system. While no exhaustive study has been undertaken, there are numerous examples of cost saving from health and medical research in Australia. Any one of these cost savings represents a significant return on the annual NHMRC budget:

- Australia has been at the forefront of clinical research on the immunosuppressive drug cyclosporin. With the ability to successfully conduct kidney transplants, even small improvements in the transplantation success rate leads to large savings to the national

health budget as well as significantly improved quality of life for those affected individuals. Savings in treatment costs are estimated at around \$100 million per annum.

- The discovery in Perth that *Helicobacter pylori* causes peptic ulcer has resulted in \$200 million savings a year in ulcer treatment.

A more thorough study performed in the US showed that annual savings from health and medical research were almost US\$70 billion per year. The NIH budget is now about US\$15 billion per year.



Economic return and jobs boost

Economic studies reviewed by the Industry Commission² have shown estimated returns from research and development of between 10% and 55%. The report notes that these returns are difficult to measure in terms of data collection and modelling. Nevertheless, research, and particularly basic research, is recognised as essential for continued economic growth.

“The growth of scientific knowledge and the generation of new technology have permitted the market economies of the Western nations to achieve unprecedented prosperity. A recent analysis of the link between US technology and publicly funded science found that 73% of publications cited in US industry patents as ‘prior art’ (a fundamental requirement of patent law) were from ‘top-flight’ basic research organisations heavily supported by public agencies such as NIH and that this trend was increasing.” Submission 198 from The Walter and Eliza Hall Institute

² Industry Commission (1995), Research and Development, Industry Commission Report No. 45

The indirect economic benefits of health and medical research are also enormous. One study in the United States showed that 10 biomedical discoveries created non medical spin-offs worth over US\$90 billion for the economy annually.

Biomedical Discovery	Industrial Application	1995 Estimated Annual \$ Value (\$billions)
Enzyme biochemistry	Chillproofing of beer, leather bating, enzyme detergents	53.7
Laboratory instrument computer (LINC)	Minicomputer	22.2
Chlortetracycline	Animal feed	5.7
Fibre optics	Telecommunications	3.7
Immobilised enzymes	High fructose corn syrup, sugar beet, molasses	2.9
Steroid hormones	Animal feed	2.5
Freeze-drying	Food preservation	1.0
Warfarin	Rodenticide	0.1
Virology/oncology	Vaccine for Marek's disease	0.1
Total for 10 biomedical discoveries		91.9

Source: Data from Washington FAX, May 2, 1995, based on report prepared for NIH Office of Medical Applications of Research by Battelle Columbus Laboratories and CDP Associates

Australia can point to a number of successful commercial ventures arising from health and medical research such as Biota and ResMed, and a number of missed opportunities such as colony stimulating factors and haemochromatosis gene discoveries where the value was not captured for Australia.

Sharing responsibility through the Virtuous Cycle

Achieving these benefits requires a cooperative and concerted effort on behalf of many parties. At the broadest level there must exist the recurring Virtuous Cycle of beneficial cause and effect between government, research and industry.

Responsibility for improving the delivery and outcomes of health and medical research in Australia relies upon:

- An effective health and medical research sector built on high impact fundamental research and world-class workforce and infrastructure;
- Priority-driven research that contributes directly to population health and evidence-based health care;
- An industry sector that mutually reinforces the research sector; and
- Increase public investment in a well-managed research sector.

Responsibility for the largest share of the recommendations made by this Review falls largely on government and government bodies, including the Federal Government, the Minister for Health and Aged Care, DHAC, DETYA, DISR, State and Territory Governments, State and Territory health authorities, NHMRC, ARC, AHMAC, PHERP,

NPHP and AIHW, AVCC, Academy of Sciences, ASMR, Universities, Institutes, Research Centres, Hospitals and health services. Within this group, a restructured and newly resourced NHMRC would play the leading role.

But there is also a need to ensure the continuing involvement of the broader research community and industry in the finalisation and implementation of these recommendations. This could be achieved through an independent overview process established to supervise implementation and provide a sense of continuity for the government and the community in the process of planning health and medical research into the new millennium. The overview process should provide clear, temporally-driven leadership in energising the various health, research, education and industrial sectors to action. Without this, momentum will be dissipated and actions will be uncoordinated.

It is recommended that such a process be overseen by an Implementation Committee consisting of a range of stakeholders including, we suggest:

- Three members of this Review Committee to maintain the momentum and knowledge generated through the Review
- The Chairman of the NHMRC and its Research Committee
- A top-level staff member representing each of DHAC, DETYA and DISR
- One industry representative
- Two representatives of State and Territory health authorities
- One economist

What next

The vision developed by this Review of a bright, vibrant and prosperous health and medical research sector requires the commitment of industry, government and the research community. Achieving this goal is beyond the capabilities of any one group. Furthermore, the real power of this Review lies in the collective package of recommendations.

The community is seeking such change and for those involved to deliver it. The release of this Report is a significant step towards developing the necessary momentum to turn such visions into reality, thereby benefitting every single Australian.

This Report has been released by the Federal Minister for Health and Aged Care, The Hon. Dr Michael Wooldridge, as a discussion document. The document will be widely circulated for comment and a series of briefings held across Australia before the Final Report is released early in 1999.

If you are interested in attending such a briefing or require further copies of this summary or the complete Draft Report, please contact the Health and Medical Research Strategic Review on (02) 6289 5920 or care of the Department of Health and Aged Care, GPO Box 9848, Canberra 2601.

Abbreviations

ARC	Australian Research Council
DETYA	Department of Education, Training and Youth Affairs
DHAC	Department of Health and Aged Care
DISR	Department of Industry, Science and Resources
FASEB	Federation of American Societies for Experimental Biology
NHMRC	National Health and Medical Research Council
NHS	National Health Service (UK)
NIH	National Institutes of Health (USA)
SPIRT	Strategic Partnerships in Industry, Research and Training
SRDC	Strategic Research Development Committee
WHO	World Health Organization