

Nurturing and Supporting our Greatest Asset – A Brave New World for Researchers and Managers

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Abstract

Australia's outstanding performance in recent decades in science and innovation, as well as in the humanities and social sciences, can be put down to two things – an outstanding base of talent and commitment, and an environment that has allowed that talent to be revealed and flourish.

In considering our previous and current standing in the worlds of science and the arts, it would be unwise to suggest that we have performed up to our ability and capacity. How much of our outstanding talent has failed to reach its potential, and why? The answers are impossible to determine. However, the questions themselves provoke consideration of the factors that might need attention so that we can have some assurance that raw talent in the new and emerging research environment can reach its full potential and the personal commitment to excellence is fostered. These issues include, but go well beyond, the physical environment, infrastructure and personal remuneration, and extend into the psyche of the intellect and personality of the researcher.

What is required then of researchers in a modern environment of multidisciplinary team-based research and a rapidly developing knowledge base? What is required of managers in determining the balance of their responsibilities in matters fiscal and physical, and psychological – at the team and individual level? It is an exciting time for anyone contemplating how best to nurture and support our greatest asset for the benefit of all. The

importance of these issues in health and medical research will be highlighted, along with a summary of initiatives under way through the NHMRC to ensure a bright future for our brightest minds.

Introduction

Human capital is any country's greatest asset that needs protection, understanding, opportunity and encouragement. Freedom, mobility and the pursuit of excellence are essential elements of any strategy to preserve this asset. My comments will address these issues from my knowledge of health and medical research in Australia. However, the examples and the issues raised are probably applicable across all fields of research.

I believe that the issue of a perceived 'brain drain' should be considered within the broader context of the nature of the research environment in Australia. By creating an environment where the insight and innovation of researchers can flourish, then we have the potential to attract Australian researchers who might want to return home, or foreign researchers who might wish to immigrate here.

There are several fundamental parameters that have to be considered in this context. These include understanding the researcher, understanding the modern way of research, and understanding what administrators can and need to do to support a strong research community.

What are the motivations to embark on a career in research?

There are some significant personal drivers that attract people into health and medical research. First, researchers can be drawn by their observation of human suffering and disease. This is a powerful incentive to an enquiring mind where there is potential to make a difference for one's fellow human beings.

Current statistics reveal that disability or death can result from a wide range of medical conditions – including cardiovascular disease, cancer, diseases of the nervous system, and long standing problems such as asthma (Figure 1).

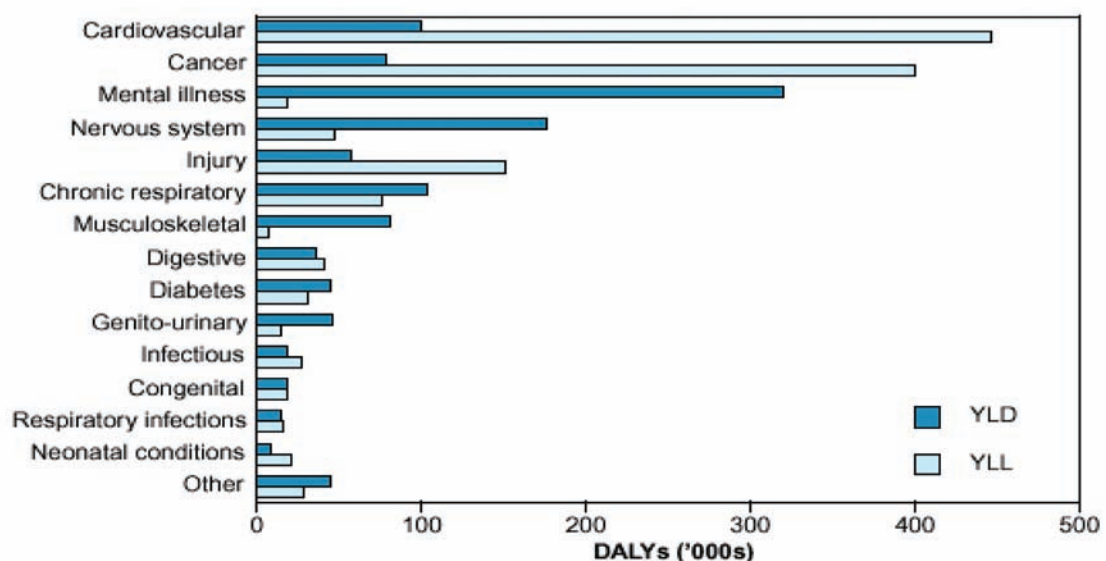
These data show that for some diseases, like cardiovascular disease, there is a high proportion of lives lost (YLL) and a lesser proportion of people who live with a disability (YLD). However, for other diseases such as mental illness, there is a significant level of disability and a lower proportion of death. Understanding these and the other prominent diseases, and finding a way to relieve disability or prevent death, are powerful incentives to undertake health and medical research.

The evidence for the burden of disease being a strong driver for researchers is shown in the NHMRC's first *Performance Report 2000-2003* (NHMRC 2003). The report shows that the majority of NHMRC funding for investigator-driven research has been allocated to the broad health areas represented prominently in the distribution of the burden of disease. In other words, our medical researchers are attuned to the major burden of disease in Australia and are seeking funding from the NHMRC to address these major health questions.

These observations suggest that there is not a great need to exert a 'top down' direction to ensure that research into major disease areas is being carried out. However, the NHMRC is allocating more funding to specific areas where we have identified gaps in both the level of research and the 'capacity' of the research community to address some issues. These issues include the health of Aboriginal and Torres Strait Islander peoples and health services and delivery.

Another driver for researchers is to contribute to the broader benefit to the community. The Australian Society for Medical Research (ASMR), has recently published a report by Access Economics (2003) on the returns to Australia of investing in health and medical research. The results of this study show that:

Figure 1: The Australian Burden of Disease



Source :Australian Institute of Health and Welfare (2000), *Australia's Health 2000*, adapted from Figure 2.19

- Historically, annual rates of return to Australian health R&D lie between one and five times R&D expenditure.
- Public sector returns were 72 per cent for longevity and 62 per cent for wellness, while private sector returns were 208 % for longevity and 179 % for wellness.
- Returns in cardio-vascular R&D were 8-fold, to respiratory R&D 6-fold and to digestive system R&D 5-fold.

(Access Economics 2003: 1)

It is clear that our medical researchers bring enormous returns to Australia. This is an important driver for those who undertake health and medical research. Other benefits for individuals can arise from the intellectual property they may generate. However, this is not usually a primary driving force.

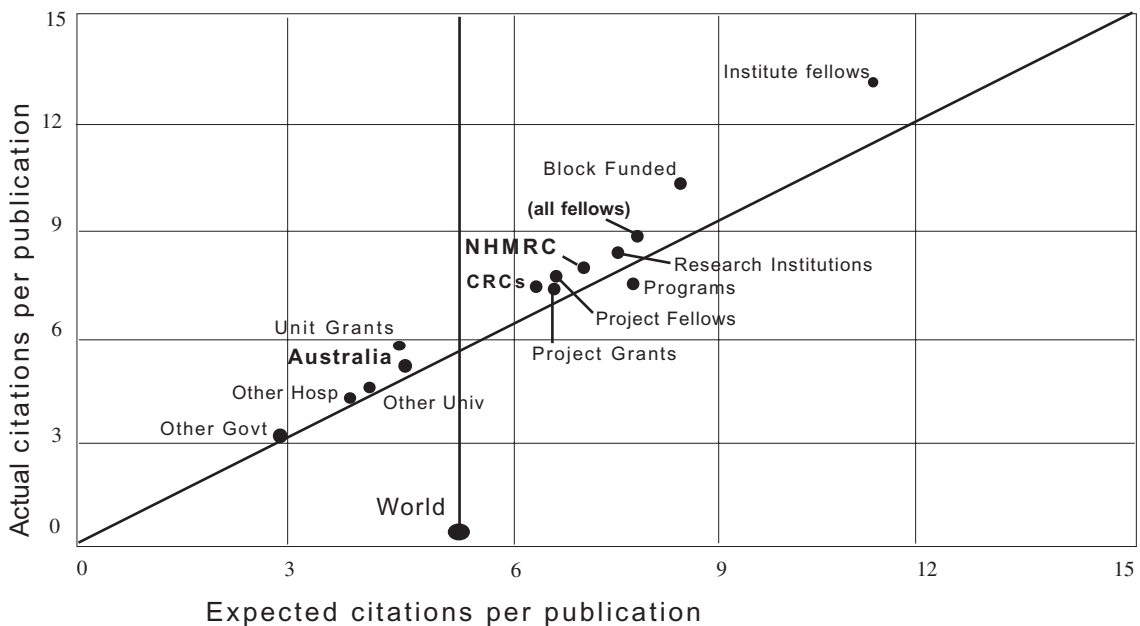
One of the other very important drivers to undertake research is the personal satisfaction that researchers gain from publishing their research in the best journals. Dr Linda Butler of the Australian National University (ANU) has analysed the citation of Australian health and medical research supported over recent years by the NHMRC (figure 2). Compared to the average citation rate of all Australian health

and medical research, which lies close to the world average, the papers published from NHMRC-funded programs are cited more often and at a level higher than expected for the journals in which the research has been published.

The outstanding performers in this analysis are the NHMRCs Research Fellows working at various institutes around Australia. These Fellows are living, breathing and working in places where there is a 'critical mass' of research and where there are groups of people working on broad research questions. The evidence indicates that it is this sort of environment from which the highest quality publications are regularly produced. Of course, journal citations are not the only indicators of research productivity and standing and one should not dwell on these data.

The NHMRCs *Performance Report 2000-2003* presents highlights of results and productivity in research from some outstanding individuals. Such case studies not only provide convincing evidence to the public and politicians about the value of investing in health and medical research, but they also provide encouragement to new researchers to undertake health and medical research. One such example, Professor Ian Frazer, has been working for 18

Figure 2: Citation rates



Source: Butler, Linda (2003), *NHMRC-supported research: the impact of journal publication output 1996-2000*. Australian Government and National Health and Medical Research Council, Figure 3, p.25.

years with NHMRC funding on a vaccine to prevent cervical cancer. His work has reached stage IV clinical trials and the vaccine is very likely to be a success. Ian's 18 years of hard work will return hundreds of millions of dollars to the Australian economy, and his research will make a real difference for women. Ian has been driven by the personal satisfaction of solving a major problem and making a real difference for humankind. It is this sort of attitude and psyche of the individual that we have to encourage and for whom we need to provide an environment from which these outcomes can be realised.

What is the modern research environment like?

There are several changes occurring in the Australian research environment.

- *Curiosity research vs outcomes, outcomes and more outcomes!*

It is clear that the political imperative at present is for research to produce demonstrable outcomes, in particular, an economic return. It is of greater importance, however, that all the benefits of curiosity-driven research are conveyed to the community. Researchers need to be encouraged to think very seriously about the problems that they are addressing and to ensure that they can indicate the likely outcomes of their work.

- *International experience and participation*

International experience and participation is something that is very prominent in the modern research environment. This has been brought about by significant improvements in travel, facilities on the internet and so on, as well as the competitive world in which we live.

- *Increased competition*

Winning research funding is a very competitive business – just ask a researcher! In the last 10 years, the number of applications for project grants from the NHMRC has risen by more than 50% (1297 to 1982). Even though overall funding levels have recently increased, the rapidly increasing costs of research have limited the NHMRCs capacity to support this increased demand. Furthermore, researchers

must approach many different sources of competitive funding in order to meet the rising costs of research. It is also a very competitive world for researchers seeking the right sort of position to support the work that they need to do. The average career track these days usually includes a period of about 10 years on short-term positions funded on competitive grants.

- *Increased public awareness and scrutiny*

The community has become increasingly aware of the role that research plays in their lives and in their future. A recent poll¹ has shown that more than 80% of people surveyed are either interested or very interested in the outcomes of medical research. This is also reflected in the high interest that is generated through news items such as those provided on the ABC News every few days by Sophie Scott. It is also the case that people are interested in where their taxpayer dollar goes, as are our politicians. All together, there is a high level of interest and scrutiny in the conduct and outcomes of research.

- *Industry will become more demanding*

As industry becomes more sophisticated and as more and more biotechnology and other companies grow in this country there will be increased demand for high-quality work and people from our universities and other research entities.

All of these factors and parameters provide a rich, challenging and exciting scenario for the modern researcher.

What do the researchers need to be?

It goes without saying that as science advances at an increasing rate, researchers need to be highly skilled, well trained and adaptable. Adaptation can sometimes involve moving from circumstances where a researcher is working alone to a multi-disciplinary national, or indeed international, team. Being able to cope with that type of change and knowing how to deal with the implications, both personally and intellectually, is extremely important. It is crucial to know how to interact on a personal level with people in a multi-disciplinary international team who have different skills and backgrounds.

These days, researchers need skills in communication, people management, leadership, financial management, time management, information and communications technology, administration and so on, but particularly time management. Where do they get that training? I am not aware of any formal training available for these sorts of skills for researchers. As usual, I think most researchers pick it up along the way. Maybe today's leaders in research need to address some of these issues more directly.

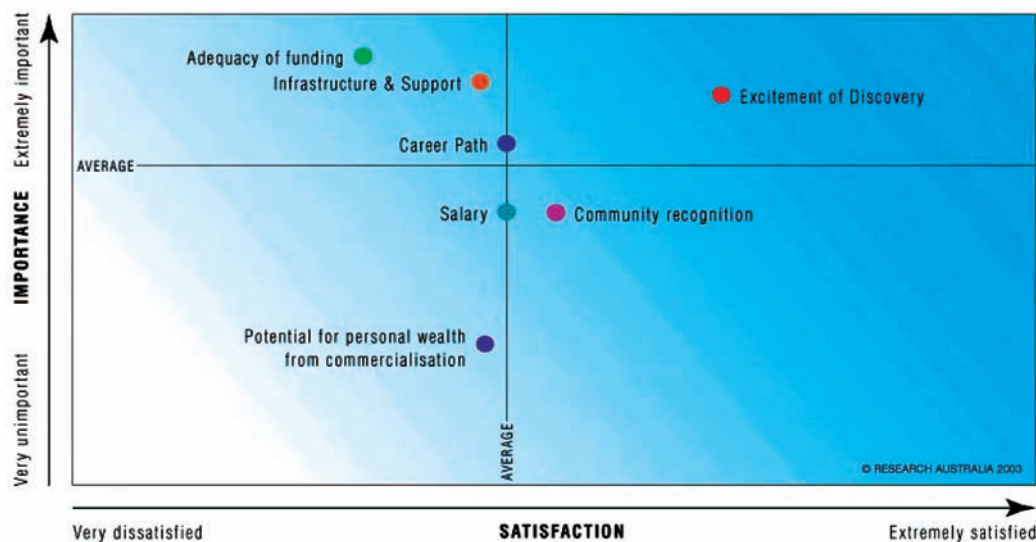
With these myriad issues and challenges, why do researchers choose to follow this course?

For researchers, the importance of intellectual stimulation ahead of salary has been well documented. There is value in personal recognition, the opportunity of working with leaders in their field and being loyal to a team. Making a lasting difference and a meaningful contribution are fundamental aspirations for all

researchers. A recent survey of researcher attitudes has been published by Research Australia (2003)². Figure 3 is a very simple summary of some of the issues that researchers have indicated as being important to them.

These data clearly establish that the most satisfying and important factor in the life of a researcher is the excitement of discovery. Other factors, which limit the attainment of discovery, are extremely important to researchers. These include adequacy of funding and infrastructure, support and a career path. It is also noteworthy that salary and the potential for wealth from discovery are below the average level of importance for the researchers who were surveyed. Clearly we must foster an environment that provides opportunities for the excitement of discovery. If we can do that then we will have a productive research workforce and an exciting environment that will attract new entrants and returning expatriates.

Figure 3: Importance versus satisfaction



Source: Research Australia (2003) *Health and Medical Researcher Opinion Poll 2003*, p.4.

What do researchers want and need?

The evidence suggests that researchers require more than just a salary. Perhaps the most important factor is the career path that lies ahead for new young researchers. This is daunting indeed, since there are no easy routes these days to a relatively secure appointment. The following diagram illustrates the uncertainty, lengthy timeframe and, by implication, the commitment that individuals have to make to be successful in a research career.

Figure 4 attempts to represent the steps that have to be met through a University-based career and the approximate time course at each step. Overseas experience can be an option at various stages of one's career. Taking opportunities to gain overseas experience in different research environments is an important and somewhat traditional career-building step for Australians. For most who embark on this career path there is no certainty in funding or duration at each level

and moving from one step to the next is a very competitive process.

Given the internationalisation of research these days, we must ensure that the research environment in Australia is at least equal, in the full range of personal and scientific respects, to that available overseas. Only then will we be able to provide the opportunities for our best and brightest to participate in and benefit from the leading international research that will define Australia's place in the modern era.

Returning to the career path issue, 81 per cent of the researchers surveyed by Research Australia believed that the Australian health and medical research environment does not provide a secure or long-term career path. This is a telling statistic. However, I believe that there is an 'up-side' to this situation.

Figure 4: Career Tracks in Research



Source: NHMRC data

Figure 5 shows the different types of fellowships and awards offered by the NHMRC for supporting researchers at different stages of their careers.

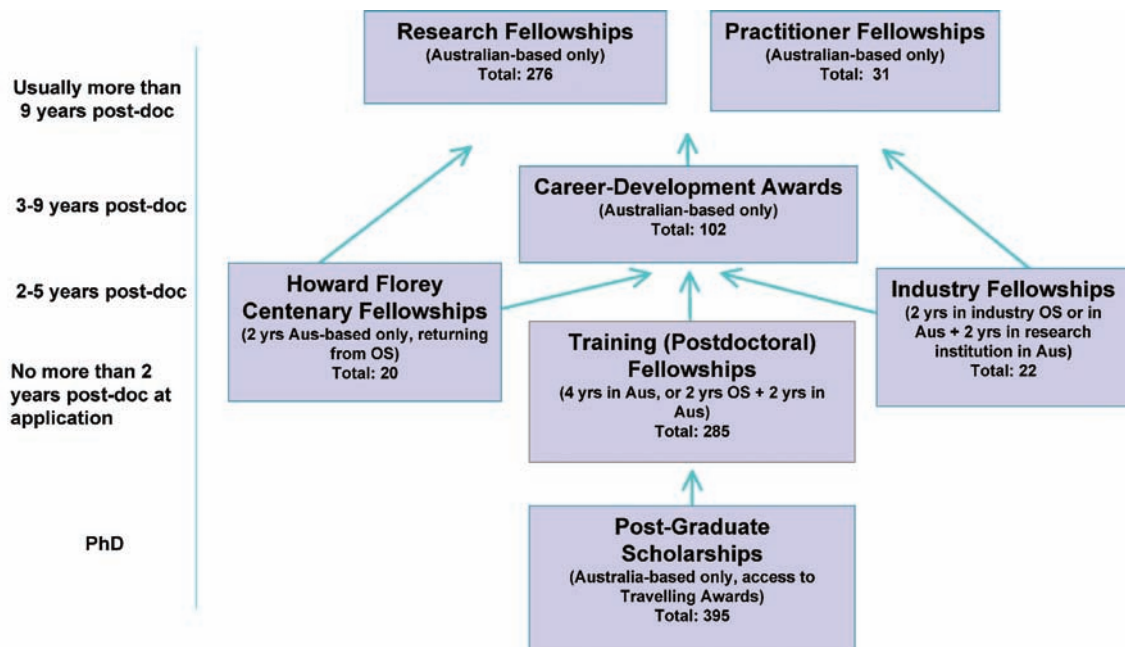
The policy that has been followed for some time by the NHMRC is that there must be 'tests' in the research environment where researchers have to re-apply for funding that is subject to peer review. While such a process creates uncertainty, it also helps to ensure excellence over time. Through this mechanism, hard and uncertain as it may be for researchers, the NHMRC is able to ensure that taxpayers are supporting the best researchers. However, if funding levels become limited there is a significant risk that the prospects of success for individuals will diminish to the point where they will not wish to compete. It is essential therefore to set the right balance between opportunity and excellence.

It is important to note that the system for career support for researchers funded

through the NHMRC has not been designed by bureaucrats. The NHMRC's career path opportunities are designed and monitored by active researchers who contribute their valuable time to the NHMRC's Research Committee, the fellowship committees and the training awards committees. It is a dynamic system that draws on community experience and involvement as much as community expectation.

Apart from career opportunities, researchers need space and time. This is very easy to say but not so easy to provide in a highly competitive environment. Resources are also required for maintenance, turnover and development of state-of-the-art infrastructure. Communication, administrative support, encouragement and an environment of recognition and reward are all important components of a vibrant environment for researchers. But perhaps the most important element for researchers is to have opportunities to work with the best, both locally and overseas.

Figure 5: NHMRC Researcher Support Path for 2004



Source: NHMRC data

What are the priorities for the NHMRC in supporting researchers in an international context?

The priorities for the NHMRCs support for research are to see the creation of internationally competitive knowledge, to increase world-class research capacity in this country, to increase skills across the spectrum of health and medical research, and to increase the application of research outcomes into health care. The NHMRC has a number of different funding mechanisms to support these priorities, many of which are targeted at supporting the best researchers across a range of disciplines with various levels of experience.

In the context of support for researchers, there has been a change in policy in the NHMRC flowing on from the Wills Review in 1999.

Figure 6 shows that there has been increased funding provided to a new scheme open to overseas-based researchers as well as Australian-based researchers. This scheme aims to support the best possible researchers whether they are Australians overseas or Australians locally. This scheme complements the NHMRCs Burnett Awards that were specifically introduced to attract very high profile overseas-based Australian researchers back to Australia. These latter awards have been made to Professor Peter Doherty and

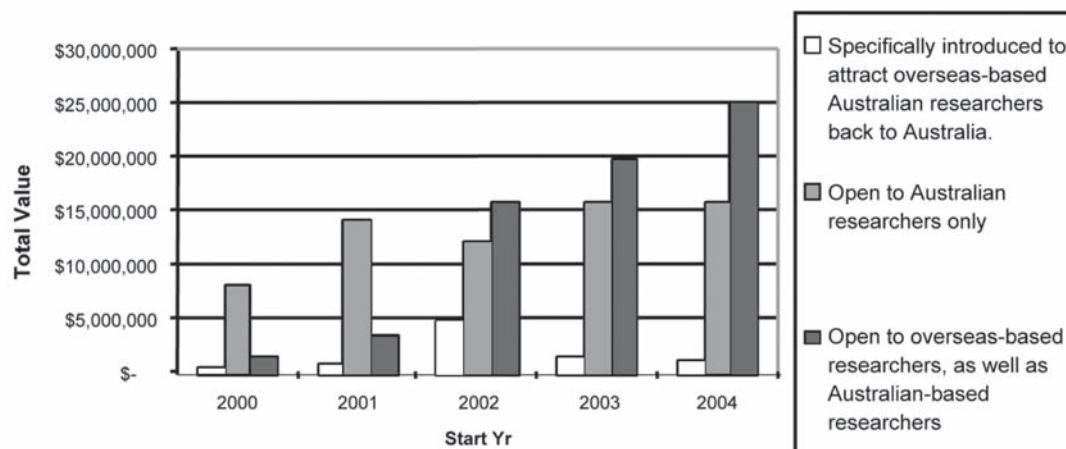
Professor Tony McMichael – both icon Australian researchers in their respective fields of medical research.

The NHMRCs Howard Florey Centenary Fellowships include various incentives for researchers to return to Australia. In addition to salary support, each Fellowship can include a maintenance allowance for research activities, a relocation allowance of airfares and an additional \$5,000. The salary component may include a further \$15,000 per annum clinical loading for clinical researchers. All of the NHMRCs 'people support' schemes are designed as investments in the long-term research environment in this country. Most importantly, the criterion for selection in these schemes is excellence.

Another current strategy of the NHMRC is to ensure that the organisation, and the research effort that we support, is exposed internationally. The aim of this strategy is to develop an international understanding and appreciation of how Australian research can contribute to the world's health problems, as well as Australian researchers benefiting from alliances that will facilitate their access to other sources of funding, infrastructure, and collaboration with the world's best researchers.

By way of example, the NHMRC has several funding agreements with the Juvenile Diabetes Research Foundation (JDRF) that is based in New York. The Foundation raises money from the public across the United

Figure 6: Training Awards & Career Development Awards



Source: NHMRC data

States to support diabetes research. Part of the JDRF International funding is supporting collaborative research programs jointly funded with the NHMRC over five years, and another co-funded grant is supporting the Juvenile Diabetes Vaccine Research Centre based at the University of Melbourne.

A further example is the co-funding agreement between the Wellcome Trust in the UK, New Zealand’s Health Research Council and the NHMRC to support research teams investigating health in developing nations, particularly in the Asia/Pacific region. This is a collaborative funding arrangement where teams of researchers in Australia are working with teams of researchers in regional countries. This scheme is facilitating a wide range of multi-disciplinary collaborations across international boundaries and providing mentoring and development opportunities. The outcomes of these programs are expected to provide important health benefits in Australia and in countries of our region.

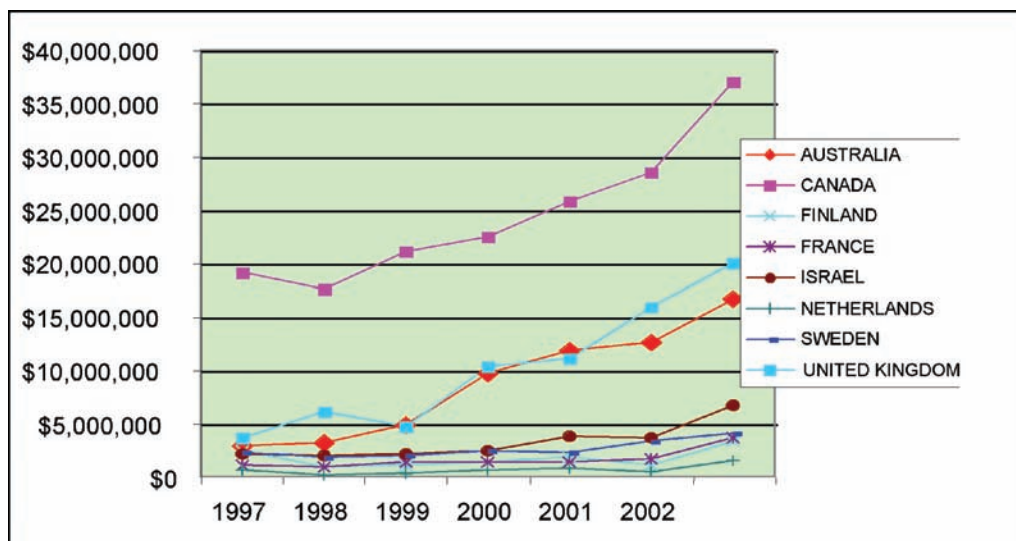
Links have been made with the Canadian Institutes of Health Research (CIHR) and the Health Research Council in New Zealand on a program for co-operation in research in indigenous health. This is a major problem for all three countries and through this co-operative effort we aim to facilitate the exchange of ideas and researchers and to develop collaborative research programs to

address major Indigenous health problems. The NHMRC has also established a collaborative funding arrangement with the European Union and we are working with both APEC and the OECD on a number of new initiatives. By improving our international links and exposing the world to Australian research we will facilitate the formation of strong collaborations between institutions and researchers that are so important to our own research effort, as well as contributing to the global research effort. The outcomes of this strategy will include improved mobility, opportunity and international competitiveness for Australian researchers.

How is this reflected in performance?

One statistic that reflects the high standing of Australian medical researchers in an international context, apart from their strong citation performance (see above), is their ability to attract US dollars into Australia through competitive extramural grants from the US National Institutes of Health (NIH). Australia’s level of NIH funding is similar to and increasing at the same rate as the United Kingdom, despite our much smaller research base (see figure 7).

Figure 7: Funding from the United States National Institutes of Health (US\$)



Source: Prepared by NHMRC (2004) – using data sourced from the National Institutes of Health (NIH) ‘Extramural Awards by State and Foreign Site’. <http://www.grants1.nih.gov/grants/award/state/state.htm>
<http://.grants1.nih.gov/grants/award/state/state03.htm>

The fact that Canadian researchers attract the highest rate of NIH funding is probably related to the level of cross-boarder collaboration between US and Canadian researchers. If this is the case, then it is imperative that Australia supports its scientists in these sorts of collaborations by fostering communication and mobility. It is only through active contact and mobility of researchers, as well as a strong culture of excellent research at home, that Australia will keep its place in a global research environment.

How can research administrators best support researchers?

It is crucial that research administrators respect the effort and commitment of researchers and seek all avenues to foster our best talent. The important elements include providing space and time, infrastructure, opportunities to travel and to share experience in collaborative research, and encouragement.

Career promotion procedures need to be attuned to the modern research environment where teamwork and collaboration between laboratories and different institutions is the norm. The recognition and assessment of the performance of individuals in a research team is one of the most difficult issues that needs to be addressed.

It is essential that research administrators reduce barriers to co-operation and collaboration between individuals, teams, laboratories and institutions. It is unfortunate that some funding mechanisms and accounting practices arising out of government policy do not always help in this respect. Administrators need to create the right environment to provide support for researchers, to help them with rules, regulations and reporting requirements, to minimise the paperwork if at all possible and to provide education and training in key areas. These areas include ethics, commercialisation, job security, career advancement opportunities and recognition.

Conclusion

If Australia can align all the elements required for a strong research environment, then Australian researchers will continue to perform

'well above their weight' in an increasingly competitive world of expanding knowledge and opportunity. Australia could also be a destination of choice for pursuing research. A strong and vibrant research environment and community will be essential for Australia to maintain its high standard of living, to protect our community in a challenging health environment and to grow our economy for the benefit of those that follow.

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Footnotes

¹ Research Australia 2003 (see <http://researchaustralia.republicast.com/PublicOpinionPoll2003/republicast.asp>)

² Research Australia 2003 (see <http://researchaustralia.republicast.com/PublicOpinionPoll2003/republicast.asp>)
