

Submission to the Strategic Review of Health and Medical Research

By the Victorian Comprehensive Cancer Centre

Summary

The health and wellbeing of Australians is dependent on an active and excellent health and medical research sector. Depth and breadth of multidisciplinary research is needed to generate discovery and interpret findings from both Australia and overseas for swift application locally.

Strengthening the interface between research, teaching and clinical care will enable new discoveries to be more rapidly translated to improve the health care of Australians. This requires strong functional links to be built between health care organisations, universities and medical research institutes. The Victorian Comprehensive Cancer Centre is a model for bringing eight leading organisations in cancer together, based on the premise of research-led excellence in clinical care.

Achieving improved health outcomes also requires excellence in clinical sciences, laboratory sciences and disciplines such as population health and health economics. It requires a workforce skilled in translational research and the implementation of new evidence into healthcare practice.

The Victorian Comprehensive Cancer Centre recommends to the Review Panel that an increased emphasis on multidisciplinary collaboration will improve health outcomes. Specific suggestions include:

- Implement a research funding system which is simple to apply, transparent and provides equitable access to funding for health and medical research.
- Foster models which offer robust linkage between clinical, research and teaching organisations. Ensure these enhance multidisciplinary research and its outcomes.
- Support collaborative centres to provide the infrastructure and academic expertise underpinning basic and clinical research platforms (e.g biostatistics, biobanks, data linkage).
- Build the translational capacity of the research and health care workforce. Pathways include education and training, as well as protected time for health care practitioners to participate in clinical research.
- Attract PhD students from diverse disciplines into long term medical research careers by reducing the time from first postdoctoral position and a fellowship position.
- Recognise the importance of health service research and research in prevention and supportive care in improving patient outcomes. Consider mechanisms to build workforce, excellence and investment in these areas.
- Encourage collaborative research across disciplines and organisations by recognising and valuing the contribution made by individuals to these efforts.

Introduction

The vision of the Commonwealth Government to translate research into improved primary and hospital care, aged care and better preventative health strategies is shared by the Victorian Comprehensive Cancer Centre (VCCC). The VCCC provides a model, novel in Australia, for rapidly driving the next generation of improvements in cancer prevention, detection and treatment. It connects population health and primary care to acute care settings and clinical and laboratory research in a way which is unique in Australia.

The VCCC brings together an alliance of eight successful organisations in cancer research, education and patient care. It is based on the successful US Comprehensive Cancer Centres and has significant parallels with UK Academic Health Science Centres. Such models bring healthcare services, research and education together under a single leadership and recognise the opportunities of strong functional links between patient care and research. These linkages contribute to excellence in multidisciplinary research and more rapid uptake of new research evidence, resulting in improved patient care.

The VCCC has directly faced the challenges of encouraging multidisciplinary collaboration between researchers and clinicians and of fostering the integration of cancer research, education and clinical care. In doing so, we have encountered systemic barriers within the health and medical research system which require a coordinated national response to fully address and resolve. In this submission, we use the VCCC as an exemplar to describe the barriers encountered to optimal collaborative research and to the translation of research findings. We then provide specific responses to the questions posed by the Review Panel.

VCCC: at the interface of research and health care

The VCCC members provide cancer care, from detection to palliation, to children and adults. The VCCC links population health and primary care with acute care. There is a correspondingly broad spectrum of research, addressing prevention, early diagnosis, treatment, supportive care and health outcomes. Laboratory-based research is a strength of the VCCC.

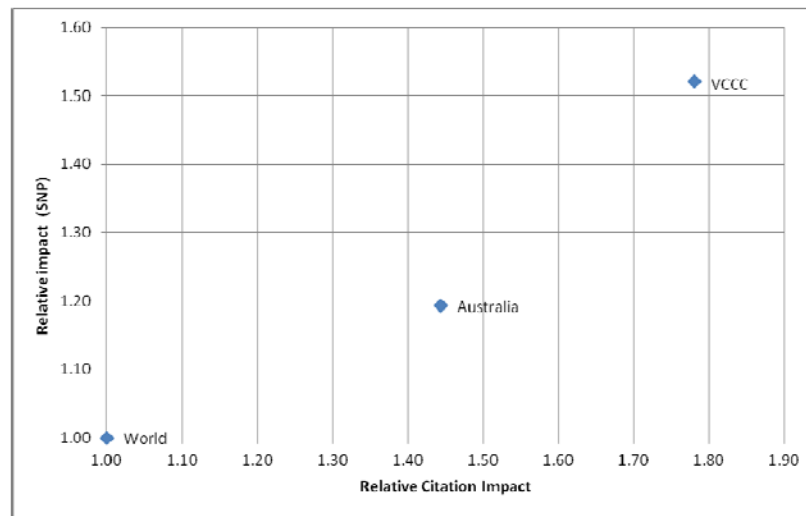
The VCCC membership includes

- three specialist hospitals (Peter MacCallum Cancer Centre - including its large laboratory and clinical research portfolio, The Royal Women's Hospital and The Royal Children's Hospital),
- three leading public teaching hospitals (Melbourne Health, St Vincent's Hospital and Melbourne Western Health),
- world-leading medical research institutes (The Walter and Eliza Hall Institute for Medical Research, St Vincent's Institute and Murdoch Children's Research Institute) and
- the number one ranked Group of Eight university (The University of Melbourne).

The VCCC encompasses more than 1300 cancer researchers who attracted a total research income of \$100M in 2009-10 and generated 21% of Australia's peer reviewed cancer research publications during 2006-2010. As shown in Figure 1, these publications had a relative citation impact 78% higher than the world and 24% higher than all Australian cancer publications (even when the denominator includes all of the VCCC publications). VCCC members also published in journals with relative higher impact than all Australian cancer publications (Figure 1). Of all

VCCC publications, 22% are in the top 10% of the world's most highly cited cancer publications¹.

Figure 1: Comparison of VCCC cancer publications to all Australian cancer publications - relative citation* and journal impact



* Relative Citation Impact is normalised for discipline variation in citation practice and benchmarked against the world's average for cancer publications.
Source: L. Butler (2012) *Bibliometric Analysis of the Victorian Comprehensive Cancer Centre 2006- 2010*. VCCC publication.

The primary tenet of the VCCC is research-led excellence in clinical care. Multidisciplinary research, collaboration and innovation are fundamental to the VCCC achieving its key outcomes. Collaboration clearly underpins excellence: publications with authors from multiple VCCC members and external collaborators had close to three times the relative citation impact of those with authors from only a single VCCC Member organisation.

Answering 'practice changing' questions in health will require greater cross disciplinary collaboration across laboratory, clinical and quantitative sciences. Translation requires strong connection with clinical services. Systemic challenges hinder collaborative research being conducted at a depth and scale that will ensure rapid translation and improved health.

Challenges

- (1) **Funding is incomplete.** Conducting research requires people, technical and analytical services, facilities and administration, as well 'consumables' for experimentation. These experiment, salary and indirect costs are not fully met by any one funding scheme. Furthermore inequities arise as medical research institutes, universities and teaching hospitals do not have the same level of access to funding to meet these costs, particularly indirect research costs. New research platforms receiving capital funding also struggle to find the necessary salary support.
- (2) **Emerging and under-represented disciplines are not sufficiently supported.** Under-represented and emerging disciplines require fostering and career progression. These should be aligned with changes in the research landscape. There is a need to support the convergence of disciplines in engineering, physical sciences and life sciences around health and medical research. For example, bioinformatics draws from

¹ L. Butler (2012) *Bibliometric Analysis of the Victorian Comprehensive Cancer Centre 2006-2010*. VCCC publication.

the mathematical sciences to make sense of the large volume of data emerging from genomic research. The contribution of this expertise to a medical research team is poorly recognised in traditional performance metrics, limiting career progression. Consequently entry into the discipline is unattractive. Health economics and biostatistics, so essential for clinical research, are similarly poorly supported.

- (3) Collaboration is not systematically or consistently rewarded.** Recognising researchers for their individual performance has caused a strong culture of competition across the sector. It is clear that collaboration results in research with a higher impact (as demonstrated above) but may be detrimental to individual career recognition and progression currently. Even the Prime Minister's Prize for Science will only consider collaborations of fewer than four people. It is difficult and time consuming to establish collaborations, let alone to ensure they flourish and have rapid success. All funding schemes should prioritise and reward teams and individuals for genuine collaboration, where there is good evidence for strong relationships and true outcomes.
- (4) High quality large scale resources are at risk.** The value of annotated biological samples linked to demographic, clinical and/or health behaviour (epidemiological) for research is well established. The creation of bio-repositories has been supported by local and international investment. However, at the point where these are of sufficient size to be a useful resource for researchers, they are under threat from lack of ongoing funding.
- (5) Electronic clinical outcomes data is lacking.** Australian researchers will not be competitive internationally without access to comprehensive electronic clinical and outcomes data. This is not fully addressed by the Patient Held Electronic Health Record initiative. Similarly, without linkage between electronic health records and population and health databases the ability to identify effective clinical practices and monitor outcomes is severely compromised.
- (6) Translation into practice is poorly supported.** The development of evidence is a global undertaking. Good systems to interpret, evaluate and adapt new evidence for the Australian health system are lacking. We need to train a new generation of healthcare practitioners who have the skills and time to respond to new evidence and rapidly introduce change locally.
- (7) Research evaluation is under-developed.** In large part this is due to a lack of complete data. Universities, hospitals and medical research institutes have different reporting requirements and metrics. Subsequently, capturing a complete and accurate picture of research activity and income across organisations is close to impossible. This severely limits the ability of institutions and governments to make strategic decisions. A rich reporting environment would be enabled by:

 - a. a broader alignment of reporting requirements across agencies, and
 - b. an electronic system which aggregates data from a range of clinical, research and administrative systems within research organisations.

These should replace the current disjointed approach, not add an additional layer of bureaucratic complexity.

Responses to Questions

Q1 Why is it in Australia's interest to have a viable internationally competitive health and medical research sector?

High quality research and researchers are necessary to interpret and capture the world's research discoveries, a significant proportion of which occur overseas. Such knowledge transfer can only occur where there is a viable research sector. Academic research drives change in healthcare practice. Researchers ensure that new discoveries can be translated into health care interventions which are effective in an Australian context. The health and medical research sector is therefore central to the 'virtuous cycle' of research investment, knowledge creation and the generation of health and wealth in Australia².

The numerous examples of Australian scientific discoveries impacting on treatment internationally do not need reiterating here³. The further development of innovative research and its practical application are an integral requirement of Australia's medical research.

The high calibre of Australian research is attractive to international research organisations: 24% of VCCC collaborations are international, predominantly the US. The economic and health benefits of health and medical research have been demonstrated⁴. Every dollar of investment in cancer research made by the NHMRC returned \$1.70 in benefit to the community⁵.

Despite the challenges faced by the sector, we firmly believe that Australia is well positioned to continue to be competitive. Australia has a record of research excellence. It has a strong base of collaboration. The healthcare system and population databases such as the Cancer Registries enable recruitment to studies and the collection of annotated clinical and population samples. The Kathleen Cunningham Foundation Consortium for research into Familial Breast Cancer (kConFab) repository based at the Peter Mac Callum Cancer Centre and the Biorepository at the University of Melbourne are two such collections accessed by researchers internationally⁶. These initiatives have led to more than 160 papers (kConFab) and attracted about \$30M funding from the US (University of Melbourne).

Q2 How might health and medical research be best managed and funded in Australia?

The spread of medical research disciplines receiving funding for cancer research in Australia is different from some overseas funding programs, with a higher emphasis on biology (see Figure 2). This is a likely contributing factor to Australia's success in this realm of science and should be a foundation for greater investment in other research types to accelerate gains in health outcomes. Strategic investment decisions should be made based on an understanding of both the reasons for the disparities observed in Figure 2 and the impact of these areas of research on reducing the burden of disease.

² Australian Government (2010) *National Health and Medical Research Council strategic plan 2010-12*. NHMRC publication

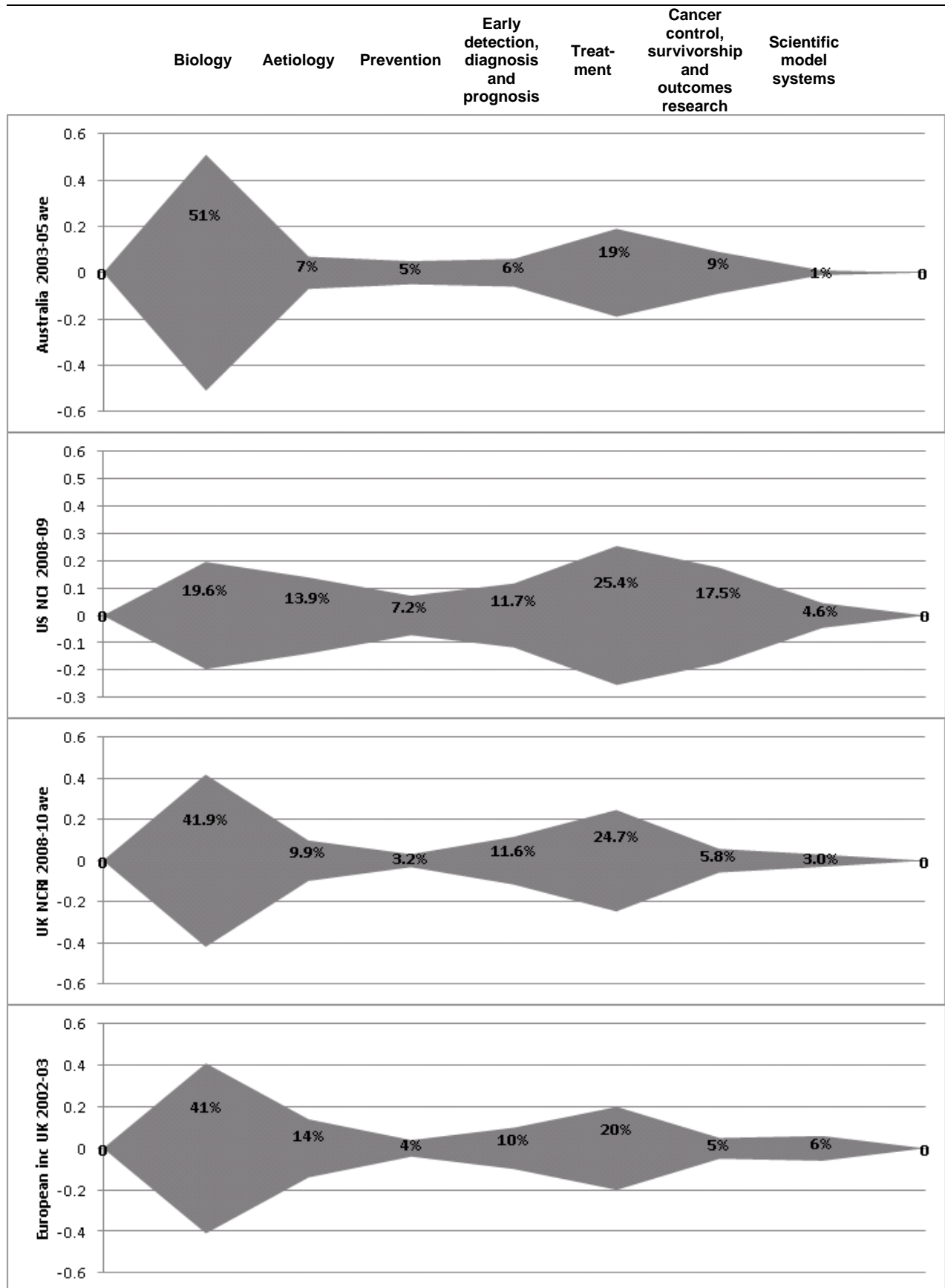
³ For further details, please see the submissions from the individual VCCC member organisations.

⁴ Lateral Economics/Research Australia (October 2010) *Australia's Investment in Health and Medical Research: Reinforcing the Evidence for Exceptional Returns*

⁵ Deloitte Access Economics/Australian Society for Medical Research (2010) *Returns on NHMRC funded Research and Development*.

⁶ The kConFab repository has 150,000 biological fractions stored from 12,590 people (www.kconfab.org). The University of Melbourne biorepository has 660,000 specimens from approximately 100,000 people.

Figure 2: Proportion of cancer research funding awarded by Common Scientific Outline



Source: Healthcare Management Advisors (2012) *Victorian Comprehensive Cancer Centre Cancer Research Capability and Activity Census 2008-09 and 2009-10*. Cancer research funding information is publicly available data from Cancer Australia, European Cancer Research Managers Forum, National Cancer Research Institute and the National Cancer Institute.

With respect to the management of funding, a simple and transparent system is needed to overcome the disparities and administrative burden inherent in the current funding mechanisms. The pros and cons of single funding agency model versus multiple agencies targeted at specific research areas needs careful consideration. The model chosen should enhance research opportunity, facilitate collaboration and reduce the silos that can exist between research disciplines as well as between basic and applied research. Whichever approach is taken, funding should continue to be tied to the Health budget.

The current approach of only partially funding research should be re-examined. Of particular concern are meeting indirect research costs and the difference in funds available to meet these across medical research institutes, universities and hospitals⁷. The VCCC notes that The Walter and Eliza Hall Institute for Medical Research propose that the indirect costs of federally funded research be funded federally. The relevant State would meet those arising from state-funded research. Current algorithms for funding of indirect costs are derived from the costs of university and medical research institutes. Quantifying the indirect costs of clinical research should recognise the potentially different cost basis, e.g clinical governance, clinician time and maintenance of processes and platforms for patient recruitment, collection of samples and clinical data etc.

Improving health requires the generation of new findings, as well as mechanisms for the interpretation of large volumes of research data generated globally, and evaluation for evidence of effectiveness. Rapid and cohesive application in patient care is needed on a sufficiently large scale to have a significant impact on health outcomes. This is only possible through consortia of sufficient depth such as the VCCC, with its direct links between research and clinical care. The benefits of consortia between hospitals, medical research institutes and universities to further translational research in cancer cannot be understated.

The VCCC strongly advocates the promotion of models which enable close functional engagement across health care, research and teaching. The VCCC supports the development of Advanced Health Research Centres, emphasizing that their success will depend on their size and research depth. Lessons can also be learned from the experiences of the Australian Government funded Collaborative Research Centres. These suggest that the viability and success of such Centres will be dependent on sufficient financial support and robust governance.

Q3 What are the health and medical research strategic directions and priorities and how might we meet them?

- (1) Grow research capacity in prevention, early detection, treatment, health service research, and survivorship.** Australia's profile of funding for cancer research differs to the UK, Europe, the US and Canada (Figure 2). The reasons for this are not immediately apparent. Government policy decisions regarding research funding are likely to play a role. Differences in workforce profiles and in the ability of researchers in these areas to compete for limited funds cannot be excluded. The value of excellence of research across these areas needs to be recognised. Further work is required to identify the potential impact of these areas of research, barriers to excellence and how these can be addressed.

Health service research and health economics should be developed as a strategic priority as both are essential for the evaluation of health care interventions. The

⁷ See further elaboration of the issue in the submission from the Peter MacCallum Cancer Centre.

emerging field of Implementation Science provides research-based evidence for effecting change in health practices. Education, training and research opportunity in each of these fields needs to be increased.

Linkage of basic research more directly to primary care and to population health is also needed.

Finally, clinical trials conducted in Australia bring numerous benefits to the economy, health system and individuals^{8,9}, not least the faster introduction of new therapies. It is important to support the conduct of clinical trials in the health system and ensure Australia's international competitiveness in attracting commercially driven research.

- (2) Support collaborative programs addressing specific disease.** As noted in the Terms of Reference, chronic diseases are now the leading cause of morbidity and mortality. Cancer is foremost amongst these.

Cancer contributes the greatest burden of disease and deaths in our community¹⁰, with an incidence projected to increase from 100,000 new cases per annum to 150,000 by 2020¹¹. One in every two people can expect to be diagnosed with cancer by the age of 85.

Making a difference in health outcomes needs programs targeted at those diseases which are projected to have the greatest impact on morbidity and mortality. It also needs a multidisciplinary approach with sufficient depth and breadth of expertise to address prevention, detection, treatment, supportive care and health outcomes.

- (3) Build and maintain systems which will enable large scale research endeavours.** Australian researchers need to be able to conduct research at a scale which will yield meaningful results. Large scale endeavours attract international investment and make it possible to rigorously evaluate the effectiveness of health interventions.

Molecular characterization of diseases such as cancer has meant that larger numbers of samples and patients are required for significant findings. Where it does not already exist, research infrastructure to support sample and data collections must be developed and maintained.

In the near future, it will not be possible to compete internationally without (ethical) access for research to complete electronic health records. Linkage of electronic clinical data to the existing health and population databases will provide Australia with a competitive advantage over countries with private health systems. However the essential expertise (e.g. health informatics, bioinformatics) must also be put in

⁸ Clinical Trials Action Group Report (2011) *Clinically Competitive: boosting the business of clinical trials in Australia*. Australian Government Publication.

⁹ Consumers Health Forum of Australia. *Consumer Guide to Clinical Trials*. Australian Government initiative

¹⁰ Australian Institute of Health and Welfare (2010) *Australia's health 2010*.

¹¹ Australian Institute of Health and Welfare (2012) *Cancer incidence projections, Australia 2011-2020*

place concurrently. The issues arising in capital funding for technology described above are relevant here also.

The conduct of large scale research can be enabled by harmonising processes across organisations, reducing the administrative burden and delays inherent in multi-site studies. Collaborative centres involving research organisations and health services are well placed to support such initiatives.

- (4) Expertise.** A coherent strategy is needed to address workforce issues in research and at its interface with clinical care. Several points in the research career pathway need to be addressed. Firstly, research higher degree students need to be attracted to ensure sufficient workforce into the sector. Secondly, more researchers are needed in emerging areas of need (eg bioinformatics, health economics, health informatics, biostatistics) and from 'non-traditional' life science disciplines such as engineering. Thirdly, better career support is necessary for young postdoctoral researchers to bridge and shorten the gap between their first postdoctoral position and an NHMRC fellowship or equivalent position. In the clinical setting, some restructuring is necessary to ensure protected time for clinicians to facilitate clinical research and to be the driving force of transferring discovery into better health outcomes.

Education and training can enhance the quality of collaboration and translation. Scientists with a greater depth of understanding of clinical science will be better placed to collaborate effectively with clinicians (see Q4 below). Clinicians would benefit from more training in research methods and the implementation of new evidence into clinical practice.

Q4 How can we optimise translation of health and medical research into better health and wellbeing?

The translation of health and medical research into better health and wellbeing is a complex endeavour. Attention must be paid to both the translation of research into the development of effective therapeutics and the use of research based evidence in clinical practice (hospital and community-based). Both of these 'pipelines' require multidisciplinary collaboration for a rapid 'virtuous cycle'.

The ability of multidisciplinary consortia to develop long term research collaborations and optimise translation may be enhanced by building the workforce's capacity for interdisciplinary interaction. Education and training is one pathway to this. Of particular interest is the 'Med into Grad' initiative by the Howard Hughes Medical Institute. Twenty-five programs in the USA have been funded to introduce PhD students from the biological sciences to clinical medicine. Their aim is to enhance the participants' ability to collaborate with physician-scientists and conduct translational research¹².

Strategic development of academic excellence in health service research will support the interpretation, evaluation and application of research evidence in Australia. This must be complemented by research into the mechanisms which influence uptake of evidence and improve clinical practice. Structured approaches to implementation are then needed to address barriers and nurture change in the health system and by organisations.

¹² Howard Hughes Medical Institute *HHMI expands program to introduce Ph.D to clinical medicine.*
www.hhmi.org/news/20081218MedintoGrad.html accessed 28 March 2012