STRATEGIC REVIEW OF HEALTH AND MEDICAL RESEARCH

BACKGROUND - UNIVERSITY OF QUEENSLAND DIAMANTINA INSTITUTE (UQDI)

UQDI is a faculty-level research institute based on the Princess Alexandra Hospital campus Brisbane. The institute is home to currently ~150 research staff, and is expanding over the next 2-3 years up to 280 staff. Its research strengths lie in immunology, cancer and genomic medicine. UQDI also houses the UQ Centre for Clinical Genomics, which is the largest genomics (sequencing and array) facility in Australia. The institute has a strong relationship with the Princess Alexandra Hospital, with key group leaders being clinician-scientists co-appointed with the hospital, and extensive interaction between the key research and clinical staff of the two facilities. This facilitates near-patient, translational research. The institute is currently directed by Prof. Matt Brown; Prof. Ian Frazer was the previous director.

KEY DISCUSSION POINTS:

1. FUNDING

There is general agreement that biomedical research in Australia is underfunded. Adverse impacts of this on the Australian research community include:

- The paucity of funding leads to an extremely high dropout rate of early-mid-career research scientists. This is a waste of human resource and investment in their training, and leads to high stress levels amongst this research group given the low chance of long-term career stability.
- The underfunding leads to the available funding being focussed on low risk projects. Thus higher risk but potentially higher impact research is underfunded. This encourages leading researchers to leave Australia, again wasting our human capital. For example, the NHMRC did not fund an Australian genome-wide association study till 2008, five years after the Wellcome Trust funded the Wellcome Trust Case-Control Consortium studies which revolutionised the field, and 3-5 years behind funding agencies in Europe, United States and Japan. This left Australian genetics research several years behind the field, despite excellent clinical resources which could have been utilised for productive high impact research.
- A large proportion of high quality research proposals do not get funded and most are therefore never carried out, with substantial waste of the intellectual input involved. Researchers spend a disproportionately large fraction of their time preparing these research proposals rather than performing research, reducing productivity.
- There are not enough funds to allow significant numbers of strategically targeted calls for applications. This reduces the flexibility of the research system and its ability to respond to changing health and research priorities.
- There is not enough support for international collaborative linkages, weakening our ability to participate in international collaborative research, and thence to compete for overseas funding.

Additionally, there are few sources of significant research funding, with the vast majority of funds coming from and being distributed by the NHMRC and ARC. The contribution from the medical charity, philanthropy and pharmaceutical industry sectors are relatively small by comparison with, for example the United States and United Kingdom.

- The centralisation of funding distribution, whilst efficient, reduces research diversity. This reduces the ability of the research community to establish new research fields, pursue

higher risk research, or research whose value may not necessarily lie in the narrow set of metrics used particularly by the dominant research funding agencies.

The current system is largely responsive and short-term. This results in a lack of central strategic planning of research direction, and increase waste and missed opportunities. An example of that relates to long-term population cohort studies in Australia, where there is no suitable long-term funding mechanism, and no use of strategic funds to optimise their use. Therefore Australia does not have an equivalent of the Framingham or Rotterdam studies, although we have several studies (Blue Mountain Eye Study, Dubbo Osteoporosis Epidemiology Study, RAINE Cohort Study) which with appropriate support could have become as productive as these outstanding population studies have been.

<u>Recommendations:</u>

1. The level of research funding needs to increase to similar levels as those of other major developed countries such as the United Kingdom and United States, and be maintained there.
2. Initiatives to encourage a significant biotechnology and pharmaceutical industry in Australia need to be introduced. These will require a range of mechanisms including:
    a. Direct funding support particularly for academic-industry partnerships, and increased support for spin-off biotech/pharma companies
    b. Active state and federal government engagement in courting the relevant industries overseas to establish a presence in Australia
    c. Enabling clinical research (see below) and higher risk translational research, particularly where partnered with these industries.
3. The medical charity and philanthropy sectors need to be further encouraged, which would have expected benefits in increasing the total funding pool, and its diversity. Whilst throughout the university sector in recent years there has been increased activity in advancement, progress in the biomedical charity sector has been slower. This will likely require financial incentives such as through taxation to achieve.
4. The diversity of funding mechanisms used through the NHMRC and ARC needs to be increased, particularly an increased use of strategic funding initiatives. Used appropriately this could increase the responsiveness of the system and increase its efficiency, by supporting fields of significance, strength or need.
5. Australian funding should encourage greater international collaboration, particularly with regional powerhouses like China. These partnerships need to be encouraged by a combination of initiatives including personnel exchange, student exchange and collaborative research programs. Their funding needs to be of an appropriate scale; the $9 million funded to the Australia-China Science and Research Fund from 2011-14 is for example, derisory, and was perceived as such by Chinese researchers.

2. CLINICAL RESEARCH

Whilst basic research in Australia has maintained a strong position internationally despite the resource issues discussed above, clinical research has waned. This includes both ‘experimental medicine’ (near-patient studies including research into disease-causation or early phase translational studies) and clinical trial research.

Clinical research is an essential component of translational research activity. The weakness of clinical research in Australia reduces the capacity of the Australian research community to deliver on the strong basic science research being performed here.

Further, having strong clinical researchers associated with health care delivery services also benefits those services, maintaining them at the cutting edge and encouraging a culture of continual review and improvement. Clinical trials activity provides improved access to developmental treatments, and has other benefits such as increasing engagement with the pharmaceutical industry, enabling translational research and providing income streams for other activities.

A specific example of the problems that can arise because of the substantial division in Australia between health care service delivery and research is in the field of genetics. The rapid advance of the genetics research in the past decade with the completion of the human genome project, advances in our understanding of the genetic aetiology of disease, and rapid improvements in sequencing technology with concomitant reductions in costs, has brought this research field close to the point of translation into clinical practice. This is going to have a major impact on both research and clinical service provision for which neither the research nor clinical communities are prepared. With the cost of whole genome sequencing likely to fall to under $500 within the next four years, there is an urgent need for planning regarding the implications of this and opportunities it will bring.

Reasons for the weakness of the Australian clinical research field include:

- A reduction in the number of clinician-scientists in training. For example, there are only three Australian rheumatology clinicians in RHD training programs currently, and not one Australian rheumatology clinician-scientist either in training or early-postdoctoral work overseas, despite Arthritis being a National Health Priority. Similar situations exist across most medical specialties in Australia. There is a long lag time involved in training these researchers, and so urgent action is required to minimise the impact that shortage of trainees will have on clinician-scientist numbers.
- Having completed training, the career structure for clinician-scientists that was present 20-30 years ago has eroded, and so it has become increasingly hard for these researchers to remain in research long-term. This is related to the increasing division between clinical and basic research in Australia.
- The absence of a truly national ethics framework creates unnecessary obstacles to performing clinical research. Researchers need to apply to multiple ethics approval authorities, even for research within the one city, and then also organise complex site-specific agreements across multiple bodies. This leads to substantial unnecessary delay and expense and discourages research activity.
- There is a physical and organisational separation of clinical and basic research in Australia which inhibits interaction between the two. Hospitals have increasingly been focussed purely on health care delivery, and the concept of 'teaching hospitals', which were at one point also major hubs of clinical research, has been severely weakened.

<u>Recommendations:</u>

1. Clinical Research Training

There needs to be increased funding of clinical research training positions such as the NHMRC practitioner fellowships, and of university/hospital positions for clinician-scientists. Major hospital departments, should, for example, be required to have senior staff with conjoint

research/academic appointments and postgraduate research qualifications. Protected time for research activities should be provided, and research support staff should be funded by hospitals to enable clinical research.

2. Academic Health Centres

Partnership between universities and health care delivery organisations such as hospitals should be encouraged by the creation and funding of academic health centres in major cities across Australia. The aim of these centres will be to remove barriers to clinical research, create pipelines for translational research including facilities for early phase clinical trials, encourage collaboration between different levels of researchers from basic science to clinical medicine, and to foster excellence in clinical medicine.

3. A National Research Ethics Framework

Ethics is not relative depending on where research is performed. The NHMRC sponsored 'Harmonisation of Multi-Centre Ethical Review' initiative has not led to a national approach to ethics, let alone research governance approaches. A renewed effort needs to be made to develop an ethics review system which is truly national and efficient. This recommendation would ultimately save money by reducing the inefficiency of the current bureaucracy.

4. Establishment of a National Institute of Health Research

Clinical research in Australia would benefit from the establishment of a body to coordinate and encourage clinical research. This could be closely modelled on the British equivalent, which has been highly successful, through funding of clinical research infrastructure and trials, organisation of clinical research networks and academic health centres, and encouraging and enabling better training and career opportunities for clinical research. Alternately this could be achieved within the current NHMRC, though not within the NHMRC's current budget, and would require .

5. Specific Funding for Clinical Research

For the initiatives described above to succeed, further funding will be required. This has been recognised overseas, where the linkage between health care delivery and research, and the bidirectional benefits involved have been recognised through funding of clinical research allied to health care funding. Both health delivery and research sectors in Australia are financially stressed, and are unlikely to support these initiatives unless a specific body of funding is made available for them. In the United Kingdom, despite a far bigger contribution from the pharmaceutical and charity sector to research funding, 1.5% of the NHS budget was allocated for these purposes; a similar arrangement would have a major beneficial impact on clinical research and service delivery in Australia.

MATTHEW BROWN
Director | Professor of Immunogenetics
University of Queensland Diamantina Institute