Summary of submission to the McKeon Review

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Australia's health and medical research sector is internationally competitive and high-functioning. However, there are areas that could be improved to put us in the best position to face current and emerging health challenges. Our key recommendations to the McKeon Strategic Review of Health and Medical Research are as follows:

- Improve use of existing resources by promoting collaboration and ensuring career opportunities
- Overhaul the Project Grants system, which is currently excessively time-consuming for those involved both as assessors and applicants
- Increase Program Grant support
- Establish more explicit and deliberate assessment of collaboration, translation and industry engagement
- Link spending on medical research to total national spending on health care or a similar economic parameter
- Increase infrastructure funding
- Remove structural barriers in Government to linkage of research and application
- Focus on collaborative opportunity between clinicians and researchers through support of platform technologies and technologists, reducing red tape and establishing formal indicators to foster innovation
- Explore opportunities for "wealth fund" from mining and resources to support research into common diseases in Australia and its near neighbours
- Finally, for future directions, a good guide is Eric Topol's "The Creative Destruction on Medicine"

1 Why is it in Australia's interest to have a viable, internationally competitive health and medical research sector? (Terms of Reference 1 and 6)

It seems surprising to have to justify why it is in the nation's interests to have a strong medical research sector. For one thing, we already have one and it would be perverse to lose it. There are only limited numbers of other activities for which Australians have such a globally acknowledged role – sport and mining being among those. No-one, at least no-one who has been seriously ill, would doubt the importance of very strong health care; it is an essential indicator of quality of life and there is nothing more threatening to an individual in our society than being sick or having a sick close relative. While it is hard to prove causality, countries with good health care have strong medical research: medical care and medical research are so intertwined that they cannot be unpicked. In addtion, in any cohort of university graduates there will be some with great curiosity and the desire to try new things and achieve greater understanding of disease – why would you push these people away to other countries?

1.1 Medical research is an integral part of a high-functioning health system

The treatment of disease changes so quickly it is almost unrecognizable within a couple of decades. A good example is acute myocardial infarction, which was not actively treated at all until the 1960's. Coronary care units, defibrillation, by-pass graft surgery, angioplasty, clot-dissolving drugs and stents have all been widely applied since then, as well as important drugs such as platelet function inhibitors, ACE inhibitors and statins. Similar rapid change can be identified in many other diseases such as rheumatoid arthritis, cancer, diabetes, HIV and hepatitis. While there will always be impatience for cures and better treatments, it is hard to see health and medical research as an unsuccessful enterprise. Medicine is not static and a strong health and medical research sector ensures early knowledge and exposure and understanding of change. Australians have been actively involved in this as evidenced by our Nobel Laureates.

Australia has an excellent health system and its citizens receive medical care equal to anywhere in the world, with better access and equity than is available in the USA, for example. However, this needs constant attention and there are many areas in which Australia could improve, including mental health, indigenous health, rural and regional health care delivery. Medical research underpins excellent health care delivery by providing professionals committed to innovation. This involves application of discoveries made here in Australia and discoveries made elsewhere. Application of discoveries from overseas is likely to be more effective and appropriate for Australian requirements with a domestic medical innovation community. When people ask whether they should head to New York, Boston or London for medical treatment, we can tell them that the best is available here – this would not be the case if we were wholly reliant on medical research overseas.

1.2 Medical research provides opportunity for a highly educated workforce

Many of Australia's most intellectually capable citizens work in health care. Not only medicine, but biomedical science, allied health and nursing attract outstanding school leavers and there is no indication that this will change. These individuals are capable of doing much more than following instructions and protocols. They represent one of the most highly educated workforces in the country. It is highly desirable that these well-educated professionals have the opportunity to achieve great things in this country. The alternative is for them to go overseas – a shameful loss of our talent – or for them to be involved only in service delivery. In addition, the opportunity to do medical research brings many outstanding people into Australia.

1.3 Medical research is part of a 21st century economy

It is true that Australia has been better at making discoveries and creating knowledge than applying it and that the Australian pharmaceutical industry is mainly the local arms of multi-national companies. However, medicine and medical research are economic opportunities that are set to

continue growing despite the setbacks recently experienced by large companies. Australia should continue to press hard to support local industries based around medical research, devices and pharmaceuticals. There appears to be growing maturity of the local biotech industry. This is a high value added industry that contrasts with the currently successful mining boom and it is directly connected with the high standard of the workforce in medical research and related fields.

2 How might health and medical research be best managed and funded in Australia? (Terms of Reference 2, 3 and 7)

Topics covered by AAMRI and Research Australia and supported by SVI, but not further covered in this submission:

- Indirect costs should be funded equally wherever grants are awarded and research carried out.

- Government research grants should be equally accessible to researchers, independent of the type of organization by which they are employed. This is often referred to as grants being awarded to the best applicants, independent of their address within Australia.

- NHMRC remains in need of re-organisation despite several previous reviews. Evidence for this includes the difficulty with implementation of their RGMS software, largely resolved at last. A major challenge is that the responsibilities of the NHMRC are quite broad including practice guidelines as well as research management.

2.1 How can we do better with existing resources?

2.1.1 Promote collaboration

Collaboration is essential for success in research: it delivers large teams that can tackle difficult and important problems; it provides a broader range of skills and knowledge; and it eases the community's concerns about research being spent on secretive and competitive duplication. Therefore, collaboration should be encouraged and barriers to collaboration reduced.

Some barriers include:

- The paradox that performing strongly as a team is highly valued, but being an effective team player can have a negative impact on how individuals are assessed. Ability to collaborate is at times seen as a sign of individual weakness. In the NHMRC Fellowship scheme, the applicants are assessed on their individual rather than team achievement. This is out of sync with encouragement to collaborate.

- Researchers are encouraged to form collaborative teams, but the main NHMRC-funded mechanism to do this – Program Grants – remains underfunded compared with the mechanisms for funding individual projects. This is out of sync with the policy objective of collaboration.

- Administrative processes are at odds with encouraging Program participation, e.g. barriers to indirect (infrastructure) funds being transferred from the administering institution to where research is being done; recognition being primarily given to Chief Investigator A and their institution when the credit should be shared.

Program Grants are designed to provide a longer period of funding so that investigators with strong records of achievement can be more secure and tackle longer-term questions. However, they do not achieve this goal. This is because re-application occurs after three and a half, rather than five years, and the amount of funding awarded is insufficient. This is because the investigators in Programs are typically quite senior with large groups that cannot be supported by the quanta

awarded (roughly twice the value of a Project grant). Because of constrained funding the bar is set very high for a Program to add new investigators to the team and receive additional funding. This makes Program investigators very resistant to expanding the collaborative team. It has been common for amounts awarded to decline despite rising costs and continued good performance.

Ideally, younger emerging researchers would be able to join with existing Program teams when the Program is renewed. The quanta might need to increase a little but more importantly it should be easier to add new team members with less risk of diluted funding.

2.1.2 Ensure career opportunities

It is a truism to say that research success begins with and depends upon recruiting and retaining the right people. Science is a noble calling that attracts altruistic, passionate and talented young people prepared for challenge. It is a big responsibility for the sector to ensure that career opportunities do not let these people down. Losing mid-career scientists is costly, considering the years of training and investment.

Career support is competitive at all stages, but there are bottlenecks currently at the Career Development Fellowship stage and within the NHMRC Fellowship scheme. The CDF scheme as a whole has become unrealistically competitive and is discouraging and disheartening for people at this career stage, when they are also applying for their first Project Grants.

The Fellowship system is difficult to enter and even more so to progress through. Many Senior Research Fellows (the lowest rung of the scheme) have appointments as full University Professors. Many very high-powered researchers never progress beyond this stage. For those that do progress up the ranks, the Australia Fellowship was an important funding possibility. It is disappointing that the scheme has not continued both for potential new applicants and Fellows completing their term. These Fellows return to the lower level of SPRF despite continued high performance in most cases. A worrying trend has been the loss of paid research positions in hospitals and universities that once added to researchers funded by NHMRC – increasingly, salaries for research are unusual and these institutions rely on NHMRC to fund their researchers.

Several groups in the workforce need specific consideration, including women, clinicians, bioinformaticians and senior scientists with technical but not grant writing skills. Senior technical people can be very valuable as supervisors and managers of platform technology facilities – but it is very difficult to fund this important operational expense. Salary structures also need review because of the increasing discrepancy between the levels of support set by NHMRC and actual salary levels usually determined by enterprise bargaining agreements in major universities.

Fixing these problems almost certainly requires more money – this would be a good way of spending funds from a new major source of funding – see Section 2 below.

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2.1.3 Reviewing the Project Grant peer review system

While peer review remains the preferred model, it is incredibly time consuming and can have a negative impact on productivity. Grant writing is an important planning exercise but has increasingly become virtually an end in itself.

Due to the time commitment in writing and subsequently reviewing Project Grants, other activities such as commercialization and translation are likely to suffer. Because of the funding structure it is very hard to shake free of this. If you have a large research group, the most senior members of whom are funded in the Program system, insufficient funds almost invariably mean that they also need to be in the Project system. To achieve critical mass (say a group of 10-15 people), you may need over $1million/annum in grants – almost a full time job in itself. This is a source of insecurity

for young investigators and an increasing burden for established investigators with large groups. The only funding sources really available are the NHMRC and disease-based charities and until this year the Australian Research Council.

The Project Grant assessment process seems at times a bit of a lottery because so many grants cluster in the 'fundable' category. Panel composition is overly weighted towards junior inexperienced investigators who understandably lack confidence and consistency. There is good evidence that reproducibility of assessment is poor. Conflict of interest rules can almost result in grid-lock in our small and highly connected community. The grant panels can become overly negative with nit-picking encouraged by executive members of the panel, who are relieved if more grants finish in the unfundable category. There is elaborate gaming of budget asks on both the applicant and reviewer side of the table. The unspoken and possibly unconscious psychology, part of all peer review, is that if a grant does well this must reduce the chances for grants from panel members. The escalating number of grants for review makes this hard to manage for the NHMRC.

Peer review could also be improved by priority setting within disease areas. NHMRC does not have the internal resources to do this. Contact between researchers and clinicians knowledgeable about disease and policy makers is surprisingly limited. Technical experts are tainted by concerns about self-interest. A mechanism for coordinating advice from researchers and clinical practitioners and disease-based groups who can provide advice to NHMRC or DOHA would be helpful. This could involve special societies (Cardiac Society, Australian Diabetes Society), disease based charities (National Heart Foundation, Juvenile Diabetes Research Foundation), consumer groups etc. Such mechanisms are currently well developed for cancer but less so in other areas. Expansion of the Cancer Australia initiative to other diseases should be explored.

Possible improvements:

- **Fixed budgets e.g. $200k/year**
- **Make the project grant system focused on younger investigators - try to take senior experienced researchers out of the Project System**
- **Possibly expressions of interest with subsequent triage**
- **Primarily fund people rather than specific projects (something done increasingly by Wellcome)**

2.2 How can resources for medical research be increased?

Most would agree that medical research in Australia is excessively dependent on government funding, with up to 80% of funding from government, and limited additional support from disease-based charities and commercial activities. Philanthropic funding is spent primarily on equipment rather than project costs. Other sources of funding are urgently needed to relieve this intense reliance on government.

2.2.1 Philanthropy

Our institute receives about 10% of its current income from philanthropy. This comes from applications to Trusts and Foundations (~30%), personal donations and events (~ 30%) and income from long-term invested funds, such as those arising from past bequests (~30%). Costs are approximately 20% of this. The expenses do not include the time taken by scientists on tours and giving talks or a truly comprehensive assessment of the time contribution of administrative staff indirectly involved (e.g. HR, finance etc.). Community contact to raise money has the valuable spin-off of science communication.

Our philanthropic effort involves applying to myriad grant making philanthropic organisations, approaching wealthy individuals and hoping that community profile will yield increased bequests. There is a worrying trend for Trusts and Foundations to move away from funding medical research because of difficulty in assessing the merit of the large number of grants received. It is simply unrealistic to think the system as it is currently organized has the scale of donors to replace reliance of the sector upon Government. While many Australians are generous, we do not have the

giving culture of the USA, and it is difficult to imagine raising substantial amounts from the community in this way.

Possible approaches to increasing the amount or the efficiency of philanthropy for medical research include consolidation of the existing large number of small funds. This would improve review and efficiency – although it is not clear that this would increase the amount on offer. A second possibility is finding a new source of funds.

In other countries there is significant non-Government support from major charities. In the UK, for example, there is the Wellcome Trust (with a corpus in excess of 10 billion pounds) and in the US major charities include the Howard Hughes Foundation and the Bill and Melinda Gates Foundation. These Foundations have rigorous processes and strong governance.

Would it be feasible to establish an Australian philanthropic medical research funding body with the scale of the Wellcome Foundation and the Gates Foundation to complement Government support? Banking and Mining are Australian industries that rival the success of overseas industries like information technology, pharmaceuticals or oil exploration. We could explore the feasibility of establishing a fund with contributions from multiple Mining industry sources dedicated to prevention and better treatment of common diseases in the mining sector work force as well as in the broader community. These include:

- Obesity and type 2 diabetes
- Coronary artery disease
- Infectious diseases including malaria, TB, and HIV
- Cancer especially lung, bowel and breast.
- Mental health including alcohol and drug dependence

Like with the flagship overseas Foundations, strong governance and peer review would ensure the independence of the outcomes of funding applications.The benefits to the mining industry would primarily be improved health of its workforce in the communities where mining is taking place. Additional benefits would include the legacy that would flow to the Australian community and the recognition that this would bring. We believe that a sector wide approach for both donors and recipients is likely to be more powerful than individual ad hoc requests to individual companies. A visit from Ian Frazer, Fiona Stanley and Gus Nossal together would be much harder to resist than these people coming individually for their own organisations. We saw the strength of sector-wide unity in the Discoveries need Dollars campaign.

Mining already has a close connection with medical research through previous donations such as the Walter and Eliza Hall Trust and the participation of many mining leaders in leadership and governance of Australian medical research, and strong but limited local contributions e.g. support from Xstrata in the Hunter Valley. Further, mining and health share the benefits of a strong and proud track record of applied research in Australia. We believe that an alliance of this kind between the two sectors would be of great benefit to them both and to the Nation.

I have presented this idea to several forums and the response has been positive but mixed. A major issue is shareholder consent to public companies spending money in this way but it is possible that champions in the mining industry could help this become reality with support from both public and private companies.

2.2.2 Government

It is hard to subscribe to the idea that direct research funding will inevitably be flat for several years. This will very significantly damage the sector and in particular result in significant job losses. This is a sector that is performing well. There is a consensus that it is important for Australia's future – and costs relatively little in absolute terms. Additionally, Australia remains a relatively young society with a growing population and research spending that is increasing from a low base, in line with population and economic growth. The recurrent need to ask for increased funding

means that the sector appears needy and insatiable. Ideally, spending on medical research would be linked to total national spending on health care or a similar economic parameter. This is said to be naïve but it would mean constrained increases in research spending based on a benchmark. This would mean gradual rather than periodic step ups in funding. It would also have the interesting result that if health care costs drop with research-based improvements then research income would drop.
We could also pursue sourcing money from elsewhere – other than government - as a goal. This always results in the concern that government will pull back from funding if it is successful. This would be very unfortunate. The most successful fundraising organization I have been with – WEHI – encouraged scientists to seek grants from all sources and did not withdraw its institutional support for those who were successful. Hopefully government would welcome "leveraging" of its support and use this as a reason to increase, not decrease, funding.

2.3 Need for increased funding for vitality of MRIs

Independent Medical Research Institutes have emerged as a very successful solution to carrying out world-class research in the health system. They are successful for a number of reasons: they are focused on research, not health care or teaching; they are usually on hospital campuses; and they build on their own success by attracting very talented staff. Additionally, they have strong governance structures with excellent high-level community links through their Boards.

Realistic funding of indirect research costs is a critical issue for MRIs so funds do not have to be diverted to cover the shortfall. One weakness of MRIs is their financial precariousness, which is shared by all to some extent. MRIs get funds from competitive grants with a 1-5 year duration. If no grants are won there is no money in an MRI. Because there is no certain ongoing funding, there have to be some reserves for the times when grants are not funded – when the crops fail. Quite often hospitals and government will think the small operating surpluses we strive to make indicate excess funding but they are essential because we do not know what will come in next year – unlike a hospital which has more predictable income.

Even extremely successful MRIs find it very difficult to remain financially secure and are vulnerable to small changes in funding arrangements because of low levels of financial reserves. The low rate of infrastructure support means constant pressure on funds and virtual inability to build up financial reserves for the "rainy day". Funds, such as income from bequests, that might be used in this way are diverted to the shortfall in infrastructure funding. Furthermore it makes "doing things properly" very difficult. This is made worse by the flat funding now experienced, the global financial crisis that has affected donations and continuing growth in costs, especially salaries. Because of low reserves these pressures are extremely significant and threaten to damage the MRI sector, which is the most successful part of Australian biomedical research.

By pushing even very successful institutes like ours to a no better than balanced position by restricting indirect cost support, governments are ensuring financial instability, especially for institutions that are less successful for a period. Financial instability can also result when rules change slightly, such as the changes to distribution in infrastructure from universities.

This is why increased infrastructure funding is so important.

3 What are the health and medical research strategic directions and priorities and how might we meet them? (Terms of Reference 5, 12 and 13)

3.1 "The Creative Destruction of Medicine: How the Digital Revolution Will Create Better Health Care"

An outstanding summary of where medicine is headed has recently been written by a cardiologist, Eric Topol (*The Creative Destruction of Medicine: How the Digital Revolution Will Create Better Health Care*, Basic Books, New York, 2012). The book covers a number of subjects, which are a good indication of where health and medical research are heading. These include:
Genomics, Exome sequencing, Next gen sequencing, Whole genome sequencing, Bioinformatics, Electronics, Sensors, Large data sets, Systems biology ,Personalized medicine, Pharmacogenomics, Targeted drugs, N of 1 p of many, Stem cells, IPS cells, Imaging, Tissue engineering, Printing cells and tissues, The internet, Mobile phone technology in medicine, Social media and Crowd sourcing.

We will we meet the challenges ahead by nurturing young people, our most precious resource to keep pace with change; by developing outstanding platform facilities at the local and national level and by promoting the development of multi-disciplinary teams. Money is critical and will have to come from industry as well as government and philanthropy. The big changes are in the role of information and communications technology, and mathematics and engineering in medicine. Education is our most powerful weapon, including high school education in science and mathematics.

4 How can we optimise translation of health and medical research into better health and wellbeing? (Terms of Reference 4, 8, 9, 10 and 11)

One of the main sources of motivation for researchers is the possibility that what they discover will be of value in clinical practice and improve the quality of life or even survival of patients. Further, there is always pressure to move research towards clinical application – being able to cure disease in a mouse or rat is a standing joke in the field. Relatively few researchers are driven by basic discovery alone.

Despite major advances over the last 40 years, such as the Human Genome Project and increasing knowledge of the cause of disease, there is dissatisfaction at the impact of research on patient treatment, particularly when it comes to chronic diseases such as cancer, dementia, diabetes and heart failure. Discoveries arising from medical research have led to increases in life expectancy, but at the same time health care costs have been rising.

This process of "translation" – applying research findings to the real world of patient care – is suboptimal. This applies to specific research projects in which researchers attempt to bridge the gap between bench and bedside, but also more generally to applying innovations from around the world to improve the lives of people in our community. Translation generally implies the involvement of clinicians and collaboration between them and scientists in a variety of disciplines.

Desire for greater translation is natural – for greater engagement between research and for greater impact of research on clinical problems. But it is also natural that curiosity-driven research involves deep specialization and reductionist approaches for competitive success.

Translation can be improved. Australia has a strong health care delivery system and strong medical research, but they should be better connected.

4.1 Funding of translational research

There is no doubt that the NHMRC recognizes the value of translational research and encourages it at a policy level. For example, Practitioner Fellowships and Centres for Research Excellence grants are new mechanisms that have been introduced by the NHMRC. However, they are very competitive and are modest grants for the number of investigators involved (e.g. $500k pa for 10 investigators in some CREs). Funding support has risen from a low base and remains much less in absolute terms than for traditional research projects. One problem that we, as researchers,

experience is that we are encouraged by policy to head down this path only to subsequently discover that adequate funding really isn't there and funding would have been "easier" if less clinical projects had been pursued.

It is also easy for a project to fall outside what is fundable. This may be because it is a hybrid of research, development and clinical practice that lacks the research discovery potential to score well. This is the equivalent of the "valley of death" in drug development. Studies can become too applied and translational for traditional research funding and not sufficiently clinical to be funded from the health care delivery system.

The culture of science rightly places a high premium on discovery. The emphasis is on newness, not application. A culture that is akin to that in engineering may be underemphasized in medical research, i.e. a culture of problem solving and implementation rather than discovery alone.

4.2 Responsibility for translational research

Australia's federal system means that the responsibilities for medical research primarily rest with the Commonwealth and health care delivery in hospitals with the States. This produces a structural discontinuity in support for translation: a project can fall between typical research and typical clinical care and therefore be funded by neither level of government (see Case Study below). The opposite, i.e. focused support for translation, is what is desirable.

The federal arrangement of funding is not shared by other countries, yet problems in translation are seen in other countries, so shared funding responsibilities cannot be the only problem.

Other funding arrangements also create an artificial divide between health care funding and research funding that can make it harder, not easier, to fund translational research. Not only a State Government Dept of Health, but also a hospital can be vigilant in ensuring that routine care funding is protected from the costs of innovation. Universities are charged with custodianship of teaching and research training and hospitals charged with clinical care but translational research often seems to be an orphan, with no institutional structure charged with its promotion. Case-mix (activity-based) funding appears to make the focus on the bottom line worse as there is reduced flexibility to seed fund innovation.

Suggestion: Translational research should be someone's responsibility. This has been the stimulus for the idea of Advanced/Academic Health Science Centres. Hospital campus based research facilities such as MRIs have an important role to play. Translational research should be given funding priority to sort out the perverse difficulties it currently faces.

Case study – Islet transplant program

The Australian Islet Transplant Program was funded by the Federal Government from 2005-2010. After this period of establishment and "research", the Federal Government decided that islet transplantation was now more clinical practice than research so it should be funded by the State Governments. However, the State Governments initially felt it was still in part research, so should be funded by the Commonwealth.

We have been referred to the Nationally Funded Centre mechanism and are working through this as if we are a new program rather than one that has been going for over five years. We have gratefully received a lot of advice and help but the point to make is that the program falls in the gap between Commonwealth and State and between research and clinical practice. I suspect this is quite common. There is a big financial burden of spending almost $1m a year to keep the program going and retaining the staff and other capacity built up over years – without any income.

Suggestion: DOHA and NHMRC recognize the structural gap between the state and federal governments in the area of innovative medicine and introduce processes to bridge this divide.

4.3 Clinical research in the hospital system

Academic activity in the hospital system is patchy and ad hoc and could be made more structured. Limited money is directly available in hospitals for research – but clinical medicine provides a vast opportunity for research. Clinical medicine – from surgical procedures with removal of tissue, to the many patients attending for care of chronic disease, to the routine attendances in primary care – generates a vast amount of data. Patients are the clinical research equivalent of pre-clinical research's laboratory animals, but their costs are paid for by clinical budgets. The pathology service, radiology service and the operating theatre are the equivalent of the laboratory. A researcher needs little more than good ideas, a computer and possibly a research nurse (the equivalent of a research assistant) to carry out research, compared with the much greater resources needed to run a dedicated research facility that does not feed off clinical activity in the same way.

This potential should be unlocked more efficiently. Some of the barriers to doing more research like this are explored below.

4.3.1 Dedicated time

This is probably the main cost of research within hospitals. Most doctors have fractional appointments exactly matched to service load. NHMRC support for clinician-researchers is extremely competitive, especially at the senior level. More support is needed for this, possibly structured as joint appointments.

4.3.2 Collaborative opportunity and research in teams

To perform truly innovative studies on the vast array of samples and information, clinicians need collaborations in place with fully professional scientists. On hospital campuses these potential collaborators are mainly found in research institutes. It is surprisingly difficult for scientists located on hospital campuses to access clinical samples.

4.3.3 Platform facilities

Hospital researchers ideally would share platform facility resources that are a common need, including biostatistics access, database facilities, sample storage (biobanks). These are the equivalent of animal houses and flow cytometry in a laboratory research institute. Shared, well-organised and structured facilities are better than ad hoc individual ones. Facilities like histopathology and radiology are necessary for clinical research, but should not be separated from routine clinical services, i.e. research pathology should be done in the routine pathology department although there are issues in costing and paying for this.

Expecting service departments to provide a certain amount of research tests at operating cost price would help. Sometimes it seems that there is more focus on recovering costs for research than on ensuring research gets done.

4.3.4 Red tape

Red tape is a big issue for all forms of research but very much for clinical research when human subjects are involved. This especially involves ethics applications and ethics reporting but also progress reports and clinical trial reporting. Some of this documentation is of course important. However, in some studies it becomes overwhelming and is a significant burden for busy clinician researchers and research nurses. Additionally ethics delays are recognized as a problem in carrying out clinical trials which are an important measure of translational research.

4.3.5 Low expectations from hospitals and Health Departments about performing research

If KPIs are all in the area of patient care, throughput, waiting times and costs there is no pressure to look at innovation other than internal drive. The existence of formal indicators demonstrating an expectation that all from the CEO down should foster innovation is likely to be helpful.

4.4 Work force for translational research

There is abundant evidence that the numbers of doctors combining patient care and research are either in decline or certainly not growing at the same rate as the medical and scientific workforce more generally. There are many reasons for this, including the extremely long duration of training for such a career (essentially beginning definitive positions at age 40), time pressures of clinical work, the difficulties of such a career for women graduates, family and financial pressures, lack of role models, perceptions about the insecurity and difficulty of such a career.

Scientists carrying out more clinical programs are also highly desirable. For example, scientists are essential to SVI's islet transplant program and were essential when clinical IVF was introduced. Imaging scientists and statisticians also fit here. It is very difficult to fund these scientists unless they are bona fide academics, which they often are not. Technical specialists are a gap in the Australian research scene. These are scientists with specialized technical expertise who are sometimes not suited to grant writing. They are needed for translational research. It is very hard to fund these, especially when they are experienced and therefore tend to be on higher salaries. Our system has no career structure or scheme for this. Examples include imaging specialists, in our lab our islet isolation expert, statisticians and bioinformatics experts etc.

Clinical research has come to rely heavily on research nurses. This is a minimally structured career path with good clinical knowledge but quite poor research training in scientific method and quantitative analysis.

Suggestion: More flexible learned College training requirements; availability of joint appointments between hospitals, research institutes and universities allowing specific time for research; fellowships at critical career stages including initial appointment following post-doctoral studies.

4.5 Conclusion

Medicine and related fields remain desirable career choices for young Australians and there is no sign of this changing, despite major demographic shifts. Medical and biological sciences graduates are among the brightest graduates in our community. Medicine and biology have a reputation for rote learning rather than problem solving, although medical courses are addressing this. However, there is no doubt that many creative and innovative minds are working in our health care system and it is important to unlock, not stifle them. New ideas that will directly impact on patient care do not come along every day, but ideas worth having and creative thoughts about individual patients and about improving the system will occur to scientists and clinicians frequently and need to nurtured and appreciated. They sometimes get lost in a system largely focused on short-term costs.