AusBiotech response

to the Prime Minister's Science, Engineering and Innovation Council (PMSEIC), which has asked:

"*What are the top breakthrough actions that the Commonwealth and state/territories government, research agencies, universities and the business community can take to utilise Australia's substantial research capability to contribute to national productivity growth through innovation?*"

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Introduction

Please find following comments from AusBiotech, Australia's biotechnology industry organisation, working on behalf of members for more than 25 years to provide representation and services to promote the global growth of Australian biotechnology. AusBiotech is a well-connected network of over 3,000 members in the life sciences, including therapeutics, medical technology (devices and diagnostics), food technology and agricultural, environmental and industrial biotechnology sectors.

When it comes to fundamental discovery in science and biomedical research, Australia is a legitimate and impressive global contributor, producing 3% of the world's research publications with only 0.3% of the population. However, our ability to translate this strength into tests, cures, treatments and vaccines to benefit the Australian community continues to fall short of expectation.

The 2012 (INSEAD) Global Innovation Index ranks Australia 13th in terms of innovation input and 31st in innovation output. But when these figures are converted to innovation efficiency ratio of output over input, Australia dives to a ranking of 107 out of 141 countries assessed.

AusBiotech strongly supports the view put in the Australian Research Committee (ARCom) National Research Investment Plan discussion paper (July 2012) that "*the [research] system must have the capacity to translate research outcomes into public and private benefit and to respond to demand from a wide range of end-users.*"

AusBiotech would like recommend the following actions be addressed:

1) Articulating innovation as a priority

Underlying the success of innovation is the need to see innovation as an entire value chain, which deserves and needs support along its length, not simply at the early research end, but all the way through to translation.

However knowing this and actually improving innovation in Australia, requires it to be placed as and talked about as a national priority, particularly by governments.

Israel is an example often held up as what could be emulated in Australia. Dr Anna Lavelle, the CEO of AusBiotech, travelled to Israel under a National Australia Bank Yachad Fellowship in 2010, where she observed the focused attitude to innovation held by many Israelis in business and government.

The people in Israel reportedly recognise that they have no natural resources to sustain them, and as such, see that their main resource is their own ingenuity. This means innovation is highly prized, and therefore receives financial support and is seen to be a highly-valued economic driver. In contrast such an attitude and drive are not so evident in Australia, perhaps because for now we're able to fall back on an economy driven by resources.

Australia has just the same potential to be a nation driven by innovation. We have a strong education system, stable government, good regulatory and legal environment and a proven track record in innovation – even if this is not widely known.

The first recommendation is for governments to articulate the importance of innovation to our future and how we see ourselves as a nation. This is likely to be a long term project, but if that attitude can permeate through governments and flow to the general public, then it might mean a substantiative change in the way we approach investment in high technology industries, such as scientific and medical research.

In contrast, Australians and their governments still perceive their future nation more as a mine, farm or factory. Take the recent report by the Prime Minister's Manufacturing Taskforce. While the report gives a cursory nod to advanced manufacturing in pharmaceuticals and medical devices, it proposes

little to promote those high technology industries and a lot to save existing low technology manufacturers in decline.

In reality, Australia is never going to compete on low cost high throughput items. The area where we're better able to compete with high cost, low throughput items is in advanced manufacturing. Australia has the talent, but we need to reorient our thinking if we're going to optimise the future in terms of jobs, the economy and in terms of social benefits.

2) Reforming how we measure success

The National Health and Medical Research Council (NHMRC) manages over $780 million a year, which is allocated to medical research projects. Arguably, in terms of pure discovery, it gets its money's worth. However, there are a great many more researchers who deserve funding than receive it. With only around 20 to 25 per cent of applications receiving funding support, competition for NHMRC Project Grants and Fellowships is fierce.

Thus whatever criteria the NHMRC places on awarding funding become the goals for most medical researchers in this country. However, the NHMRC's remit is about supporting health and medical *research*, not health and medical *commercialisation*. As such, the metrics of success are typically academic. Any time spent producing patents, working with industry or spinning off a biotechnology company is time not spent publishing papers in top tier journals. And less publications means less money for researchers. Thus, indirectly, the Australian medical research funding system punishes commercialisation.

Academics are not rewarded for getting involved with industry, so there is little motivation to do it. Many young career scientists have spoken to AusBiotech about their personal frustration. They would love to get involved in the whole value chain and be able to take what they're working on in the laboratory as scientists and see how it translates into SMEs, and understand how that work will eventually reach the community.

But academics must have a solid publication record in order to get NHMRC funding. If they take time out to interact with SMEs, then that may disadvantage them in the NHMRC process.

The second recommendation to improve the commercialisation of medical research in Australia is to reform the NHMRC to make it more amenable to translational research, yet do so in a way that doesn't jeopardise basic discovery.

This doesn't necessarily mean wholesale changes to the way the NHMRC operates, or require explicit funding of commercialisation, but a simple change in the metrics used to evaluate funding applications could have a substantial knock-on effect in encouraging many researchers to take their ideas out of the lab and into the market.

3) Proving the concept

The third recommendation is to bridge the so-called 'valley of death.' This is the precipitous gap between the point a discovery is made, typically as a result of publicly-funded research, and the point where it is attractive enough to receive private funding to take it down the development pathway. Currently there is little capital available to fund this crucial step, meaning many potential medical breakthroughs remain dormant with respect to community impact.

The need is to get a discovery from the point where it looks good on paper to where it looks enticing to an investor. This can be as simple as doing one pivotal proof-of-concept experiment – the 'killer experiment' – that will reduce the risk of investing in a discovery to the point where an enterprising venture capitalist or angel investor might be willing.

The current system fails at this point. We have a nonsensical situation where we fund a research project right up to the point where we can find the final answers: does it in fact work or not, and is it

a commercially viable discovery? And at that point, cease support, which makes no sense from a logical, from an academic or from an economic point of view. A small proportion of funding to finish that process, and provide evidence of the science and the commercial concept, is money well spent.

Something as simple as a 'killer experiment' fund could go a long way to rectifying this situation. It could be run in a similar way to current NHMRC Project Grants, which are assessed centrally by peer-review. The Project Grants program is extremely poorly funded and does not have enough commercial intelligence as part of the decision-making process.

Alternatively AusBiotech agrees with the Walter and Eliza Hall Institute's Doug Hilton, who suggested that this could be done in a similar way to the NHMRC funds equipment grants, where instead of competitive peer review, the NHMRC would say that, as a campus, if you bring in, for example, X per cent of NHMRC grants, then it will allocate $Y million a year for killer experiments. This would create a local structure to judge which will be the best projects to receive the funding.

However, the NHMRC isn't the only way to fund this element. Previously there was a way to secure the funds to de-risk a new technology in order to attract private investors. Sydney-based Pharmaxis is one company that benefited from Commercial Ready, or R&D Start, as it was known prior to Commercial Ready.

The Start grant enabled Pharmaxis in the early days to convince investors to put money into the company, knowing that for each dollar they contributed, the government would be matching with a dollar.

Pharmaxis were able to say to investors: "against this $8 million we'll be able to raise a further $3 million from the R&D Start Grant scheme." That allowed the company to tackle the project with much more confidence, by reducing the risk and made it more attractive because there was more leverage that could be applied to the money they were putting in. This was a critical feature in Pharmaxis' success.

However it is managed, if only a fraction of the dollars that are put into discovery research are contributed to providing proof-of-concept funding; this would enable small biotechs to better attract investors.

4) Expert critical mass

There are commercialisation units attached to virtually all universities and research institutions across the country. Their performance varies widely as many are understaffed and under-resourced. Often they have to provide services to a startling array of technologies with only limited expertise in those areas. The problem is often one of never reaching critical mass of people, expertise and resources.

Once critical mass is achieved, then things can be radically different, as demonstrated by UniQuest, the commercialisation arm of the University of Queensland. Besides the tremendously successful Gardasil vaccine, UniQuest has been involved in spinning out companies such as QRxPharma, ImpediMed, MRI company Magnetica, a drought-resistant plant marketing company and many more.

UniQuest, for example, employs over 80 staff, many of whom have scientific and industry expertise, and it embeds people within the research institutions with which it partners, using a 'hub-and-spoke' model. From an initial $10 million in funding – and, crucially, a long term vision from its parent, the University of Queensland – it has delivered over $320 million in revenues over the past five years.

One way to help other institutions benefit from similar critical mass is to aggregate commercialisation organisations into clusters, each of which service multiple research institutions. Such a notion was recommended by the Association of Australian Medical Research Institutes in its recent submission to the McKeon Review of Health and Medical Research in Australia.

One issue to overcome would be encouraging institutions who compete over student and funding pools to collaborate. This is no mean feat, but it's not the first time that competing organisations have gathered together to cooperate for mutual benefit under clearly defined guidelines through an outside institution. If this hurdle can be overcome, commercialisation organisations could be made significantly more effective across the country.

5) Supercharging investment

Another way to more effectively transform translational research in Australia is a more radical but important suggestion that has gained increasing attention in recent months. That is accessing the tremendous wealth contained in Australia's superannuation funds. If only a tiny fraction of this money could be invested in health and medical research and biotechnology, it could give commercialisation a much needed 'shot in the arm'.

As of 30 June 2011, Australian superannuation funds were managing over $1.3 trillion dollars, according to the Australian Prudential Regulation Authority. However, little of that money flows to innovation. This is largely because superannuation companies are highly constrained in terms of where they invest, and how much risk they're willing to take. They also often don't have the specialised expertise it takes to assess life science companies, or have the agility and opportunity to make small investments in individual outfits.

AusBiotech recommends a forum, which gathers key interests together, including the superannuation industry, the finance industry, the small innovative industries – heavily represented by the life sciences, but also others – and talk about what vehicle can be designed that will be acceptable to the trustees of super funds, which will be acceptable to superannuants, and would benefit innovation in this country.

Conclusion

AusBiotech is supportive of the PMSEIC investigation into what actions need to be taken to improve the translation of research into innovation leading to national prosperity, and would be pleased to work in collaboration with PMSEIC on any of the above recommendations.

**The above 5 points were adapted from a story first appearing in the Sept-Oct 2012 edition of Australian Life Scientist, featuring comments from Dr Anna Lavelle.*