

Response to SA Productivity Commission Inquiry into Health & Medical Research (HMR) in South Australia

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This is a personal submission that brings my experience in a range of executive, board and investment positions relevant to this inquiry, and particularly for translation and commercialisation of research.

In addition to the appointments listed above, my past positions include inaugural director of the Child Health Research Institute and CEO of the CRC for Tissue Growth and Repair as well as founder and Managing Director of the CRC's spin-off biotechnology company, TGR BioSciences Pty Ltd. I have also held positions on numerous government advisory boards related to innovation including the Federal Government Industry Research and Development Board, the SA Economic Development Board, Commercialisation Australia and the SA Science Council. In the university sector, I have held a tenured academic position at the University of Adelaide and completed a seven-year term on the University of South Australia Council.

Inquiry Response

I am primarily addressing the two issues that I consider key to SA's underperformance in HMR funding and research translation:

- Failure to capitalise on large-scale HMR funding initiatives, and
- Underperformance in research translation and commercialisation

As Chair of Health Translation SA, I have also contributed to and support Health Translation SA's submission, which addresses a broader range of issues.

Failure to capitalise on large-scale HMR funding initiatives

The Issues Paper notes the high quality and quantity of HMR in SA (eg accounting for 34% of SA HERD), but also reports that the state's share of national NHMRC expenditure has fallen from 10.9% to 6.6% from 2001 to 2017.

To determine the cause for this decline, it is important to analyse performance in the different categories of HMR funding. I do not have the recent data, but historically, SA's share of NHMRC project grants was competitive nationally, but we fell down in program grant success. That is, our performance was biased towards the smaller scale project grants submitted by individual researchers.

I expect this trend has continued, while at the same time, the balance of available research funding programs has tilted towards the large-scale projects, with a greater focus on translation (i.e.

outcome-driven), rather than 'bottom-up' research typical of smaller-scale project grants. This means that increasingly, research success and translation will require large collaborative efforts on outcome-based research, linking different expertise and end-users such as industry, clinicians and consumers at the state, national and international level.

SA's poor performance in MRFF funding (3% of the national total) supports the conclusion that it is in the area of large-scale MRF opportunities that SA has underperformed.

I do not believe that lack of quality facilities infrastructure is an issue limiting our performance in large scale MRF programs. There has been very significant investment by the SA government and our universities over the past years, resulting in high-quality research facilities, notably SAHMRI and the new UniSA and University of Adelaide complexes in the Bio-Med precinct on North Tce, but also at Flinders University, UniSA Mawson Lakes and Tonsley. The Thebarton Bioscience precinct was a jewel in the crown but in recent years has not been further developed. [I note the SAPC issues paper did not mention the Thebarton precinct in the list of major facilities!]

Instead, I believe the poor performance relates to attitudinal issues. From my observations, the challenges for SA in meeting the new HMR paradigm include:

- A culture of complacency in public sector researchers and universities
- Insufficient HMR leadership to drive success in large collaborative programs, and
- Research not being embedded as a priority in the SA health system.

Currently, our universities are not committing the required effort to achieve success in major, highly competitive HMR funding programs. For example, I am aware of some university researchers saying they could not be bothered putting in the effort to orchestrate Frontier grant applications. This raises the question of whether universities put sufficient emphasis on large-scale, outcome-driven research projects as a key performance indicator for university research staff.

I recommend that an analysis is undertaken of the criteria for university researcher performance and promotion to determine if they are sufficiently weighted to success in large-scale research projects and translation of HMR.

A second factor is that SA government policies and incentives are not tailored to address the above issues:

- In the government health sector, hospitals are increasingly focused on the bottom line, with research given a much lower priority than in previous decades.
- Clinicians are focused so heavily on clinical service, they have very limited time or incentives to undertake significant research. Yet their involvement is integral to success in large-scale collaborative HMR.
- SA Government policy has given insufficient attention to embedding evidence-based research in decision making in the health sector (although recent initiatives such as the establishment of the Commission for Excellence in Healthcare are positive).

I recommend that SA Health establish clear and widely understood policies and funding to embed evidence-based research in their agencies' performance indicators and to provide clinicians with sufficient time to undertake quality research.

The SA Government can also take leadership in helping to incentivise HMR that increases the State's success in large-scale HMR funding initiatives. While the SA Government offers some matching

funds for Cooperative Research Centre applications or similar initiatives, there needs to be a much more coordinated and strategic approach to funding HMR.

The potential success of such an approach can be seen from the Research Consortium Program (RCP) that was introduced during my tenure as Chief Scientist (<https://innovationandskills.sa.gov.au/upload/premier-research-industry-fund/research-consortia/rcp-guidelines.PDF>).

The RCP was specifically targeted to establish strong ongoing consortia to strategically address large scale research challenges in areas of critical need and/or strategic importance to SA, and also to facilitate growth of innovative companies and establish more start-ups. The objectives were to:

1. Develop and support local, national and international networks and collaborations that bring together academic, industry, private and public organisations to address these research challenges.
2. Support research that pursues innovative solutions that are high impact and capable of being effectively utilised by end-users, particularly South Australian companies, where possible.
3. Link existing research strengths and build critical mass and capacity for interdisciplinary approaches to address defined research challenges.
4. Attract and retain from within Australia and abroad, world- leading researchers.
5. Develop and support promising early to mid-career researchers and postgraduate research students.

With government funding to each consortium of \$1M per annum for 4 years (matched by the applicants), the RCP was well-positioned to encourage the type of research that SA needs to prioritise.

As the chair of the assessment committee, I was amazed at the quality of the applications, the extent of cooperation between partners and the leadership that emerged. By way of example, RCP funded the establishment of the Registry of Senior Australians (ROSA) to monitor the health, service utilisation, medication use, mortality, and other outcomes of people receiving aged care services in South Australia (see box below).

Registry of Senior Australians (ROSA)

<https://rosaresearch.org/>

- Established in 2017
- Coordinated under the auspices of Health Translation SA
- A collaboration between 13 organisations: the SA Health and Medical Research Institute (SAHMRI), 3 universities (University of Adelaide, University of South Australia, and Flinders University), 5 industry partners (Helping Hand, Silver Chain, ECH, Adelaide PHN, Country SA PHN), 2 consumer health advocacy groups (COTA SA, HCA SA), SA NT DataLink, and SA Health.
- The first large scale resource of its kind in Australia, connecting existing data silos at both the state and federal levels to reveal a more complete picture of how older people navigate the aged care and health care sectors, and how this impacts their overall health outcomes and quality of life.
- As an example of ROSA research, an analysis of seven years of national data that included more than 320,000 Australians entering permanent residential aged care provided evidence that the use of psychotropic medicines more than doubled after older people entered residential care. The authors conclude that the results are a call for caution in use of such drugs in residential aged care.
- The ROSA Research Team were awarded the “Best application of business intelligence to leverage value from Big Data” at the Information Technology in Aged Care (ITAC) 2020 Conference Awards.

In 2018, the incoming new SA Government replaced this program with the Research, Commercialisation and Start-up Fund to focus much more heavily on research commercialisation and growing innovative companies. While I support the intent of this new program, there is now a very much reduced incentive to change research culture towards large collaborative efforts.

As another example of the success of a collaborative approach, the CRC for Cell Therapy Manufacturing brought together public and private sector researchers in materials and surface chemistry, cell biology and pre-clinical animal models, plus clinicians and commercial and IP expertise to develop innovative solutions to make cell therapies more cost-effective and to develop novel cell therapy solutions for cancer [see box below].

The Cooperative Research Centre for Cell Therapy Manufacturing (CTM CRC)

www.ctmrc.com

CTM CRC was established in 2013 under the federal government's CRC program. In the space of only 6 years, CTM CRC:

- developed novel coatings for medical implants that are being partnered with major international medical device companies, and
- discovered and developed new, potentially curative CAR-T therapies for cancer.

As the legacy, South Australia now has three ongoing, independently funded spin-out organisations:

- Curecell Ltd, to bring novel CAR-T clinical trials to Australia to treat children that would otherwise have no access to these potentially curative therapies for cancer
- Carina Biotech Pty Ltd, which is developing new, potentially curative, chimeric antigen receptor T cell (CAR-T) therapies for solid tumours, as well as strategies to overcome the ability of tumours to resist the immune system
- TekCyte Pty Ltd, which has advanced biomedical coatings to reduce surface fouling of implanted medical devices such as blood clots in metal stents, as well as a stem cell-based specialised dressing to improve healing of chronic wounds

Between them, Carina and TekCyte have already attracted over \$5M in grant and industry funding as well as several million dollars in equity funding to continue the research and commercialisation of the CRC – essentially ensuring the continuity of a very successful program.

Importantly, the CRC provided the opportunities for researchers to apply their skills to entirely new fields in which they had no prior experience. For example, some of the CRC's surface chemistry experts had never worked with living cells. By bringing these scientists together with cell biologists, they were able to achieve applications and outcomes of their research that would never be possible in the absence of such collaborations.

This illustrates an important point - it is not necessary to take researchers out of their core area of expertise. Rather, they can achieve the outcomes simply by working closely with others that bring the complementary research and commercialisation expertise.

I recommend reinstating the SA Research Consortium Program at similar levels of funding to the previous program to complement (not replace) the Research, Commercialisation and Start-up Fund.

I further recommend introducing a seeding grant program for SA health and medical researchers to develop applications for major national or international opportunities such as the MRFF.

The seeding grant program could follow the model of the new federal government Frontier program (and indeed include funding to develop an effective stage 1 Frontier grant application as one such opportunity), providing up to \$500K over a 12-month period to develop an outcome-focused research proposal that addresses a strategically important area with a high chance of success in a national large-scale research funding program (such as CRCs, MRFF etc).

Importantly, the seeding grant program would drive significant cultural change towards:

- More outcome-driven research
- Collaboration involving multiple partners with the range of necessary research, translation and commercialisation expertise as appropriate
- Improved understanding and success with technology transfer and commercialisation
- Development and attraction of research leaders, and
- Extensive involvement of clinicians in research.

The introduction of such a seeding program will naturally determine the priority areas of HMR in SA. By allowing them to self-select through success in large-scale, competitive grant programs, there will be no need for the SA Government to pick winners in terms of research focus for the State.

Health Translation SA provides an ideal vehicle to facilitate greater research cooperation in the State. As a NHMRC accredited Advanced Health and Research Translation Centre that unites nine academic, research and health care agencies within SA, Health Translation SA is uniquely positioned to have oversight of the SA Government's strategies to enhance the State's HMR capability, particularly in collaborative efforts.

It is recommended that the SA Government engages Health Translation SA to develop and implement strategies to embed research in health service delivery and position the State to be highly competitive in major national and international HMR research funding opportunities.

Under-performance in research translation and commercialisation

From my extensive experience at the interface of HMR and technology commercialisation, there are a number of reasons that SA underperforms in research translation:

- Poor understanding of commercialisation and industry needs by public sector researchers and their organisations
- Insufficient incentives for researchers to commercialise research or work with industry partners
- Fragmentation of the State's research commercialisation support
- A paucity of skilled commercialisation 'translators' to mentor researchers in commercialisation strategies and to identify industry partners
- Insufficient involvement of end-users (including clinicians, industry and consumers) in the design and implementation of research programs, and
- SA lacks the breadth and depth of industry in the sector, as exemplified by the export data in the issues paper showing SA pharmaceutical and medical device exports represent only 1.4% and 3.9%, respectively of the national totals.

The solutions are in part addressed by the above proposal for the SA Government to establish funding programs that incentivise large-scale and outcome-focused research collaborations with strong end-user engagement.

Preferably the SA universities would agree to combine forces in some manner to facilitate HMR commercialisation and build maximum commercial value by packaging assets from multiple universities. This would not necessitate a formal merger of their commercialisation arms, which is unlikely to appeal to the universities. Rather it should provide the opportunity and incentive to share resources to optimise commercial outcomes. Given the scarcity of quality commercialisation and investment managers for early stage HMR, some form of formal collaboration would seem an essential strategy.

An effective cooperation between the university commercialisation arms would be particularly attractive to potential investors and commercial partners. It is highly inefficient for an investor or company to have to deal separately with three universities in a city the size of Adelaide. Also, a close working relationship between the universities offers the potential to 'mix and match' technologies, resulting in a more competitive commercial opportunity.

Another negative factor is the lack of a government-supported vehicle to mentor researchers in commercialisation strategies and to link them with industry partners. Bioinnovation SA was established many years ago to help spin-out companies from public sector life sciences research. It initially proved very effective in creating a large number of start-up companies, but unfortunately lost momentum and focus in later years, particularly after it was expanded to TechinSA. TechinSA has now been superseded by Lot 14, with a focus on IT related technologies rather than HMR commercialisation.

SA also has other technology precincts, notably Tonsley and the Thebarton Bioscience Precinct, but we are lacking a government support mechanism to provide skilled 'translators'/'intermediaries' to mentor researchers in commercialisation and to help determine the best route to market for HMR technologies. It is 'people' skills rather than facilities that will drive successful commercialisation.

I do not believe a HMR 'translator' program can simply be bolted on to Lot 14. HMR commercialisation requires a very different skill set, level of investment and timeframe to market compared with IT technologies.

The success of the Medical Device Partnering Program is testament to the value of supporting sector-specific translators that understand the relevant research capabilities across SA as well as the needs of the state's medical device companies, and can identify strategies to bring them together, or otherwise develop commercial opportunities. This concept should be expanded to have broader focus across the HMR sector.

Importantly, I believe the 'translators' will be able to leverage a network of successful SA HMR entrepreneurs to provide quality mentoring at minimal cost. Health Translation SA can also play an important role in coordinating efforts across the state's health and medical research sector.

Given this background I recommend the SA Government:

- **Considers financial incentives to enhance formal collaboration between the commercialisation arms of the SA universities**
- **Builds on the successful Medical Device Partnering Program to supporting HMR 'translators' to mentor researchers and advise on commercialisation strategies, including establishment of new companies as well as partnering with existing companies.**
- **Commissions Health Translation SA to help coordinate translation activities across its nine member organisations.**