Building a Sustainable Victorian Medical Research Sector

Proposal to the Victorian State Government

from the

State's Major Medical Research Institutes

February 2013

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Executive Summary

Health and medical research is one of Victoria's most valuable assets

Victoria's health and medical research sector is a world-class asset that delivers significant economic dividends and contributes to a vibrant and highly successful academic and biotech economy. This success is closely linked to a unique feature of the Victorian innovation scene, a powerful and productive MRI sector.

MRI's directly contribute to the health of Victorians. Every day, in every hospital in Victoria, people benefit from treatments developed by Victorian MRI's ranging from the Colony Stimulating Factor drugs that allows modern cancer chemotherapy to preventive programs for chronic disease. Over 10,000 Victorian hospital patients a year benefit from treatment through the performance of research- sponsored clinical trials[1] – treatment that would otherwise be unavailable to Victorians or at best, funded directly from the State's health budget.

These are the present benefits from past investment. **However, we face a future of potentially unsustainable health costs and an ageing community with more chronic disease.** This demands a rejuvenation of the funding systems that underlie MRI productivity.

The Victorian health and medical research and biotech sector is the powerhouse behind the nation's knowledge economy. Victoria has a total of 42 life science companies listed on the Australian Stock Exchange, with a combined market capitalisation of A$21.4bn[2].

Across all critical measures, Victorian MRIs punch above their weight and attract public and private investment from diverse sources in Australia as well as overseas. Victoria's MRIs also attract a greater proportional investment of NHMRC funding than their counterparts in other states. Direct research revenues to Victoria from the NHMRC in 2012 were $322,577,360 up from $129,526,911 in 2003. **Victoria consistently receives more than a 40% share of Commonwealth NHMRC funding and leverages more than $12 in direct research funding for every $ provided by the State OIS program.**

Speaking in Melbourne on 30 January 2013, Federal Coalition leader Tony Abbott described health and medical research as one of five essential 'pillars' of the national economy as well as acknowledging Melbourne as the '*health and medical research capital of Australia*'[3].

Victoria's MRIs, and the benefits they deliver to the State, are at risk

The ability of Victoria's MRIs to continue to deliver these benefits is at risk because of the decreasing viability of their business model. **This is a national problem that is exacerbated in Victoria by our success in growing revenue.** This growth has effectively reduced the proportional value of the Victorian Government's indirect funding support.

The indirect cost of medical research is one of the biggest issues facing Victorian MRI's and is particularly concerning for the smaller MRIs. These costs are integral to successful research and cover such essentials items as computing and bioinformatics centres, animal houses, administrative staff and ethics committees.

At present, the gap between MRI funding for the indirect costs of the research they bring to the State and the actual expenditure on indirect costs has grown from $90m in 2008/09 to $139m in 2012/13 – a 55% increase over 5 years.

Over this same period, the proportional value of indirect cost funding from all sources, including the Commonwealth and State Governments has declined.

Victoria's MRIs have responded by driving efficiencies, stalling new programs and managing diminished access to the talent pool

In the early stages of the funding squeeze, **Victoria's MRIs were able to cope through the introduction of greater efficiencies off an already lean operating base. However, efficiencies alone cannot address the funding gap** and MRIs are now dipping into their reserves and diverting flexible funding such as philanthropic donations and investment income to meet indirect costs. This situation is unsustainable and threatens Victoria's productivity, our future as a knowledge economy and the availability of a world-class health workforce.

A direct consequence of this is that **the value proposition for philanthropy has diminished as institutes seek to address indirect funding gaps rather than new programs, technologies and competitive recruitment**.

These pressures have had a compounding effect and with less income to support their operations, MRIs have delayed or deferred important but non-critical upgrades and other discretionary activities by eating into their reserves.

However, with better support for indirect costs from all sources, flexible income could be allocated to projects that add real value to the state but do not currently have external funding support.

Victoria's MRIs propose a new program to attract non-Government revenue

Our proposal is that **a new program, similar to and alongside the Victorian OIS, would address the present market failure and provide leverage of non-government funds for research to Victoria similar to that which we presently enjoy for NHMRC funding.**

There is a direct correlation between growth in grant income support and the Institutes' ability to attract a more diverse range of funding. State Government support initiated in 2002/3 was a success; in NHMRC grant income alone, the institutes were able to grow by 175% from 2003 to 2011. Institutes that expanded on the basis of NHMRC funding also grew their philanthropic, commercial and international grant income.

The new funding scheme proposed in this submission would support a diversified base of direct research income, and provide for new activities and capabilities. This should be run alongside the existing program - which should continue at its current level.

Where the existing program supports Commonwealth revenue, **this proposal applies the principle of a cents-in-the-dollar incentive for non-government income**, with a view to establishing Victoria as a leader in health and medical

research revenue of this kind. **The scheme targets three revenue sources; philanthropy, commercial income and international grant income.**

In submitting this proposal, we contend that **investment in Victoria's medical research sector will deliver improved philanthropic, commercial income, international grant income, enhanced recruitment of talent, greater research and development capacity for clinical translation as well as administrative efficiency and productivity.**

The consequences will include:

- **Reduced burden of disease** through the development of new diagnostics, treatments and technologies

- **Improved efficiency and cost-effectiveness** of health care and fostering a culture of excellence in our hospitals

- **Safeguards for the community against the health threats and health costs of tomorrow**, including the growing costs associated with an ageing population.

This proposal seeks to address the erosion of Victoria's position as a world-class destination for investment and talent in health and medical research and in doing so, ensure that Victorian patients remain the beneficiaries of world-class research sector.

Victoria's MRIs are committed to working in partnership with government to identify solutions. The program set out provides a basis from which to differentiate Victoria and provide a legacy for future generations.

[1] Funding for the Future, The case for increased indirect cost funding for Victorian MRIs, LEK Consultancy (2009)

[2] Victorian Biotechnology Strategic Development Plan Update, Department of Innovation, Industry and Regional Development, May 2009

[3] The Hon Tony Abbott, Leader of the Opposition, Press Release 30 January 2013

[4] Operational Infrastructure Support for Victorian Medical Research Institutes - February 2013

1. Background

1.1 Health and Medical Research is one of Victoria's most valuable assets

Victoria is firmly established as the leading Australian jurisdiction in health and medical research and this has delivered significant benefits to Victoria, including:

- Investment and revenue earnings;
- Employment opportunities;
- Attracting top-tier research leaders;
- Creating a fertile environment for growing biotech companies;
- Increasing clinical trials activity and commercialisation outcomes, and
- Nurturing commercial entities that support the research industry.

The hospitals that are affiliated with medical research institutes (MRIs) and research universities also benefit from the activity of research through:

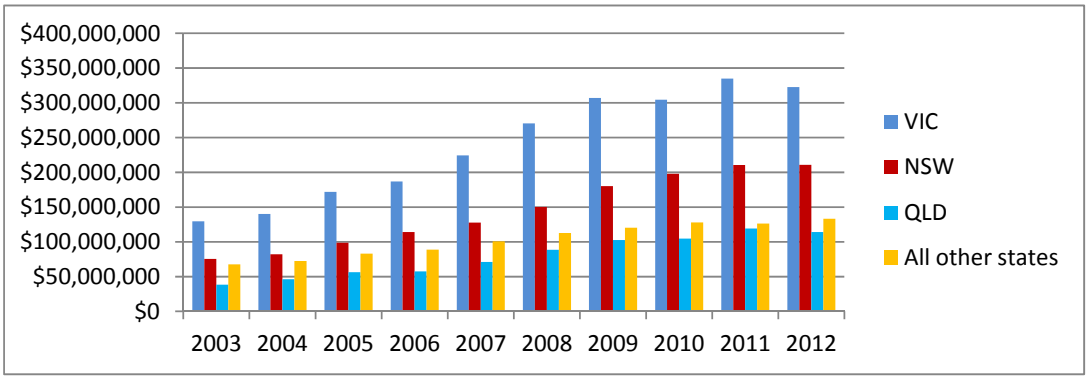
- The provision of quality support and financial contributions to their operations;
- The recruitment and employment of talented clinical research staff;
- Access to research outcomes, and
- The provision of an evidence base which supports the development and delivery of improved clinical services.

1.2 Benefits to Victoria

→ Attracting Investment

Health and medical research income to Victoria is dominated by revenue from the Commonwealth funded National Health and Medical Research Council (NHMRC). Direct research revenues to Victoria from NHMRC in 2012 were $322,577,360, up from $129,526,911 in 2003. Victoria's share of the NHRMC national budget has remained consistently at between 41% and 43% throughout this time.

Figure 1: NHMRC revenues to Victoria have long outstripped those to NSW, Queensland and all other states 2003-12

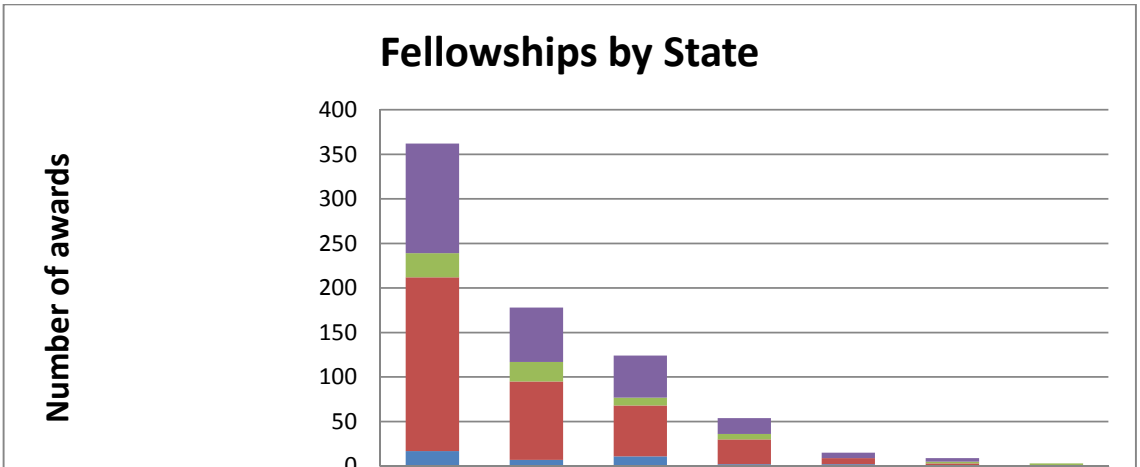


→ Generating Employment Opportunities

Health and medical research is also a significant employer, both in terms of the quality and quantity of jobs it generates. Nationally, the health and medical research workforce is estimated at 23,000[1], and it is reasonable to assume on the basis of NHMRC figures that Victoria is home to over 40% (9,200) of these.

Victoria's share of the high-value end of this employment market is very high. Of the 379 new and ongoing Research Fellowships funded by the NHMRC in 2011, 51% were held at Victorian institutions. Victoria performs well at all levels of NHMRC support, from career development fellowships (47% of national awards) to the highest award, the Australia Fellowships (44%).[2]

Figure 2: Victoria is nationally pre-eminent in NHRMC-funded employment as demonstrated by the number of fellowships funded (2011 data)



	VIC	NSW	QLD	SA	ACT	TAS	NT
Career Development Awards	123	61	47	18	6	4	0
Practitioner fellowships	27	22	9	6	0	2	2
Research Fellowships	195	88	57	28	7	3	1
Australia Fellowships	17	7	11	2	2	0	0

→ Leadership in Biotech

Health and medical research provides a significant boost to industry as both a skills development and technology partner. The State has long been recognised as Australia's most attractive state for biotech companies, with the view being expressed in 2009 that Victoria's life sciences industry was then close to becoming one of the world's top five biotechnology locations.[3] Victoria is home to a significant proportion of Australia's most developed biotechnology companies including CSL, Biota, Cellestis, Acrux, Chemgenex and Mesoblast. Victoria has a total of 42 life science companies listed on the Australian Stock Exchange, with a combined market capitalisation of A$21.4bn[4]. In 2012 these companies had 85 life science products on the market, with 39 phase II and 15 phase III clinical trial programs underway[5].

[1] NSW Health and Medical Research Strategic Review Fact Base, Pacific Strategy Partners, 2011
[2] Current NHRMC Fellows, National Health & Medical Research Council, May 2011
[3] Victorian Biotechnology Strategic Development Plan Update, Department of Innovation, Industry and Regional Development, May 2009
[4] Ibid
[5] The Victorian Infection and Immunity Network, working with the support of the Victorian Department of Business and Innovation, surveyed the sector in 2012 and identified >50 such companies in Victoria.

→ Building a Knowledge Economy

Victorian health and medical research generates significant intellectual property (IP) in the pursuit of innovation and commercialisation. In 2012, Victorian MRIs won seven new NHMRC Development Grants worth $2,730,322 from a total of 18 awarded nationwide. Development Grants provide funding support for research at the early proof-of-principle or pre-seed stage. The Scheme supports the commercial development of a product, process, procedure or service that if applied, would result in improved health care, disease prevention or provide health cost savings.

Victoria's MRIs have established an outstanding track record in securing seed funding. Ten of the sixteen Development Grants (totaling $4,808,003) awarded in 2011 were to Victorian Institutes. During the period 2010 to 2012, the Commercialisation Australia scheme has awarded 27 new grants to support Victorian Commercialisation projects in health and medical research, grants worth $8,141,685 – or 33% of the total number of projects supported nationwide. Projects supported by the Commercialisation Australia scheme include:

- A novel inhaler which can compete with proprietary products to provide a lower priced alternative for governments, insurers and patients (Advent Pharmaceuticals Pty Ltd)
- Commercialisation of a pre-meal functional beverage for use in the management of type 2 diabetes (Omniblend Pty Ltd)
- Development of strategic human resource software that generates cost simulations and greatly enhances strategic workforce management and planning (Health-e Workforce Solutions Pty Ltd).

Commercial investment in early-stage Victorian health and medical research is well represented by the investment portfolio of the Medical Research Commercialisation Fund (an Innovation Investment Fund), where $77,973,078 of a total of $96,672,891 leveraged investment has been into Victorian technologies. An example of the program's success is the establishment of Osprey Medical Inc. which is developing the CINCOR(tm) System for advanced kidney protection during coronary interventions based on technology developed by research scientists at Baker IDI Heart & Diabetes Institute.

→ A Venture Fund Destination

UniSeed Pty Ltd, a venture fund operating at the Universities of Melbourne, Queensland and NSW, has put 51% of its investment into Victorian technologies - $8.5m of Australia's major University-based seed fund investment has then leveraged $60.1m in downstream investments. All eleven investments are biotech-sector, *most developed in or with the collaboration of the State's medical research institutes.*

→ Bolstering Education Export Earnings

Victoria's pre-eminence as a base for the national health and medical research effort helps to attract more, and higher quality international students to our Universities, boosting Victoria's largest export earner. In 2011 there were more than 160,000 international student enrolments in Victoria from over 160 countries, bringing $4.82bn to the state and generating around 50,000 direct and indirect full time equivalent jobs across the State. Victoria's reputation as an academic leader in health and medical research significantly supports this industry, with more graduates at PhD level in biotechnology related disciplines per head of population than the USA, Canada and Japan[6].

[6] Invest Victoria website; www.invest.vic.gov.au/biotechnoliogy-life-sciences

→ Benefiting the Health of Victorians

While research is a global endeavour, research conducted in Victoria addresses health problems specific to the Victorian community, and produces solutions of clear benefit to the Victorian health system:

- Doctors from the Royal Melbourne Hospital, the University of Melbourne and the Murdoch Childrens Research Institute developed a non-invasive genetic test for epilepsy, enabling effective treatment and care;
- Researchers at the Walter and Eliza Hall Institute of Medical Research discovered the CSFs (colony stimulating factors) which have helped more than 10 million cancer patients recover from the side-effects of chemotherapy;
- Neuroscientists at the Florey Neuroscience Institutes developed a wristwatch-like device that continuously monitors the mobility of patients with Parkinson's disease, allowing doctors to personalise treatment;
- The bionic ear (cochlear implant) was invented at the University of Melbourne and the first prototype was implanted at the Victorian Eye and Ear Hospital in 1978; Bionics Institute staff made significant contributions to the development of the successful commercial device manufactured by Cochlear Ltd.
- In March 2012, researchers at Bionics Institute (a member of the Bionic Vision Australia consortium) designed, manufactured and switched on an Australian-first prototype bionic eye. The BI conducted the preclinical studies, and is currently conducting psychophysics studies. Surgeons at the Centre for Eye Research Australia – another Victorian Medical Research Institute – implanted the prototype;
- Andrology Australia, a venture of the Monash Institute of Medical Research in partnership with Prince Henry's Institute, has been instrumental in disseminating important messages about and changing attitudes within men's health;
- In Vitro Fertilisation (IVF) was first developed at the Centre for Early Human Development, later to become the Monash Institute of Medical Research, and
- The power of Melbourne's translational medical research is exemplified by Cancer Trials Australia (CTA), a venture originally established through a collaboration between the Walter and Eliza Hall Institute, the Ludwig Institute and the Royal Melbourne Hospital. CTA now attracts to Melbourne approximately 50% of all first time in cancer patient clinical trials in Australia, including many from international sponsors. This initiative, catalysed by Melbourne's MRIs and research hospitals has resulted in a world class clinician-driven network that brings novel cancer treatments to benefit Victorians first.

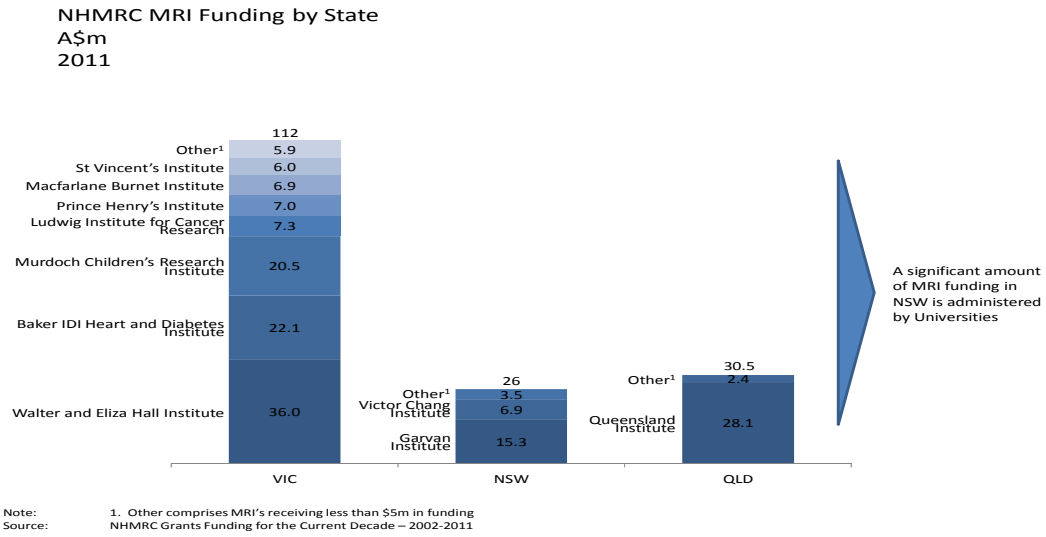
1.3 Medical Research Institutes are key to Victoria's success in health & medical research

Victoria's 13 major Medical Research Institutes (MRIs) have been the powerhouse behind this achievement. Together they employ a total of 3488 equivalent full time staff (over 4300 individuals); from a combined turnover of $336m in 2008/9 they have grown 29% to $434.m in 2012/13.

Over this period, Victoria's MRIs have maintained a greater proportional significance for Victoria's health and medical research sector than their counterparts in other states have for their own medical research productivity. Nationally, institutes are responsible for an estimated 27% of NHRMC funded research activity, whereas in Victoria the figure has consistently been in the range of 36-40%. ($132m of total NHMRC revenues to the State of $334m in

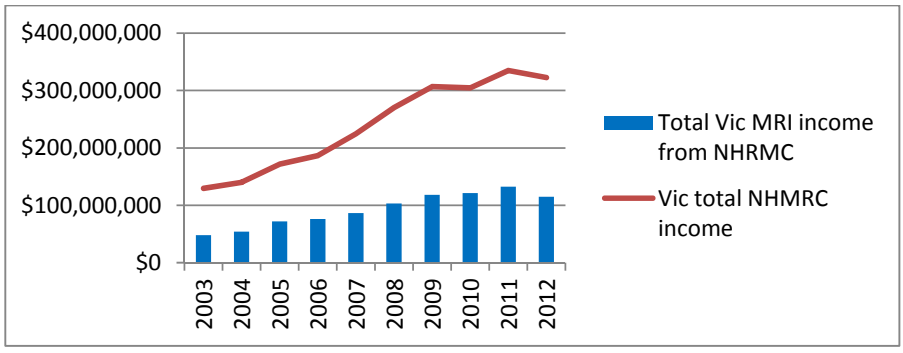
2011). This is in marked contrast to the performance of MRIs in the other major states, and is a major strategic insight drawn from the recent NSW Government review of that State's health and medical research sector:

Figure 3: More Victorian MRIs are awarded grant funding than either NSW or Queensland[7]



Within Victoria, MRIs form a significant part of the State's health and medical research capacity, and have been widely recognised as such at the Federal level. Speaking in Melbourne on 30 January 2013, Federal Coalition leader Tony Abbott described health and medical research as one of five essential 'pillars' of the national economy as well as acknowledging Melbourne as the '*health and medical research capital of Australia*'[8]. There was immediate and widespread support for this statement from the broad community of stakeholder interest around medical research, including scientists, patients and donors.

Figure 4: Victorian MRIs continue to bring in a very high proportion of the state's HMR revenues[9]



[7] NSW Health and Medical Research Strategic Review Fact base http://www.health.nsw.gov.au/resources/omr/review/pdf/ . Note for all States, this data excludes grants indirectly administered for MRIs by Universities.

[8] The Hon Tony Abbott, Leader of the Opposition, *Press Release* 30 January 2013

[9] Note these figures exclude grant revenues to the Florey Institute for Neuroscience and Mental health and the Peter Macallum Cancer Centre, as grants to these institutes are administrated by the University of Melbourne.

2. Victoria's Medical Research Institutes are at risk

2.1 There is a growing gap in funding for indirect costs at Victoria's MRIs

The ability of Victoria's MRIs to continue to deliver these benefits is at risk because of the decreasing viability of their business model and its reliance on existing funding mechanisms. This is a national problem that is exacerbated in Victoria by our success in growing revenue, which has reduced the proportional value of all forms of indirect cost funding, including the fixed OIS program.

Victoria's long and substantial period of growth in health and medical research is in part attributable to the early introduction of the OIS scheme - a State Government program designed to provide institutes with indirect cost support. First established in the early 1990s, the scheme was significantly revitalised in 2002/03, when total Victorian revenues from the NHMRC were only $130m. The value of the OIS program increased over the 12 years commencing 2000, rising from $12.4m (when MRI revenues from NHRMC were $21.5m) to $26.1m in 2011 (when MRI revenues from NHMRC were $132m).

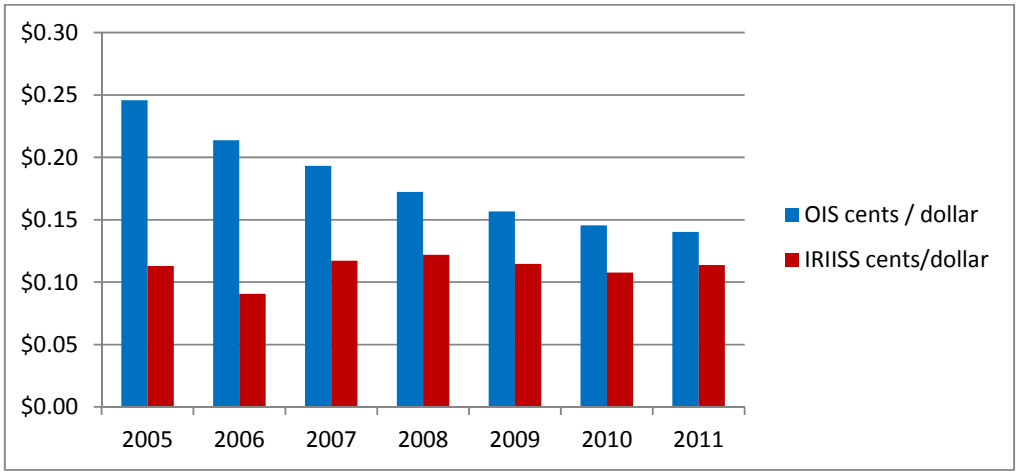
The introduction of the new OIS program in 2002/3 had a significant impact on the State's attractiveness for scientific talent, and ensured that Victoria maintained its proportion of NHMRC funding at 40-43%. Over the first part of this period the contribution of the MRIs to this achievement grew from 37% of total revenue in 2003 to 42% in 2005.

At this point, other states began to notice the advantage that the Victorian program had given its MRIs, and programs similar to the OIS scheme were created first in Queensland, then NSW and more recently in Western Australia and South Australia. While NHMRC revenues to Victoria continued to grow in line with the national budget the State was able to hold its position at 42% of the total NHMRC competitive budget in 2005-12. However, the proportion of this contributed by the institutes fell back to 36% by 2012.

The OIS program remained static over this period, and so the advantage to Victoria from the early introduction of the scheme was gradually lost. Worth 53% of total Victorian MRI income from the NHMRC in 2003, the value of the program had fallen to 22% of NHMRC revenues in 2012, even as analogous support programs to the university sector nationwide had grown from 30% in 2008 to near 50% in 2012.

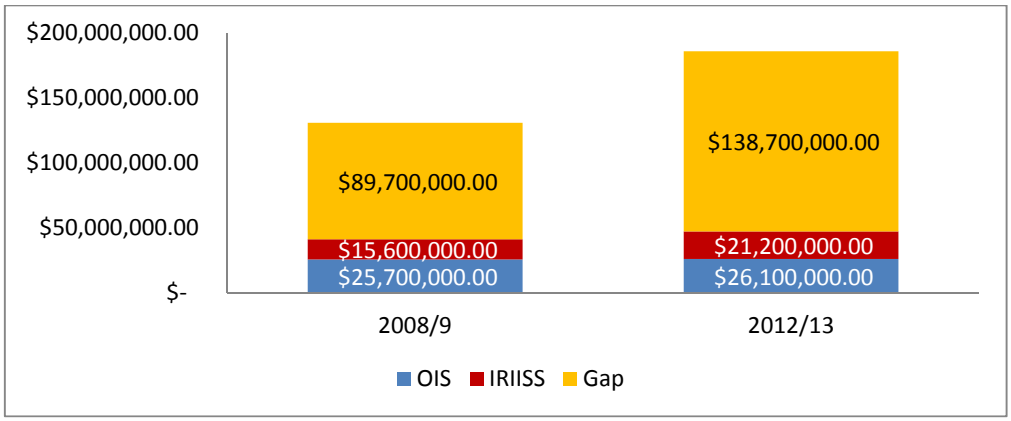
State Government support for indirect costs in Victoria's MRIs has not kept pace with the institutes' growth. In 2003, the three year rolling average of grant revenues eligible for support came to $82.1m, attracting $22.33m in OIS support, or 27.19 cents in the dollar. By 2011 grant revenues of $186m attracted only $26.1m - now only 14 cents in the dollar. Commonwealth Government support through the NHMRC – auspiced Independent Research Institutes Infrastructure Support Scheme (IRIISS) – which supports only NHRMC grants - remained steady but did not compensate for this. IRIISS is also a capped funding allocation, whose value in the next three to five years is uncertain:

Figure 5: Maintained levels of Commonwealth indirect cost support have not compensated for the drop in the value of the OIS program



The resulting gap in MRI funding for indirect costs has grown from $90m in 2008/09 to $139m in 2012/13 – a 55% increase over 5 years. Over this period, IRIISS funding to OIS-supported Victorian MRIs has grown by 36%, while OIS has increased by 1.6%. It is clearly not in Victoria's interest for this trend to continue.

Figure 6: The unfunded indirect cost funding gap has grown by $49m in five years[10]



[10] Source: Victorian Department of Business and Innovation, 2012

2.2 As the gap has grown, funds available to fill the gap have reduced

Supporting the growth of the State's medical research institutes by revitalising the OIS program in 2002/3 was a demonstrated success. In NHMRC grant income alone, the institutes were able to grow from $48.1m in 2003 to $132.4m in 2011. Importantly, this growth enabled other forms of funding and the institutes that expanded on the basis of NHMRC funding also grew their philanthropic, commercial and international grant revenues.

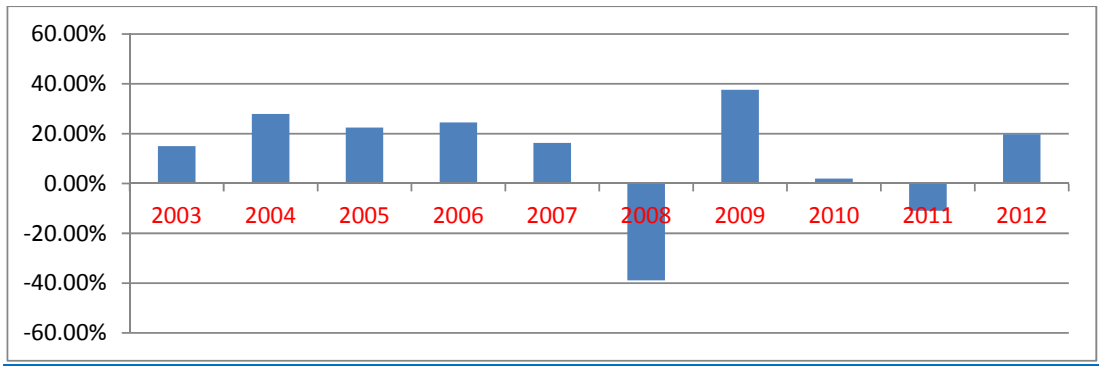
→ Philanthropy

Domestic philanthropic grant revenues have reduced to$ 13.46m in 2012 from $16.2m three years earlier, and individual donations are down across the board. As the indirect cost funding problems started to 'bite', and philanthropic revenues were directed towards the scientific and administrative support services that in other jurisdictions are funded by Government, so the MRIs started to become less attractive to philanthropy. The result of inadequate investment in the core has therefore been a clear reduction in the capacity of the sector to win philanthropic revenue, which in turn puts further pressure on the remaining funds to be directed towards 'keeping the lights on'. This is reversible, but turning it around becomes harder the longer the indirect funding crisis continues. Maintaining the momentum on existing capacity is much cheaper than re-creating that capacity once it has been lost.

→ Investment income

While filling the funding gap for indirect research costs has always been an issue, in the early years when the gap was smaller, institutes were generally able to fill it with income from investment revenues. Since the global financial crisis (GFC) investment revenues have fluctuated wildly, and philanthropic donations have also been impacted, with many philanthropic trusts and foundations simply ceasing to distribute for several years after the GFC in order to retain their corpus. Since 2003 for example, Baker IDI Heart and Diabetes Institute has had results ranging from a positive return on its investment portfolio of 25.69% (2005) to a negative return of -40.08% (2008). This is not a basis on which the long term scientific program of the nation's largest cardiovascular and diabetes research institute can support a viable scientific community, and a review of ASX 300 returns over the past 10 year shows that this will continue to be the case (see Figure 7 below). Reliance on funding that is prone to fluctuations for core scientific and administrative infrastructure dangerously reduces organisational viability.

Figure 7: ASX 300 Accounting index annual returns have fluctuated since 2003



→ Revenue and support from partners

MRIs work closely with the hospitals on whose campuses they are mostly located, and with the Universities with which they collaborate and whose PhD students they supervise in their laboratories and research groups. The institutional relationships that form the basis for these partnerships are constructive and important. However, as funding in the University and Hospital sectors has become tighter, the financial arrangements made with MRIs to manage these partnerships has become harder to negotiate. The result is a substantial increase in the cost to MRIs for services and partnership arrangements which cover lease agreements, service contracts and even collaborations. For example, at the Florey Neurosciences Institute, the cost of IT support from the University of Melbourne has increased from $600,000 to $1.15m in 12 months, and the cost of operational support over the same period at the Institute's Austin Health facilities has increased from zero to $450,000. All Victorian MRIs have had similar recent experiences.

→ Drawing on reserves

Declining philanthropic revenues, negative fluctuations in investment income and increasing partnership costs have made it necessary for MRIs to dip into their reserves to fund their operations. This is a highly unsustainable business model that undermines financial viability and significantly diminishes contingency resources.

3. MRI Response to Diminished Funding

3.1 Victorian medical research institutes have responded with efficiencies

In the early stages of the funding squeeze, Victoria's MRIs were able to cope through the introduction of efficiencies. In 2008/9, 39% of the institutes' combined revenues were spent on the indirect costs of research which includes items such as:

- Shared equipment and data sets;
- Computing and bioinformatics centres;
- Libraries;
- Animal houses and their support personnel;
- Building maintenance and supply costs;
- Management salaries;
- Commercialisation and IP costs;
- Administrative staff, and
- Ethics and safety committees.

All these services are instrumental in the delivery of research activity and outcomes specified in a competitively awarded grant. By 2012 this had reduced to 37.4%.

However, these efficiencies do not fill the funding gap as the value of the Victorian contribution towards MRI indirect costs has now fallen to 14 c / $ in 2012.

3.2 Operations are now severely affected

The negative impact of the current funding shortfall for Victorian MRIs is now being felt across the entire operations of the institutes. Specifically, this impacts:

- Scientific operations in support of existing grants;
- The capacity to generate 'blue sky' innovations as the basis for future competitive grant applications;
- The ability to recruit competitively and maintain Victoria's traditional place as the national 'magnet' for research talent;
- Investment in early stage intellectual property development and protection to feed the State's biotech industry with a pipeline of investible proposals, and
- The ability to support the development of innovations of value to the State's health service providers.

Each of these is explored below with examples from the State's MRI sector.

→ Scientific operations

While it is important for all institutions that are awarded competitive research grants to manage their operations with financial prudence, the best and most productive institutes worldwide provide their scientific communities with extensive shared research support in the form of up-to-date equipment, animal research facilities and data management. Victoria's MRIs are now finding it increasingly difficult to provide the breadth of support required by top international research talent.

Case Study 1

The Murdoch Childrens Research Institute's hardware for electronic data storage has not kept up with its ability to generate research data from high throughput gene sequencing and analysis of this data through the use of computer generated computational mathematics. The institute estimates that it currently needs to update its storage capacity by around 100 Terabytes at a cost of $350,000. Under current indirect cost support arrangements this is not possible, and the upgrade has been deferred.

Case Study 2

The impact of indirect cost funding shortfalls has been widely felt at the Burnet Institute, where it has been necessary to cancel the institute's entire Indigenous health research initiative, reduce the cancer research program, halve support for vital biostatistics capacity, reduce the reach of the justice health program, and reduce x-ray crystallography capacity.

→ Administrative operations

Administrative support for research at Victoria's MRIs reaches across the full range of corporate support services including finance, human resource management, IT, building and facilities management, occupational health and safety, media and communications, fundraising and government relations, commercialisation and grant management. The highly specialised research environment of the institutes makes it necessary for administrative support to be of a high standard and responsive to both change and risk. While critical mass has enabled some economies of scale, the benchmark cost of administration and scientific support remains (worldwide) around 60 cents in the grant dollar, and so under-funding of indirect costs has resulted in a gradual diminution of the range and quality of administrative support provided at Victoria's MRIs. Some example of this include:

Case Study 1

The procurement systems needed by internationally competitive health and medical research scientists are increasingly complex and speed of response and delivery is competitively paramount. In 2012 the Murdoch Childrens Research Institute took advice on the approach it should take to updating its procurement systems, resulting in a clear recommendation for an updated system whose implementation will cost in the region of $400,000. Under the current environment this is not affordable, with the result that MCRI scientists continue to be supported by a suboptimal procurement system, with the competitive delays and weaknesses that this causes. A similar situation exists for Prince Henry's Institute, that wishes to update and integrate procurement systems with chemical and dangerous goods inventories to reduce inefficiencies.

Case Study 2

A lack of sufficient indirect cost support at the Centre for Eye Research Australia has prevented the implementation of an adequate database for grants and donations. This has resulted in inefficient work practices for tracking the progress of grants and for ensuring that compliance requirements are completed in a timely manner.

Case Study 3

The specialist diabetes clinics run at Baker IDI Heart and Diabetes Institute are an important outreach function which makes cutting edge treatment available to diabetes patients, who themselves provide a valuable cohort for research studies undertaken by the Institute. Expansion of the research relevance of this service into associated areas (sleep apnea, obesity etc) has been slowed because of the cost of administrative support required to properly research, market and manage such new services.

→ 'Blue sky' innovation

A key strategic expectation that donors and the wider community have of medical research institutes focussed on the cure, prevention and treatment of specific diseases and populations, is that they will support 'disruptive' research initiatives, which break with scientific convention in the hope of discovering new approaches to old problems. The peer review system tends to be less supportive of such initiatives, in general leaning towards incremental discovery based on existing paradigms[11].

[11] Australia's best known example of this is the discovery of the link between the Helicobacter pylori bacterium and gastric ulcers, leading to simple antibiotic treatment for ulcers and wining the 2005 Nobel Prize for Barry Marshall and Robin Warren. As is now well known, the discovery phase of this work was not funded through traditional grant mechanisms.

For this reason it is essential that leading health and medical researchers have a level of funding freedom with which to take 'calculated risks'. Scientists need to be empowered to follow research leads that would not initially win external competitive support through the peer review system due to lack of precedent, but which, if proven, could form the basis for new discoveries that will benefit human health.

Such funding has traditionally been sourced from the donor community, which has shown itself to be much more willing to take calculated risks with new ideas than other sources of research support. However, in the past five years, MRIs have had to direct donor support towards back-funding the indirect costs of grant funded research, which in-turn has reduced the donor funding available for 'blue sky' initiatives.

Donors recognise this effect and the result is that institutes become less attractive targets for donation, as the blue sky initiatives which appeal to donors are undertaken less frequently. Major donors are attracted to definable initiatives and are not generally willing to support the indirect costs of research. The result is that both the research and ultimately the funding available to support it suffer.

Case Study 1

At the Burnet Institute, promising research partnerships with collaborators in China which are ineligible for peer review grant funding have been pruned back. A range of Global Health initiatives of clear potential social value has also been suspended for similar reasons.

Case Study 2

At Baker IDI Heart & Diabetes Institute, a program of internally determined grant support intended to sponsor collaboration between scientific disciplines was initiated in 2006 but withdrawn in 2010 because the funds had to be used to fill the indirect funding gap. More than 50% of projects supported by the program achieved NHMRC funding success in subsequent years.

Case Study 3

At the Murdoch Childrens Research Institute, it has been calculated that $1 of discretionary income leverages around $6 of NHMRC grant funding over a five year period. Thus the reduction in the availability of such funding caused by the drop in contribution towards indirect costs of grant funded research (around $1m) is in fact costing the institute (and the state) $6m.

Case Study 4

The Walter and Eliza Hall Institute has not been able to find sufficient internal funds to create value in two medicinal chemistry anti-fungal and dementia programs due to the lack of public support for medicinal chemistry and the need to divert internal funds to support infrastructure at the expense of intellectual property creation.

→ Competitive recruitment and retention

Bibliometric surveys undertaken by the NHMRC have identified for many years that the research-only environment provided by MRIs supports the production of much greater levels of research output per capita and per dollar spent than the mixed purpose environments of hospitals, universities or government. One such measure is the relative citation impact of biomedical research publications. AAMRI-commissioned research showed in 2009 that MRIs produce more than twice as much high impact research as universities.

As research productivity is the most significant contributor to university status and competitive ranking, MRI research leaders are therefore increasingly sought-after competitively, especially after grant announcements have been made public in October / November each year. Victorian MRIs are no longer able to offer competitive salary and research support packages, because their flexible income from philanthropy and investments is now being used to fill the indirect costs gap. This puts MRIs at risk of no longer being able to attract or retain the outstanding talent needed to drive their research agendas.

Case Study 1

The erosion of salary support provided by the Burnet institute has been identified as a factor in at least four research leaders leaving the institute and taking university positions since 2010.

Case Study 2

Baker IDI lost two Indigenous full Professors of health and medical research to competitive approaches from interstate in the first quarter of 2012.

→ Intellectual Property

The discovery, definition, development and marketing[12] of intellectual property is key to the missions of Victoria's health and medical research institutes. It is through this process that innovation is harnessed and used as the basis for the development of drugs, devices and clinical practices that will ultimately benefit patients. Victoria's MRIs have been very successful in this area. Examples of such success include:

Case Study 1

There have been several major recent advances at the Walter and Eliza Hall Institute where a strong intellectual property position have resulted in translational investment. These include:

- The creation and subsequent ASX listing of Genera Biosystems based on a strong molecular diagnosis platform
- The success of WEHI's spin-out company, Murigen, in engaging venture capital to create an asset now being developed by CSL – a novel antibody therapy for the treatment of inflammatory diseases.
- A first in class Phase 1 clinical trial for the treatment of coeliac disease was conducted in Melbourne, based on intellectual property created at the Institute and supported by seed capital investment, has now succeeded in raising $20 million for a Phase 2 trial also to be conducted in Melbourne.
- A strong intellectual property position from the Institute's apoptosis program resulted in a multimillion dollar investment by Genentech/Abbott to develop a new cancer drug using the Institute's intellectual property and capabilities in High Throughput Chemical Screening and medicinal chemistry. The result is ABT199, a novel anticancer drug successfully completing Phase 1 trials in Melbourne through collaboration between the Institute and the Peter MacCallum Cancer Centre and managed by Cancer Trials Australia.

Case Study 2

At Baker IDI Heart & Diabetes Institute, researchers created a device which is designed to reduce kidney injury from X-ray dyes used during heart procedures such as angioplasty and stenting. The system was developed using a removable catheter designed at the institute, which captures the toxic dye before it reaches the kidneys, and is designed for use in heart patients who also suffer from chronic kidney illness. The device has been approved for use in Europe, a market with an estimated worth of $400m, and TGA approval is currently being sought in Australia. The company created by Baker IDI to commercialise the invention, Osprey Medical, was listed on the ASX in May 2012 and raised $20m through an initial public offering.

[12] *Enhancing the Commercialisation Outcomes of Health and Medical Research*, Association of Australian Medical Research Institutes (2012)

Bringing innovations like this to the point where they are attractive to seed and venture capital investors is an area of market failure that is internationally recognised as requiring Government support. Underfunding of the indirect costs of research in Victoria's MRIs has identifiably reduced the extent to which the institutes are able to support such activity through other flexible funding streams, and this has meant that fewer Victorian inventions are now being developed and presented to potential investors, as the funding for patent processing and associated commercialisation costs is not available.

→ Health service innovation

Victoria's MRIs are deeply embedded within the State's hospitals, providing clinical service delivery partnerships which improve both the quality and innovativeness of treatments provided to Victorian patients. The partnership is long-standing and has worked well for both parties, however the growing pressure on flexible funding now means that MRIs are no longer able to bring the same level of financial commitment to the discussion. The result is that opportunities for clinical innovation identified through the research networks of the MRIs are missed, and talented clinical research staff who in the past have been brought to the State by virtue of the partnership are lost.

Case Study 1

Since the 1950s, Baker IDI Heart and Diabetes Institute has supported the Alfred Hospital in the development of its status as a pre-eminent transplant centre, jointly employing clinical researchers and providing support for the promotion of their research interests. The extent of this support to the hospital is presently under threat.

Case Study 2

The clinical staff of the Endocrine Unit of Southern Health (Monash Medical Centre) is managed and served entirely by Prince Henry's Institute staff: this unit manages 5,000 consults per annum. Without the staff appointment at PHI, this unit would not be operational.

Case Study 3

The Victorian Clinical Genetics Service at the Murdoch Childrens Research Institute has recently used research into microarray as a diagnostic tool. Changing the testing of children with intellectual disability, autism and congenital abnormalities from a cytogenetic test to microarray has resulted in dramatic improvements to the clinical service on campus and regionally. It has provided hundreds of families with an explanation for their child's condition, where previously there had been no diagnosis.

4. The opportunity for Victoria

4.1 Creating a diversified revenue base

A clear opportunity exists to build on the long standing strengths brought to the Victorian health, research and education sectors by MRIs, by addressing the indirect cost funding squeeze described in this paper. As identified in Figure 6 above, that gap is now sitting at around $140m. Indirect cost funding to Victorian MRIs has fallen below what can be compensated for with efficiencies. Inadequate funding for indirect costs is reducing the capacity of MRIs to use other flexible income sources for important value-add activities, which in-turn is reducing the institutes' ability to bring in such funding.

The existing OIS scheme distributes $26m to the 13 major institutes in Victoria, on the basis of cents in the dollar to match GOVERNMENT grant revenues, plus a component rewarding clinical improvements and innovation. It provides a much-needed contribution towards the indirect costs associated with competitively won grants, but does not incentivise or influence growth in commercial, philanthropic or grant income from several key non-Australian government sources.

The new funding scheme proposed in this submission would go beyond this to *support and reward a diversified base of direct research income, and make it possible to point to new activities and capabilities that these revenues had enabled*.

This would be achieved through the establishment of a new financial support scheme for Victoria's Medical Research Institutes, to be run alongside the existing OIS program - which would continue at its current level.

This proposal therefore builds on the model of the existing OIS, but applies the principle of a cents-in-the-dollar *incentive* for NON-GOVERNMENT income, with a view to supporting its growth. Three revenue sources would be targeted:

→ Philanthropy

National and international competition for philanthropic support is intense and although Victoria's MRIs have been very successful in this environment, a Victorian program which provides a cents-in-the-dollar co-payment for donations would greatly enhance the State's competitiveness.

→ Commercial income

Commercial revenues to the State's MRIs support not only income diversity but also foster collaborations and partnership with the private sector which support clinical and therapeutic innovations. A competitive program which makes Victoria more attractive as a place to do business with health and medical researchers will bring greater collaborations and partnerships to Victoria.

→ International grant income

While the State's MRIs have focussed largely on the NHMRC for grant support, there is an increasing number of international grant bodies to which Australian institutes are now eligible to apply. With better funding, MRIs will be able to attract additional support from overseas funding sources, enhance international engagement and diversify their funding base.

The level of co-payments in each category would be established on the basis of Government priority, and could be 'flexed' in successive years depending on where opportunities were identified by the sector.

The total value of the proposed program could realistically be set at the equivalent of the existing OIS program ($26m per annum), in effect doubling the level of support currently provided by the State Government to Victorian MRIs. Establishing the program would enable MRIs to diversify their funding base and enhance their international engagement, it would expand other sources of institute funding such as philanthropy and investments to support a range of value-add activities. These include:

→ Enhanced recruitment

To date, Victoria has built a national pre-eminence in health and medical research on an ability to attract and retain top talent from around the world. With this program the State's major institutes combined could bring in 10-15 new internationally recognised research leaders and their teams per year, each of which would increase and diversify the income and resource base of the broad State health and medical research effort.

→ Administrative efficiency and productivity

Adequately funded through this program, MRIs would be able to avoid the unhelpful additional layer of administration and associated costs that come with partnership arrangements with universities, for example, designed only to access university indirect cost funding schemes. This kind of arrangement is increasingly common because of the higher levels of indirect cost support provided through the Federally-based university support schemes. However ,the cost in administrative burden and autonomy is generally high and inefficiencies invariably result.

→ Enhanced translation in the clinical setting

The significance of Victoria's MRIs for the State's hospitals has been well documented. This program would enable the State's MRIs to employ and attract senior clinical research staff who would otherwise not be brought to the State, thus enhancing the quality of clinical service available to Victorian patients. It would also allow their research groups to undertake research projects within hospitals that subsidise the employment of hospital staff and bring new therapies to patients.

Over 10,000 Victorian hospital patients a year benefit from treatment through the performance of research sponsored clinical trials[13] – treatment that would otherwise be unavailable to Victorians or at best funded directly from the State's health budget. The excellence of our medical research institutes and that of our hospitals are interdependent.

Victoria's MRIs already have a track record with benefits of these kinds – freeing up and expanding philanthropic and investment incomes through the establishment of this program would give Victoria's MRIs an opportunity to develop more projects similar to the following successes:

Case Study 1

The Burnet Institute has led the development of the CD4 point of care test for human immunodeficiency virus (HIV), as well as the creation of a vaccine for Hepatitis C. Work on both these projects could be accelerated with further investment if indirect costs were being covered and institute funds were made available for investment in these activities.

[13] *Funding for the Future, The case for increased indirect cost funding for Victorian MRIs*, LEK Consultancy (2009)

Case Study 2

Baker IDI Heart and Diabetes Institute has pioneered the development of treatments for peripheral arterial disease. Institute scientists are currently developing a case for the expansion of TGA indications and PBAC rebate for the use of a known drug to cover arterial claudication, which will improve evidence-based practise in management of this debilitating disease. Current indirect cost funding inadequacies make investment in this project from other flexible institute income impossible, thus delaying the provision of this treatment to Victorian patients with peripheral arterial disease.

Case Study 3

Since 2010, the Victorian Clinical Genetics Service at the Murdoch Childrens Research Institute introduced a mass spectrometry assay for cystic fibrosis testing which was an Australian first, and has made an enormous impact not only on the laboratory testing capacity but also on the number of detectable mutations in newborn and community screening programs.

Case Study 4

The recently established Potter Centre for Personalised Medicine, a venture between the Walter and Eliza Hall Institute and the Murdoch Childrens Research Institute, provide a unique platform at the nexus of molecular pathology and clinical practise, but depends heavily on infrastructure support from its partners. The Potter Foundation provided funds for equipment – the MRIs must find infrastructure support.

→ **Increased third party 'seed' and 'venture' investment**

Each of Victoria's 13 medical research institutes can produce examples of where increased research capacity through more adequate indirect cost funding would increase their ability to win commercial and investment revenue for the state.

Case Study

The Bionics Institute is a case in point. It has a long-term strategy to build the medical bionics industry in Victoria. A core objective is to deliver a manufacturing industry in Victoria for the next generation of medical bionics devices and to ensure the economic benefits are captured and retained in Victoria.

The Bionics five-year strategy is a $35M program to produce six new medical bionics devices for the treatment of chronic pain (2 x devices), epilepsy (2 x devices), obsessive compulsive disorder, and essential tremor to clinical trials (these devices would be further leveraged for other related movement and neurological disorders). The first stage of this program is to establish infrastructure/facilities to addresses the pressing problem of lack of capability and capacity for Good Manufacturing Practice-compliant manufacturing and preclinical/early clinical testing of sufficient numbers of custom-designed electrodes and medical bionics devices in ISO/IEC 17025 and ISO 13485 certified facilities in Victoria. Currently, these facilities do not exist in either capability or capacity to adequately respond to industry needs or to advance the Victorian medical bionics capability.

With adequate infrastructure support, the Bionics Institute could establish the following facilities:

Electrode Fabrication Facility - to produce and manufacture a new suite of novel human-grade electrode arrays for application in neurobionics devices.

Clinical Neurobionics Facility - to provide a translational hub bringing clinicians and researchers together to design, develop, and clinically evaluate prototype neurobionics devices.

The value-added benefit from these new facilities would include:

- Advancing the Victorian medical bionics industry by establishing critical industry capability;
- Fast-tracking innovative medical bionics technology into health solutions;
- Creating employment opportunities;
- Providing a manufacturing base in Victoria for a new generation of medical bionic devices and resulting economic returns, and
- Establishing Victoria as a key centre for medical bionics research and manufacture.

Better support for indirect costs would free up philanthropy and investment income to enable the institute to help support these important initiatives.

→ Improved career support for young scientists and for female scientists returning to the workforce.

A key to the attraction and retention of top scientific talent in Victoria is the creation of an environment in which young scientist are supported in the early stages of their careers. While mentoring is an accepted part of a senior scientist's role in all environments, a key to creating such an environment is funding for conference attendance, professional development and other experience.

Funding is also necessary to help women returning to the workforce after having children, to bridge the grant funding gap often experienced after a time away from the lab.

Case Study 1

Baker IDI Heart & Diabetes Institute has developed an early career scientist (ECS) program that provides young scientists with support in the early stages of their career. Through the scheme, they receive support with conference and travel expenses, mentorship from senior scientists, and advice on grant applications and dealing with the commercial sector. The ECS program is a significant contributor to the institute's ability to attract and retain young scientists, and to support them in the development of their career until they become 'self funded'. With freed-up philanthropic and investment revenues, the institute would expand this program and enhance its recruitment of young talent to the institute, and thus to Victoria.

Case Study 2

The Murdoch Childrens Research Institute has had recent similar experience, as the number of PhD students being supervised under the institute's auspices has doubled since 2007 yet funding for conference travel and scholarship support has remained at 2007 levels.

Case Study 3

The Walter and Eliza Hall Institute established a Women in Science program in 2009 to encourage the state's best women scientists to remain in research. The program provides up to $15,000 per annum to outstanding female postdoctoral fellows striving for career independence and female laboratory heads with pre-school-age to assist with the out-of-pocket cost of childcare for pre-school-age children. It also gives women scientists access to funding for additional technical support while they are on maternity leave, so their research programs can continue uninterrupted. Funding for the program is an indirect cost.

Case Study 4

The Walter and Eliza Hall Institute's Business Development Intern program is designed to make early career scientists more competitive in securing grants and developing a career in science. This highly successful program now has DBI support for expansion to other Victorian MRIs, however the core element of success, mentoring and on the job training, requires significant commitment from the employing MRI through infrastructure support. If adequately funded, this unique approach to developing early career scientists will make a significant contribution to maintaining and increasing Victoria's competitiveness.

Appendix 1

Indirect cost support for medical research

How it works

Appendix 1: Indirect cost support for medical research

Explainer

Most research grants held by Australian Medical Research Institutes (MRIs) and Universities, including all grants awarded by the National Health and Medical Research Council (NHMRC), provide only the direct costs of undertaking the research specified in the grant application. The indirect costs of the research - that is, those costs that are incurred in providing the physical infrastructure, the administrative support and the platform technologies essential to an ability to do the work - are provided through a complex set of Commonwealth and State based funding programs.

Indirect cost funding of research is complex.

For the Universities, it is provided through the Commonwealth Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE) on the basis of a range of metrics focussed around direct grant dollars won, publication impact and output, and to a lesser extent students successfully graduated, via a series of indirect costs programs which group research productivity with other metrics such as graduate completions.

For the MRIs, the funding comes from both the Commonwealth, via an NHMRC scheme which awards funding entirely on the basis of grants won (the Independent Research Institute Infrastructure Support Scheme – IRIISS), and a variety of State programs which calculate eligibility both on the basis of grant funding, and whatever other metrics are judged important by the different State governments. A certain element of competition exists between the major states to provide indirect cost funding that supports an environment conducive to undertaking good research, supporting medical researchers and their host institutions and thereby winning future grants.

Indirect cost funding for medical research has been extensively benchmarked within Australia and Internationally. It is generally agreed that adequate support across all areas of indirect funding requires in the region of 60 cents in the research grant dollar, although in some jurisdictions and in some of the more platform technology-dependent sub disciplines, this can go as high as 80 cents in the dollar.

Appendix 2

A Snapshot of the Victorian Health and Medical Research Sector

Appendix 2: The Victorian Health and Medical Research Sector

(Source: Australian Association of Medical Research Institutes – AAMRI)

Around 4,000 staff and students	>	Around 4,400 staff and students work at Melbourne's independent medical research institutes (MRIs) (see table below), accounting for over 40% of staff and students employed by Australian MRIs[14]
42% of NHMRC funding	>	Victoria received 42% of NHMRC funding for medical research over the last decade ($323 M in 2012; $2.4B over last decade), compared with 26% for NSW and 14% for Qld[15]
$55 for Victoria	>	State comparison: NHMRC funding per capita - $33 for Australia; $55 for Victoria; $44 for ACT; $36 for SA; $33 for NT; $28 for NSW; $26 for Qld[16]
36% of NHMRC funding	>	Victoria's 13 major MRIs account for around 36% of NHMRC funding to Victoria (i.e. Melbourne MRIs accounted for 20% of total NHMRC funding in 2012; approx. $160M)[17]
51% of NHMRC Research Fellowships	>	51% of NHMRC Research Fellowships > Of the 379 new and ongoing Research Fellowships funded by the NHRMC in 2011, 51% were held at Victorian institutions. Victoria performs well at all levels of NHMRC support, from Career Development Fellowships (47% of national awards) to the highest award, the Australia Fellowships (44%)[18]
The Largest portion of funding	>	The Largest portion of funding >Victoria attracts the biggest slice of total Australian Government funding for health & medical research (NHMRC plus other funding programs/schemes) at $695 million (in 2008-09) followed by $642 million for NSW and $272 million for Qld[19]
Combined annual turnover of $433.8m	>	Melbourne's 13 major MRIs had a combined annual turnover of $433.8 M in 2012-13, an increase of 29% compared with 2008-09 ($336 M).14 Income was sourced from competitive government grants, foundations/philanthropic grants, donations & bequests and industry.
Top 20 biomedicine rankings	>	Melbourne, along with London and Boston, is one of only three cities in the world with two universities in the global top 20 biomedicine rankings. [Note: haven't checked statistic; from Biomelbourne Network website]
International Collaboration	>	Approx. 80% of Victorian publications have international co-authors, compared with 72% for Qld and 68% for NSW[21]
42 ASX listings	>	Victoria has a total of 42 life science companies listed on the Australian Stock Exchange, with a combined market capitalisation of A$21.4 billion. In 2012 these companies had 85 life science products on the market, with 39 phase II and 15 phase III clinical trial programs underway.

[14] AAMRI records.
[15] NHMRC funding statistics (NHMRC website).
[16] Source: Source: NSW Review – Fact Base, 1 Sept 2011. (Note, this publication is not accurate for all the data on MRIs, for the same reason as in footnote 6.)
[14] NHMRC funding statistics (NHMRC website) and MRI Annual Reports. (Note, some MRIs administer their funding through a university, so NHMRC data is not completely accurate with regard to the institute performing the research.)
[18] Current NHMRC Fellows, National Health & Medical Research Council, May 2011
[19] Research Australia, Shaping Up: Trends and Statistics in Funding Health and Medical Research.

A Snapshot of Australia's National Medical Research Sector

Generating employment. Producing results.

- More than 10,000 staff and students work at Australia's MRIs.[15]
- Australia's MRIs consistently punch above their weight:
  - They produce half of NHMRC-funded publications from a third of NHMRC funding.[16]
  - Their work is cited 1.6 times the rate of the rest of the medical research sector. [17]
  - They are more successful at generating commercialisation revenue than Australia's leading universities.[18]

Australia is a recognised leader in medical research and biotech.

- Australia produces 3% of the world's medical research publications from just 1.1% of global expenditure on medical research.[19]
- Health and medical research employs approx. 23,000 people in Australia.[20]
- 7 Nobel prizes in medicine have been awarded to Australians.
- Australia's medicines industry is Australia's most valuable high-tech export industry, worth $4 billion in exports per annum, almost 4 times our exports of electronics and 3.5 times exports of office machinery/computer industry.[21]
- Australia has an internationally recognised strength in biotech/nanotech, ranking within the top 6 countries in the world in terms of concentration of patents in biotech/nanotech.[22]
- The market capitalisation of Australia's listed biotech companies has increased from AU$10 billion in 2004 to AU$24.5 billion in 2010.[23] Victoria dominates for market capitalisation, home to companies such as CSL, Mesoblast, Acrux, Biota, Starpharma.

MRIs: Addressing Australia's Health Challenge.

- Every dollar invested in Australian health and medical research returns on average $2.17 in health benefits (Source: ASMR).
- Investment in the NHMRC between 2000-2010 is projected to have saved $966 million in direct/indirect costs to the health system, with a further $6 billion in gains linked to increased wellbeing from NHMRC investment over the decade (Source: ASMR).
- An estimated 75% of Australians have a long-term health condition (Source: AIHW).
- Health & aged care costs, as a proportion of Government expenditure, is expected to almost double by 2050, from 18.5% to a crippling 33% of Government expenditure.

[15] AAMRI records; Do not compare with 23,000 for entire sector, as sources (and thus methods) might be different.
[16] Source: LEK Report; NHMRC statistics; Mark Roberts, Wiley publishers (analysis of Web of Science); based on world peer-reviewed publications acknowledging NHMRC funding; MRIs = 51% of NHMRC-funded publications, but only represent around 32% of NHMRC budget. Hence, MRIs do 2.2 x better than the rest of NHMRC awardees (51/32 vs 49/68).
[17] Source: AAMRI report from ANU
[18] Source: LEK Report
[19] Source: Research Australia; ASMR Access Economics study 2008, p31
[20] Source: NSW Review – Fact Base, 1 Sept 2011 (no international comparisons available); do not compare with number for MRIs, as this data was sourced separately and so may not be comparable with AAMRI data.
[21] Source: OECD Main Science and Technology Indicators Database and Medicines Australia media release (based on ABS statistics).
[22] OECD (Outlook 2012?) - the revealed technology advantage (RTA) index provides an indication of the relative specialisation of a given country in selected technological domains and is based on patent applications filed under the Patent Cooperation Treaty. It is defined as a country's share of patents in a particular technology field divided by the country's share in all patent fields.)
[23] Source: Research Australia