

CASE STUDY 1: **BIO21 INSTITUTE**

Victorian Government investment in the construction of the Bio21 Institute supported the development of a multidisciplinary hub, bringing industry and researchers together to maximise health and research outcomes.

IDENTIFIED PROBLEM/GAP

Leaders from the University of Melbourne, Melbourne Health and WEHI identified the need for greater linkages between biotechnology research, translation and commercialisation activities within Victoria. These entities partnered with the Victorian Government to establish Bio21 Australia Limited, which expanded to become the Bio21 Cluster representing more than 21 hospitals and medical research institutions. The overall aim of the Project was to create a medically focused hub of research, development and commercialisation that would attract talent and investment from around the world.

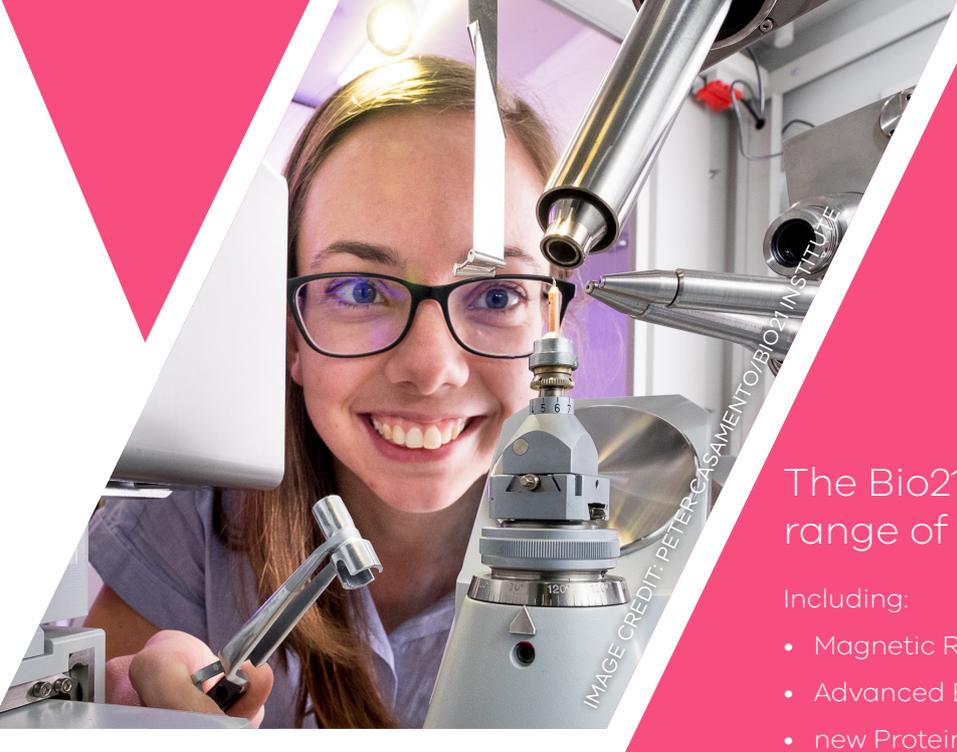
The Bio21 Molecular Science and Biotechnology Institute was formed out of the Bio21 Australia partnership as a formal institute and new premises. The Bio21 Institute aimed to specialise in interdisciplinary research, industry engagement and state-of-the-art platform technologies, providing critical mass (the minimum amount of resources necessary to become self-sustaining) to maximise health and research outcomes, encouraging institutions to work collaboratively.

OVERVIEW OF THE INVESTMENT

The Victorian Government provided \$35 million in funding through the STI First Generation (Other Funding) for the construction and establishment of the Bio21 Institute and associated infrastructure. The \$35 million was distributed between the Bio21 Institute (\$15 million), the Ludwig Institute for Cancer Research and WEHI Joint Proteomics Facility (\$5 million) and a Bio21 STI strategic development fund for seeding research infrastructure investments and collaborations between Bio21 Australia members (\$15 million). Victorian Government funding for the Bio21 Institute was supplemented by additional funding from the University of Melbourne (\$50 million), the Atlantic Philanthropic Foundation (\$30 million), the Australian Government (\$9.5 million) and industry. A further \$1 million in Victorian Government funding was provided for the Bio21 Clean Room through the STI Second Generation (Strategic Projects).

The Bio21 Institute now houses
MORE THAN
500
research scientists,
students and
industry participants.





The Bio21 Institute houses a range of **platform technologies**

Including:

- Magnetic Resonance
- Advanced Electron Microscopy
- new Protein Characterisation facilities
- Systems and Computational Biology facilities
- a major Mass Spectrometry facility.

IMPACT

The Bio21 Institute now houses more than 800 research scientists, students and industry participants. It plays an important role in building a pipeline of talent, currently training around 380 early career researchers, post-doctorates and PhD students. It also supports Year 11 and Year 12 students to take their VCE studies out of the classroom into Bio21 Institute labs.

The Bio21 Institute houses a range of platform technologies, employs managers to run them, and educates researchers to use them. Platform technologies include Magnetic Resonance Imaging, Advanced Electron Microscopy, new Protein Characterisation facilities, Systems and Computational Biology facilities, and a major Mass Spectrometry facility. Access to these platforms by researchers enables discovery, knowledge translation and commercialisation. The platform technologies also attract leading scientists from around to world to Victoria.

Australia's largest multinational biopharmaceutical company CSL has based its global Research and Translational Science hub in Melbourne due to the reputation, facilities and research environment of Bio21 and surrounds. CSL has been a partner of the Bio21 Institute since 2007, and now has around 170 scientists co-located at the facility.

The Bio21 Institute has played a role in improving health outcomes. This includes a potential treatment for Motor Neurone Disease and Parkinson's Disease, a new approach to eradicating dengue fever, a more effective malaria treatment, and 3D modelling of tuberculosis mutations to allow doctors to rapidly tailor individual treatments.

As a successful model of industry-academic relationships, the Bio21 Business Incubator has added to the pipeline of new Victorian businesses. Patrys Ltd, an ASX-listed company, is developing antibody therapies in oncology. Sienna Cancer Diagnostics focuses on the development of novel in vitro diagnostic cancer tests. Bioscreen has developed into a commercial faecal microbiome testing business linked with the personal healthcare industry.

Many collaborations have also had commercial impact. For example, a collaboration between Bio21 researchers and Telix Pharmaceuticals, an Australian biopharmaceutical company, has led to a new Industrial Manufacturing Cooperative Research Centre. The Centre will translate new molecules to provide more effective and personalised cancer therapeutics, that were invented in the Bio21 Institute, to commercial manufacture.

CASE STUDY 2:

WALTER AND ELIZA HILL INSTITUTE OF MEDICAL RESEARCH

WEHI is Australia's leading biomedical research institute. The contribution by the Victorian Government to expand and effectively double the Institute's size in 2008 was critical in helping the Institute grow to becoming the global success it is today.

IDENTIFIED PROBLEM/GAP

In the early 2000s, WEHI experienced severe limitations in physical space, which was impeding its potential to undertake new scientific and technological programs and attract new scientific talent. At the time, a review of similar major competing organisations abroad led to WEHI concluding that without expansion, WEHI would be unable to continue competing at the highest level internationally and would experience inevitable decline.

OVERVIEW OF THE INVESTMENT

The Victorian Government provided \$50 million through the *Healthy Futures* program in 2006 to support the expansion of WEHI to ensure the Institute could rival the world's best. The seven-storey western wing at WEHI's Parkville laboratories was estimated to cost \$130 million, with the Australian Government providing \$50 million and Atlantic Philanthropies providing the remaining \$30 million.

Officially opened in 2012, the redevelopment included Australian-first research services across seven new levels of laboratories and

scientific support services. This included a new personalised medicine research centre, volunteer blood donor registry, an insectary for breeding malaria-carrying mosquitos, and a clinical translation centre.

IMPACT

The expansion doubled WEHI's floor space and enabled an additional 270 researchers to be employed by 2012. Growth of this scale has only been possible by having the necessary space, quality infrastructure, reputation and funding to house the world's leading scientists.

Ten years on, it is clear that the expansion has been transformative for WEHI. Not only are the state-of-the-art laboratories, support facilities and office space still being utilised by WEHI, the redevelopment proved essential in enabling WEHI to have the critical mass and quality infrastructure necessary to attract exceptional talent and deliver remarkable health outcomes through new scientific discoveries and commercialisation capabilities.

The expansion enabled WEHI to establish new strategic research initiatives, most notably in genomics, bioinformatics, breast cancer, structural biology, medicinal chemistry, developmental biology and systems biology. WEHI's enhanced research capacity was also able to attract increased competitive research grants. By 2019, revenue from government and industrial and philanthropic grants has grown to over \$80 million per annum.

These new research opportunities and initiatives have also led to an increase in high quality jobs, which have been filled with leading talent from Australia and abroad.



Growing from 320 staff in 1997, today WEHI has 1,160 staff comprising 89 senior scientists, 286 scientists, 569 research laboratory staff, and 216 support staff. Additionally, WEHI supports 203 research students completing honours, Masters, and PhD studies. In the period 2000-2009, WEHI authored 2,190 peer reviewed publications. In the subsequent decade, this figure grew to 3,700 peer reviewed publications.

Today, there are more than 300 research projects underway at WEHI – in cancer, immunology, infectious diseases, and healthy development and ageing – creating a robust discovery and development pipeline. For instance, WEHI has received more than \$16 million in funding from global charity Wellcome Trust to identify and investigate 'drug-like' molecules for treating malaria in partnership with biopharmaceutical company Merck Sharp & Dohme. WEHI's longstanding collaborative relationship with CSL has yielded several new biological drugs that are now in clinical development for inflammatory diseases, and the two organisations continue to work closely on a range of translational research. In 2019, WEHI's annual income from its commercialisation activities totalled \$43 million.

Innovations at WEHI have also led to the foundation of several spinout companies, such as IonOpticks, which manufactures innovative analytical tools used by researchers worldwide, and Anaxis Pharma, a joint venture between WEHI and Synthesis Research to develop novel drugs for the treatment of inflammatory diseases.

To continue to build a diverse pipeline of WEHI spinouts, the Institute initiated an entrepreneurship program in 2018, which is designed to encourage and support the entrepreneurial activities of all staff and students. In addition, WEHI's intellectual property is currently the subject of more than 200 clinical trials being conducted worldwide.

Attraction of talent has been an enduring focus for the Institute, with a sustained focus on ensuring WEHI attracts the best and brightest people through initiatives to support gender equity and the promotion of science as a career pathway to secondary and tertiary students. The Institute is a founding partner of the Gene Technology Access Centre, which aims to increase science literacy in the community and to inspire students to undertake tertiary studies in STEM.

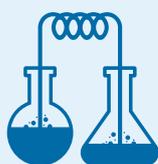
VICTORIAN GOVERNMENT'S INVESTMENT IN WEHI WAS transformative



1,160
staff

203
research
students

3,700
peer reviewed
publications



MORE THAN 300
research
projects
underway

Annual income from
commercialisation
activities

\$43 million



CASE STUDY 3: FLOREY INSTITUTE

Victorian Government investment to support the amalgamation of neuroscience institutes in Victoria built a powerhouse of discovery and funding. The Florey Institute is now one of the largest and most highly respected brain research centres in the world.

IDENTIFIED PROBLEM / GAP

In the early 2000s, Victoria had an established reputation in neurosciences – an important and growing field encompassing research into the prevention, diagnosis, treatment and cure of neurological and psychiatric conditions. Several neuroscience institutes operated across Victoria. However, many of these institutes were operating in dated facilities that required significant investment to remain viable.

In this context, a clear opportunity arose to merge Victoria's neuroscience institutes, both to address infrastructure challenges and to also create the critical mass of capabilities, talent and skills needed to boost Victoria's leadership in neuroscience.

OVERVIEW OF THE INVESTMENT

To support the collaboration of neuroscience institutes, the Victorian Government contributed \$53 million through the *Healthy Futures* program towards the merging of the Florey Institute, the Mental Health Research Institute, the National Stroke Research Institute and the Brain Research Institute, to build a powerhouse of discovery and funding. These institutes collectively now operate under the guise of the Florey Institute of Neuroscience and Mental Health.

This capital funding provided the infrastructure and space for these institutes to co-locate together. It also addresses research infrastructure needs, including dry laboratory space, wet lab space, and new capital equipment.



This document provides an extract of KPMG's findings during the course of the work undertaken for the Department of Jobs, Precincts and Regions under the terms of the engagement letter dated 29 September 2020. The contents of this document do not represent our conclusive findings, which are contained in our final detailed report available at djpr.vic.gov.au/victorias-lead-scientist

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OVER
300 FTE



TOTAL INCOME OF
\$85.5 million
in 2019 including \$45.2 million in grants



**LARGEST BRAIN
RESEARCH GROUP**
in the Southern Hemisphere

IMPACT

Today, the Florey Institute is one of the largest and highly respected brain research centres in the world. The Institute is the largest brain research group in the Southern Hemisphere and is one of the world's top five brain research centres.

The Institute provides scientists and students with world-class facilities and the opportunity to improve lives. The Institute works on a range of serious diseases including stroke, epilepsy, Alzheimer's, Parkinson's and motor neurone diseases, depression and addiction. The Florey Institute is also a world leader in imaging technology, stroke rehabilitation and large population studies to improve patient care around the world.

For example, the Australian National Imaging Facility (NIF), which is lead out of Queensland and is a key partner of the Florey Institute, is a \$300 million project that provides state-of-the-art imaging capability of humans, animals, plants and materials for the Australian research community. NIF was established as an unincorporated joint venture in 2007 with 11 participants. It received substantial funding through the Commonwealth Government's National Collaborative Research Infrastructure Strategy (NCRIS) and co-funding by state governments and other partners.

This reputation has also helped the Florey Institute to secure further funding and opportunities for the Institute. The Florey Institute currently has over 300 FTE and in 2019 received a total income of \$85.5 million, including \$45.2 million in grants. The Florey Institute also continues to attract significant philanthropic investment, including from the Myer and Potter Foundations.

In recent times, the Florey Institute has focussed on translation and commercialisation, substantially increasing its interaction with industry partners in Australia and throughout the world. This has resulted in several large industry funded drug development projects in indications such as epilepsy and dementia and allowed the Florey Institute to substantially increase its impact from a clinical perspective. The Florey Institute has also been cognisant of ensuring that there is a reasonable commercial return for these efforts to ensure sustainability into the future which will underpin the success of future generations of neuroscientists.

CASE STUDY 4:

AUSTRALIAN REGENERATIVE MEDICINE INSTITUTE

The Victorian Government funding helped establish the Australian Regenerative Medicine Institute as a pre-eminent research institute that has forged the way in regenerative medicine, attracting exceptional talent, building lasting international partnerships and making remarkable discoveries that have changed how disease and injury are treated.

IDENTIFIED PROBLEM/GAP

In the mid-2000s, regenerative medicine was recognised as one of the most revolutionary and emerging fields in medical science. At Monash University, the Australian Stem Cell Centre, the Monash Immunology and Stem Cell Laboratory and stem cell companies were gaining significant traction in this area, forming a centre of excellence in regenerative medicine that was already attracting international attention.

There was a clear opportunity to leverage these existing strengths and catapult Monash University's leading role in regenerative medicine, both nationally and globally.

OVERVIEW OF THE INVESTMENT

As part of the *Healthy Futures* Program, the Victorian Government entered into a joint venture with Monash University to build a new Australian Regenerative Medicine Institute – the first of its kind in Australia.

The Victorian Government invested \$35 million towards the \$138 million project to construct one of the world's largest stem cell research hubs to consolidate platform technology capabilities related to regenerative medicine in a central facility, and establish the critical mass to promote an integrated, interdisciplinary approach to regeneration. Officially opened in 2009, the Institute was also built to provide a focus on cutting edge research, clinical applications and the development of commercial products in one of the most significant and innovative fields of medical science. It was also intended to build international links, attract talent and provide a unique training environment for Victoria's young scientists.

IMPACT

ARMI has established a strong reputation as a pre-eminent research institute that has forged the way in regenerative medicine, attracting exceptional talent, building lasting international partnerships with the global scientific community and making remarkable and life-changing discoveries that have and will transform how we treat disease and injury.

ARMI led Australia's Associate Membership of the European Molecular Biology Laboratory (EMBL). ARMI attained the appointment of the first two Australian EMBL Group leaders for the newly established EMBL Australia Partner Laboratory Network.

The EMBL Network has since played a critical role in the growth and international reputation of Australia's scientific community – internationalising Australian research,



IMAGE CREDIT: ARMI

empowering and training Australia's best early-career researchers and future scientific leaders and embedding powerful new enabling tools, such as bioinformatics and systems biology, in Australian life sciences. Without the leadership role that ARMI played, this Network may not have otherwise been formed.

Today, ARMI has 18 research groups with up to 250 staff and students, a comprehensive teaching program and plans for continued growth including the development of a new purpose-built hub facility suitable for research and manufacturing to also accommodate local regenerative medicine start-up companies. Initiating and leading the Centre for Commercialisation of Regenerative Medicine (CCRM) Australia, a national initiative to support translation and commercialisation of Australia's growing regenerative medicine sector not only underscores the Institute's

support for regenerative medicine but also provides the commercialisation expertise for ARMI's research pipeline.

ARMI's researchers have also secured significant competitive research funding, established unique enabling research infrastructure and have expanded in size and scope because of the targeted recruitment of exceptionally talented scientists and developed undergraduate and postgraduate education programs.

Of the 24 research group leaders recruited since inception, 20 were international recruits from leading institutes in North America (University of Toronto, Harvard University), Japan (Osaka University) and Europe (European Molecular Biology Laboratory). Except for two of these initial recruits, all have continued their research career within Australia.



SOME OF ARMI'S REMARKABLE DISCOVERIES

- Discovery of how areas of the brain that are responsible for vision could potentially adapt to injury or trauma and ultimately prevent blindness.
- Unlocking a mechanism that triggers stem cell production in the blood.
- Developing the first research model for stroke that most closely resembles what happens in the human brain.
- Uncovered a vital mechanism underlying the process of myelination, a key characteristic of multiple sclerosis.
- Developed technology to speed up the mending of damaged bone, skin and, potentially, other tissue.

CASE STUDY 5: MURDOCH CHILDREN'S RESEARCH INSTITUTE

Victorian Government investment during the early formative development of the Murdoch Children's Research Institute (MCRI) played a key role in establishing the Institute as one of the top 3 children's health and medical centres globally. The investment in a building to house MCRI as a dedicated research institute within The Royal Children's Hospital (RCH) was key to accelerating solutions to health issues facing children and young people within Victoria and around the world.



OVER **2,000**
staff and students

INCOME INCREASED to around
\$200 million
in 2019



MCRI IS RANKED WITHIN THE
top 10
institutions
receiving federal grant funding
for the last five years

MCRI IS RANKED WITHIN THE
top three
children's health and medical
research centres globally



INVESTMENT RATIONALE

Following the merger of the Murdoch Institute and the Royal Children's Hospital Research Institute in 2000, to form MCRI, a dedicated space for research was needed to leverage the unique opportunity of a campus where MCRI and RCH staff worked closely and seamlessly across research and clinical care. The campus offered the potential to create a globally unique approach to solving health challenges; one where research could be brought to the frontiers of healthcare and scaled out to communities across Victoria and Australia, and health systems around the world.

OVERVIEW OF THE INVESTMENT

The Victorian Government provided \$14.9 million in 2002 through the STI Initiative to support the development of the Research Precinct Building. The construction and design of the 10-storey building dedicated to research discovery and translation housed basic, clinical and population health research, Genetic Health Services Victoria (now known as the Victorian Clinical Genetics Service) as well as scientific enablers including the Clinical Epidemiological and Biostatistics Unit, biobanking facility and small and large animal modelling facilities.



IMAGE CREDIT: MURDOCH CHILDREN'S RESEARCH INSTITUTE

IMPACT

Investment by the Victorian government has helped position MCRI as an impact organisation powered by research. The dedicated research building facilitated the consolidation of research activities which drove collaboration and generation of new ideas between scientists and clinician researchers, and across disciplines (laboratory-based, clinical and population health research), to address important health challenges facing children and young people.

The investment played a key role in establishing MCRI's nationally and internationally leading strategic initiatives in genomics, stem cell medicine, population health and large population cohorts (GenV) and global health – with a particular focus on applying research expertise and innovative technologies to solving real world problems affecting children and adolescents. For example:

- MCRI is leading the case to incorporate genomic medicine into healthcare to accelerate genetic diagnosis and guide tailored treatment as leaders of Australian Genomics.
- MCRI were the first in the world to grow mini-kidneys from stem cells as a new possible treatments for chronic kidney disease.
- MCRI established one of the world's largest longitudinal studies of children to advance health and well-being of Victorian children, GenV.

- MCRI's global health program is working with over 30 low-income countries to address major health threats affecting children.

The profile of MCRI as a leading medical research institute nationally and internationally was established as a result of Victorian Government investment, making MCRI attractive to key talent who have established and lead innovative and translational research programs. MCRI grew from around 40 researchers to over 2,000 staff and students by 2019, research output (number and quality of publications) increased each year, and income increased from around \$11 million in 2000 to around \$200 million in 2019, including from competitive grants which continues to increase each year. MCRI is now ranked within the top 10 institutions receiving federal grant funding for the last five years and is ranked within the top three children's health and medical research centres globally.

The investment also played a key role in driving innovation and research translation and attracting industry partners. Key examples include the development of a Rotavirus vaccine, based on MCRI's world first discovery of Rotavirus, development of a treatment for food allergy, and new diagnostic tests offered to families through the Victorian Clinical Genetics Service.

CASE STUDY 6: CSL

CSL has recently announced it will build a new global headquarters in Melbourne by 2024. The strong presence and linkages CSL has formed in the Parkville Biomedical Precinct, as well as the strengths of the Precinct, supported by Victorian Government investment, was a key driver in CSL's decision.

CSL is a leading global biotechnology company with a dynamic portfolio of life-saving medicines, including those that treat haemophilia and immune deficiencies, as well as vaccines to prevent influenza. CSL, including its two businesses, CSL Behring and Seqirus, provides life-saving products to more than 70 countries and employs more than 27,000 people.



IMAGE CREDIT: CSL

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IMAGE CREDIT: CSL – ARTIST IMPRESSION OF NEW HEADQUARTERS

In 2019, CSL announced that it will be building a new global headquarters, which will accommodate more than 800 CSL employees, in the Parkville Biomedical Precinct. The Precinct's global reputation, as well as the strong research ties and collaborations established by CSL in the Precinct, were key drivers in the company's decision.

In the early 2000s, strategic investments by the Victorian Government had helped to assemble the key components necessary to grow the Precinct's density and quality of medical research activity.

One of these investments was \$35 million to support the establishment of the Bio21 Precinct, including the construction of the Bio21 Institute. The Institute now houses more than 800 research scientists, students and industry participants and a range of platform technologies.

In 2007, CSL moved its global research and development activity to the Bio21 Institute, and now has a strong presence in the Precinct, with over 170 scientists working in the Institute. CSL is part of a strong network of industry and research institutes operating in close proximity, enabled and facilitated by Victorian Government efforts to strengthen the collaborative ties in the Precinct. For example, CSL works closely with the WEHI to accelerate the development of new therapeutics and translate WEHI's research.

Other key institutes that make the Melbourne precinct a vibrant research hub include the Doherty Institute for Infectious Disease, The Murdoch Children's Research Institute, the Victorian Comprehensive Cancer Centre, the Royal Melbourne Hospital, the Royal Women's Hospital, The Peter MacCallum Cancer Centre and the Royal Children's Hospital. Victorian Government investment has supported all of these institutions.

In 2014, with support from the Victorian Government, CSL opened the Biotechnology Manufacturing Facility in Broadmeadows, for the large-scale manufacture of novel recombinant therapies for international clinical trials, and in December 2015 opened the Turner Facility for the manufacture of an immunoglobulin therapy. In 2017, CSL also expanded its facilities with a \$230 million advancement manufacturing facility at its CSL Behring site in Broadmeadows. The facility is expected to produce therapies with an estimated annual market value of \$850 million as well as generate up to 200 new jobs by 2026.

In November 2020, CSL announced it will invest \$800 million in a cell-based influenza vaccine manufacturing plant at the Melbourne Airport Business Park, with operations expected to start in 2026. The investment is the largest made in the local pharmaceutical sector since the construction of CSL Behring's Broadmeadows plant.

CSL...



PROVIDES
LIFE-SAVING PRODUCTS
TO MORE THAN
70 countries

EMPLOYS
**MORE THAN
27,000** PEOPLE



CASE STUDY 7: MONASH INSTITUTE OF PHARMACEUTICAL SCIENCES – CENTRE FOR DRUG CANDIDATE OPTIMISATION

Victorian Government investment in the Centre for Drug Candidate Optimisation created a footprint in drug discovery in Victoria. Since then, the Centre has been self-funded and has become part of the national infrastructure in drug discovery, contributing to the growth of the Monash Institute of Pharmaceutical Sciences (MIPS).

INVESTMENT RATIONALE

Drug candidate optimisation is a critical part of the medical research system, working to identify drug candidates with necessary properties for successful progression into pre-clinical and clinical development. The Centre for Drug Candidate Optimisation was formed to fill a critical gap in the Australian drug discovery system by providing expertise and infrastructure in pharmaceutical drug candidate optimisation for improved compound design, selection and progression.

Prior to the establishment of the Centre, access to pharmaceutical lead optimisation did not exist in Australia in a consistently coordinated, validated and high-quality way. As individual companies tend not to require lead optimisation regularly, there was not sufficient incentive to invest in the

required costly infrastructure and equipment. Researchers were forced to either work with overseas contract research organisations that typically provide only minimal data interpretation or utilise ad hoc local expertise of varying quality, limiting product development and commercialisation activities.

OVERVIEW OF THE INVESTMENT

The Centre was established in 2002 with \$4 million in funding through the Second Round of the STI First Generation Infrastructure Program. This funding provided for the purchase of new equipment and infrastructure, the development of new R&D programs and the appointment of scientific and administrative staff. Since the initial Victorian Government investment, the Centre has leveraged a further \$52.6 million in funding to 2020 from other sources, including \$44.1 million in funding from research projects.

IMPACT

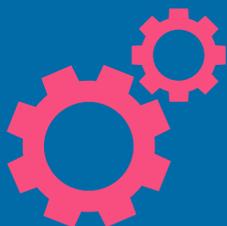
The Centre for Drug Candidate Optimisation, located within MIPS in Monash University, has provided a rigorous and successful model for national and international collaboration. It plays an important role within the system, providing expertise and infrastructure to advance basic Australian biological discoveries into drug candidates that are well-positioned for further clinical development, investment and commercialisation.



IMAGE CREDIT: MONASH INSTITUTE OF PHARMACEUTICAL SCIENCES

OVER THE PAST 18 YEARS THE CENTRE HAS:

- Contributed to over 260 drug discovery projects across Australian companies, Australian and international academic groups, and international not-for-profit and commercial drug discovery organisations.
- Contributed to the progression of 34 novel drug candidates into human clinical development by partner organisations, of which 26 candidates are from Australian companies.
- Contributed to more than nine successful licencing deals for Australian companies with large pharmaceutical companies, with upfront payments to companies of over \$175 million and total potential milestone payments of over \$2 billion.
- Contributed to two academic collaborations in the past three years that have spun out to form new companies.
- Played a major role in the progression of seven novel drug candidates into international clinical trials for the treatment of malaria. One candidate, Arterolane, has been registered in India and used in India and Africa to treat millions of malaria patients, while the others are still undergoing clinical development.



A total of 87 staff have spent time working at the Centre since 2003. The Centre has served as a training ground for industry and research organisations, with the majority moving into industry roles, research or academic roles within universities or medical research organisations, or future education. The initial Victorian Government investment has also had an indirect impact on job retention in Victoria and Australia through the 15 to 20 commercial partner organisations that are supported by the Centre each year. The success of these organisations depends heavily on their ability to advance compounds through a discovery pathway.

The strengths of the Centre contributed to the establishment of the MIPS in 2008, and the strength of MIPS as a beacon for attracting talent to Melbourne and anchoring

Monash University's global strengths in pharmaceutical research and training. MIPS has been ranked within the top-two universities in the world for pharmacy/ pharmacology since 2016. Access to the Centre and MIPS was a critical driver in the formation of the Cooperative Research Centre for Cancer Therapeutics in 2007, the attraction of a significant internationally renowned Metabolic G Protein-Coupled Receptor biology research group to MIPS in 2009, and a major initiative to form the Australian Translational Medicinal Chemistry Facility at MIPS in 2012. The Centre is also part of the Monash University Technology Research Platform Network and continues to support the internal drug discovery activities of the Institute.

CASE STUDY 8: NUCLEUS NETWORK (CLINICAL TRIALS VICTORIA)

The Victorian Government’s investment in Clinical Trials Victoria was instrumental in building the State’s current strength in early-phase clinical trials through what is now known as the Nucleus Network. This capability would not have existed without this support from the Victorian Government.

AUSTRALIA’S LARGEST
Phase 1 clinical trial organisation

MORE THAN 800 
Phase 1 clinical trials for biotechnology and pharmaceutical companies

 **OVER 200**
beds across Australia and the United States

AUSTRALIAN WORKFORCE OF AROUND
400 specialists

IDENTIFIED PROBLEM/GAP

Victorian Government investment in Clinical Trials Victoria aimed to increase the Victorian systems’ capability and capacity in early clinical trials. Prior to this investment, there was limited clinical trial capability within Victoria and very few other sources of financial support. Existing capability was mostly limited to cancer research. Clinical research organisations that conduct early clinical trials usually go on to secure later trials, hence the identified gap in early-stage trials was limiting for Victoria’s entire clinical trials capacity.

OVERVIEW OF THE INVESTMENT

Originally known as Clinical Trials Victoria, the organisation was part of a consortium that received \$8 million in funding in 2003 through the Second Round of the STI First Generation Infrastructure Program. Clinical Trials Victoria received approximately \$2 million in funding for its operational costs, with the Centre for Clinical Studies and Cancer Trials Australia sharing the remainder. Clinical Trials Victoria was required to administer the \$2 million to develop a 24-bed Phase 1 trials unit as part of a Centre for Clinical Studies. The funding provided to Cancer Trials Australia was used to establish and operate two research Positron Emission Tomography scanning machines, along with laboratory capacity at Royal Melbourne Hospital.

In 2005, the Baker Heart Research Institute took over Clinical Trials Victoria to improve its reach and impact. The Baker Institute merged the Centre for Clinical Studies with Clinical Trials Victoria to form the Nucleus Network. In 2018, Nucleus Network was sold to an Australian private equity firm, Crescent Capital Partners, which continues to invest in the organisation today.

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IMAGE CREDIT: PATRICK ROCCA, ABC

IMPACT

The formative funding provided to Clinical Trials Victoria was integral to its establishment. Nucleus Network is now Australia's largest Phase 1 clinical trial organisation. With clinics in Melbourne, Brisbane and the United States, Nucleus Network has conducted more than 800 Phase 1 clinical trials for biotechnology and pharmaceutical companies. It has over 200 beds and an Australian workforce of around 400 specialists. Within Victoria, Nucleus Network employs around 170 staff, with support from additional casual staff. Its facility in Melbourne is co-located with the Alfred Research Alliance Precinct, which houses 2,000 to 3,000 medical professionals and researchers.

In 2008, 75 percent of Nucleus Network's revenue came from international customers. This has increased to over 90 percent today. In recognition of the important role Nucleus Network played in building an export capability for the State, the Nucleus Network received the Victorian Export Award for Innovation Excellence and the Emerging Exporter Award at the 2008 Governor of Victoria Export Awards. A 2009 review of the *STI Initiative* estimated that export revenues to that point had generated around 85 new permanent jobs and 50 part-time jobs at Nucleus Network.

The education arm of Nucleus Network also played an important role in training staff in the clinical trials sector to raise the awareness

and standard of Good Clinical Practice. This work enabled the success of other clinical trial organisations across Australia. Between 2003 and 2008, Nucleus Network Education trained 1,198 industry professionals across Australia and in New Zealand.

The work of Nucleus Network also generates indirect flow-on benefits for the Victorian economy. A 2009 review of the *STI Initiative*, found that each trial conducted generates additional activity from local trial monitors, from sponsor companies or from other contract research organisations. The flow-on benefits are estimated to be around 30 percent of the revenue earned by Nucleus Network. This additional activity would not have occurred without the initial investment and was estimated to have generated an additional 30 FTE jobs. In addition, Nucleus Network helped establish Pharmaceutical Packaging Professionals Pty Ltd, a company dedicated to specialist drug development and manufacturing.

In April 2020, Nucleus Network was tasked by biotechnology company Novavax to begin Phase 1 clinical trials of a new COVID-19 vaccine – the first time a COVID-19 drug had been trialled in humans outside of the United States and the United Kingdom. Nucleus Network had previously worked with Novavax as part of the development of their Ebola vaccine in 2015. Nucleus Network is also working with the Serum Institute of India and Accelagen on Phase 1/2 trials for another COVID-19 vaccine.

CASE STUDY 9: MEDICAL RESEARCH COMMERCIALISATION FUND

The Medical Research Commercialisation Fund (MRCF) plays an invaluable role helping research organisations fulfil their mandate of translating first class research into improved health outcomes. Investment by the Victorian Government to set up the Fund helped bring capital and expertise in commercialisation to the State, raising commercialisation capability within research organisations as well as driving capital into the sector.

IDENTIFIED PROBLEM/GAP

The MRCF was created to help research organisations fulfil their fundamental mandate of translating first class research into improved health outcomes and recognised that while Victoria was a leader in health and medical research, the sector often did not have the capital or expertise to translate research into successful start-ups. The Fund was set up to provide research institutes in Victoria with:

- Ready access to proof of concept capability, investment funding and expertise.
- A structured and collaborative investment process to commercialise intellectual property.
- Training and exposure to the commercialisation process.

OVERVIEW OF THE INVESTMENT

The MRCF was established in 2007 with an initial grant from the Victorian Government of \$1.2 million. To 2020, the Victorian Government has provided \$8.4 million in grants to the MRCF.

IMPACT

The MRCF is the largest life science investment fund in Australia and New Zealand. It has been successful in increasing access to capital, maturing the sector, creating jobs, and advancing biotechnology companies further along the value creation chain. It now has more than 50 members, with the largest proportion based in Victoria.

To date, the majority of MRCF's investments have been in Victoria. To 2020, the Victorian Government has provided \$8.4 million in grants to the MRCF, leading to \$379.9 million in total funding in Victorian companies from MRCF investment, syndicate investment and non-dilutive funding. This means that for every \$1 invested by the Victorian Government in supporting the MRCF, \$45 has been invested in Victorian life science companies

MRCF has also played a role in improving commercialisation capability within research organisations, which traditional investment firms would not support. It hosts commercialisation training workshops for member institutes and government agencies. It also runs an internship program, providing 10-12 interns from member institutes each year with training and exposure to venture capital investment. The Fund also offers subsidised offices in the MRCF Melbourne offices for early-stage portfolio companies.



IMAGE CREDIT: MEDICAL RESEARCH COMMERCIALISATION FUND



The MRCF now has
**MORE THAN
50 MEMBERS**

with the largest
proportion based
in Victoria.



To date, **MRCF has supported the establishment of around 25 new biotechnology companies in Victoria**, which are generating value and improving health outcomes for Victorians. These include:

- Fibrotech's development of novel drug candidates for the treatment of the fibrosis prevalent in chronic kidney disease, chronic heart failure, pulmonary fibrosis and arthritis. This research was undertaken within the Bio21 Institute.
- Denteric's development of vaccines to treat and prevent severe periodontal disease and its complications, based on research conducted at the University of Melbourne.
- PolyActiva's development of ocular implants that provide controlled delivery of drugs to both the front and back of the eye.
- Certa Therapeutics' novel drugs which block a receptor that is a key driver of scarring of the kidney.
- Global Kinetics Corporation's development of a wrist device that records Parkinson's symptoms and reminds a patient when to take their Parkinson's disease medication as prescribed by their doctor. The device was developed by the Florey Institute of Neuroscience and Mental Health.
- Osprey Medical's development of a novel cardiovascular device that reduces contrast dye reaching kidneys to make angiography safer for Chronic Kidney Disease patients. The company's core technologies originated from research conducted at Melbourne's Baker Institute.

CASE STUDY 10: BURNET INSTITUTE AND THE ALFRED MEDICAL RESEARCH AND EDUCATION PRECINCT

Initial seed funding by the Victorian Government to create a new academic precinct on the Alfred Hospital campus supported strong collaborations and partnerships between universities, hospitals and research institutes. This partnership, now known as the Alfred Research Alliance, has been able to take research from bench to bedside.

IDENTIFIED PROBLEM/GAP

Agglomeration of medical bodies has the power to create the critical mass necessary to achieve exceptional health outcomes and create linkages from discovery through to commercialisation and better patient treatment and care. In 1998, a group of universities, hospitals and medical institutes in Victoria set out to achieve this.

The Inner & Eastern Healthcare Network (including The Alfred Hospital), Baker Medical Research Institute, Macfarlane Burnet Centre for Medical Research and Monash University agreed to establish a new academic precinct on the Alfred Hospital campus. The newly formed partners sought funding from the Victorian Government to support this vision.

OVERVIEW OF THE INVESTMENT

Through the First Generation *STI Initiative*, the Victorian Government provided an \$8 million infrastructure grant for the construction of the Alfred Medical Research and Education Precinct (AMREP) to bring these various partners together. This was the cornerstone for another \$90 million contributed by partners, philanthropic organisations and the Australian Government.

In 2002, AMREP was officially opened. The Institute included the Baker Institute building, Monash laboratories, the Ian Potter Library, Precinct Animal Centre and the AMREP Education Centre. It also included the opening of Burnet Tower and relocation of the Burnet Institute from the Fairfield Infectious Diseases Hospital.

A further \$16 million provided as part of *Healthy Futures* in 2006 was used to create a new research 'super institute' which supported the merger of the Austin Research Institute and the Burnet Institute to create the Southern Hemisphere's largest infectious disease institute to fight global diseases.



IMAGE CREDIT: 360BIOLABS

TAKING RESEARCH FROM BENCH TO BEDSIDE

Discoveries in laboratories can be tested in clinical trials, and then carried through into clinical practice at The Alfred, one of Australia's largest hospitals.

IMPACT

Since initial establishment, the AMREP partnership has continued to evolve and made a demonstrable impact on the health of Victorians through its core research strengths. In 2018, AMREP rebranded itself as the Alfred Research Alliance, acknowledging that collaboration and commitment of their partners defies place, and that it is the people who make the partnership exceptional.

The Alliance now brings together eight independent and diverse organisations to create a community of excellence in medical research and education in Melbourne. The members are recognised as leaders in their fields, and include Alfred Health, Monash University, the Baker Heart & Diabetes Institute, the Burnet Institute, Deakin University, La Trobe University, Nucleus Network, and 360biolabs.

The Alliance is particularly unique in its ability to take research from bench to bedside. Discoveries in laboratories can be tested in clinical trials, and then carried through into clinical practice at The Alfred, one of Australia's largest hospitals. These learnings in the clinical setting can then inform decision-making for health policy or future research, completing the translational research loop.

These capabilities across the research loop are being utilised to solve health challenges across eight core research strengths, including blood diseases and cancer, cardiovascular disease, diabetes and obesity, and infection and immunity. These are complemented by comprehensive capacity in pre-clinical research and Phase I to IV clinical trials, co-located start-ups and businesses, and the clinical environment of The Alfred.

The new facilities constructed through *Healthy Futures*, Alfred Centre Stage 2, also doubled the capacity of Burnet's laboratory facilities and floor space to ensure future growth across programs. The new facilities facilitated the final phase in the merger with the Austin Research Institute enabling the relocation of all staff to the AMREP campus.

In 2019, the Alliance received \$133 million in external research funding and published over 1,895 original research papers. In the same year, it also received 14 provisional patent applications, eight international patent applications, 37 national phase entry patents, and had three patents granted. A total of 671 clinical trials were underway at the Alfred Research Alliance.

CASE STUDY 11: BIOMELBOURNE NETWORK

Victorian Government investment helped set up the BioMelbourne Network, which has played a pivotal role in improving linkages within the sector and helped drive the development of the industry in Victoria.

IDENTIFIED PROBLEM/GAP

The BioMelbourne Network was established in February 2001 as an initiative of the Committee for Melbourne. This was in response to a finding that while Victoria was the leading biotechnology research and development hub in Australia, an important expertise gap was present which threatened the development of ongoing commercial opportunities. The Network aimed to correct this by:

- Improving existing, and creating new, linkages to assist the drive to position Melbourne and Victoria as a leading regional and global biotechnology centre.
- Creating a vital and sustainable biotechnology industry in Victoria by encouraging cooperative ventures and partnerships amongst industry participants.

OVERVIEW OF THE INVESTMENT

The Victorian Government provided a \$750,000 three-year establishment grant in 2002 to provide critical funding to launch the Network as an independent industry-led membership organisation and to develop its revenue base. The Network is now mostly funded through membership subscriptions and sponsorships.

The Victorian Government continues to provide sponsorship funding for packages of events beyond this initial investment to support the establishment of the BioMelbourne Network's marquee events, such as its Devices and Diagnostics lab event, Women in Leadership program, as well as specific workshops to assist companies export to international markets such as the Going Global Program.



IMAGE CREDIT: BIOMELBOURNE NETWORK

This document provides an extract of KPMG's findings during the course of the work undertaken for the Department of Jobs, Precincts and Regions under the terms of the engagement letter dated 29 September 2020. The contents of this document do not represent our conclusive findings, which are contained in our final detailed report available at djpr.vic.gov.au/victorias-lead-scientist

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IMAGE CREDIT: BIOMELBOURNE NETWORK

IMPACT

Since then, BioMelbourne Network remains the first and only state-based biotechnology industry body in Australia, playing an important role in confirming Victoria's leadership position as Australia's biotechnology capital. It has broadened its scope to the health industry, encompassing biotechnology, medtech devices, diagnostics and digital health. It has helped establish relationships with international industry associations, hosted business development activities, obtained industry intelligence regarding service requirements and revenue raising opportunities for the sector, and identified international promotional opportunities for Victoria's health industry capabilities. All of these have had positive outcomes for the broader sector.

- The Network's relationships with national and international industry associations include AusBiotech and organisations in the United States, Canada, the United Kingdom, New Zealand, Ireland and Singapore. It has also developed a formal network of regional associations using the 'Best Cities' relationship model, which includes Melbourne, Boston, Vancouver, Edinburgh and Copenhagen.
- The Network has hosted hundreds of events, providing access to members, key stakeholders and decision makers, local and international industry intelligence and networking opportunities. It also offers facilitated introductions for members to drive collaboration and partnerships.

- The Network delivers programs to develop local talent and provide pathways to upskill and generate business acumen. It also continues to develop emerging talent, fostering professional development by hosting internship placements and volunteering opportunities for undergraduate and postgraduates of member organisations.
- The Network has been involved in advocacy projects relating to stem cell legislation, research and development tax incentive reform and the development of the state and federal biotechnology policy and programs to support the sector's growth.

Its strengths come from its access to high-level decisionmakers to help develop and drive the industry development agenda; its reach into the broader business community beyond core biotech interests; its broad-based membership encompassing multiple fields and including research and its application; its ability to run credible, high-level events that attract prominent scientific and industry leaders; and its ability to promote working partnerships and alliances between stakeholders to address industry concerns.

In 2020, the BioMelbourne Network had 194 member organisations, with 2,552 people in its member network. It held 27 events reaching 1,605 industry professionals from 495 organisations. As the sector has developed, its focus has shifted from connecting researchers to focusing on supporting the translation and commercialisation of research and the building of the necessary supply chains. Its current focus is on value-adding locally while ensuring significant competitiveness in Australian and overseas markets.