THERAPEUTIC INNOVATION AUSTRALIA

# Innovate Accelerate Translate

TIA Highlights 2021-22

NCRIS National Research Infrastructure for Australia

An Australian Government Initiative

# From the CEO

**You might be forgiven for thinking that, in the wake of the COVID-19 pandemic, 2021-22 might be something of an anticlimax for TIA, but not at all. The TIA consortium emerged from lockdowns, quarantines, and other issues to quickly return to offering easy access to translational research services.**

This was exemplified when we awarded our 100th Pipeline Accelerator voucher in December 2021. This innovative access scheme, with its matched awards of up to $50,000, has been utterly transformative, and has enabled all manner of outcomes, including publications, spinouts, grant success, commercial licences and even clinical trials. The accelerator scheme has supported our facilities to do a lot with a little, and at great speed.

The NCRIS network continued to pull together as never before, including self-organising into discrete groups of related facilities. TIA has joined with Bioplatforms Australia, the National Imaging Facility, Phenomics Australia and the Population Health Research Network to form the **NCRIS Health Group**, to identify and undertake initiatives that ensure seamless connectivity and delivery of services. We are already sharing staff and office space with several of these facilities.

Speaking of office space, TIA's expansion meant we bade a fond farewell to two of our long-term office spaces in Collins Street in Melbourne's CBD and the Griffith Institute for Drug Discovery in Brisbane. Our new offices at the **Bio21 Institute** in Melbourne's Parkville precinct and at Brisbane's **Translational Research Institute** bring us closer to researchers and small and medium-sized enterprises (SMEs) that will benefit from access to TIA's suite of available services.

TIA welcomed the publication of the 2021 National Research Infrastructure Roadmap, and warmly congratulates the Expert Advisory Group on their work, conducted under the most difficult of circumstances. TIA acknowledges and supports the strong focus on industry engagement and research translation, as well as the recognition of the discovery and development of medical products as a key priority area.

We are now looking to the future, with a new Strategic Plan for the next 5 years and a clear vision for how best to translate Australia's medical research excellence into real impacts for Australia and the whole world.

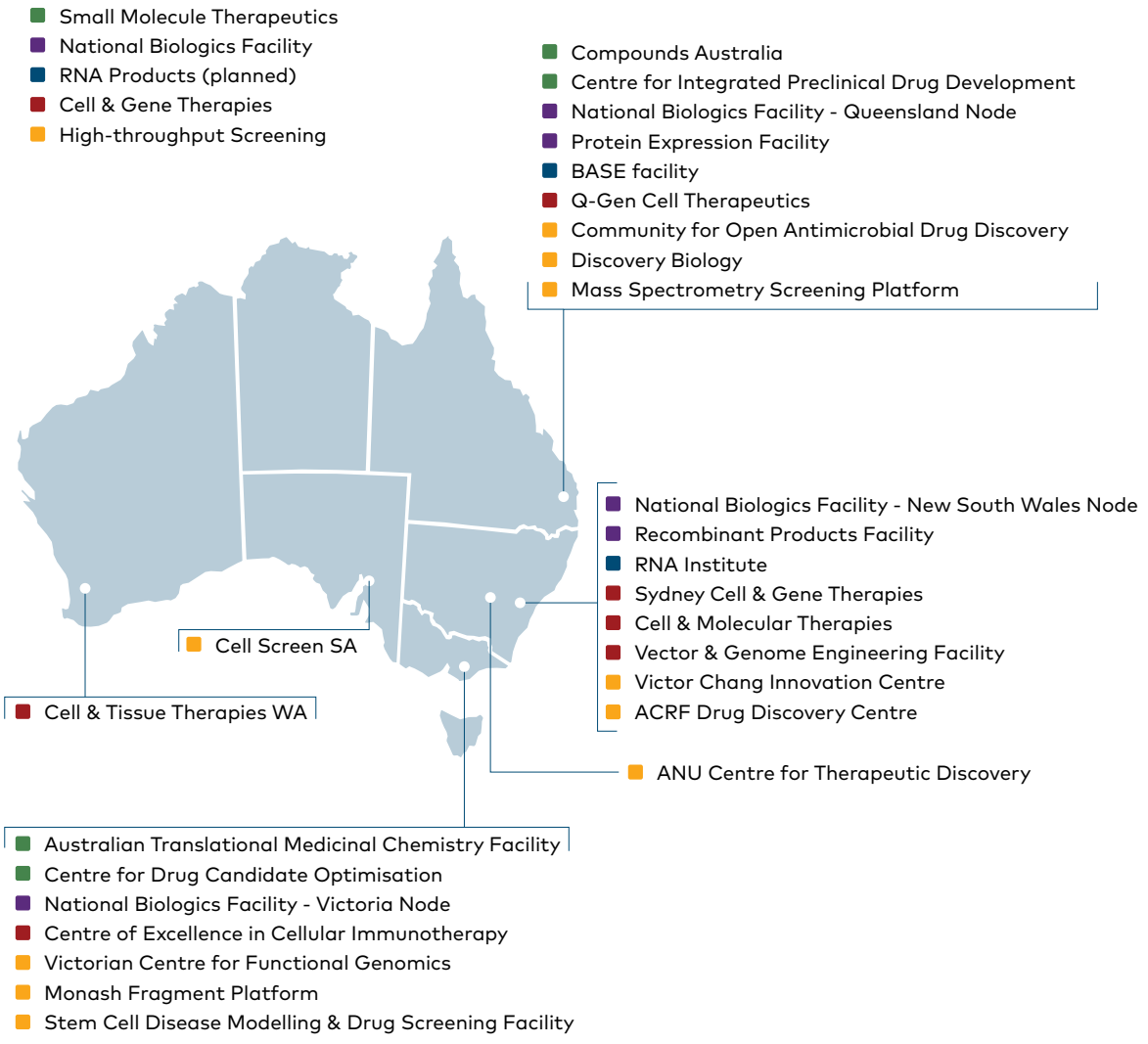
**Stuart Newman,**
**PhD GAICD**
CEO of TIA

*Bio21 Institute, Victoria*


*Translational Research Institute, Brisbane*

# Our vision and mission

TIA Ltd is a not-for-profit company funded by the Australian Department of Education, Skills and Employment under the National Collaborative Research Infrastructure Strategy (NCRIS) program. TIA supports national translational research infrastructure facilities in the fields of biologics & vaccines, cell & gene therapies, RNA products and small molecule therapeutics. The TIA Consortium comprises 28 facilities across the country as shown in the diagram below.



The TIA consortium supports the acceleration of research discoveries from Technology Readiness Level (TRL) 3 to TRL 6, traversing the Valley of Death. We support access to expertise and services to assist researchers and SMEs in the development of new therapeutic products.

**Figure 1.** Technology readiness levels as applied to therapeutic development and TIA's area of focus


## Vision

An Australian Research and Development ecosystem that effectively translates discoveries into improvements in human health through seamless access to a consortium of state-of-the-art infrastructure supported by a network of experts.

## Mission

Enable and accelerate research translation along the therapeutic development pipeline by investing in research infrastructure that is coordinated, comprehensive, accessible and responsive to the needs of academic and industry researchers.

# Future directions

The importance of medical research, particularly development of new vaccines, has never been more apparent than the past few years, and TIA continues to support development of medical products including biologics, vaccines, cell and gene therapies, regenerative medicine, small molecule pharmaceutical and antibody therapies [Refer to Table 1 on page 7].

It is critical to maintain a strong foundation of proven and mature capabilities while responding to the emerging needs of the medical R&D sector. Accordingly, TIA has refreshed and revised our strategic plan for 2023-28, to reassert support for sovereign medical R&D capability and establish a fourth capability, that provides support for development of **RNA Products.**

This exciting area of innovation has already changed the world, through the successful development, testing and mass deployment of two mRNA-based vaccines for COVID-19 produced by Pfizer/BioNTech and Moderna. The new TIA capability builds on Australia's existing research strength in this area and recognises the massive potential of RNA-based therapies, as well as the increase of government investment in manufacturing.

To make the best use of this investment, it is critical that sufficient translational research infrastructure exists to support a vibrant pipeline of Australian discoveries with access to this new commercial manufacturing infrastructure.

*BASE RNA facility*

## TIA'S CAPABILITIES ENCOMPASS MAJOR AND EMERGING THERAPEUTIC MODALITIES IN WHICH AUSTRALIA HAS PROVEN RESEARCH STRENGTH

| | |
|---|---|
| **National Biologics Facility** | Access to expertise and services in biologics discovery, development and GMP manufacture to support early-stage clinical trials of recombinant proteins, antibodies and vaccines produced across multiple expression systems. |
| **Small Molecule Therapeutics** | A comprehensive and seamless pipeline of capabilities encompassing compound library logistics and supply, hit compound discovery (including high-throughput screening of libraries), medicinal chemistry, lead optimisation and industry-standard, quality-accredited efficacy testing. |
| **Cell & Gene Therapies** | A clinically focussed network of Therapeutic Goods Administration (TGA) licenced facilities for developing and producing advanced therapeutic products for early to late-stage clinical trials and patient care. |
| **RNA Products (New)** | A complementary network of facilities that supports Australian excellence in RNA science and development of novel therapeutics, through access to rapid synthesis and formulation of a variety of high-quality RNA products. |

*Table 1. TIA Capabilities are organised around product types*

# 100 not out

## – A century of Pipeline Accelerator awards

The Pipeline Accelerator is TIA's flagship program to leverage NCRIS investment and maximise effective use of facilities by enabling high-quality projects to access TIA's suite of capabilities. The scheme has been awarding vouchers since a pilot round in 2017-18, with up to $50,000 to subsidise the cost of accessing TIA's high quality facilities.

In December 2021 TIA reached the milestone of the 100th Pipeline Accelerator award and we will continue to provide an additional means of subsidising access to TIA facilities.

Since 2017, TIA has adapted the successful voucher scheme framework for specific focus areas. In early 2020 we held a special COVID-19 round to rapidly respond to the pandemic, still in its early days, with drug repurposing and vaccine projects. We are also partnering with the Medical Research Future Fund (MRFF) to pre-allocate access vouchers to successful recipients of the MRFF's 2021 **mRNA Clinical Trial Enabling Infrastructure opportunity.**

## At a glance

**117** awards

**28** eligible facilities

Open to academic and industry researchers

**20** awards to commercial entities

**$4,000,000** invested to date

**$10,000-50,000** vouchers
(average award ~$33,000)

**A path to grant success**

The Pipeline Accelerator scheme has led to successful applications for more than $21M in Australian national competitive grant funding since 2017.

> **This is the first time we have collaborated with TIA on its Pipeline Accelerator scheme to offer particular support for Australian projects tackling the complex challenges of antimicrobial resistance (AMR). We look forward to following the projects' progress.**
>
> **ANDREW BOWSKILL, AAMRNet co-chair**

In early 2022 we partnered with the Australian Antimicrobial Resistance Network (AAMRNet) to support vouchers to access TIA facilities for four meritorious projects seeking new treatments to combat emerging antimicrobial resistance (AMR). It is one of the most critical public health threats that the world is facing.

For 2021-22, the Pipeline Accelerator scheme made a total of 32 awards totalling $1,050,000. Reflecting the dynamic and evolving nature of the research infrastructure ecosystem, we also added new facilities to the scheme, including:

- Vector and Genome Engineering Facility at the Children's Medical Research Institute, Westmead, NSW
- Victor Chang Innovation Centre at Victor Chang Cardiac Research Institute in Sydney, NSW

Recognising the evolving needs of researchers, in 2022-23 we will add several other facilities to the network including RNA and protein production and stem cell modeling capabilities.

# The R and the D

**There is a common perception that research is generally the domain of the academic sector, with industry taking over the outputs of early-stage research and developing them independently towards a product or service.**

However, nothing could be further from the truth, with researchers from industry, start-ups and SMEs increasingly working directly with academic researchers on product development and solving industry wide problems. Government has recognised this trend by maintaining the R&D tax incentive, and also providing sources of non-dilutive funding from schemes such as MTPconnect's Biomedical Translation Bridge and Brandon Capital's CUREator scheme.

TIA is also contributing, through its soft infrastructure investment and **the Pipeline Accelerator scheme**, with access to specialist translational infrastructure that supports collaboration and builds proof of concept as part of navigating the development pipeline to clinical trials and commercial outcomes. Examples of case studies are listed below.

- Associate Professor Joost Lesterhuis will lead teams at the University of Western Australia and the Telethon Kids Institute, using access to TIA's Centre for Drug Candidate Optimisation to identify a therapeutic that improves success rates of cancer immunotherapy, with fewer side effects than traditional chemotherapy and, in many cases, improved patient outcomes.
- Professor Jonathan Baell is leading a team from TIA's Australian Translational Medicinal Chemistry Facility at Monash Institute of Pharmaceutical Sciences (MIPS) to study and refine compounds that show promise as a drug candidate for inflammation, primarily for people with sepsis.
- The newly established BASE facility has formed a partnership with DNA Script, a world leader in Enzymatic DNA Synthesis for DNA on demand. This partnership allows the BASE facility to integrate DNA Script's SYNTAX Platform and Enzymatic DNA Synthesis technology into their mRNA vaccine manufacture. Having access to the new technology will speed up the manufacture of mRNA vaccines to quickly respond to emerging infectious diseases and support the development of personalised vaccines in cancer.

**18%** of users of TIA facilities come from industry

**20** Pipeline Accelerator awards made to SMEs and industry (17% of the total)

Industry partners receiving vouchers during 2021-22 included Psylo Pty Ltd, Prescient Therapeutics and Argenica Therapeutics Ltd.

# Partnerships with MRFF

Since its inception in 2015, the Medical Research Future Fund (MRFF) has become a major source of support and funding for medical research and clinical trials. NCRIS infrastructure has a key role to play in maximising the value of MRFF-funded projects by providing ready-to-access services and advice and negating the need to develop internal capabilities to serve a single project. NCRIS entities such as TIA are working closely with the MRFF.

An example of this involvement is TIA's partnership with MTPConnect on the **Clinical Translation and Commercialisation Medtech Program** (CTCM), funded under the MRFF's 2020 Early-Stage Translation and Commercialisation Support Grant. Other project partners include the Medical Technology Association of Australia, the Medical Device Partnering Program, Cicada Innovations and BridgeTech Program. CTCM awards development grants and mentoring to SMEs engaging in development of medical devices. TIA's role in this program is to provide access to NCRIS research infrastructure that assists the recipients in developing their medical products.

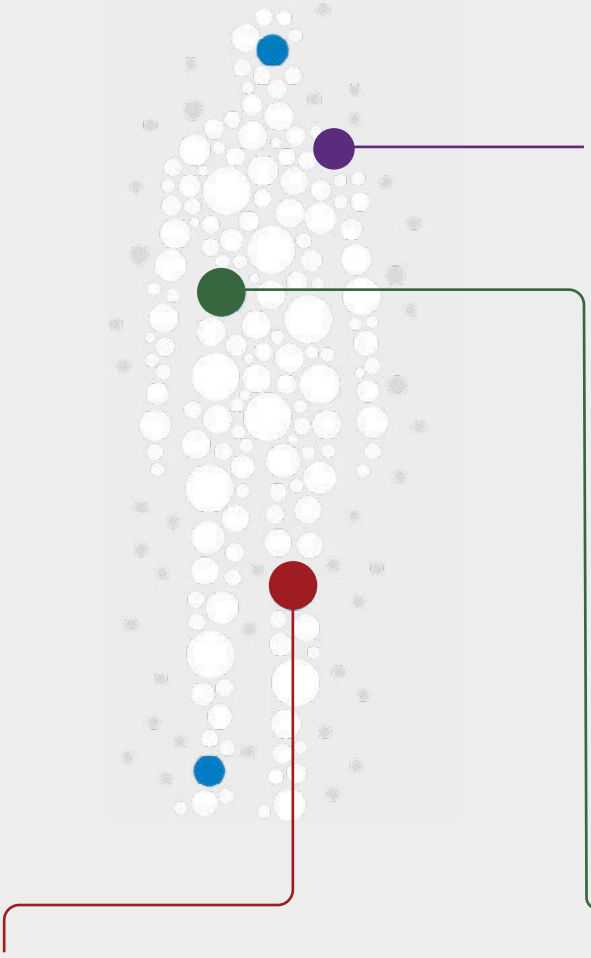
As well as supporting applications, TIA is directly partnering and co-funding select strategic MRFF programs. For example, TIA leveraged the successful Pipeline Accelerator access voucher framework in 2021-22 to support the MRFF's 2021 **mRNA Clinical Trial Enabling Infrastructure opportunity**.

This scheme supported companies and consortia that had applied to the government's Approach to Market to establish onshore mRNA manufacturing. Applications to this scheme have been assessed and results were yet to be announced in January 2023. Once awards are made, TIA will pre-allocate vouchers of $50,000 to awardees that can be utilised at any TIA facility, including future facilities in our planned RNA Products capability.

TIA facilities have been involved in...

**23** successful MRFF grants totalling **$42.3M** highlighting the value of engaging research infrastructure at the earliest stage of project planning.

**TIA supports access to a broad range of expertise across three capabilities. Each capability has extensive technical know-how and experience in therapeutic discovery and development.**



## Biologics and Vaccines

National Biologics Facility

**The National Biologics Facility has been supporting researchers for more than 15 years to develop novel biologic therapies, bridging the gap between research and clinical development by offering access to:**

- Molecular engineering and cloning monoclonal antibody discovery
- Recombinant protein optimisation
- Upstream cell line development, feed optimisation, bioreactor and fermentation processes
- Downstream product purification, conjugation, final formulation and stability studies
- Extensive analytics for in-process control assays, quality testing and characterisation
- mRNA and DNA production following the recent addition of the BASE facility, which will form part of TIA's new RNA Products capability in the near future.

## Cell & Gene Therapies

**The Cell & Gene Therapies Capability supports development and manufacturing of advanced therapy medicinal products. More than 35 cleanrooms are operated under a quality system compliant with the Therapeutic Goods Administration (TGA) or the Foundation for Accreditation of Cellular Therapies (FACT) standards. This Capability offers access to:**

- GMP manufacture of cell and gene therapies for research and clinical use
- Review of development and manufacturing processes
- Quality control, including in-process and for-release quality control testing and assay development
- Regulatory advice to meet requirements of the TGA and the Food and Drug Administration (FDA).

## Small Molecule Therapeutics

**Small Molecule Therapeutics is a long-established pipeline of critical and complementary capabilities that can translate projects from hit and lead identification through to preclinical efficacy testing. The Capability offers access to:**

- Compound libraries
- High-throughput screening technologies, including fragment-based, nuclear magnetic resonance and mass spectrometry-guided screening
- Medicinal chemistry, including compounds synthesis and hit and lead identification expertise
- Lead optimisation using drug metabolism, absorption, distribution, metabolism and excretion studies
- Preclinical efficacy studies using rodent models of human disease.

**TIA's capabilities are supported by a team of dedicated broker/facilitators, whose mission is to direct projects to the correct facility, advise and mentor researchers, and support collaboration within and between capabilities. Each are experts and draw on extensive experience in areas such as research, clinical trials, translation and manufacturing. They can be contacted via the TIA website.**

## Small Molecule Therapeutics

**Integrated drug discovery and development pipeline**

Dr John Parisot is the Business Development Manager for the Small Molecule Therapeutics Capability. John's main role is the Capability broker, directing projects to TIA's small molecule capabilities and guiding them through the engagement process.

**John is based at TIA's Melbourne office at the Bio21 Institute.**

## Biologics and Vaccines

**Comprehensive discovery and development for biologic products**

Mr Ben Hughes is the Director of Strategic Development for National Biologics Facility. His roles include developing the NBF's capabilities and chaperoning projects to and between the nodes. In addition, Ben also acts as the broker for NBF where he advises researchers on projects with a particular focus on scale-up and manufacturability.

**Ben is based at The University of Queensland.**

## Cell & Gene Therapies

**National network for TGA-licensed cell & gene therapies production**

Dr Heather Donaghy is the Scientific Engagement Manager for Cell & Gene Therapies and acts as the broker to direct researchers to the appropriate facility. Heather has written two guidance documents to assist academic and SME researchers in translating research discoveries into advanced therapy medicinal products.

**Heather is based at the Royal Prince Alfred Hospital.**

# Small Molecule Therapeutics

## Highlights

**Compounds Australia** has moved to an innovative new storage system and is developing the **Smart Libraries** initiative to intelligently annotate its compound libraries to enable more efficient design of screening campaigns. This will enable servicing more than the 247 projects supported in 2021-22.

The purpose-built Australian Drug Discovery Library (ADDL), stored at Compounds Australia and supported by TIA, has provided significant support to Australian research. It has:

- Provided starting points for new drugs to treat childhood cancer through the THerapeutic INnovations for Kids (THINK) initiative, pioneered by Children's Cancer Institute Australia.
- Enabled researchers at WEHI to identify drug-like compounds that could block two key coronavirus proteins, called Mpro and PLpro, that are essential for the virus to enter and multiply within human cells.
- Supported the Cancer Therapeutics CRC's preclinical data packages of ENPP1 inhibitors for commercial licensing to Aculeus Therapeutics.

The **Centre for Drug Candidate Optimisation** has recently purchased an Acoustic Ejection Mass Spectrometer (AEMS), an ultra high-throughput mass spectrometer designed to greatly expedite bioanalytical processing and increase throughput for pharmaceutical profiling of new drug candidates. The AEMS will enhance drug discovery by supporting medicinal chemistry, pharmaceutical optimisation and metabolomics/proteomics and accelerate the progression of new drug candidates toward clinical development.

The **Australian Translational Medicinal Chemistry Facility** formed a three-year partnership with Integral BioSciences Pvt Ltd, based in India, to advance novel epigenetic inhibitors with potential application in the treatment of a range of cancers. This project initially focuses on the design and optimisation of the novel epigenetic inhibitors and will then progress the promising molecules through the drug development pipeline - licensing, preclinical development, Investigational New Drug (IND) filing and clinical trials.

The **Centre for Integrated Preclinical Drug Development** is expanding its battery of pain-related preclinical assays by developing assays for new indications, including triple negative breast cancer and multiple sclerosis.

### Industry partnerships

During 2021-22, the Capability supported 39 industry partners including Aculeus Therapeutics, Gertrude Biomedical, MecRx, Cyclotek, Integral BioSciences, Canthera Discovery and Argenica Therapeutics Ltd.

# Biologics and Vaccines

## Highlights

- The **BASE facility** partnered with COVID-19 Vaccination Corporation Ltd to produce an mRNA COVID-19 vaccine. This included the design of T-cell COVID-19 mRNA vaccine candidates and production of the vaccine's active substance for formulation and evaluation in pre-clinical studies.
- Two people who were in close contact with a Hendra virus-infected horse in North Queensland were treated on a compassionate basis with a monoclonal antibody against the virus, to prevent them from developing the deadly disease. The antibody therapy is manufactured and stored at the Queensland Node of NBF.
- The Queensland and Victoria Nodes of NBF collaborated with the Peter Doherty Institute to develop and produce a receptor binding domain protein-based COVID-19 vaccine for Phase I clinical trials, which are currently underway.
- The New South Wales Node of NBF was one of the facilities used for hands-on training under the Centre for Biopharmaceutical Excellence(CBE) GMP Uplift Programs. This program is supported by MTPConnect's $32m Researcher Exchange and Development within Industry (REDI) initiative funded by the MRFF.

## Looking ahead

NBF's Victorian Node at CSIRO has opened the $23.1M National Vaccines & Therapeutics Lab at the Clayton campus. The new facility will offer a range of products at GMP standard, at a scale and quality for clinical trials.

NBF's Queensland Node will complete ISO 9001 certification in 2023 and continue supporting research users progressing therapeutic and vaccine targets through stable cell line development and onto Phase I clinical trials.

The BASE facility, established as a leader in providing high-quality mRNA, has recently added formulation capabilities to offer end-to-end services for the design, manufacture and formulation of mRNA vaccines and therapies.

### Industry partnerships

During 2021-22, NBF worked with 15 industry partners including Kira, Cancuravax, Glytherix, Biosceptre, Prescient Therapeutics, CVC (NZ), Aegros, AviPep, Sementis and CEPI.

# Cell & Gene Therapies

## Highlights

TIA's Pipeline Accelerator scheme provided researcher access to **Q-Gen** for a pilot study that successfully produced cells called cardiomyocytes from induced pluripotent stem cells (iPSCs), suitable for Phase I clinical trials to treat cardiovascular disease. Dr Andrew Prowse from The University of Queensland led the research project, using Q-Gen facilities, completing training and GMP batch testing to refine working protocols and lay the groundwork for establishing a GMP grade cell bank for pluripotent stem cells. The aim is to use the iPSCs to regenerate damaged heart muscle and alleviate the need for people to undergo transplant operations.

Four facilities participated in the TGA's **Special Access Scheme** that allows select health practitioners to access new and advanced therapeutics yet to be approved for patients. Using the scheme, Australians with rare diseases can, under certain circumstances, access the very latest life-saving treatments that are not listed on the Australian Register of Therapeutic Goods. Among the practitioners in the scheme is head of the **Sydney Cell and Gene Therapy's** Gene Therapy Research Unit, Professor Ian Alexander, leading the only Australian clinical trial of Zolgensma® in collaboration with Dr Michelle Farrar. Zolgensma is a breakthrough treatment for spinal muscular atrophy in children, using therapy to replace a missing gene that causes the disorder. Results have been encouraging, with none of the 29 participants needing ventilatory or feeding tube support during the global SPR1NT trial and all subsequently still alive. Without the treatment, survival rates to their first birthdays were poor.

The **Cell & Molecular Therapies** facility at the Royal Prince Alfred Hospital has been actively engaging in investigator and pharmaceutical company sponsored clinical trials of immunotherapies, cellular therapies and gene therapies. They were involved in material transfers, consultancy and honoraria with organisations such as Gilead, Novartis, bluebird bio, Spark Therapeutics, Cynata, Pfizer, Atara Bio, Bayer and CRISPR Therapeutics.

Five research projects are aiming to progress novel cellular immunotherapies through to early phase clinical trials and beyond, using services at the **Centre of Excellence in Cellular Immunotherapy**. To increase capacity, three commercial manufacturing suites and a Translation and Development Laboratory have been built. TIA supported the purchase of equipment for the new laboratory to provide researchers early access to industrial scale equipment during the process development stage. Access to industrial scale equipment is important to ensure a well-executed bioprocess technology transfer from research and development to manufacturing – one of the critical factors to the success and speed to market of the products. The new spaces are expected to be commissioned and in use in early 2023.

## Industry partnerships

During 2021-22, the Cell & Gene Therapies Capability supported 40 industry partners and 74 Phase I to III clinical trials. There are more than 63 on-going projects at different stages - from process development through to Phase III trials.

During the same period, the new **Cell and Tissue Therapies WA** Director, Dr Zlatibor Velickovic, completed the FACT Inspector training, becoming the first inspector for cell and gene therapies in Australia.

## TIA Board

**Chair:** Mr Terry Slater AM

**Director/Company Secretary:** Mr Rob Anderson

**Directors:** Ms Liz Furler
Prof Ross McKinnon
Prof Judith Whitworth AC

**Scientific Advisor to the Board:** A/Prof Stella Clark AM

## TIA Management

**Chief Executive Officer:** Dr Stuart Newman

**Director of Programs:** Dr MJ Chua

**Director of Strategic Development, National Biologics Facility:** Mr Ben Hughes

**Business Development Manager, Small Molecule Therapeutics Capability:** Dr John Parisot

**Scientific Engagement Manager, Cell & Gene Therapies Capability:** Dr Heather Donaghy

**Office Manager/Board Secretary:** Ms Lesley Bath

## TIA is enabled by

NCRIS National Research Infrastructure for Australia
An Australian Government Initiative

Australian Government
Department of Education

## Supporting partners

CCRM AUSTRALIA

MTPConnect
MedTech and Pharma Growth Centre

NSW GOVERNMENT

Queensland Government

VICTORIA State Government

GOVERNMENT OF WESTERN AUSTRALIA

## TIA Facilities























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