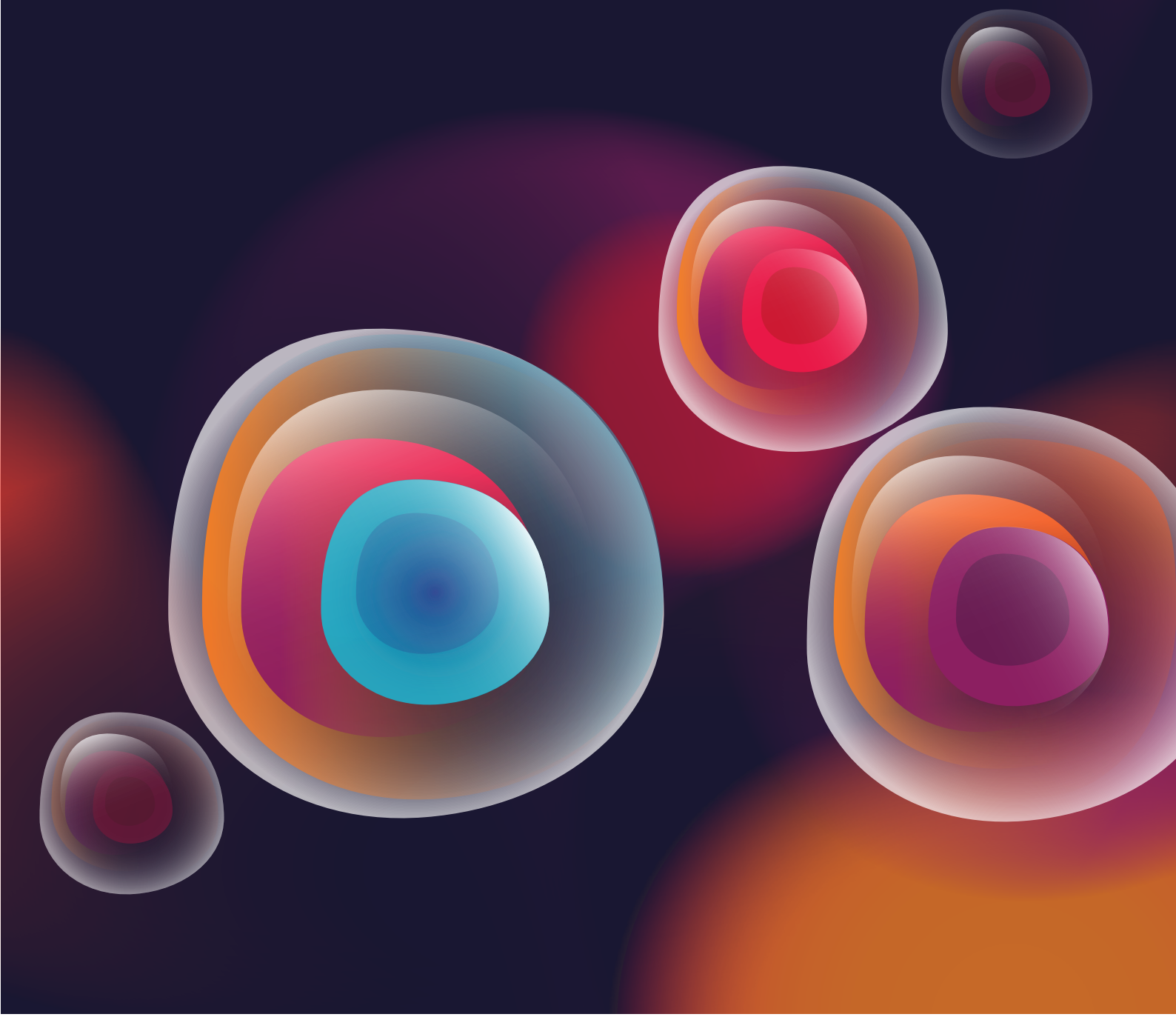
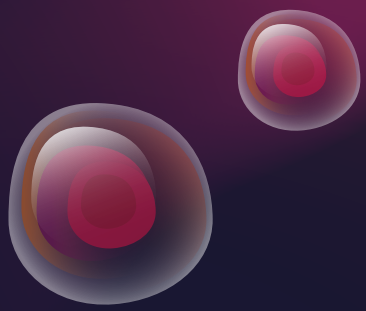
Australian Regenerative Medicine Institute

ANNUAL REPORT 2022



MONASH University | ARMI AUSTRALIAN REGENERATIVE MEDICINE INSTITUTE



ACKNOWLEDGMENTS

The Australian Regenerative Medicine Institute
Annual Report 2022

Editorial Team
Silvio Tiziani, ARMI
Lisa Douglas, ARMI
Lorraine Mascarenhas, ARMI
Jane McCausland, ARMI
Carolyn Hornstra, ARMI
Julie Milland, ScribblersInc
Vicky Vallas, ScribblersInc

Design
Linda Cerkvenik, Inkube8 Design

Photography
David Russell, David Russell Photography
Gerard Hynes, Hynesite Photography

Image front cover – Graphical representation of blood cells.

The Australian Regenerative Medicine Institute acknowledges the people of the Kulin Nations on whose land our institute is located and pays our respects to Elders past, present and emerging.

VICTORIA State Government

Australian Government

ARMI is supported by grants from the State Government of Victoria and the Australian Government

EMBL Australia

ARMI is proud to host EMBL Australia Partner Laboratory Research Groups

CONTENTS

ABOUT THE INSTITUTE
CHAIR'S REPORT

Professor Andrew Dyer

In 2022, the Institute continued its forward progress on the path to advancing our core strategy – develop our regenerative medicine research to create health improvements and solutions that will materially improve people's quality of life.

Professor Peter Currie and our research team leaders have advanced the Institute's reputation as a world-leading regenerative medicine research institute. ARMI discovery science continues to be published in field-leading journals, and our grant success attests to the quality of research. I would like to congratulate all research and professional staff and students for achieving these outstanding results.

Our ARMI Strategic Plan 2020–2025 guides our research excellence and drives the translation and commercialisation of our regenerative medicine research into positive health outcomes. An important part of developing such outcomes is active engagement with industry.

I am pleased to report that in 2022, ARMI's first start-up company was launched to develop novel therapies for the treatment of muscular dystrophies, based on research and intellectual property developed at the Institute. The establishment of the company, Myostellar, is a major step forward in commercialising our inventions, with invaluable support from Monash University's commercialisation team.

ARMI is located and is very much a part of the broader ecosystem at Monash University. We work closely with many arms of the University, including exceptional support from the Faculty of Medicine and its leadership, External Relations, Development and Alumni, Provost, Global Engagement team, Industry Engagement team and the Office of the Deputy Vice Chancellor of Research, in particular the Monash Research Office. ARMI is also indebted to the Vice Chancellor and her office for particular support in driving our philanthropic success. On behalf of ARMI, I express our deep appreciation of the ongoing advice and support we receive from the University.

Another important factor in achieving positive health impacts from basic research are clinical relationships and close connections with appropriate clinician bodies. Our links with clinicians will further improve with the new Victorian Heart Hospital, located at Monash University's Clayton campus.

There are many stakeholders to thank. In particular, I would like to acknowledge Professor Christina Mitchell AO, Dean of Monash University's Faculty of Medicine, Nursing and Health Sciences, for her strong leadership and support. We also deeply appreciate the ongoing support received from the Victorian Government and the Australian Government.

Finally, I would like to thank my colleagues on the ARMI Leadership Advisory Board – Dr Katie Allen, Emeritus Professor Claude Bernard, Professor Kim Cornish, Professor Peter Currie, Dr Patrick Hughes, Dr Meroula Richardson, Dr Peter Rogers, Dr Duncan Thomson, Mr Silvio Tiziani and Ms Sonya Walker, for their amazing insights, counsel and promotion of ARMI. I look forward to our work together to help ARMI throughout 2023.

The Board's subcommittees also play an important role in supporting the Institute's objectives and I would like to acknowledge their excellent work and thank the subcommittee chairs – Emeritus Professor Claude Bernard (Strategy), Dr Peter Rogers (Development) and Dr Duncan Thompson (Industry).

We look forward to continuing to make a material difference to the quality of life for humans from our leading-edge and world-class research.

Professor Andrew Dyer, Chair

PhD student Bhavana Nayer (Martino Group).

ABOUT THE INSTITUTE
DIRECTOR'S REPORT

Professor Peter Currie

As we emerged from the difficult COVID lockdown period in Melbourne, 2022 became a year of excitement as people came together again to share experiences and research face to face in our Institute's wonderful environment.

No one emerged unscathed from the pandemic years and it has been especially difficult for students who had limited opportunities to reach their research goals and gain all the advantages of our on-site research environment. But our students and leaders showed remarkable resilience. I would especially like to thank Monash University as it actively supported students and provided scholarship extensions.

I would also like to thank the professional staff who often worked at home under difficult circumstances. Our research leaders did an outstanding job holding it all together so that in 2022, the Institute and our excellent research environment and outreach activities were able to re-emerge.

An important part of rebuilding our internal culture at a grassroots level was the Diversity and Inclusion committee, spearheaded by Dr Jennifer Zenker. The Committee brought staff and students from all walks of life together with six events where experiences and research and life strategies were shared. I would like to commend the fantastic work of the Committee in helping us to rebuild our research and work environment following the peak of the pandemic.

From a purely scientific perspective, the quality of the research at the Institute continued to be extraordinary. In 2022, we built on the previous year with a raft of publications in high-impact journals. Professor Edwina McGlinn's group had a standout year with three publications in *Nature Communications* as did Professor José Polo's group with 13 publications, including in high-impact journals such as *Nature Communications*. We also achieved excellent results with our grant and fellowship applications.

As we move through the middle years of the *ARMI Strategic Plan 2020–2025*, we worked hard to re-establish and create new partnerships in 2022. I would especially like to point out how the CCRM Australia project is maturing nicely and relationships with Cartherics and AstraZeneca are emerging.

A highlight of 2022 was establishing our first ever start-up company to commercialise intellectual property emerging from ARMI research. This represents a major step forward and highlights the maturation of our strategy to deliver clinical impacts for people.

I am looking forward to more exciting advances in research translation in the years to come, with the opening of the Victorian Heart Hospital in 2023 and the strengthening of our clinical linkages.

Everyone was happy to see the public back at the Institute through an outreach event in partnership with the Convergence Science Network. The "Opening the Vault" event was enthusiastically embraced by researchers who volunteered to share the inner workings of our science.

As always, the support and the collective decision-making in the ARMI Executive Team was incredible in 2022 and I would like to again acknowledge all the research leaders who worked hard during these past difficult years and set the scene for our continued success.

I would also like to thank the Leadership Advisory Board and Chair Professor Andrew Dyer for critical support as we bounce back from the pandemic years.

I know I say it often, but I continue to feel privileged to work with the fantastic team of people associated with our Institute. I look forward to the coming years as we continue to produce outstanding regenerative medicine research that drives clinical impacts to improve quality of life for communities globally.

Professor Peter Currie, Director


ARMI
AUSTRALIAN REGENERATIVE
MEDICINE INSTITUTE

ABOUT THE INSTITUTE
INTRODUCTION TO REGENERATIVE MEDICINE

Regenerative medicine is a new approach to understanding development, ageing and disease.

Over the past 100 years, medical research has transformed human lives. As a result, people are living longer and better. For example, children rarely die of preventable infectious diseases; cancer survival rates are improving, and people can live for decades after a heart attack.

However, although scientific discoveries have enabled doctors to replace organs or use drugs to compensate for organ disease, medicine still can't provide treatments that help hearts repair themselves or help nerves regrow after a spinal cord injury.

As a relatively new field of research, regenerative medicine seeks to unlock the body's remarkable innate ability to repair, restore and replace various tissues and organs damaged by age, injury or disease. The US Department of Health and Human Services has called regenerative medicine the "next evolution of medical treatments".

Regenerative medicine approaches aim to regain the remarkable regenerative capacity humans have before birth. The techniques include injecting or implanting cells that can regenerate or re-engineer tissues to stimulate endogenous stem cell pools or reprogram existing differentiated cells to proliferate.

Researchers in this exciting and unique field of science look to exploit the body's capacity to heal and repair. Exploring this fundamental biological challenge is enriched in an extraordinary environment that brings together different scientific disciplines working in tandem.

The animal kingdom provides inspiration for what is possible. As Australia's first institute dedicated to regenerative medicine, ARMI's work studying axolotls has identified the critical role of an immune cell in the animal's ability to regrow limbs and regenerate the spinal cord, brain and heart tissue. Meanwhile, the zebrafish is also revealing how it regenerates new fins, skin, heart and brain. These and other species are housed in AquaCore, a unique Aquatics Research Facility in Australia.

ARMI's transgenic quail facility also provides more opportunities to leverage the unique characteristics of birds to help researchers understand potential regenerative therapies for humans, especially in skeletal muscle.

From exotic animals to therapeutic applications, regenerative medicine promises to assist human cells, limbs and organs to do the same as these animals. Moreover, it can revolutionise health care for an ageing population facing many years living with degenerative conditions.

Research Officer Kallum Robinson (Kaslin Group).

ABOUT THE INSTITUTE

THE AUSTRALIAN REGENERATIVE MEDICINE INSTITUTE – DRIVING REGENERATIVE MEDICINE

ARMI is Australia's first research institute dedicated to delivering on the promise of the field of regenerative medicine. Regenerative medicine aims to unlock the healing power of the body to heal and regenerate organ or tissue damage caused by disease, injury or genetic conditions.

The six ARMI themes (for highlights, see page 12) are designed to augment Australia's capacity to drive and translate the potential of regenerative medicine to create health impacts for Australian and global communities.

- Research – realising the potential of regenerative medicine (see page 14). Five discovery pipelines (see page 45) support the research theme and drive innovation in regenerative medicine.
- Teaching – harnessing scientific passion (see page 20). Our teaching program will deliver Australia's next generation of scientific and clinical regenerative medicine researchers.
- Clinical impacts – driving research advances towards treatments (see page 26). ARMI's research aims to develop new therapies for conditions such as heart disease, muscular dystrophy, diabetes, multiple sclerosis, Alzheimer's disease, brain injury and autoimmune disorders.
- Industry partnerships – cutting barriers to commercialisation (see page 30). ARMI partners with industry to fast-track research translation and the development of future therapies.
- International collaborations – fostering global linkages (see page 36). ARMI builds opportunities and programs to ensure we are part of an international network specialising in regenerative medicine.
- Outreach – engaging with the public (see page 40). Our outreach program is designed to help the public, policymakers, industry, and undergraduate and school students to learn about and engage with the concepts of regenerative medicine and the people pursuing new knowledge and tools.

ARMI's research agenda has adopted a multidisciplinary approach to investigating the science of regeneration, designed to seed and foster collaboration and to pursue rapid translation of basic research into clinical knowledge and treatments. Our five discovery pipelines (see page 45) are supported by outstanding research groups in the fields of:

- heart and muscle development and regeneration
- immunity and regeneration
- stem cells, cancer and regeneration
- neural regeneration
- organ engineering and synthetic biology.

The Institute's dynamic and collaborative research culture is redefining how regenerative medicine is approached worldwide. Our researchers have access to key research platforms – molecular genetics, stem cell biology and animal modelling – to deliver technologies with medium- to long-term application for treating diseases of social, medical and economic importance and unmet clinical need.

ABOUT ARMI

ARMI is part of Monash University's Faculty of Medicine, Nursing and Health Sciences, located at one of the world's largest regenerative medicine and stem cell research centres at Clayton in Victoria, Australia.

The Institute was established through a joint venture between Monash University and the Victorian State Government with additional funding from the Australian Commonwealth Government. Today, ARMI acts as a focus for public engagement in regenerative medicine and is the source of advice for policymakers.

Most ARMI researchers are based at Monash University's Clayton campus, with some having joint appointments with other Monash academic departments and the CSIRO. Some of the Institute's research is undertaken through participation in national initiatives, including the Centre for Commercialisation of Regenerative Medicine (CCRM) Australia and the European Molecular Biology Laboratory (EMBL) Australia Partner Laboratory.

ARMI'S FUTURE

The activities and themes outlined in this annual report are all aligned with core values and strategic focus areas distilled in the ARMI Strategic Plan 2020–2025. Concerted effort in the six strategic focus areas will ensure the long-term success of the Institute.

STRATEGIC FOCUS AREAS

VISION

Improved quality of life by unlocking the body's innate regenerative potential.

MISSION

To discover new regenerative therapies by conducting cutting-edge research and forming collaborative networks with the best scientists and clinicians worldwide.

ABOUT THE INSTITUTE
DONATING TO ARMI

ARMI researchers are at the cutting edge of regenerative research, seeking to find effective treatments for a range of diseases and conditions.

Our researchers are among the best minds in the world and are working towards finding answers in areas such as:

- ageing and degenerative diseases
- diabetes
- heart diseases
- arthritis
- neurotrauma in the brain, such as stroke or blindness
- multiple sclerosis (MS)
- Alzheimer's disease.

ARMI relies on the support of the community to continue this critical work. Your donation goes towards research and treatments for these diseases and degenerative conditions.

HOW TO SUPPORT ARMI

Donors can choose to support ARMI in a variety of ways:

1. Visit us online: http://www.armi.org.au/donate
2. If it is more convenient to donate by cheque or money order, donations can be mailed to:

Donor Relations
Advancement
Locked Bag 7
MONASH UNIVERSITY VIC 3800

Cheques should be made payable to "Monash University". You will also need to provide your name, contact details, donation amount, whether you wish to remain anonymous and instructions to direct the gift to ARMI.

3. Direct deposit
4. Make a gift by phone

Credit card donations, including single gifts and ongoing pledges, can be made by calling +61 9903 1608.

Please note that we are unable to take direct debits over the phone.

All donations over $2 are tax-deductible. A letter and receipt will acknowledge all donations.

ACKNOWLEDGMENTS

Major gifts

Metal Manufactures Pty Limited

Corporate sponsors

ARMI would like to thank the following sponsors for their contribution in 2022 and would encourage you to support them.

Inkube8 Design

Opyl Ltd

Individual donors

Brad Doneman
Mycause
Maria Papadopoulos

HIGHLIGHTING ARMI'S STRATEGIC FOCUS AREA:
INVESTMENT, ENGAGEMENT AND FUNDING

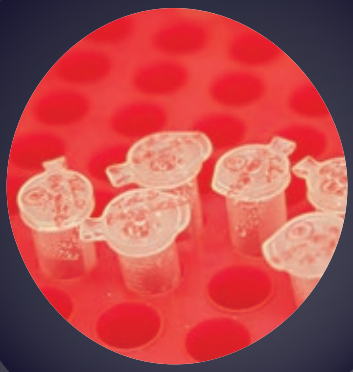
Attracting investment and funding remains a cornerstone of cutting-edge biomedical research in regenerative medicine during our decade of delivery.

ARMI Strategic Plan 2020–2025

Research Assistant Brenda Briones Miranda (Lieschke Group) in the AquaCore facility.

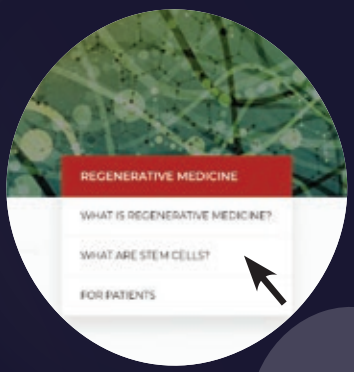
ARMI THEMES – HIGHLIGHTS

ARMI's six themes are designed to augment Australia's capacity to drive and translate the potential of regenerative medicine to create health impacts for Australian and global communities.



RESEARCH – REALISING THE POTENTIAL OF REGENERATIVE MEDICINE	TEACHING – HARNESSING SCIENTIFIC PASSION	CLINICAL IMPACTS – DRIVING RESEARCH ADVANCES TOWARDS TREATMENTS
61 publications	54 PhD students	10 diseases impacted by ARMI research
23 publications with an impact factor >10	17 Masters students	Injection of clinical talent to the Board boosts person-centred research design
$3.997 million in total grant income	6 Honours students	Leading cardiologist joins the Leadership Advisory Board to expand our clinical links
World-first finding a key to the mystery of muscle wasting in disease and ageing	22 graduating students	Newest Leadership Advisory Board member helps drive our research towards clinical impact
Study identifies gene transcription factors that enhance the regenerative potential of intestinal stem cells	12 student awards	
ARMI–Nature partner journal doubles its impact	13 publications with student authors	
	New program launched to accelerate opportunities for early-career researchers	
	Training at ARMI opened up the "perfect" career opportunity for this former student	
	Exposure to a range of possibilities at ARMI helped this former student transition to industry	
(see page 14)	*(see page 20)*	*(see page 26)*

From left to right: Axolotls are an animal model of regeneration; ARMI lab – working to unlock the regenerative capabilities of the human body; Samples awaiting testing.



INDUSTRY PARTNERSHIPS – CUTTING BARRIERS TO COMMERCIALISATION

ARMI has access to diverse infrastructure, specialised manufacturing capabilities, industry partners and networks to accelerate commercialisation and drive delivery of clinical impacts based on regenerative medicine research.

ARMI biotech startup receives funding to develop therapies for muscular dystrophy

Three-way partnership boosts translation and commercialisation of research into therapies

Funding for industry–academic partnership boosts macrophage-based technologies for tissue regeneration

Agile industry engagement is key to innovation and commercialisation

(see page 30)

INTERNATIONAL COLLABORATIONS – FOSTERING GLOBAL INITIATIVES

ARMI continued to build its international collaborative research and activities, even though 2022 still compelled us to use an online environment. We look forward to exciting in-person activities.

Advancing biomedical sciences between Monash and Osaka universities

International FAMOUS Program awards seed grants for collaborative research

(see page 36)

OUTREACH – ENGAGING WITH THE PUBLIC

Social media activity
Followers:

- Facebook 9.4K
- twitter 3.7K
- LinkedIn 2.2K
- Instagram 772

Student researcher discovers the positive impact of social media on research practice

ARMI re-opens the doors for a behind-the-scenes look at research in action

(see page 40)

THEMES IN FOCUS

RESEARCH – REALISING THE POTENTIAL OF REGENERATIVE MEDICINE

Regenerative medicine represents a revolution in human health and has the potential to reverse tissue damage, repair traumatic injuries and improve the health of an ageing population. It seeks to repair, replace, restore and regenerate tissues and organs damaged by age, injury and genetic and degenerative conditions.

With a total of 6000 fish tanks ranging from one litre to 10 litres, AquaCore is the largest aquatics research laboratory of its type in the southern hemisphere.

RESEARCH – REALISING THE POTENTIAL OF REGENERATIVE MEDICINE

HIGH-IMPACT RESEARCH NEEDS HIGH-IMPACT PEOPLE

As ARMI emerged from the peak pandemic years, our research outcomes in 2022 continued to impress thanks to the hard work and dedication of our students and staff. All were invited to come together for face-to-face events to help reconnect and share life and work experiences and strategies and to build an environment of inclusion and respect for all our people.

A research highlight of the year was the awarding of a prestigious 2022 Viertel Senior Medical Research Fellowship to Dr Jennifer Zenker.

The Rosenthal Prize in honour of our Founding Director, Professor Nadia Rosenthal was awarded to postdoctoral researchers Drs Joachim Berger and Avnika Ruparelia for their exceptional academic performance and excellent publication record.

The Crilley Prize, named in honour of founding staff member Ms Laura Crilley, was awarded to Ms Renae Hayle for her exceptional contribution the Institute's core values outside of scientific excellence.

The ARMI Student Prize for the PhD Program was awarded to Mr Joseph Chen and the ARMI Student Prize for the Honours Program was awarded to Mr Peter Kaltzis.

Staff and students come together for diversity and inclusion events.

Dr Avnika Ruparelia receives her Rosenthal Prize from Professor Peter Currie.

Ms Renae Hayle receives the 2022 Crilley Award from Professor Peter Currie.

Mr Joseph Chen receives his ARMI Student Prize for the PhD Program from Professor Peter Currie.

RESEARCH – REALISING THE POTENTIAL OF REGENERATIVE MEDICINE

HIGH-IMPACT PUBLICATIONS

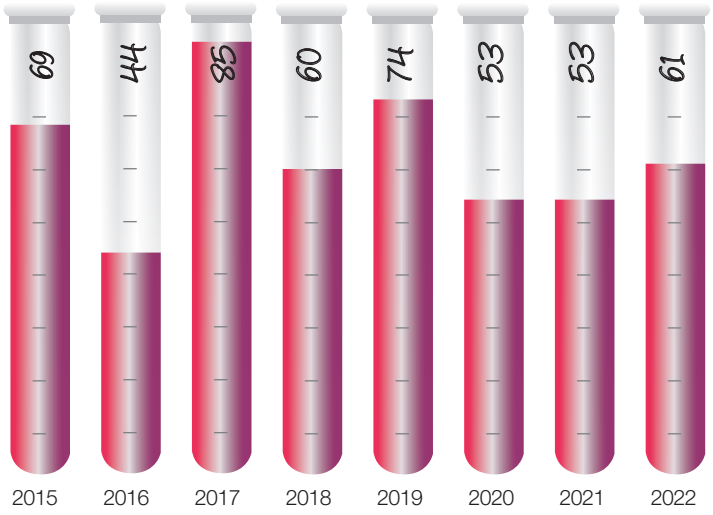
ARMI researchers had another outstanding year in 2022, with 61 publications in global high-impact journals. Twenty-three publications were in journals with an impact factor greater than 10 and four of those were in journals with an impact factor greater than 20.

HIGHLIGHTING ARMI'S STRATEGIC FOCUS AREA: *RESEARCH EXCELLENCE*

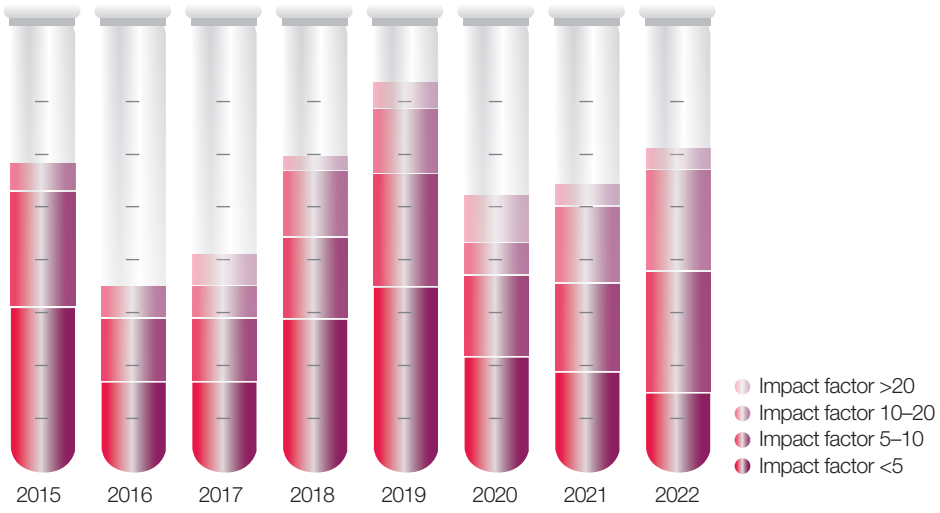
Research excellence is at the heart of our strategy to both build a strong Institute for the future and ensure high-quality external engagement.

ARMI Strategic Plan 2020–2025

NUMBER OF PUBLICATIONS



HIGH-IMPACT RESEARCH



GRANTS AND FUNDING SUCCESS

In 2022, ARMI attracted $3.997 million in competitive and non-competitive research funding. Most funds came from Australian Competitive Grants – Category 1 (see Appendix 5). The Institute continues to have an active research program, thoughtful mentoring of applicants, and a rigorous pre-application grant development program overseen by Institute Director, Professor Peter Currie.

ARMI'S TOTAL INCOME FROM RESEARCH FUNDING IN 2022 WAS

$3.997m

NUMBER OF PUBLICATIONS WITH IMPACT FACTOR >10

23

RESEARCH – REALISING THE POTENTIAL OF REGENERATIVE MEDICINE

WORLD-FIRST FINDING A KEY TO THE MYSTERY OF MUSCLE WASTING IN DISEASE AND AGEING

Researchers have found an answer to an old puzzle about why diseased muscle cannot regenerate as well as healthy muscle and this could finally open a door to developing a treatment for severe muscle wasting diseases and injuries.

After damage because of injury or a heavy workout at the gym, healthy muscle can regenerate through a type of stem cell called a satellite cell.

However after some types of serious injury or disease, muscles can lose the ability to regenerate. This can result in the severe muscle wasting seen in dystrophy, cancer and ageing.

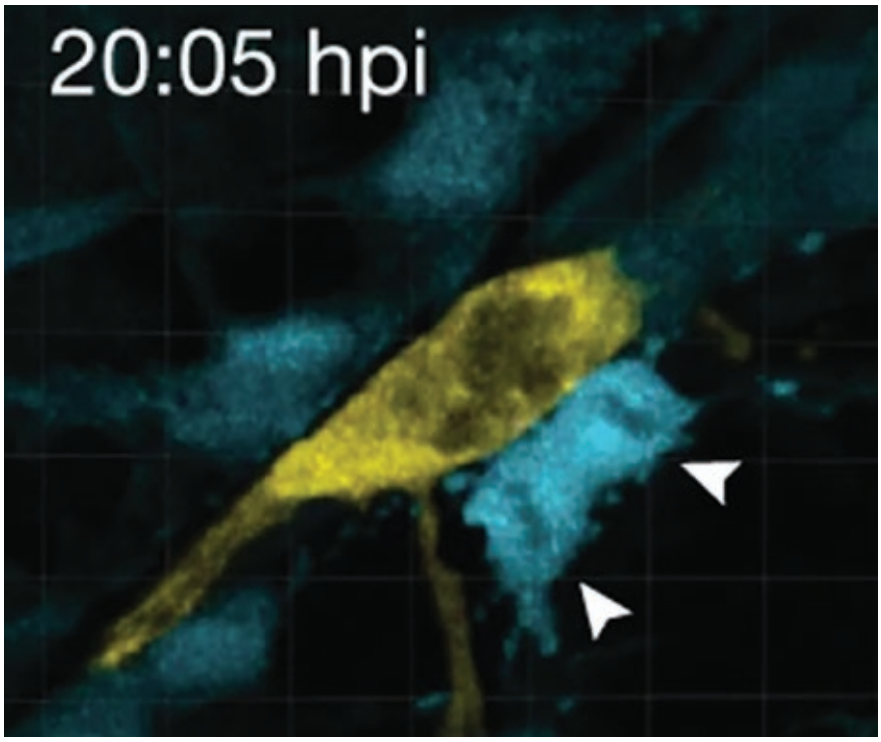
In an article published in the prestigious journal *Nature*,[1] Professor Peter Currie's team and their collaborators found that a subset of immune cells called macrophages secretes a protein that can help to create an environment conducive to satellite cell activation and muscle regeneration.

Professor Currie said that scientists have long found it difficult to visualise what activates muscle stem cells, but his team used zebrafish to get real-time information about the interactions between the satellite cells and the immune system during the repair process.

"What we saw was a subset of macrophages dwelling in the damaged tissue and secreting signals to govern muscle repair and activate the muscle stem cells. This included a molecule called NAMPT."

He said NAMPT (nicotinamide phosphoribosyltransferase) is essential for the muscle repair process to take place.

"For decades, scientists had tried to transplant healthy satellite cells into injured or diseased muscle but the satellite cells died and the scientists didn't know why."



AiryScan microscopy shows that dwelling macrophages (yellow) maintained prolonged contact with muscle stem cells (blue).

"NAMPT could be a key to create an environment that will promote muscle healing."

Professor Currie said this study gave a first answer to a decades-long puzzle and generated significant international interest as a potential treatment for muscle wasting and a way to delay muscle tissue ageing.

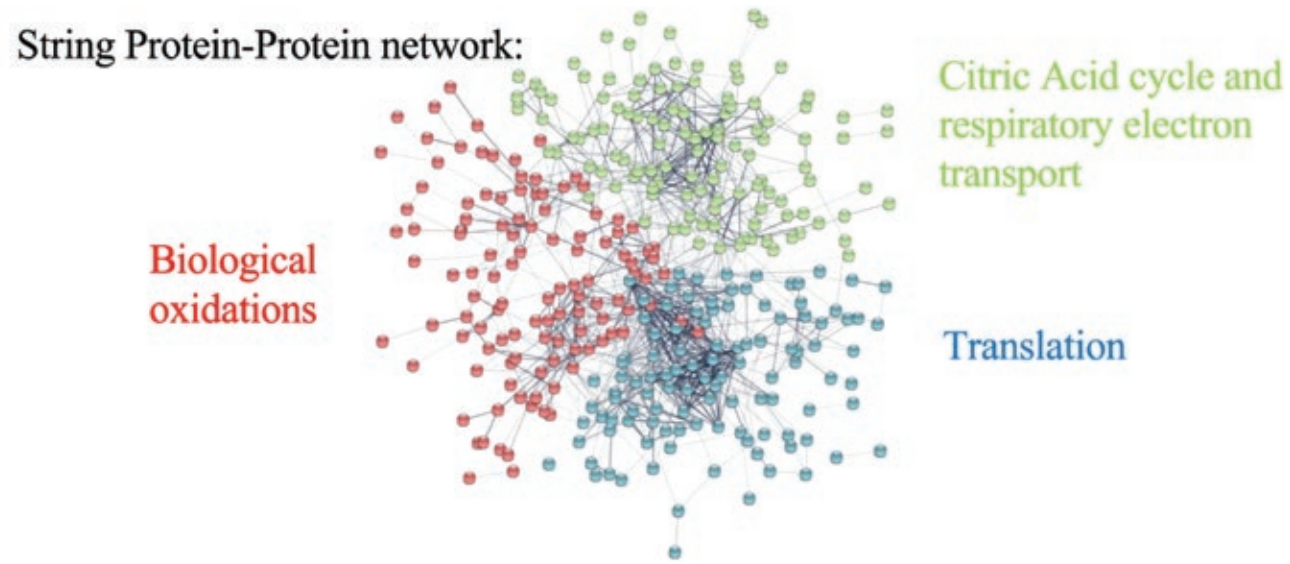
"In addition to looking for ways of commercialising these findings we are building on this discovery to see if macrophage-derived signals for regeneration can be applied in other medical settings, such as after hip or knee surgery when muscle is damaged."

Information about the progress of this research in the translation pipeline can be found in this report under the *Industry partnerships* theme.

[1] Ratnayake et al, Nature, Vol 591, 2021. DOI: https://doi.org/10.1038/s41586-021-03199-7.

RESEARCH – REALISING THE POTENTIAL OF REGENERATIVE MEDICINE

STUDY IDENTIFIES GENE TRANSCRIPTION FACTORS THAT ENHANCE THE REGENERATIVE POTENTIAL OF INTESTINAL STEM CELLS



String Protein/Protein interaction map of genes differentially expressed between young and old intestinal stem cells. Interactions were mainly between categories related to energy metabolism and translation.

A study of ageing intestinal cells may have shone a light on how to improve regeneration of cells in the intestines, which could lead to development of treatments for diseases of the gut.

To perform this study, Professor José Polo's team and his collaborators have taken their interest and methodologies relating to how gene expression and epigenetic mechanisms govern cell identity and applied them to an investigation of ageing intestinal cells.

Cells lining the intestine are affected in many health conditions and are one of the most rapidly dividing tissues in the body, yet the impact of ageing has not been fully explained.

Published in *npj Regenerative Medicine* (see Reference 48, Appendix 1), the study was able to identify three transcription factors that drive gene expression and could enhance the regenerative capacity of both ageing and younger intestinal cells.

Professor Polo said the first aim of the study was to understand age-related differences in the intestinal cells.

"We were able to produce miniature groups of intestinal cells called organoids from both young and older mice. Younger cells were able to produce more organoids and the organoids were bigger. This showed us that the ability for intestinal cells to regenerate and proliferate was severely affected with age."

He said the team was able to show more than 400 genes that were differentially expressed when cells from ageing mice were compared with those from younger mice.

"We also analysed protein–protein interactions of the differentially expressed genes and found that the network of interactions was mainly related to energy metabolism and translation," he said.

"We then used our recently developed reprogramming algorithm called Mogrify to predict the key transcription factors that were driving ageing in our isolated intestinal cells."

Professor Polo said three transcription factors called *Irf1*, *Fosb*, and *Egr1* were downregulated during ageing and had the potential to control approximately 80 per cent of the transcriptional network differences between young and aged intestinal stem cells.

"To confirm the importance of these three factors, we found that expressing them in ageing intestinal cells enhanced their ability to regenerate and interestingly, the factors also increased regeneration in young cells."

RESEARCH – REALISING THE POTENTIAL OF REGENERATIVE MEDICINE

ARMI–NATURE PARTNER JOURNAL DOUBLES ITS IMPACT

A Nature partner journal published by Springer Nature in partnership with Monash University and ARMI has doubled its impact factor since the debut results were published in 2020.

The online and open-access journal, *npj Regenerative Medicine*, was founded in 2016 with former ARMI Director Professor Nadia Rosenthal as Editor-in-Chief.

Springer Nature chose ARMI as a publication partner because of our position as an internationally renowned institute in the field of regenerative medicine.

The journal's debut impact factor was 7.021 but in the 2022 release of results by Clarivate Analytics, the impact factor had surged to 14.404, with any result more than 10 considered an excellent score.

This latest impact factor data shows how the field is growing and how regenerative medicine and stem cell research are progressing towards translation and clinical impact.

The journal also ranked second in the "cell and tissue engineering" category and fifth in the "biomedical engineering" category.

While initially regenerative medicine was an emerging field, the high-quality of the journal and the growth of research in the area has meant the number of articles published in the journal has surged and the citations have increased three-fold since 2019.

Springer Nature launched the journal after recognising a gap in the literature in the emerging field of regenerative medicine. Recognising ARMI as a world-leader in the field, we were invited to partner with the publisher.

ARMI maintains a strong relationship with the journal, with researcher Dr Alberto Roselló-Díez currently an Associate Editor.

npj Regenerative Medicine continues to publish "the highest quality research into ways to help the human body repair, replace, restore and regenerate damaged tissues and organs" from basic research through to patient-oriented case reports.

Another factor of *npj Regenerative Medicine's* success is its commitment to open-access publications to realise the benefits of making content freely available worldwide to all researchers.

TEACHING – HARNESSING SCIENTIFIC PASSION

2022 was a year of transition after what had been a difficult few years, especially for our students. Our student group showed remarkable resilience and continued embracing their research and innovation experiences with many more opportunities for face-to-face interactions.

A core element of the mission at ARMI is keeping Australia at the forefront of science and ensuring technology innovation is embraced.

ARMI actively recruits young, creative scientists from all corners of the world to share and inspire differing approaches to some of the most perplexing biological questions of the 21st century. They are highly motivated and nurtured in a collaborative working environment to approach complex biological problems with ingenuity and passion.

The internationalisation and uniqueness of student opportunities offered at ARMI sets the Institute apart and is a key reason students select ARMI for their undergraduate and postgraduate training.

ARMI group leaders and research fellows teach in undergraduate courses, and the Institute also offers international students and undergraduates a variety of opportunities to experience research firsthand.

Former PhD student Laura Galvis from the Marcelle Group (in red) teaching Master of Biotechnology students ovo chicken embryo electroporation and embryonic microsurgery techniques.

TEACHING – HARNESSING SCIENTIFIC PASSION

Number of postgraduate students

In 2022, the Institute maintained an active training program with 54 higher degree by research (HDR) students enrolled at ARMI. HDR students can study for Doctor of Philosophy (PhD), research Masters and other professional higher degrees by research. The Institute also provides training to Honours, selective undergraduate and visiting international students.

ARMI also had an intake of 17 students in the Master of Biotechnology. This dedicated program integrates biotechnology and entrepreneurship and equips students with the skills and knowledge to work in a rapidly growing sector.

Number of undergraduate students

In 2022, six students enrolled in the Honours program at ARMI.

Publications with student authors

Eleven students contributed to 13 manuscripts published in peer-reviewed journals, including in the prestigious *Nature* suite of journals. Four of those students were first authors.

Student awards

In 2022, ARMI's PhD students were honoured with awards for their oral presentations and for stunning microscopic and video images.

Awards for presentations

- Joseph Chen was awarded the ARMI Student Prize for PhD Program.
- Jia Tan was awarded the Carmela and Carmelo Ridolfo Prize in Stem Cell Research.
- Azelle Hawdon received three awards for best oral presentations at national conferences (the SRB Merck Presentation Award, the SRB David Healy New Investigator Award and the Best PhD Oral Presentation at the Hunter Cell Biology Meeting) and was an invited speaker at ComBio 2022. The David Healy New Investigator Award Society for Reproductive Biology (SRB) award is given to the best oral presentation by a student or early career researcher at the SRB Annual Scientific Meeting.
- Bhavana Nayer was awarded the Best Oral Presentation in the Student and Young Investigator category at the Tissue Engineering and Regenerative Medicine International Society Conference, South Korea.
- Jessica Menken was awarded the Best Lightning Talk (Judge's Category) at the EMBL Australia Postgraduate Symposium (EAPS).
- Yasith Mathangasinghe won the Early Career Researcher Outstanding Oral Presentation Prize at the 4th Proteostasis and Disease Symposium.

Awards for images and videos

- Azelle Hawdon was awarded an ANZSCDB (Australia and New Zealand Society for Cell and Developmental Biology) Image Award for a stunning image of the early mouse embryo.
- Angela Fan came second in the 2022 Monash Visualise Your Thesis Final. Angela created an amazing animation based on her research.
- Oliver Anderson was recognised with a Distinction in the Life Science Category in the 2022 Light Microscopy Australia and Volume Imaging Australia (LMA/VIA) Image Competition for his image of a fixed sample of human induced pluripotent stem cells.
- Esther Miriiklis won 2nd prize in the Super Resolution Category with an image capturing how prolonged nuclear stress dramatically alters DNA organisation in human induced pluripotent stem cells.

Student programs in 2022

Master of Biotechnology

ARMI and Monash University launched this program to integrate biotechnology and entrepreneurship and equip students with the skills and knowledge to work in a rapidly growing sector.

The course features practical training in medical biotechnology and opportunities for research projects with ARMI's world-leading researchers or industry placements.

Honours program

ARMI offered six undergraduate students the chance to further their studies in the Honours program, work beside world-class scientists and gain access to a network of international scientists and organisations.

Undergraduate studies

In 2022, there was a return of the laboratory-based initiative, the Undergraduate Research Opportunities Program (UROP) – a paid 12-month employment scheme designed to give undergraduate students an early opportunity to experience real life in a research laboratory and gain insight into careers in biomedical research.

TEACHING – HARNESSING SCIENTIFIC PASSION

NEW PROGRAM LAUNCHED TO ACCELERATE OPPORTUNITIES FOR EARLY-CAREER RESEARCHERS

In 2022, ARMI launched a new three-year program to support early-to-mid career researchers advance their leadership opportunities in academia.

The ARMI Accelerator Program focuses on providing activities and experiences to improve the competitiveness of early-career researchers for leadership positions in academia under the supervision of a Program Coordinator and Mentor.

The Program works alongside other initiatives available at Monash University and other organisations.

Mr Silvio Tiziani, ARMI's Director of External Strategy and Planning, said the early period in an academic researcher's career is critical.

"We're excited to launch this new program at ARMI," he said. "Often, researchers come up against disruptions, insecurity and burnout during this time. Academia loses some of its best and brightest at this stage."

He said support systems and programs have only recently emerged and this highlights the need to focus on fostering and nurturing the next generation of biomedical research leaders.

"We look forward to playing an even greater role in helping advance the careers of promising young researchers and to fulfill their potential as leaders in the sector."

The aim is for graduates of the ARMI Accelerator Fellowship Program to demonstrate a record of success and experiences that will make them more competitive for a senior position within an academic research environment. The types of achievements researchers will work towards include:

- a strong publication record – demonstrated track record with publication in journals considered to be in the top quartile of their specialty

- success in grant applications – demonstrated ability to apply and be successful for funding
- demonstrated leadership qualities – have assumed a leadership position in a relevant professional society
- a record of teaching/student supervision – teaching accreditation and co-supervision of Honours, Masters and preferably PhD students
- an Institute responsibility role – active in ARMI scientific or organisational activities, including leadership of a key activity
- a record of presentation at national and international conferences as a selected and/or invited speaker.

We look forward to seeing the results of this program in the years to come.

TEACHING – HARNESSING SCIENTIFIC PASSION

TRAINING AT ARMI OPENED UP THE "PERFECT" CAREER OPPORTUNITY FOR THIS FORMER STUDENT

Dr Harriet Manley is a great example of how postgraduate study at ARMI can lead to an excellent and satisfying career pathway.

Dr Manley is now practising as a Patent Scientist (Trainee Patent Attorney) in biotechnology at FPA Patent Attorneys in Melbourne.

Dr Manley said she joined ARMI during the third year of her undergraduate degree, completed her PhD and was a postdoctoral research fellow for a short time.

"I would say I essentially became a scientist at ARMI," she said.

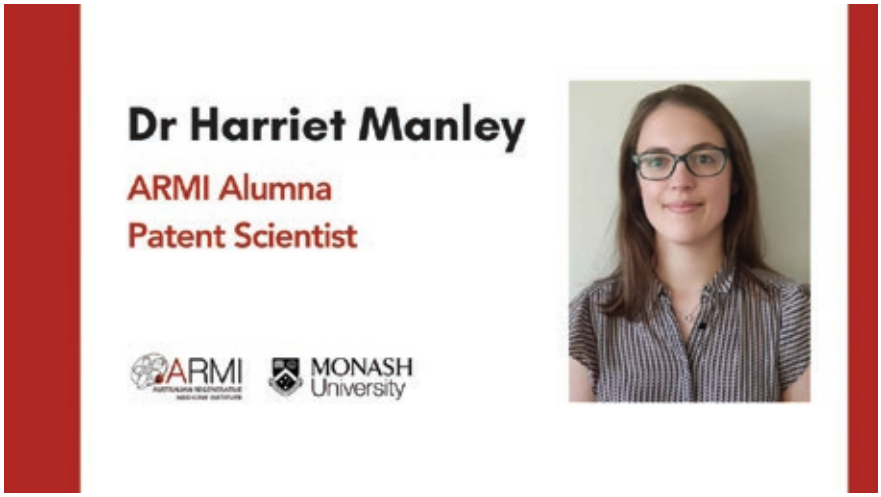
"ARMI helped me to develop myself as a scientist, not just from a technical side, but also in developing the creative thought processes of how to take a hypothesis and design experiments to find an answer. It was challenging, but extremely rewarding, too."

Dr Manley said she had always been open-minded about her future after completing her studies and during her time at ARMI she attended many events and mentoring programs to get exposure to different ideas and pathways.

"Listening to people talking about their bright scientific ideas and turning them into commercial products really sparked an interest."

Ultimately, it was the translation of innovative technology and a multidisciplinary approach to biomedical research in the form of patent law that interested her most.

"As a patent attorney, clients come to us with their ideas for inventions in the biotechnology space, such as a new drug or therapy, and we advise them on how to best protect that idea in a legal sense along its commercial trajectory. It is actually a perfect spot for me because we are always talking about new ideas and being a part of the commercialisation pipeline really excites me."



"ARMI prepared me to develop crucial expertise and knowledge for this current role, as well as provided me exposure to lots of different, fundamental science that underpins new and innovative therapies."

Dr Manley's advice for students is to follow their interests.

"Even if I'd tried to plan out my whole future to get to this point, I'm not sure it would have happened the way I thought it was going to happen. I really just followed the subjects and science I was interested in because if you are really interested in something, that is what you will do best at."

TEACHING – HARNESSING SCIENTIFIC PASSION

EXPOSURE TO A RANGE OF POSSIBILITIES AT ARMI HELPED THIS FORMER STUDENT TRANSITION TO INDUSTRY

The huge range of opportunities available with immersion in ARMI's postgraduate training are wonderfully illustrated by Dr Celia Vandestadt, a myotherapist who completed a PhD in neuroregeneration research and went on to join the world of data consulting.

Dr Vandestadt is a data consultant at Eliiza, a Melbourne-based consultancy that applies Artificial Intelligence (AI) and Machine Learning (ML) to translate data into real-world technical solutions. She said she enjoys getting exposure to different industries and the purposes of data-driven decision making.

Dr Vandestadt believes the exposure to industry throughout her PhD at ARMI prepared her well for the transition journey out of academia.

"My time at ARMI has trained me with an inquisitive and hypothesis-driven mindset that has benefited me enormously in my current job."

"Since the first year of my PhD, I knew I should not limit myself to the postdoctoral research pathway. That is why I wanted to participate in as many extracurricular activities as possible to broaden my career opportunities. There were always networking and outreach events at ARMI where we got to meet and talk to people across industry to explore different roles and build our connections."

Dr Vandestadt said she had a significant shift in her mindset when she transitioned from academia to consultancy.

"Academia requires a deep focus on a niche field. Whereas in consulting, the timelines are much shorter, and one has to deliver value with one eye on immediate outcomes and another on strategic vision. It's delivering results on time and within budget that considers the risks, which is more highly valued."

As she looked back at her time at ARMI, Dr Vandestadt said what she most enjoyed was the culture, the people and her supervisors.

"My supervisor was always helpful, accepting and supportive about all the extracurricular activities and work I was interested in exploring," she said.

"PhDs are long, but it is an advantage if you don't know what you want to do yet. It gives you a lot of time to explore what you are really interested in."

Associate Professor Jan Kaslin.

CLINICAL IMPACTS – DRIVING RESEARCH ADVANCES TOWARDS TREATMENTS

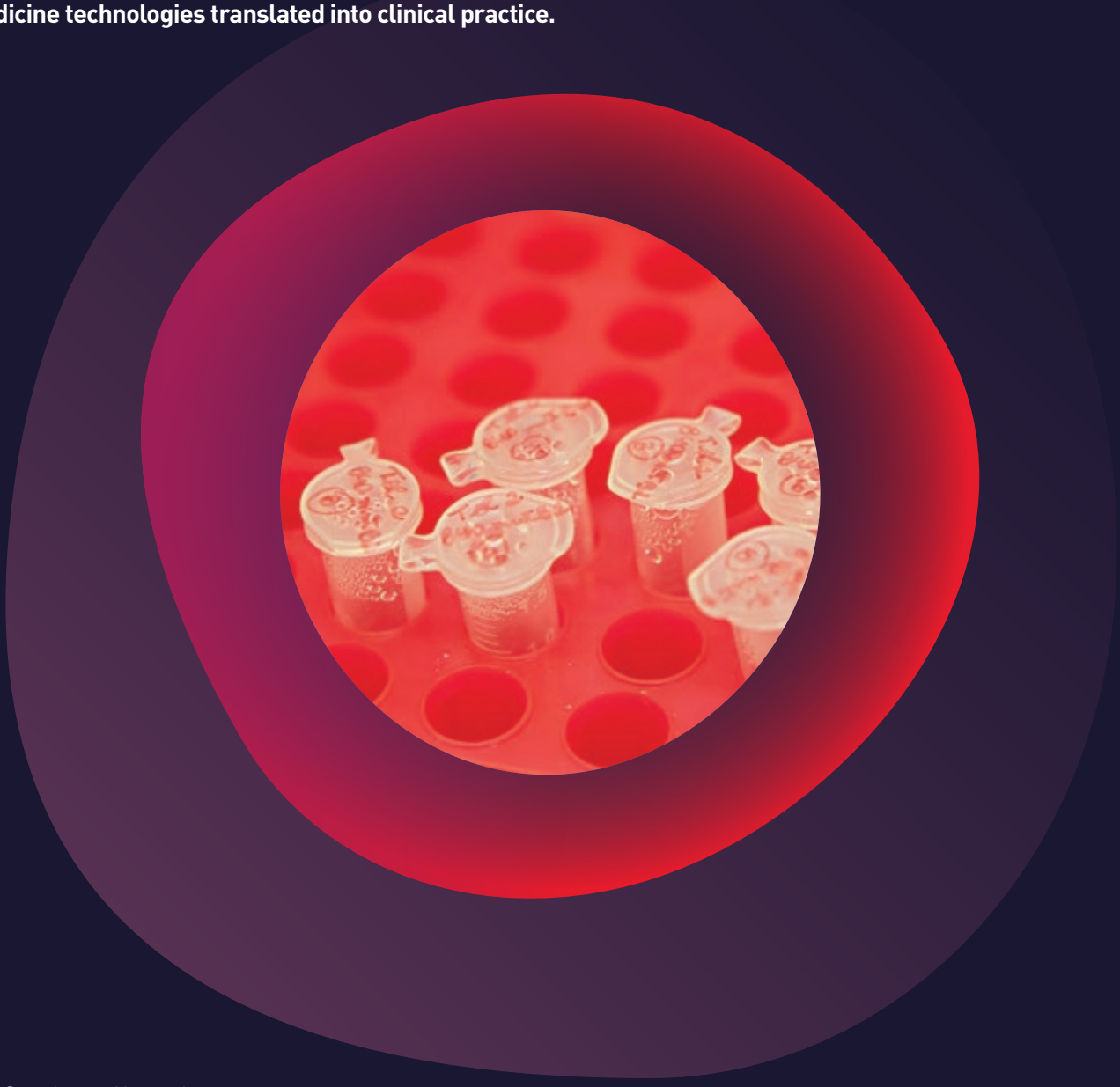
ARMI's world-class regenerative medicine research is well placed to create future treatments for many diseases, including neurological, immune and muscle conditions and organ and stem cell applications.

We are especially excited about the future as we continue to drive towards creating positive health impacts through linking research excellence to the clinic through our commercialisation efforts.

The launching of the Victorian Heart Hospital in early 2023 will only improve our clinical links. The Victorian Heart Hospital is Australia's first dedicated heart hospital. It will provide a unique opportunity to expand ARMI's cardiac research capacity through collaboration and recruitment and boost our future impacts on medical treatments for heart disease.

ARMI is uniquely placed in a precinct with world-leading research and clinical expertise and infrastructure of Monash University, the CSIRO, Monash Health (Victoria's largest health service), the future Victorian Heart Hospital and numerous other key players in Victoria's medical research network.

Our location in this vibrant precinct creates opportunities for our researchers to collaborate with clinicians and leads to fruitful synergies that will support our push for the more rapid growth of tangible regenerative medicine technologies translated into clinical practice.



Samples awaiting testing.

CLINICAL IMPACTS – DRIVING RESEARCH ADVANCES TOWARDS TREATMENTS

HIGHLIGHTING ARMI'S STRATEGIC FOCUS AREA:
BUILDING FOR STRENGTH AT SCALE

Strong leadership across our Institute and alignment with our campus and precinct partners from academia, industry and the medical community will prepare us for the growth to come in our decade of delivery of regenerative medicine therapies.

ARMI Strategic Plan 2020–2025

INJECTION OF CLINICAL TALENT TO THE BOARD BOOSTS PERSON-CENTRED RESEARCH DESIGN

ARMI has added new clinical experience to its Leadership Advisory Board (ARMILAB) to prepare for the future and to join the innovative frontier of the biomedical research sector.

With several projects from ARMI's regenerative medicine research program nearing commercialisation, we are embracing a human-centred design approach that takes into consideration all user groups including patients, doctors and nurses.

ARMI is excited to welcome three new ARMILAB members with a clinical background.

Dr Meroula Richardson and Dr Patrick Hughes have extensive experience in clinical medicine and will also further enhance our clinical linkages, especially with the opening of the Victorian Heart Hospital located on the Monash University Clayton campus.

Our other new member, Dr Katie Allen, provides extensive experience across several fields including as a clinician, a leading researcher in several fields with publications in high-impact journals and a former Federal Member of Parliament.

Mr Silvio Tiziani, Director of External Strategy and Planning, said the Institute's talent and input from industry and the academic and healthcare sectors builds the translational impact of ARMI's research.

"The insights provided at the interface between these sectors makes commercialisation and adoption of new medicines and technologies possible."

Putting patients and doctors at the centre of research thinking and design helps to identify market applications in the early stages of research and is essential for developing a successful treatment.

Drs Richardson, Hughes and Allen will provide a clinical perspective and valuable insights to researchers on the application and translation of their projects.

The definition of a "good drug" can be very different in the eyes of an academic researcher compared to those of a clinician.

Researchers can place greater value on potency and efficacy, while clinicians must consider many other factors, including patients' quality of life, regimen and compliance, and any potential risks or side effects.

Our newest ARMILAB members will bring insightful advice from a clinical perspective for any potential issues in the early stages of research and development.

From top to bottom: Drs Meroula Richardson, Patrick Hughes and Katie Allen – ARMI Leadership Advisory Board members.

CLINICAL IMPACTS – DRIVING RESEARCH ADVANCES TOWARDS TREATMENTS

LEADING CARDIOLOGIST JOINS THE LEADERSHIP ADVISORY BOARD TO EXPAND OUR CLINICAL LINKS

A leading cardiologist has joined the ARMI Leadership Advisory Board (ARMILAB) as our strategic direction matures towards realising clinical impacts for our research discoveries.

Dr Meroula Richardson is a cardiologist with 35 years of experience in practising procedural clinical medicine and will be a hugely valuable asset for ARMI as her clinical experience is applied to our research program.

Dr Richardson has travelled worldwide and made connections with doctors, cardiac researchers and patients from London to rural outreach clinics in Bairnsdale, Victoria.

She said regenerative medicine holds enormous appeal to her as a cardiologist.

"Transplantation and heart failure therapies are great – but they are treatment, not a cure," she said. "The potential for molecular and cell-based therapy to provide a cure is both real and exciting."

Dr Richardson was born in rural Western Australia and trained in medicine at University of Western Australia. She pursued physician training and followed-up with a specialisation in cardiology, completing her training in all aspects of heart transplantation with Professor Sir Magdi Yacoub's pioneering team at the Harefield Hospital outside London.

"My plan was originally to return to WA and establish a heart transplant service in Perth. However, I was offered a consultant position at The Alfred with their well-established unit. The lure of living in Melbourne was too strong."

The 1990s marked the beginning of a time of tremendous excitement in the field of heart failure and transplantation, with trials of effective drug therapy just starting. Returning from London to The Alfred in 1994, Dr Richardson became one of the foundation members of The Alfred's Heart Failure Unit.

"It was a wonderful, busy, terrifying, exciting time to be in that area."

From 2005 until 2020, Dr Richardson maintained a role at The Alfred and established a private practice, mainly at Cabrini Hospital and at rural outreach clinics in Bairnsdale.

She feels very lucky in her career so far and is looking forward to contributing and making a difference with ARMILAB.

"To see people at their most vulnerable and to be able to make a difference. When under unbearable pressure, they have humbled me with their grace. So, if you ask who has inspired me – it's these people."

Dr Meroula Richardson – ARMI Leadership Advisory Board member.

CLINICAL IMPACTS – DRIVING RESEARCH ADVANCES TOWARDS TREATMENTS

NEWEST LEADERSHIP ADVISORY BOARD MEMBER HELPS DRIVE OUR RESEARCH TOWARDS CLINICAL IMPACT

A clinician, leading researcher and a former Federal Member of Parliament was the ARMI Leadership Advisory Board's newest member in 2022.

Dr Katie Allen is providing expertise, experience and leadership to help drive our research towards translation, commercialisation and beyond.

Having worked across a spectrum of research areas with publications in high-impact journals, Dr Allen said she understands the unique promise of regenerative medicine.

"It's such a thrill to come to ARMI because I've watched the regenerative medicine space, and it's a very exciting area. It's finally coming of age. We're at that tipping point now where we can see therapeutics coming to market at speed and there's a huge pipeline capability and opportunity. It's a great privilege to help support ARMI."

Dr Allen trained in medicine at Monash University, completing paediatrics training at the Royal Children's Hospital and then moved to the University of Chicago and the Children's Memorial Hospital where she developed an interest in research.

She completed a PhD at the University of Melbourne based at Murdoch Children's Research Institute.

"For my PhD, I pioneered liver cell transplantation for paediatric metabolic liver disease. And my PhD was successful. Then I translated it into undertaking liver cell transplants in children."

Her research career included population-based screening though a project called HaemeScreen and, later, food allergy research that led a project called HealthNuts.

Although she had a thriving medical research career, Dr Allen chose to have even more impact.

"I had this urgency to put my hand up for Federal Parliament. We need more people of diversity, we need more women, we need more professional people and more problem solvers in Parliament."

During her time as a Federal Member of Parliament, Dr Allen recommended an inquiry into allergy, which led to the establishment of a National Allergy Council and a National Allergy Centre of Excellence.

With her experience in public health, Dr Allen helped Parliament to understand and deliver COVID testing, protective personal protective equipment, public health measures, vaccines and helped to engage with educating the public.

Dr Allen is driven by combination of curiosity and the desire to use her skills and expertise to make a difference to help others, not just now but into the future.

Dr Katie Allen – ARMI Leadership Advisory Board member.

INDUSTRY PARTNERSHIPS – CUTTING BARRIERS TO COMMERCIALISATION

As a global life science centre in the Monash-Clayton Innovation Precinct, ARMI has access to an interconnected ecosystem with diverse research expertise and infrastructure, specialised manufacturing capabilities, industry partners and networks to accelerate commercialisation.

Our focus on a "decade of delivery" of clinical and health impacts based on regenerative medicine research, relies upon establishing and nurturing partnerships with industry to capitalise on our intellectual property through commercialisation pipelines.

In addition to improving clinical research opportunities, the Victorian Heart Institute and the opening of the Victorian Heart Hospital in 2023 creates an essential link in Victoria's value innovation chain in the health care and medical sector. These initiatives will bring together world-class clinical care, leading research expertise and infrastructure in the heart of Victoria's light manufacturing belt.

In combination with the expertise of the Centre for Commercialisation of Regenerative Medicine (CCRM) Australia, ARMI is ideally placed to capitalise on this once-in-a-generation opportunity with the potential to attract global players in the pharmaceutical and biotechnology sectors to Victoria.

INDUSTRY PARTNERSHIPS – CUTTING BARRIERS TO COMMERCIALISATION

ARMI BIOTECH STARTUP RECEIVES FUNDING TO DEVELOP THERAPIES FOR MUSCULAR DYSTROPHY

Professor Peter Currie (L) and Associate Professor Mikaël Martino (R) lead the new startup company.

A Monash biotech startup based on world-leading research from ARMI has received $0.5 million for proof-of-concept studies needed to develop novel therapies for treatment of muscular dystrophies.

The grant was from CUREator, a national biomedical incubator managed by life science collaboration Brandon BioCatalyst.

Monash University also supported the company, Myostellar, with an investment of $200,000 to cover additional costs and provide support to help the company grow and attract further investment.

Myostellar is led by ARMI researchers Professor Peter Currie and Associate Professor Mikaël Martino and is based on research investigating why diseased muscle cannot regenerate as well as healthy muscle (see research story, page 17). This research generated significant international interest.

Professor Currie said the funds will allow Myostellar to develop a novel first-in-class therapy for stimulating skeletal muscle regeneration with minimal fibrosis.

"To date, there are no clinically approved therapeutics which can specifically promote the regeneration and repair of skeletal muscle in a patient, and consequently development of a "first-in-class" therapeutic in this area will be a game-changer in the field of skeletal muscle diseases."

"Muscular dystrophies are a group of inherited genetic conditions that gradually cause the muscles to weaken, getting progressively worse over time. It can be an extremely challenging condition and an urgent need remains for safe and effective treatments to improve the lives of patients and their families," he said.

The Myostellar team, which also includes Dr Bo Yun, and Dr Alison Greenway, was guided by Monash Innovation and Faculty business development professionals who support investment cases and build new ventures in a process led by Dr Kathy Nielsen, Monash Director of Commercialisation and Business Development (Life Sciences).

Myostellar was one of five successful Monash grant recipients to receive funding from CUREator, resulting in the formation of four new Monash-led biotech companies.

HIGHLIGHTING ARMI'S STRATEGIC FOCUS AREA:
CLINICAL CONNECTIONS, TRANSLATION AND COMMERCIALISATION

Research translation and commercialisation through industry and clinical connections remain essential as we work towards our mission of discovering new regenerative medicine therapies.

ARMI Strategic Plan 2020–2025

INDUSTRY PARTNERSHIPS – CUTTING BARRIERS TO COMMERCIALISATION

THREE-WAY PARTNERSHIP BOOSTS TRANSLATION AND COMMERCIALISATION OF RESEARCH INTO THERAPIES

Professor Alan Trounson, CEO of Cartherics provided an update of the importance for Australia of partnerships such as the one his company has with ARMI and CCRM Australia.

"In the US, there is a much bigger pool of industry working with academia and the flow from industry through academia then back into industry and then back into academia is very common. That's not a foreign process in America, but it's very unusual here."

"We have to create these affiliations as we are doing here with ARMI and create them with one or a number of companies that work in the space you're interested in. That will be really enabling for converting discoveries into products that can be commercialised and are useful for the community."

He said these types of partnerships create a connection between research and industry as federal and state governments recommend.

"There's some very good reasons for those connections to be developed with companies like Cartherics that have deep academic origins and connections."

Professor Trounson said when he was President of the California Institute for Regenerative Medicine, it became obvious the institute needed industry–academic partnerships to apply for funding so they could move discoveries through translation to clinical trials in regenerative medicine.

"Clearly, that is also an issue for effective translation in Australia. I believe partnerships forged between industry and research, such as Cartherics and ARMI, are highly valuable. The presently articulated priorities will attract a lot more funding from federal and state governments."

Professor Trounson said academic scientists interested in translating their ideas can become educated in the critical industry processes that enable private investment and commercialisation of potential products.

"Business management courses might help, but there is no better experience than to work together with a team that is actually working in this space. They will see first-hand the issues faced in translation and early development that are really quite different from the ones that academic departments anticipate, issues that involve helping projects move into and through translation and into the commercialisation process."

He said Cartherics will be running some courses for their staff, from people who are very skilled in this area.

"One of the suggestions is that we could extend some of those to ARMI staff to help them understand this process a lot better. I think that would help considerably to be exposed to those opportunities."

Professor Trounson remains very upbeat about the future of the commercialisation of stem cell and regenerative medicine.

He said the partnership with ARMI and CCRM is an example of an opportunity to work with international partners and share PhD students.

"I'm an optimist by nature, and I believe regenerative medicine is really going to come alive with impact in human medicine. Australia was leading back in the early 2000s because we initiated a lot of discoveries in human pluripotent stem cells, but it really went quiet for quite a long period. But I think it's really moving again now."

INDUSTRY PARTNERSHIPS – CUTTING BARRIERS TO COMMERCIALISATION

FUNDING FOR INDUSTRY–ACADEMIC PARTNERSHIP BOOSTS MACROPHAGE-BASED TECHNOLOGIES FOR TISSUE REGENERATION

A three-year grant from the Australian Research Council will support a partnership between the Australian Regenerative Medicine Institute (ARMI) and AstraZeneca to the tune of $857,800.

The grant enables critical research into macrophage-based technologies for tissue regeneration to be conducted by a multidisciplinary team led by Professor Peter Currie and Associate Professor Mikaël Martino at ARMI and Dr Ryan Hicks from our industry partner AstraZeneca.

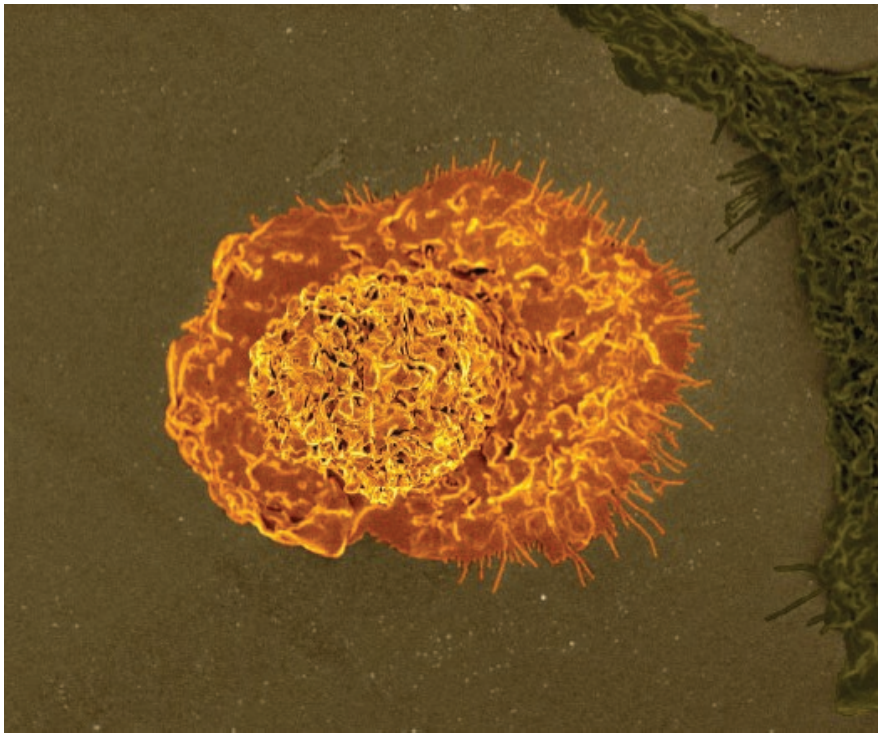
Professor Currie said ARMI is excited to form this collaboration with AstraZeneca, one of the world's leading biotechnology companies.

"Translation of exciting new biomedical discoveries cannot come to fruition without such partnerships between academia and industry. We look forward to working with the team at AstraZeneca to realise the full potential of this research and to make an impact in the lives of patients."

"The goal is to develop new regenerative medicine technologies that we can take to the clinic," he said. "This project has the potential to be a game-changer in harnessing the body's immune system to kickstart and accelerate tissue healing."

The project builds on discoveries in zebrafish about the role of macrophages, a type of immune cell, in mediating regeneration. The work will investigate whether these cells can be reprogrammed to stimulate regeneration in different settings.

While most of the research will take place in the laboratory of Associate Professor Martino at ARMI, collaborative research will be also conducted at AstraZeneca with their innovative new technologies and unique expertise in stem cell research.



Colorized scanning electron micrograph of a macrophage. Image credit: NIAID

Dr Ryan Hicks, Head of Bioscience Cell Therapy, BioPharmaceuticals R&D, AstraZeneca said: "AstraZeneca's deep understanding of the biological mechanisms driving disease and knowledge in stem cells and cell engineering technologies, combined with ARMI's vast expertise in the nature of macrophages could lead to novel cell therapies for debilitating chronic diseases that affect different organs in the body."

Mr Ben McDonald, AstraZeneca's Country President for Australia and New Zealand said AstraZeneca recognises that collaboration is central to success.

"I'm pleased that we can circumvent geographic boundaries to ensure we are collaborating with leading academic institutes, such as ARMI at Monash University."

INDUSTRY PARTNERSHIPS – CUTTING BARRIERS TO COMMERCIALISATION

AGILE INDUSTRY ENGAGEMENT IS KEY TO INNOVATION AND COMMERCIALISATION

ARMI's Industry Advisory Committee plays an important role in bringing industry exposure and sparking new ideas so that ARMI researchers can realise the full potential of their work.

Mr Silvio Tiziani, Director of External Strategy and Planning Expanding said developing the scope of ARMI's translational and commercialisation engagement brings many advantages.

"Diversity is the first step of innovation. At ARMI, we have talent from all research backgrounds, and we never limit ourselves to traditional medical research."

A strength of ARMI's research program is the diversity of topic areas, ranging from organ engineering and synthetic biology to immunity and regeneration, all of which have commercial promise.

In addition to cell-based therapies for diseases and injuries that conventional medicines cannot treat, the potential applications of stem cells are enormous and not only limited to human therapies.

The translational potential of ARMI's research program can extend beyond human therapies into areas such as veterinary therapies and the extension of cell-based technologies into agriculture, which has enormous potential for commercialisation in the context of adapting to climate change.

The chair of the Industry Advisory Committee, Dr Duncan Thomson, brings unique expertise in veterinary regenerative medicine research. Stem cell and regenerative medicine technologies developed for humans can be slightly modified to help many animal species.

Dr Thomson helps our researchers to explore how the breadth and depth of its research program can play a role in treating a broad spectrum of diseases and conditions in animals.

For potential applications of our research to cellular agriculture, ARMI has Industry Advisory committee member Dr Bianca Lê as a source of advice. Dr Lê is a cell biologist and the founder of Cellular Agriculture Australia, a non-profit committee dedicated to promoting and accelerating research and development in the cellular agriculture industry.

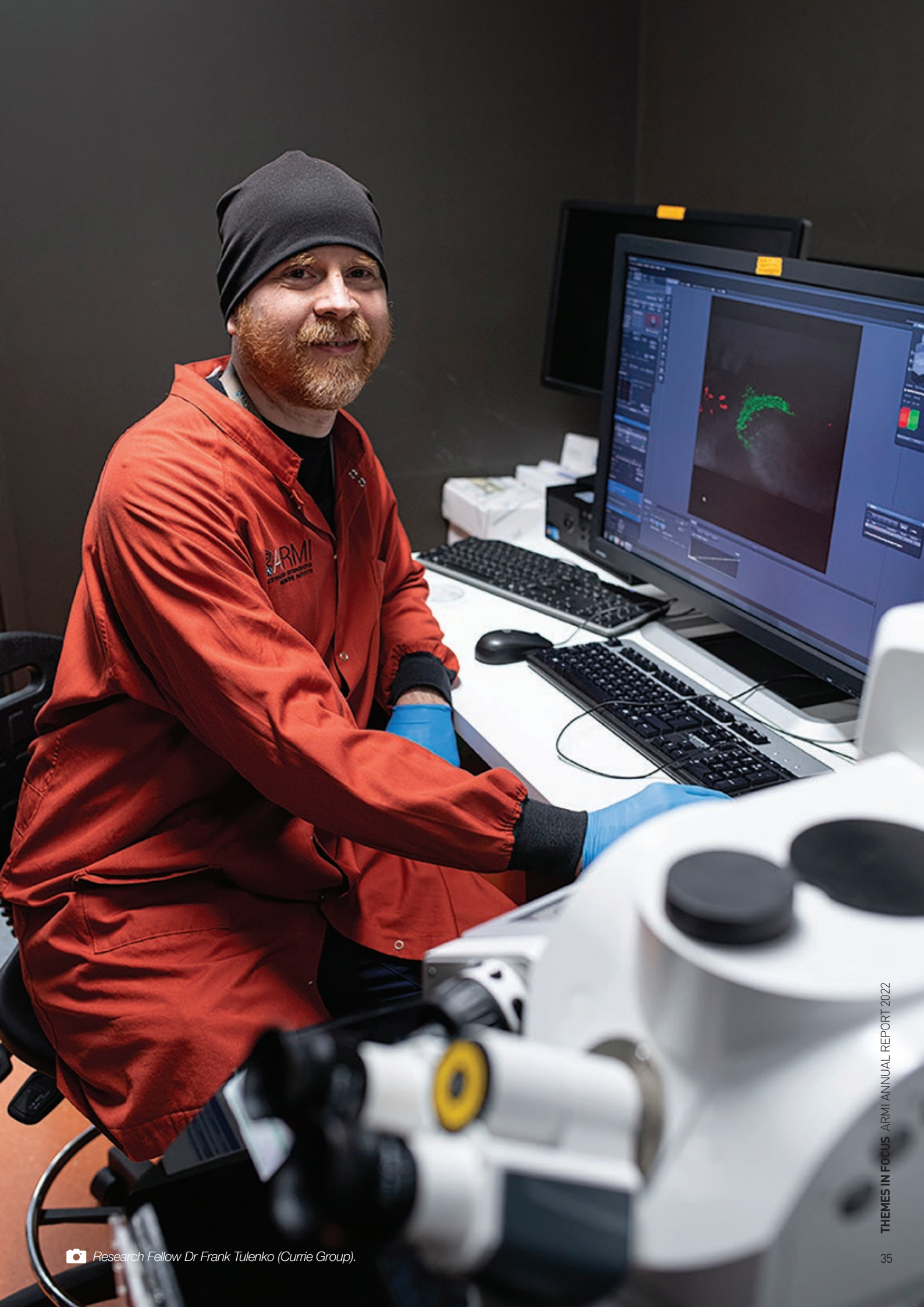
Cellular agriculture is the production of animal-sourced food from cell culture including food products like meat, dairy, eggs and fish. Interestingly, it can include biofabrication of products such as rhino horn and elephant ivory to mitigate the poaching of wildlife animals and preserve the biodiversity of delicate ecosystems.

ARMI's Industry Advisory Committee also widens the horizon for the applications for ARMI research by keeping up with current industry trends and guiding ARMI in identifying needs and possibilities in all fields. We look forward to see what the future holds.

HIGHLIGHTING ARMI'S STRATEGIC FOCUS AREA: *FUTURE PERSPECTIVES*

We continue to develop our clear perspective on which research is needed to address tomorrow's large-scale problems through multidisciplinary and collaborative research.

ARMI Strategic Plan 2020–2025



Research Fellow Dr Frank Tulenko (Currie Group).

INTERNATIONAL COLLABORATIONS – FOSTERING GLOBAL LINKAGES

Our future is truly global. ARMI has built major international collaborative initiatives, including with researchers in Hong Kong and South America and through the Centre for Commercialisation of Regenerative Medicine (CCRM) Australia and the European Molecular Biology Laboratory (EMBL) Australia networks.

CCRM Australia was established by ARMI and forms part of an international network with the original organisation in Canada and future hubs in Europe, Japan, Singapore and Israel. ARMI, CCRM and its partners have worked towards building opportunities and programs such as the international mentoring program.

As another important international research link, ARMI group leaders, Associate Professors Edwina McGlinn and Mikaël Martino, are part of the Victorian Node of EMBL Australia. These links provide unique access to the best science in Europe and a new way to approach scientific endeavour.

INTERNATIONAL COLLABORATIONS – FOSTERING GLOBAL LINKAGES

INTERNATIONAL VISITORS TO ARMI

In addition to our international outreach, ARMI is always pleased to host prominent researchers from all over the world in our External Seminar Series. In 2022, Zoom enabled our staff and students to hear presentations and still have the opportunity to listen to the latest research findings, network online and link with the national and global research community (see page 91).

ADVANCING BIOMEDICAL SCIENCES BETWEEN MONASH AND OSAKA UNIVERSITIES

The strength and growth of the international partnership between Monash and Osaka universities was again on display in 2022 during the 4th Monash University – Osaka University Joint Symposium on Advanced Biomedical Sciences.

The event was held online in 2022, but the breadth and depth of discussion among 115 delegates and 12 presentations from scientists across multiple departments and institutes was still invigorating.

Opening remarks from distinguished guests emphasised the importance of exchanging ideas and resources with international peers and the advantages of relationships in driving the biomedical sciences forward. The guests included Professor Matthew Gillespie, Vice-Provost (Academic Affairs) at Monash University; Professor Genta Kawahara, Executive Vice President of Global Engagement at Osaka University; Mr Junji Shimada, Consul General of Japan in Melbourne and Mr Trevor Holloway, Consul General of Australia in Osaka.

In the keynote address, Professor Helen Abud from Monash Biomedicine Discovery Institute discussed her work on delineating stem cell dynamics in intestinal regeneration and cancer.

Other presentations covered topics including research on the mechanisms of injury and repair, genome editing, stem cells and regenerative medicine-mediated therapies in several diseases.

The Symposium also included updates showcasing collaborative projects among Australian and Japanese researchers that have grown throughout the partnership between Monash and Osaka universities.

ARMI Director Professor Peter Currie and Professor Atsushi Kumanogoh, Dean of the Osaka University Graduate School of Medicine then gave a wrap-up summary of the day.

To end the day, Professor Eiichi Morii, Vice President of Student Life at Osaka University, spoke of the spirit of transnational cooperation, the journey of discovery and the fierce pursuit of making an impact with research.

INTERNATIONAL COLLABORATIONS – FOSTERING GLOBAL LINKAGES

INTERNATIONAL FAMOUS PROGRAM AWARDS SEED GRANTS FOR COLLABORATIVE RESEARCH

Two ARMI researchers were among the first to receive grants from the FAMOUS Program to boost research collaborations among the researchers in the State of São Paulo in Brazil and Monash University in Australia.

The FAPESP (São Paulo Research Foundation) – Monash University Collaboration Seed (FAMOUS) program co-funded by ARMI, Monash University and FAPESP was established to support new collaborations in the health sciences among research groups in the two countries.

In addition to building and developing existing and new scientific connections, the program provides a platform for further post-pandemic scientific and health sciences collaborations.

Two ARMI group leaders and their collaborators received funding: 1) Dr Gonzalo del Monte-Nieto and Professor Hernandes Carvalho of Universidade Estadual de Campinas; and 2) Dr Nadinath Nillegoda and Professor Carlos Henrique Inacio Ramos of Universidade Estadual de Campinas.

The project between Dr Gonzalo del Monte-Nieto, Professor Hernandes Carvalho and their teams is investigating the role of a specific gene in normal cardiovascular development, adult homeostasis and disease. Using a combination of developmental and systems biology approaches in different model organisms and in vitro systems, this project aims to impact discovery of new genes that cause cardiovascular disease.

The project between Dr Nadinath Nillegoda, Professor Carlos Henrique Inacio Ramos and their research groups is investigating the molecular mechanisms underlying amyloid-type protein aggregation, a common feature of many neuro/neuromuscular degenerative disorders such as Huntington's disease. This work could lead to the development of potential new targets for treatments in a broad range of neurodegenerative disorders in humans.

The FAMOUS program was launched in late 2021, with 10 grants on offer in the first round. Given the impact of the COVID-19 pandemic on international travel, the emphasis has been on projects that could be completed with online activities.

The funding supports researchers to generate preliminary results for up to two years and provides a launchpad for developing longer-term projects through funding applications to FAPESP and Australian funding agencies.

FAPESP 60 YEARS 1962 - 2022 | MONASH University | ARMI AUSTRALIAN REGENERATIVE MEDICINE INSTITUTE

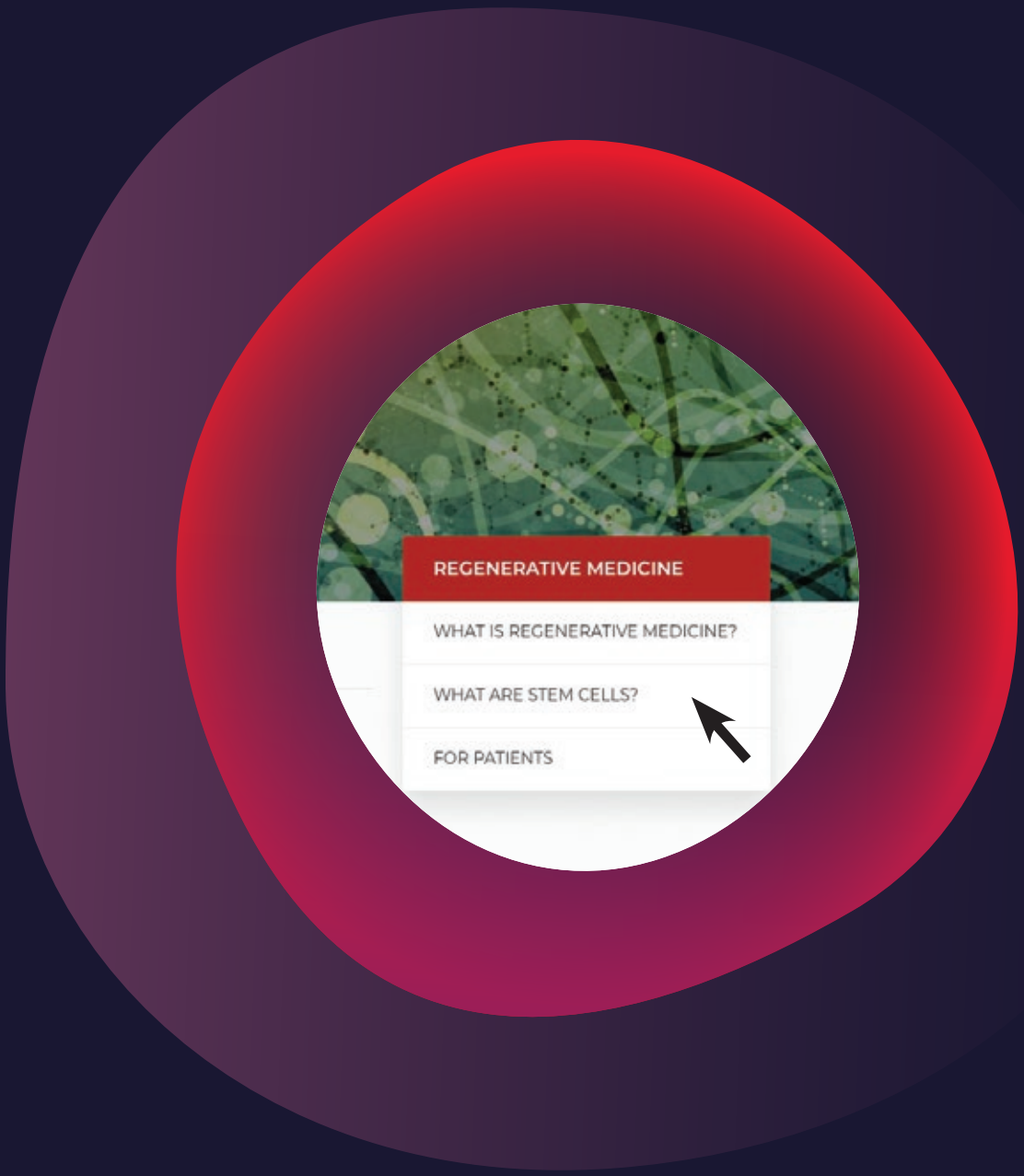
Honours student Dinasha Wimalasiri (Zenker Group).

OUTREACH – ENGAGING WITH THE PUBLIC

ARMI's early adoption and longstanding commitment to digital forms of communication fulfilled its promise when face-to-face outreach was impossible.

In 2022, our digital channels continued to provide information to the Australian public and helped us to interact with our global partners. This assists all stakeholders to improve their understanding of regenerative medicine's potential to contribute to public health and innovation.

The Institute's website, with its clean design and improved accessibility, continues to showcase ARMI's research and the beautiful images created by the scientists. Our world of regenerative medicine lives at – www.armi.org.au.



OUTREACH – ENGAGING WITH THE PUBLIC

Social media builds community

In 2022, our social media activity continued as the world emerged from the peak pandemic years. ARMI continued to develop engaging science content for the broader public through live-tweeting at events and sharing success stories.

An important aspect of improving scientific understanding is teaching our future researchers how to communicate through social media and other channels. This is simultaneously teaching and an outreach activity. ARMI's Social Media Ambassador Program is helping to train our future science communicators and disseminate our stories and successes with the public and within our organisation (see page 42 to learn more about our 2022 Social Media Ambassador).

FACEBOOK FOLLOWERS

9.4K

TOTAL REACTIONS TO POSTS 970
TOTAL COMMENTS ON POSTS 39

TWITTER FOLLOWERS

3.7K

TOTAL LIKES 875
TOTAL RETWEETS 194

LINKEDIN FOLLOWERS

2.2K

TOTAL CLICKS 2.6K
TOTAL LIKES, COMMENTS AND SHARES 2.3K

INSTAGRAM FOLLOWERS

772

TOTAL LIKES 744

WEBSITE
TOTAL USERS 27.7K
TOTAL PAGEVIEWS 85.7K

HIGHLIGHTING ARMI'S STRATEGIC FOCUS AREA:
EXTERNAL ENGAGEMENT

External engagement and communications stand us in good stead as the regenerative medicine sector grows and competition for talented researchers and funding increases.

ARMI Strategic Plan 2020–2025

OUTREACH – ENGAGING WITH THE PUBLIC

STUDENT RESEARCHER DISCOVERS THE POSITIVE IMPACT OF SOCIAL MEDIA ON RESEARCH PRACTICE

ARMI's Social Media Ambassador program had another great year of success in 2022, with another of our students using her skills in social media to improve the practise of research.

The 2022 Ambassador was Ms Rishika Turaga, who is completing a Master of Biotechnology in the laboratory of Professor Edwina McGlinn.

Ms Turaga was already a digital native and user of social media who understood connectivity and sharing knowledge in science, but she found the mentoring in the program enlightening.

"If you want to talk to researchers, realistically…how many people can you talk to physically? The number of people you can approach through social media is, on any day, higher than that through physical contact. Social media expands the field for connection and communication."

It was during this time that Ms Turaga realised how sharing research experiences on social media can go beyond explaining science and have a positive impact on research practice. She said she's keen to further explore this side of social media.

"It's only after I've seen people talk on Twitter…somebody saying that 'I need this mouse line' and then another scientist from another continent replying online 'Yes, I [have it]. And I can help you with it.'"

Another direct impact of social media on researchers is the inspiration gained through feelings of solidarity among students.

"People are doing their PhDs or Masters who just post about a 'day in their life.' And whenever they honestly talk about experiments not working or just having a bad day with their studies, I feel like there are people who I can relate to. It happens to everyone. We're all in this together."

Ms Turaga found a sense of solidarity in her research helpful after she moved from India to Melbourne.

"There are days where I'm like… nothing is working. How will I figure it out? But that's just one experiment… and then my supervisor walks up to me and tells me that I did a good job. That changes the whole thing."

She has always felt excited by the variety and exploratory aspects of science and has found her current research field makes the experience of every day different.

"This is what I like, this is what I can imagine myself doing in the future."

OUTREACH – ENGAGING WITH THE PUBLIC

ARMI RE-OPENS THE DOORS FOR A BEHIND-THE-SCENES LOOK AT RESEARCH IN ACTION

After the disruptions of COVID-19, more than 40 people were again able to see the inner workings of the Institute in the sold-out "Opening the Vault" event held in partnership with the Convergence Science Network.

ARMI Director Professor Peter Currie said he was excited about the return of the event because maintaining a relationship with the public is critical.

"With the COVID-19 pandemic, awareness of biomedical research and its impacts on our community's health has never been higher. But so has misinformation. As such, we have to inform people of our research activities and how their contribution, whether through tax and public funding or philanthropy, is helping us achieve our goals of better understanding the human body and how to harness that to improve the lives of patients."

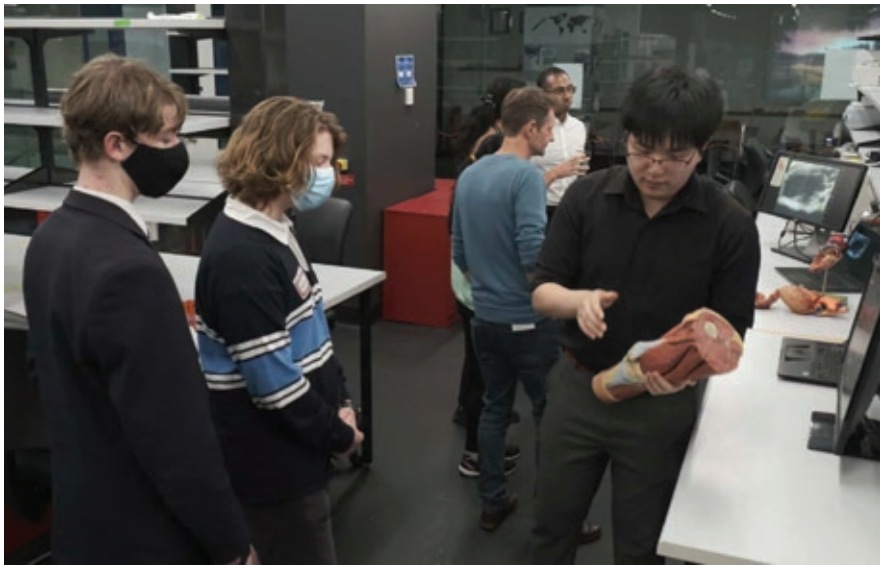
The 2022 science-curious group ranged from primary school children to retirees in their 70s. Convergence Science Network Convenor Mr Luan Ismahil said it was exciting to see people of all ages at the event.

"Making science accessible to all is imperative, especially when it comes to inspiring the next generation of researchers," he said.

"The 'Opening the Vault' events provide a welcoming and safe environment for people to explore what happens in labs and science facilities across Melbourne. Science communication and public engagement are at the core of the Convergence Science Network ethos with more events planned for 2023."

Visitors had a tour of ARMI's high-tech facilities and chatted with our scientists about their research projects.

The tour of the always-popular AquaCore facility and aquarium walkthrough gave visitors an understanding of how zebrafish and salamanders can advance research into regeneration and stem cells.

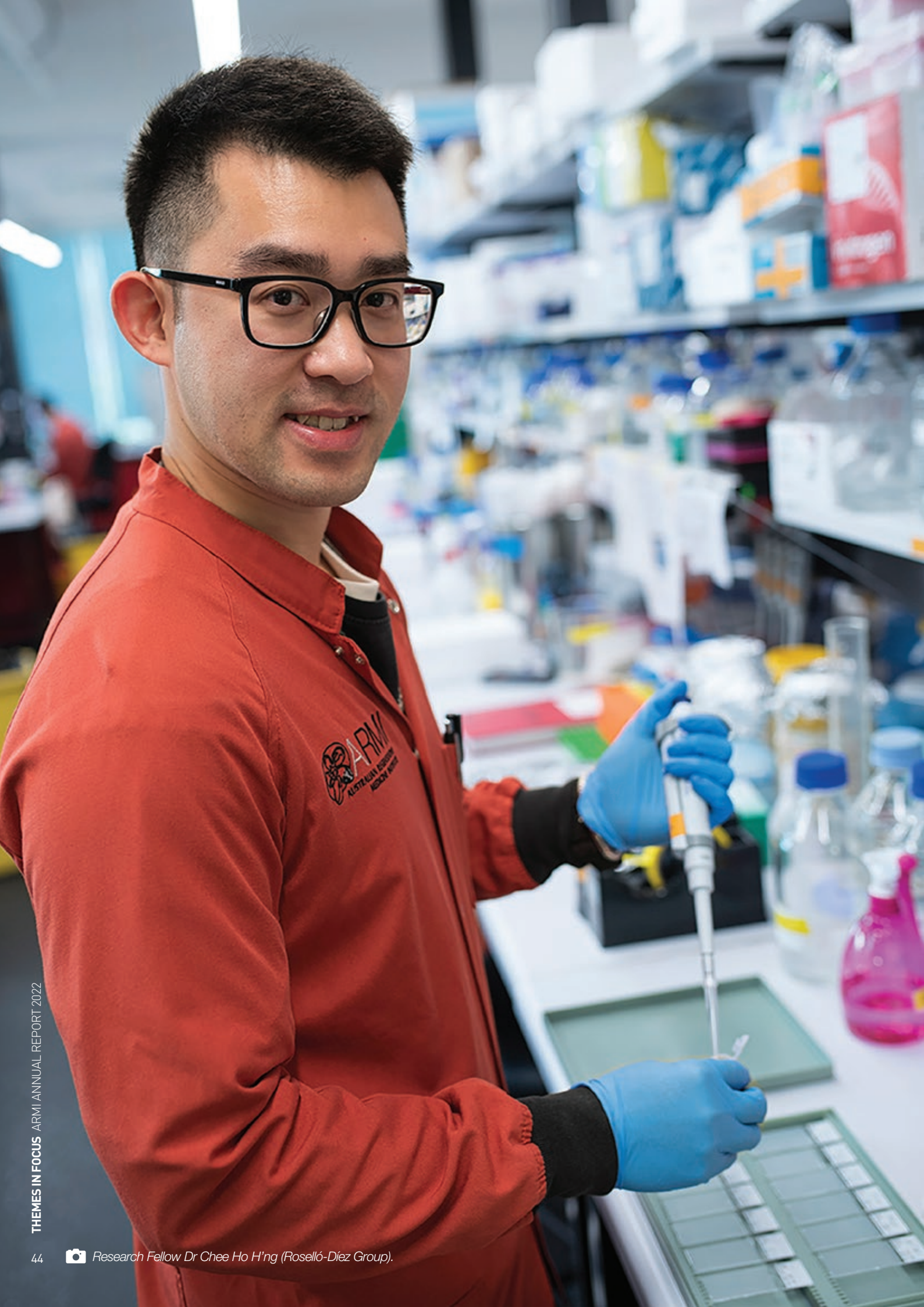


Visitors investigate the displays at the "Opening the Vault" event. Image credit: Convergence Science Network

People also had a first-hand view of powerful imaging technologies and were able to see for themselves live imaging of an early mouse embryo.

Given the public's knowledge of the immune system during COVID have increased substantially, one of the exhibits summarised some of our current work in developing immune-based therapeutic proteins to improve tissue healing.

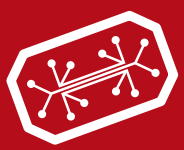
This research had a clear clinical application and feedback showed it had a clear impact on visitors.



Research Fellow Dr Chee Ho H'ng (Roselló-Díez Group).

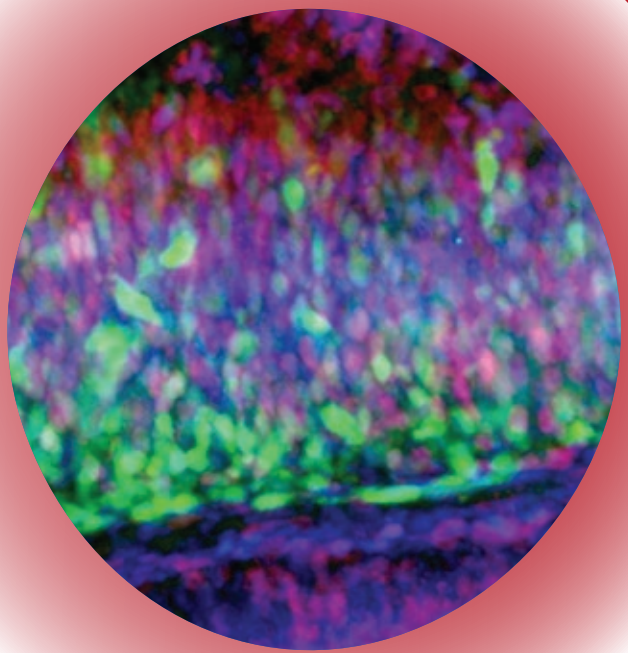
FIVE DISCOVERY PIPELINES BACKED BY INNOVATIVE RESEARCH TEAMS

RESEARCH AT ARMI IS STRUCTURED ALONG FIVE INTEGRATED DISCOVERY PIPELINES THAT ALLOW OUR RESEARCH TEAMS TO EXPLORE SPECIFIC ASPECTS OF THE REGENERATIVE PROCESS.

HEART AND MUSCLE DEVELOPMENT AND REGENERATION 	Cardiovascular diseases (CVDs) are the number one cause of death globally: more people die annually from CVDs than from any other cause. An estimated 17.9 million people died from CVDs in 2016, representing 31 per cent of all global deaths. Of these deaths, 85 per cent are due to heart attack and stroke. ARMI researchers study animals with highly sophisticated and specific tissue regenerative qualities, developing cures for heart disease and other muscular disorders, including dystrophies that can be translated to the patient bedside.
IMMUNITY AND REGENERATION 	Soon after birth, our immune systems mature and we lose our capacity to respond to damage with scar-free healing. ARMI scientists explore the animal kingdom's relationships between immunity and regeneration to enhance tissue repair in patients with wounds or degenerative diseases.
STEM CELLS AND REGENERATION 	Stem cells are integral to the development of tissues in the embryo and persist in adults as essential building blocks for our bodies. ARMI studies embryonic stem cells as a window on the mechanisms of human development and as an essential part of the tool kit of regenerative medicine. ARMI has devised methods for growing stem cells that can be used to repair damaged tissue, investigate diseases, test drug candidates for therapeutic safety and effectiveness, and develop ways to enhance the intrinsic mechanisms of stem-mediated repair. In addition, ARMI can offer IP on specific stem cells for culturing and scale-up and models that allow testing of stem cell potency.
NEURAL REGENERATION 	Unlocking the regenerative potential in the central nervous system is crucial so it can be harnessed to treat neurodegenerative disorders. ARMI scientists tackle the fundamental obstacles in neural repair for diseases such as multiple sclerosis and Alzheimer's disease by uncovering neural regenerative potential across the animal kingdom.
ORGAN ENGINEERING AND SYNTHETIC BIOLOGY 	ARMI is exploring several innovative techniques to enhance function and form that is lost because of ageing and degenerative diseases. These techniques explore various aspects of tissue engineering, including organoid and organ on a chip technology, bioactive biomaterials and biointerfaces that simulate the cellular microenvironment at the micro and nanoscale, functional biomaterials and synthetic and biological matrices for tissue engineering and transplant development.

HEART AND MUSCLE DEVELOPMENT AND REGENERATION

A human heart beats more than four billion times in an average lifetime, yet, unlike other tissues in the body, the heart cannot regenerate or replace damaged tissue. However, some organisms, such as the zebrafish, can repair injuries to the heart without any scar tissue or collateral damage. This gives researchers a unique opportunity to study these organisms to unlock the secrets of heart tissue regeneration. ARMI researchers are studying zebrafish to develop cures for heart muscle degenerative disease and to discover new ways to mend a broken heart.



Neural tube electroporation with U2-GFP to target neural crest cells of chick embryos.

HEART AND MUSCLE DEVELOPMENT AND REGENERATION

Professor Peter Currie

PETER CURRIE

The Currie Group is curious about the biological mechanisms of the zebrafish, a freshwater fish that is native to South-East Asia.

Zebrafish are used in scientific research to understand human genetics and the biological processes of human diseases.

They are beneficial because they grow quickly and are optically transparent. The zebrafish embryo is clear – every cell in the forming embryo can be seen. It also shares 70 per cent of the genetic code of *Homo sapiens*.

RESEARCH

The Currie Group uses zebrafish embryos to learn about muscle cell types. In particular, the group is interested in how specific muscle cell types are determined within the developing embryo, how they grow and how they regenerate after injury.

Associate Professor Edwina McGlinn

EMBL Australia

EDWINA MCGLINN

The McGlinn Group focuses on elucidating novel gene networks that drive growth and identity in the early embryo.

RESEARCH

The McGlinn Group is particularly interested in critical developmental regulators, the *Hox* genes and how micro-RNAs shape Hox functional output during vertebral column and spinal cord formation.

They use elegant mouse genetics coupled with cutting-edge functional genomics technologies to unravel novel gene networks and mechanisms of regulation.

HEART AND MUSCLE DEVELOPMENT AND REGENERATION

Associate Professor Mirana Ramialson

MIRANA RAMIALISON

The Ramialison Group is studying development and disease. They are a multidisciplinary team of computational and molecular biologists specialising in genomics. The researchers answer complex questions using new genomic technology and the zebrafish as a model organism.

RESEARCH

The research team applies systems biology (the study of biological components – molecules, cells, organisms or entire species) to reconstruct the cardiac gene regulatory networks and to work out what leads to proper heart formation and what causes congenital heart disease.

2022 HIGHLIGHTS

- The Ramialison Group published 11 manuscripts (see references 6, 17, 19, 20, 24, 42, 47, 51, 55, 56, 61 in Appendix 1), including one in the high-ranking journal *Nature Communications*, and a book chapter (see reference 11 in Appendix 1).

Dr Gonzalo del Monte Nieto

GONZALO DEL MONTE-NIETO

Cardiovascular disease is the major killer worldwide, with congenital heart disease affecting 1 in 100 live-born babies in Australia. The del Monte-Nieto Group is interested in understanding the molecular mechanisms and developmental processes orchestrating normal heart development in embryos and translating this knowledge to better understand congenital and adult heart disease and cardiac regeneration.

Understanding the cellular and molecular processes normally happening during embryonic development that, when dysregulated, lead to disease will allow us to design efficient genetic screening methods and therapies to ameliorate disease sequelae, including cardiac regeneration after myocardial infarction.

2022 HIGHLIGHTS

- Dr Gonzalo del Monte-Nieto and colleagues received funding from the National Health and Medical Research Council to investigate the morphological and molecular origin of non-compaction.
- The del Monte-Nieto Group also received funding from the FAPESP-Monash University Collaboration Seed Program (FAMOUS) to investigate the role of the *WFDC1* gene in cardiovascular development and its potential applications in translational medicine.
- Dr del Monte-Nieto was invited to speak about his research at the Albert Einstein College of Medicine, New York in September; at the Victor Chang Cardiac Research Institute, Sydney in October; and the Australian Network of Cardiac and Vascular Development Biologists Annual Meeting in Sydney in November.
- He was also invited to present at the "Pulling on Heart Strings: Understanding and Visualizing Molecular Mechanisms in the Developing Heart" webinar in Melbourne.
- The del Monte-Nieto Group published a manuscript in the *Journal of Molecular and Cellular Cardiology* (Mohenska and colleagues, see reference 47 in Appendix 1) describing using transcriptomics and 3D-modelling to produce a spatial transcriptional atlas of the mammalian heart.
- The group also published an editorial in *Frontiers in Physiology* (Chimenti and colleagues, see reference 12 in Appendix 1) on fibrosis and inflammation in tissues and diseases, including in renal and cardiac fibrosis.
- Dr del Monte-Nieto and colleagues published an abstract in *Heart Lung and Circulation* ("Development of a vascularised cardiac organoid platform reveals a regulatory role for extracellular matrix environment on muscle functionality").

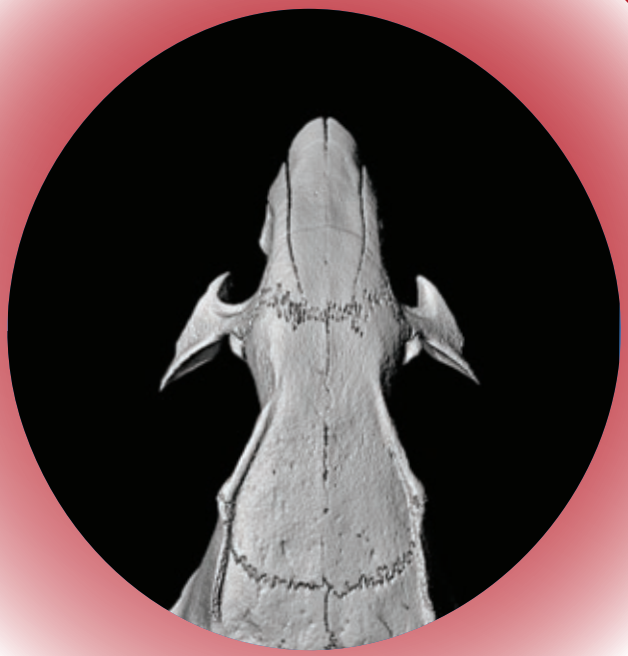
(L–R): Senior Research Assistant Ms Slike Berge and Research Fellow Dr Frank Tulenko in the Currie Group laboratory.

IMMUNITY AND REGENERATION

Before birth, the human immune system allows the body to heal injuries and tissues without forming a scar. But soon after birth, the immune system matures and the capacity to regenerate tissue and repair damage with scar-free healing is lost.

Just how the immune system regulates this prenatal tissue regeneration is still unknown. Researchers have studied animals with a wide range of regenerative capabilities and discovered that the immune system can either aid or hinder tissue repair. The greatest regenerative capacity is achieved by carefully orchestrating particular immune system responses.

ARMI scientists are examining the relationships between immunity and regeneration across the animal kingdom to learn how to enhance tissue repair in patients with wounds or degenerative diseases.



This image shows reconstitution of a rat skull by micro computed tomography (microCT). Two circular bone defects on the calvaria were regenerated after two months by the local delivery of engineered human growth factors.

IMMUNITY AND REGENERATION

Professor Graham Lieschke

GRAHAM LIESCHKE

The Lieschke Group studies the haemopoietic system and leukocytes. The haemopoietic system is a collection of organs and tissues (bone marrow, spleen, lymph nodes, etc.) responsible for producing blood cells.

Leukocytes (white blood cells) are the key cells that defend the body against foreign substances. They also play a significant role in determining whether tissue repairs and regenerates rather than scars after injury.

RESEARCH

The Lieschke Group study blood cell development and function using the zebrafish as a model organism. They look at mutant zebrafish with faulty blood cell development to find insights into the genes that regulate the haemopoietic system.

Mutant zebrafish also assist with understanding the role of leukocytes in inflammation and healing. Infection models that stimulate leukocytes in action are used to investigate the host-pathogen response.

2022 HIGHLIGHTS

- Professor Graham Lieschke and colleagues at the University of Queensland received an ARC Discovery Project Grant to study the trails of cellular fragments left by macrophages as they migrate.
- New funding for the Lieschke Group also included a Medical Research Future Fund grant and a National Institutes of Health grant on which Professor Lieschke was part of the team of investigators.
- PhD student Abdulsalam Isiaku graduated in 2022. His thesis was titled “Zebrafish models for studying cell-autonomous functions of neutrophils and macrophages”.

IMMUNITY AND REGENERATION

Associate Professor Mikaël Martino

EMBL Australia

MIKAËL MARTINO

The Martino Group combines immunology, stem cells and bioengineering research to understand the molecular and cellular mechanisms governing tissue repair and regeneration. Using the findings from the lab, the group aims to engineer novel regenerative strategies.

RESEARCH

To design successful regenerative therapies and make regenerative medicine a more widespread reality, we need to understand how our bodies can create an environment suitable for regeneration. For instance, tissue injury and the healing process are usually accompanied by activating our immune system. The type of immune response, its duration, and the cells involved can considerably change the outcome of the healing process from incomplete restoration (causing scarring/fibrosis and loss of function) to complete recovery (regeneration).

One of the group's main goals is to reveal the key mechanisms by which the immune system leads to tissue repair or regeneration. Our research tools include genetically modified and chimeric mice and injury models in tissues such as bone, skin and muscle. Ultimately, the group seeks to engineer efficient regenerative strategies that integrate control of the immune system using various bioengineering approaches (such as biomaterials, protein engineering or immune engineering).

2022 HIGHLIGHTS

- The Martino Group was awarded several grants – a National Health and Medical Research Council Ideas Grant, in collaboration with Dr Julien Legrand; two Medical Research Future Fund grants; and an Australian Research Council Linkage Grant, in collaboration with Professor Peter Currie and AstraZeneca.
- Associate Professor Mikaël Martino and Professor Peter Currie received funding for the spinoff biotech company, Myostellar, which focuses on developing new protein therapeutics for muscle regeneration and treatment of muscular dystrophies.
- PhD student Bhavana Nayer was awarded the Best Oral Presentation in the Student and Young Investigator category at the Tissue Engineering and Regenerative Medicine International Society Conference, South Korea.
- Yasmin Alshoubaki graduated with a PhD degree in December 2022.

Senior Research Officer Lisa Wong (Currie Group).

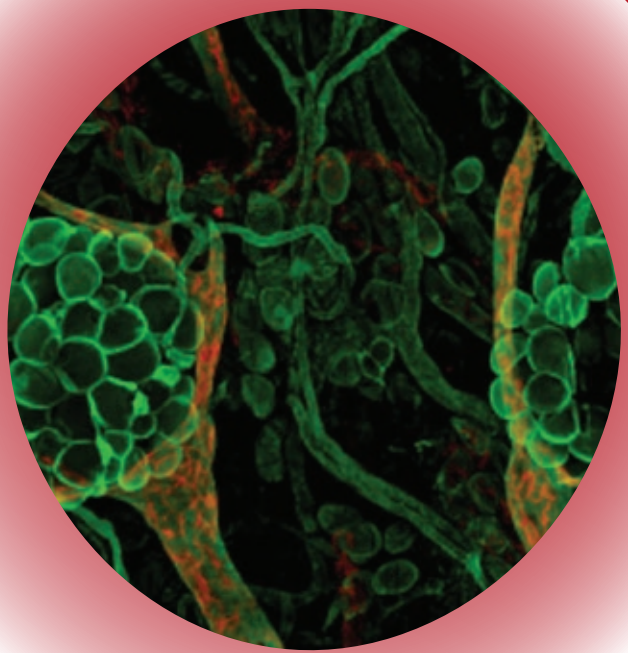
STEM CELLS AND REGENERATION

Stem cells are less specialised cells that divide and differentiate into diverse, specialised cells to form a vast array of tissues. Stem cells can be grown in the laboratory and can be used to:

- **repair damaged tissue**
- **investigate particular diseases**
- **test the therapeutic safety and effectiveness of potential new drugs.**

Cancer stem cells can proliferate to form persistent, self-renewing tumours and understanding how this happens could help researchers create future new treatments.

Researchers at ARMI study stem cells as a window on the mechanisms of development and as an essential part of the toolkit of regenerative medicine.



Mouse adipose tissue (green) and blood vessels (red).

STEM CELLS AND REGENERATION

Dr Jennifer Zenker

JENNIFER ZENKER

One of the most fascinating and most important question in biology is how pluripotent cells transform into diverse cell types to form complex tissues. Pivotal advances were made recently on the genetic and epigenetic level yet a mystery remains. How are cell fate decisions regulated? We can shed light on the mystery by understanding the cell biology of pluripotent cells – in space and time, under physiological 3D conditions and at the cellular and subcellular level.

To unravel how the microtubule cytoskeleton controls cell state transitions, the Zenker Group uses innovative live-imaging technologies to visualise the development of living preimplantation mouse embryos and human induced pluripotent stem cells (hiPSCs).

Organelles and proteins are usually not randomly distributed inside a cell, but assigned to regions where they are needed. The cell uses a network of filament-like structures, the microtubule cytoskeleton, as a road map to localise organelles and to intra- and intercellularly trigger the relay of signals.

The microtubule network in early mammalian embryogenesis was widely regarded as disorganised and its contribution to cell fate specification was largely ignored. The Zenker laboratory was the first to demonstrate the importance of the microtubule network in early mammalian embryogenesis and have published several manuscripts including in the prestigious journals, *Science* and *Cell* (Zenker et al., 2017, *Science*; Zenker et al., 2018, *Cell*; Hawdon et al., 2021, *Development*; Greaney et al., 2021, *JoVE*).

Like pluripotent cells in the living embryo, hiPSCs have the ability to differentiate into any cell type that is found in the adult body. Examining the inside of living pluripotent stem cells makes it possible to spot true pluripotent stem cells within a cluster of cells and to rectify the subcellular organisation by developing innovative non-invasive light-inducible microtubule drugs. Our work will enable us to significantly refine the current technologies to generate and select successfully reprogrammed cells for regenerative applications.

2022 HIGHLIGHTS

- The Zenker Group published a review in *Current Opinion in Cell Biology* summarising the role of diverse microtubule organising centres across mammalian preimplantation embryos (Martínez and colleagues, see reference 44 in Appendix 1).
- Dr Jessica Greaney was awarded a Faculty of Medicine, Nursing and Health Sciences (FMNHS) Early Career Researcher Postdoctoral Fellowship.
- Dr Greaney was also awarded two travel grants, one from ARMI and another from FMNHS.
- PhD student Azelle Hawdon received three awards for best oral presentations at national conferences – the Society of Reproductive Biology (SRB) Merck Presentation Award, the SRB David Healy New Investigator Award and the Best PhD oral presentation at the Hunter Cell Biology Meeting held in Newcastle, NSW.
- Azelle Hawdon was also invited to speak at ComBio 2022, a conference that incorporates the annual meetings of the Australian Society for Biochemistry and Molecular Biology, the Australian Society of Plant Scientists, the Australia and New Zealand Society for Cell and Developmental Biology, the Genetics Society of AustralAsia and the New Zealand Society for Biochemistry and Molecular Biology.
- Dr Jennifer Zenker was awarded the Sylvia and Charles Viertel Senior Medical Research Fellowship.

STEM CELLS AND REGENERATION

Professor Andras Nagy

ANDRAS NAGY

Cell-based therapies can potentially treat many currently incurable degenerative diseases by replacing missing or damaged tissues or generating cells with unique biological activity at the disease site. The Nagy Group is creating "designer" cells that incorporate pre-engineered functional elements to confer novel therapeutic features. These features include inducing allograft tolerance, reducing tumour risk, live-cell tracking and cell sensors and expressing local-acting secreted biologics. These functional elements act as building blocks, which can be combined and customised for cell therapy applications across various species and disease models.

RESEARCH

The Nagy Group's research efforts are highly collaborative and coordinated with our sister lab in Toronto, Canada. At ARMI, the Nagy Group is predominantly focused on developing cell therapies for brain injury, stroke and multiple sclerosis (MS). We work with mouse, human and nonhuman primate pluripotent stem cell systems using technologies such as CRISPR/Cas9-mediated genome editing, somatic cell reprogramming, directed differentiation and piggyBac transposase-mediated gene transfer. To learn more about the Toronto-based Nagy Group and research interests, see http://research.lunenfeld.ca/nagy/.

Professor Susie Nilsson

SUSIE NILSSON

The Nilsson Group is involved in several research projects that focus on understanding haemopoietic stem cells – the stem cells responsible for producing blood and immune cells.

Haemopoietic stem cells are a very important part of the body as they are continually renewing blood, creating billions of new blood cells each day. They are in the bone marrow, the flexible tissue found inside most bones.

RESEARCH

The main objective of the group's research is to characterise the microenvironment in which blood stem cells reside. In addition, the group studies blood stem cells at a cellular and molecular level and analyses how the stem cells develop into new blood cells.

Learning more about normal and diseased stem cells will lead to better prevention, clinical diagnosis and treatment. This will ultimately improve human health. For example, cancer patients might have better outcomes if researchers can improve bone marrow transplantation by finding new ways to replace normal cells destroyed during anticancer therapy. Essentially, better bone marrow transplantation will allow higher doses of chemotherapy or radiation to be given, which will be a more effective form of treatment.

STEM CELLS AND REGENERATION

Professor José Polo

JOSÉ POLO

The Polo Group is interested in the transcriptional and epigenetic mechanisms that govern cell identity and cell fate. It focuses on pluripotency and reprogramming somatic cells into induced pluripotent stem (iPS) cells and other mature cell types.

Being able to reprogram any specific mature cell into a pluripotent state and then back into any other particular cell gives the group a unique tool to study the molecular and cellular events that permit the conversion of one cell type to another.

Moreover, iPS cells and the reprogramming technology are of great interest in pharmaceutical and clinical settings, as the technology can be used to generate animal and cellular models for the study of various diseases as well as provide (in the future) specific patient tailor-made cells for their use in cellular replacement therapies.

RESEARCH

The Polo Group is dissecting the nature and dynamics of the process using a broad array of approaches using mouse models and a combination of different molecular, biochemical and cellular techniques and genome-wide studies.

2022 HIGHLIGHTS

- The Polo Group published 13 manuscripts in several high-impact journals including in *Nature Communications* (see references 10, 13, 14, 21, 22, 28, 30, 32, 37, 39, 47, 48 and 57 in Appendix 1).
- The Polo Group also published a book chapter – *Characterization of mammalian regulatory complexes at single-locus resolution using TINC* (see reference 34 in Appendix 1).
- Professor José Polo was awarded the Presidential Medal of the Australia and New Zealand Society for Cell and Developmental Biology (ANZSCDB).
- Dr Anja Knaupp was promoted to Group Leader at the Monash Biomedicine Discovery Institute. Her research interests include characterising cell-type-specific sets of proteins, and the molecular mechanisms and drivers that influence cellular identity.
- PhD student Joseph Chen was awarded the ARMI Student Prize for PhD Program.
- PhD student Jia Tan was awarded the Carmela and Carmelo Ridolfo Prize in Stem Cell Research.
- Dr Xiaodong (Ethan) Liu was awarded the Victorian Premier's Awards for Health and Medical Research for Basic Science and Research Excellence.

NEURAL REGENERATION

Researchers now know that the adult brain retains plasticity (the ability to change) throughout life and can respond to injury or disease. This ability can determine healthy ageing and mental functioning. In addition, understanding the regenerative potential of the brain and central nervous system will assist researchers in finding new treatments for neurodegenerative disorders.

Uncovering neural regenerative potential across the animal kingdom helps ARMI scientists to tackle the fundamental obstacles to more effective neural repair in diseases like multiple sclerosis (MS), stroke, spinal cord injury and Alzheimer's disease.

Samples ready to be processed for imaging.

NEURAL REGENERATION

Professor James Bourne

JAMES BOURNE

The Bourne Group is at the forefront of understanding visual brain development and plasticity and studying pathology states such as stroke.

The group uses the non-human primate (marmoset monkey) visual system as a research model to address how the complex visual cortex is established. The non-human primate visual brain's protracted development allows for a greater understanding of how different brain areas establish connections and ultimately mature, with implications for diseases such as schizophrenia and autism.

The marmoset serves as an invaluable model in stroke research as the nonhuman primate brain has a high degree of anatomical and physiological similarity with the human brain. This similarity is not evident in other species. Furthermore, lessons learned from brain injury in the monkey have given the group greater capacity to translate the results, providing significant hope for stroke victims.

RESEARCH

The group has three primary focuses that are studied in parallel. These are:

- to explore the development and maturation of the visual brain in non-human primates
- to determine which brain areas enable residual vision following significant brain injury
- to understand the cellular and systemic effects that occur following stroke.

DEVELOPMENT AND PLASTICITY

The cerebral cortex of an adult is an intricate system of interconnected areas. How these areas emerge and mature seamlessly and establish connections with other parts of the brain is unknown. The Bourne Group has made many significant findings and discoveries in neurobiology through molecular biology techniques, magnetic resonance imaging and neural tracing.

NEUROREPAIR

It is now accepted that the brain is in its most plastic state early in life and is more amenable to repair following injury. The Bourne Group is beginning to uncover which molecules are present in the neonatal brain and which ones are responsible for greater permissibility of functional recovery following brain injury than an adult brain that has suffered an identical injury.

The group has developed a novel model of stroke that will translate to the clinic and enables the researchers to explore how the brain responds to injury early and late in life. The researchers have used this model in conjunction with molecular biology techniques and live multiphoton imaging to shortlist some candidate molecules that may prove beneficial to patients who have had a stroke.

NEURAL REGENERATION

Associate Professor Jan Kaslin

JAN KASLIN

The Kaslin Group is interested in cellular plasticity in the brain and spinal cord. In particular, the group studies how the neural system can repair itself by mobilising stem cells and how researchers can improve this process.

RESEARCH

In the past, neural stem cells and brain regeneration have mainly been studied in vertebrates (such as rodents). But this raises a problem because these vertebrates have limited potential to regenerate.

Zebrafish can regenerate parts of its central nervous system – even when they are adults. Therefore, using the zebrafish model has many advantages for researchers, as it can solve questions about tissue repair that previously could not be answered in other models.

The Kaslin Group uses the zebrafish and other non-mammalian models to reveal how neural stem cell populations are formed during development and how they can be controlled to improve repair after injury or disease.

The group's first fundamental research stream aims to decipher the cellular and genetic drivers of CNS growth and repair using an evolutionary approach. By using genomics, imaging and experimental validation in the models, the Kaslin Group studies how neural repair mechanisms evolved within the vertebrate lineage.

The second translationally directed research stream aims to define novel genes in congenital neurodevelopmental disorders and childhood dementias. This project capitalises on rapid testing of disease causing genes in fish models with the aim to validate human data, define neuropathological mechanisms, discover novel diagnostic biomarkers and perform drug screens to identify compounds for clinical translation.

2022 HIGHLIGHTS

- The Kaslin Group published six papers, including one in the high-impact journal, *American Journal of Human Genetics* (Kurolap and colleagues, see reference 35 in Appendix 1).
- Associate Professor Jan Kaslin also contributed a chapter in the book *"Essentials of cerebellum and cerebellar disorders. A primer for graduate students"* (see reference 31 in Appendix 1).
- The Kaslin's group manuscript describing targeted isolation of alkaloids using virtual screening and molecular networking (Lever and colleagues, see reference 41 in Appendix 1) was awarded the "Editor's Choice" and an image from the manuscript appeared on the cover.
- An image showing an assay that enables accelerated neurotoxicity testing appeared on the cover of the journal *Zebrafish* (Henry and colleagues, see reference 25 in Appendix 1).
- An entry from Alon Douek (PhD student) was awarded first place in the Video/ Moving Image category of the 2022 Monash Micro Imaging Competition.
- Dr Samuel Crossman won the best post-doctoral oral presentation award at the Victorian state conference of the Australian and New Zealand Society for Cell and Developmental Biology (ANZSCDB).

NEURAL REGENERATION

Dr Nadinath Nillegoda

NADINATH NILLEGODA

Protein conformational diseases with pathological consequences such as those leading to neurodegeneration and dementia coincide with the formation and accumulation of protein aggregates in affected cells/tissues over time, leading to cellular proteostasis breakdown. Often, symptoms linked to these disease conditions become apparent only in the long-lived, ageing communities and thus limits our ability to develop preventive therapeutics.

The Nillegoda Group probes attractive new proteostasis-based directions for future therapeutic interventions that could potentially slow or reverse neurodegeneration and apply to a broad range of disorders from Alzheimer's disease to multiple sclerosis.

RESEARCH

Misfolding/aggregation of cellular proteins is amplified upon exposure to various acute proteotoxic stresses (e.g. oxidative damage and heat shock), chronic disease conditions (e.g. neurodegeneration) and ageing.

The Nillegoda group uses cutting-edge in vitro and in vivo techniques to study chaperone-based protein quality control machineries mediating cell repair. A main current focus of the group is dissecting the mechanism and regulation of a new class of human protein disaggregases that helps clear aggregated protein junk from cells. These studies provide valuable insights into the complex pathology of neurodegenerative diseases and help us to devise strategies to boost aggregate clearance in affected tissues and to reduce neurotoxicity in brain cells.

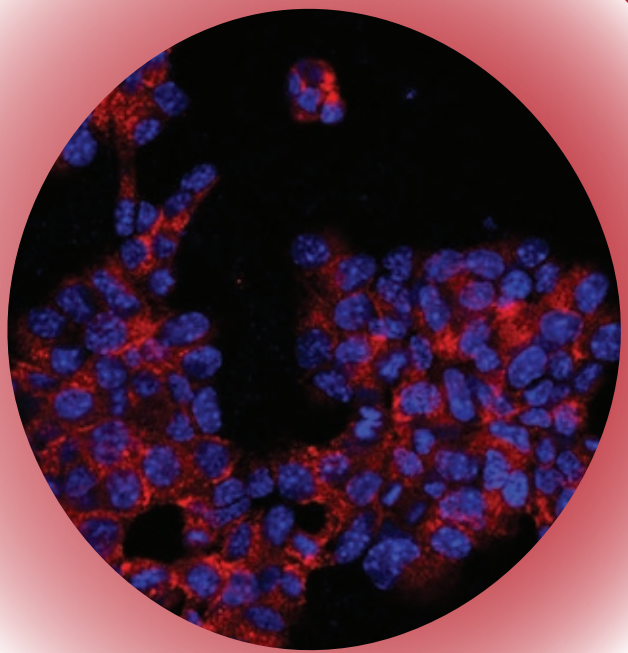
Dr Toby Merson

TOBY MERSON

The Merson Group studies the cellular and molecular interactions between neurons and myelin-forming oligodendrocytes in the central nervous system.

A major goal of the group's research is to develop strategies to promote myelin repair in diseases such as multiple sclerosis. The group is also interested in the role of oligodendrocyte turnover and myelin remodelling in cognitive processes such as learning and memory and the contribution of myelin dynamics to neurological disorders.

ORGAN ENGINEERING AND SYNTHETIC BIOLOGY



Insulin in pancreatic beta-cells.

ORGAN ENGINEERING AND SYNTHETIC BIOLOGY

Dr Alberto Roselló-Díez

ALBERTO ROSELLÓ-DÍEZ

The aim of regenerative medicine is not only to recover the integrity of individual organs but also to maintain the proportions with the rest of the body. The Roselló-Díez Group uses animal models to study the local and systemic mechanisms that orchestrate organ growth and repair in vertebrates. The ultimate goal is to lay the groundwork for regenerative therapies to boost these mechanisms.

RESEARCH

The Roselló-Díez Group studies the signals within the bones and between them and other tissues/organs during development and regeneration. At the local level, the group studies phenomena such as compensatory proliferation in response to biochemical and mechanical changes in the cell vicinity. At the systemic level, the group explores the role of the vascular and nervous systems in the bidirectional communication between the bones and the rest of the body.

2022 HIGHLIGHTS

- The Roselló-Díez Group welcomed a new member, the bioinformatician Postdoctoral Fellow, Shani Amarasinghe.
- PhD student Ehsan Razmara passed his confirmation milestone in 2022.
- Postdoctoral student Dr Chee Ho H'ng won the poster prize at the Hunter Cell Biology Meeting held in Newcastle, NSW.
- Dr Alberto Roselló-Díez was invited to present at the virtual International Society of Regenerative Biology meeting and in person, at the International Conference for Limb Development and Regeneration.
- The editors of the journal *Development* invited Dr Roselló-Díez to submit an "In preprints" article of the group's research (McCusker and colleague, see reference 46 in Appendix 1).
- The Roselló-Díez Group was awarded an ARMI Accelerator grant to kick start the group's exciting research on interspecies chimeras.

OPERATIONS AND GOVERNANCE
CORE TECHNICAL FACILITIES AND SERVICES

AQUATICS RESEARCH PLATFORM

AquaCore

AquaCore is a unique Aquatics Research Facility in Australia. It houses and breeds essential model organisms for regenerative biology, including zebrafish, Medaka, Killifish, sharks, turtles and axolotls.

Zebrafish are key tools in biomedical research, including regenerative medicine. Researchers use them to model human diseases and injuries to improve their understanding of how the body regenerates. AquaCore houses 1,000 quarantine and 5,200 non-quarantine tanks and supplies and houses zebrafish, which the researchers use.

AquaCore can provide wild-type zebrafish as well as genetically modified and mutant strains. The facility is the largest of its kind in the southern hemisphere and can meet the needs of ARMI, Monash University and the external biomedical research community. The facility also can host additional freshwater fish such as Medaka fish.

AquaCore is certified to a Physical Containment level 2 (PC2) by the Office of the Gene Technology Regulator. The large zebrafish quarantine facility is approved by the Australian Quarantine and Inspection Service and provides infrastructure and know-how for imports of zebrafish for laboratories in Australia.

In addition to the aquarium facilities, AquaCore has a phenotyping laboratory with the infrastructure necessary for phenotypic analyses, embryonic and adult fish manipulation and the generation of transgenic animals. It also has microscopes with microinjection apparatus, dedicated confocal microscopy for time-lapse analysis of live animals, and laser ablation and single-cell labelling equipment.

Axolotls are a well-studied animal regeneration model as they can fully regenerate limbs and organs, much like zebrafish. As they are very primitive vertebrates, sharks are critical to understanding the evolution of development and regenerative biology.

The facility has several separate water recirculating systems, including tempered and tropical freshwater (zebrafish, Medaka, axolotl, Killifish) and seawater systems (sharks and turtles).

The axolotl facility is used to maintain a breeding colony of various pedigree axolotls. It houses large 1.5-metre tanks for breeding adults and hundreds of tanks for rearing and keeping larvae and juveniles.

The marine system houses a broodstock of tropical epaulette sharks *Hemiscyllium ocellatum* and a cold-water incubation system for elephant shark *Callorhinchus milii* embryos. The facility can also accommodate additional marine animals; for example, the facility transiently hosts juvenile marine turtles.

The Monash Transgenic Quail Facility (MTQF) was established by ARMI researchers to create a unique research platform using birds for genetic manipulation.

A collaboration among ARMI, Monash University and CSIRO Geelong, the MTQF is the first transgenic quail facility in the world and the first to apply the powerful gene-editing technology (CRISPR) to quails.

MTQF produced several proof-of-concept transgenic quail lines to provide disease and experimental models for researchers worldwide.

Genetic manipulation of birds is a relatively recent development compared with widely used mice and other mammals. Although the use of chickens is growing, transgenic quails reach sexual maturity in six weeks (six months for chickens), making the quail a faster and cheaper alternative to transgenic chickens, with which they share 96 per cent genetic similarity.

Avian models are better than mice in some situations because birds produce many eggs (one egg per day per female) that give easy access to the embryo. Birds have some useful genetic links with humans, and some tissues are better for comparison with humans. The skeletal system of birds is similar to humans and mice. This is especially useful for research into skeletal muscle regeneration.

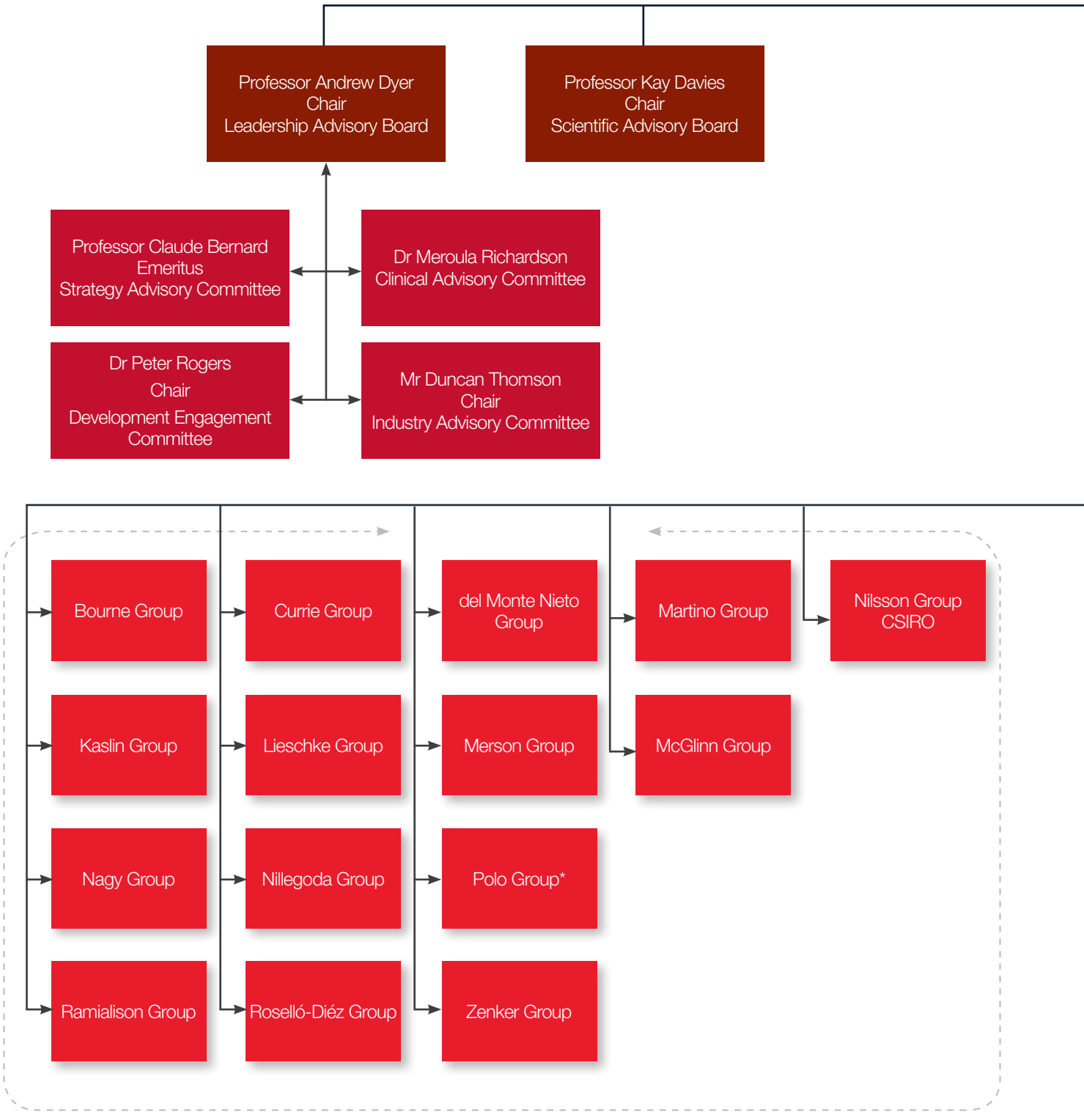
Genetic manipulation is faster and cheaper in quails because quails reach sexual maturity in six weeks rather than the six months it takes for chickens. This makes quails a good pilot model for the poultry industry before moving into more expensive chicken models.

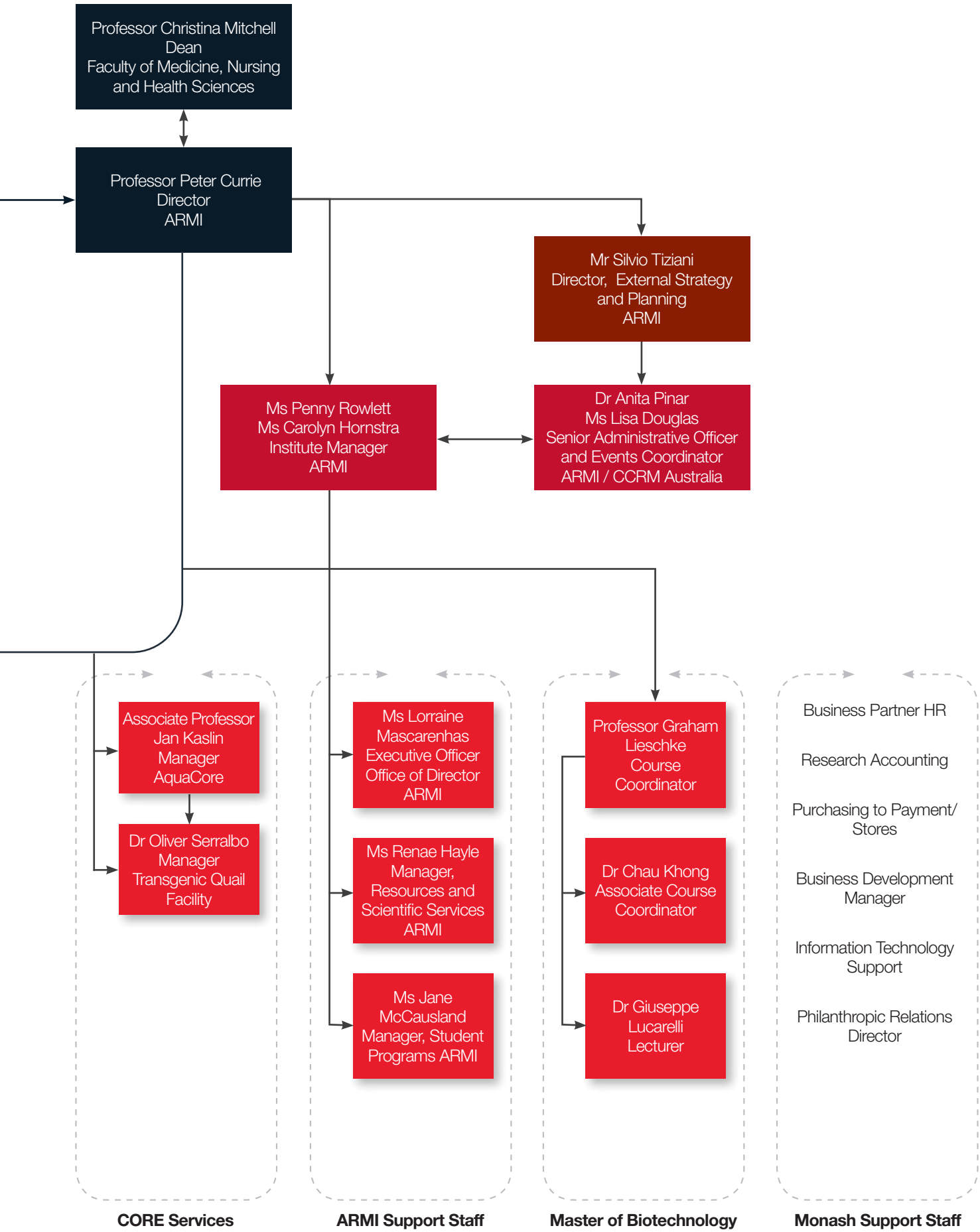
Bird models give researchers better access to the embryo than mammals. Researchers can store the eggs at 14°C for up to one week allowing the synchronisation of batches of incubating eggs. At their convenience, researchers can open the egg to manipulate the embryo, re-seal it and then continue incubation. In mice, manipulating embryos would be a difficult procedure requiring surgery that is riskier for the animals.

The MTQF is located in Building 13C (Chancellor Walk) adjacent to ARMI and is part of the Monash University Facility of Nursing and Health Science.

An axolotl

STRUCTURE AND GOVERNANCE




Professor Christina Mitchell
Dean
Faculty of Medicine, Nursing and Health Sciences
Professor Peter Currie
Director
ARMI
Mr Silvio Tiziani
Director, External Strategy and Planning
ARMI
Ms Penny Rowlett
Ms Carolyn Hornstra
Institute Manager
ARMI
Dr Anita Pinar
Ms Lisa Douglas
Senior Administrative Officer and Events Coordinator
ARMI / CCRM Australia
Associate Professor
Jan Kaslin
Manager
AquaCore
Dr Oliver Serralbo
Manager
Transgenic Quail Facility
Ms Lorraine Mascarenhas
Executive Officer
Office of Director
ARMI
Ms Renae Hayle
Manager, Resources and Scientific Services
ARMI
Ms Jane McCausland
Manager, Student Programs ARMI
Professor Graham Lieschke
Course Coordinator
Dr Chau Khong
Associate Course Coordinator
Dr Giuseppe Lucarelli
Lecturer
Business Partner HR
Research Accounting
Purchasing to Payment/ Stores
Business Development Manager
Information Technology Support
Philanthropic Relations Director
CORE Services
ARMI Support Staff
Master of Biotechnology
Monash Support Staff

LEADERSHIP ADVISORY BOARD

The ARMI Leadership Advisory Board (ARMILAB) plays a vital role in helping ARMI achieve its objectives and strategic goals.

The Board helps to enhance the reputation and positioning of the Institute with key stakeholders, including business, government, media and the broader community.

Specifically, the Board works closely with senior management to:

- promote the vision, role and accomplishments of ARMI among business, government, media and the broader community
- assist in the development of new ideas and initiatives to support the objectives of ARMI
- provide the Director and any steering bodies with feedback from an external perspective of ARMI.

These objectives are accomplished through:

- advocacy
- contributing experience and insight
- supporting and, where appropriate, mentoring ARMI's Director and its leadership
- supporting ARMI's fundraising objectives by assisting ARMI and Monash External Relations, Development and Alumni to build key philanthropic, donor and funding relationships.

Meeting dates

17 February

26 May

18 August

17 November

LEADERSHIP ADVISORY BOARD

Mr Andrew Dyer (Chair)

Mr Andrew Dyer is Chairman of the Telecommunications Industry Ombudsman Council and Information Technology System and Services and serves on the boards of the Transport Accident Commission, BrightSource Energy Australia, the American Australian Association, the Australian Solar Energy Society and The Good Foundation.

Dr Katie Allen

Dr Katie Allen was the Federal Member for Higgins and served in the Coalition Government (2019–2022).

Before joining Parliament, Dr Allen was Division Head of Population Health at the Murdoch Children's Research Institute. She was also a Professor at the University of Melbourne and at the University of Manchester, UK. Dr Allen worked for 28 years as a consultant paediatrician at the Royal Children's Hospital, authored more than 400 scientific publications and has extensive media experience.

Dr Allen's professional memberships include a place on the Board of Cabrini Health, Chair of Melbourne Girl's Grammar School Council and as a member of the advisory board of several medtech startups.

As Member for Higgins, she initiated inquiries into recycling and waste, the post-COVID recovery for the Arts and facilitated improved clinical trials investment in Australia. She was a founding member of the National COVID Health and Research Advisory Committee that met weekly during the pandemic.

Dr Allen's work as a Federal Member of Parliament and her experience in public health helped to establish a National Allergy Council and a National Allergy Centre of Excellence. Her contribution also helped to secure significant Federal funding for the National Allergy Council.

Emeritus Professor Claude Bernard

Over the course of nearly 50 years in research, Professor Claude Bernard established the first multiple sclerosis (MS) mouse model, elucidated the role of immune cells (T cells) in MS, and led world-first research establishing human cell lines from people with MS. These human cell lines have become invaluable research tools to investigate MS and develop new therapies.

Professor Bernard undertook a Master of Sciences in Microbiology and Immunology in the Faculty of Medicine, Montreal and then completed a PhD in the same area of research (1973). He furthered his studies by completing a Doctorat es Sciences (DSc) d'Etat at the University Louis Pasteur, Strasbourg, France in 1978.

His extensive research and teaching career includes working at the University of Alberta, Canada, the Walter and Eliza Hall Institute of Medical Research, Australia, LaTrobe University, Australia, the Monash Immunology and Stem Cell Laboratories at Monash University, Australia and ARMI.

Professor Bernard's sabbaticals encompass stints at the Weizmann Institute of Science, Israel (1985), the Department of Neurology & Neurological Sciences, Stanford University, USA (1991); the San Raffaele Scientific Institute Milano, Italy and the Laboratoire d'Immunologie Faculté de Médecine de Nancy, France.

He was a Fulbright Scholar with the Department of Neurology at the University of California, San Francisco (1998–1999) and held the title of Guest Professor at Kuming Medical University, China and the Bayi Brain Hospital, General Hospital of Beijing Military Command, China (2011–2014).

Professor Bernard was the Interim Deputy Director of ARMI between May 2016 and April 2018.

LEADERSHIP ADVISORY BOARD

Professor Kim Cornish

Professor Kim Cornish is a developmental cognitive neuroscientist and a Fellow of the Academy of Social Sciences Australia. She is the Head of the School of Psychological Sciences and the Founding Director of the Turner Institute for Brain and Mental Health at Monash University.

Before joining Monash University, Professor Cornish held the prestigious Canada Research Chair in developmental cognitive neuroscience at McGill University in Montreal. She is a pioneer in the field of developmental cognitive neuroscience having defined attention pathways and their trajectories across development in children with brain disorders such as autism and fragile X syndrome. This work resulted in a game-based, interactive cognitive training program (TALITM), which helps young children with severe attention deficiencies and is National Disability Insurance Scheme (NDIS) approved and used in clinics across Australia.

Professor Cornish is an Executive Board Member of the Australian Brain Alliance and a Board Member of the Hudson Institute of Medical Research.

Professor Peter Currie

Professor Peter Currie received his PhD from Syracuse University, New York, USA. He undertook postdoctoral training in zebrafish development at the Imperial Cancer Research Fund (now Cancer Research UK) in London, UK. He has worked as an independent laboratory head at the UK Medical Research Council Human Genetics Unit in Edinburgh, UK and the Victor Chang Cardiac Research Institute in Sydney, Australia where he headed a research program focused on skeletal muscle development and regeneration.

In 2016, he was appointed Director of ARMI at Monash University in Melbourne, Australia. He is a recipient of a European Molecular Biology Organization Young Investigators Award and a Wellcome Trust International Research Fellowship and currently is a Principal Research Fellow with the National Health and Medical Research Council in Australia. Professor Currie, along with Dr Georgina Hollway, from the Garvan Institute of Medical Research and Dr Phong Nguyen from ARMI, won the UNSW 2015 Eureka Prize for Scientific Research. They were awarded the prize in recognition of their groundbreaking research into stem cell generation.

Dr Patrick Hughes

Dr Patrick Hughes graduated in 1977 from Monash Medical School. He initially worked in rural general practice, but eventually specialised in anaesthesia. His practice provides care to paediatric patients and those who need major reconstructive and complex airway surgery. While juggling a busy practice, Dr Hughes found time to lecture and teach undergraduate and postgraduate students and contribute to clinical research.

As well as serving on the Board of Directors of the Victorian Anaesthetic Group, his other positions include a role on the Medical Insurance Group Australia (MIGA) Medical Advisory Panel and on the Advisory Panel and Board of Directors of indemnity insurer Invivo Medical Pty Ltd.

Dr Hughes also served on the Victorian Executive Committee of the Australian Society of Anaesthetists and for more than 10 years, as a member of the Victorian Consultative Council on Anaesthetic Mortality and Morbidity.

LEADERSHIP ADVISORY BOARD

Dr Meroula Richardson

Dr Meroula Richardson graduated from the University of Western Australia as a physician, but continued her training to specialise in cardiology. Her interest in organ transplantation led to an overseas stint at the Harefield Hospital (London, UK) where she undertook training in heart transplantation under the guidance of Professor Sir Magdi Yacoub, a pioneer in this field.

She returned to Australia in 1994 and worked as a consultant cardiologist at The Alfred Hospital (Melbourne) in the Heart and Lung Replacement Service and a few years later, became a founding member of The Alfred's Heart Failure Unit.

Dr Richardson returned to Harefield on sabbatical for further training in implantation of cardiac electrical devices and cardiac resynchronisation therapy for heart failure.

In 2005, as well as holding a part-time position at the Alfred, Dr Richardson established a private practice at the Cabrini Hospital with an emphasis on delivering specialised care for heart failure patients in the private setting. Until early 2020, she was also involved in rural outreach clinics in Bairnsdale.

Dr Richardson was a committed teacher of undergraduate and postgraduate students and a mentor of medical students and junior doctors.

She also served on medical panels and on the Advisory Board of Medtronic.

Dr Peter Rogers

Dr Peter Rogers is a Councillor of the Graduate Union at University of Melbourne, Emeritus Chairman of the Monash University Engineering and Information Technology Foundation, Chairman of the Australian Rotary Health District D9800 Committee and a past President of the Rotary Club of Melbourne.

Dr Rogers graduated in chemical engineering from Monash, M App Sc from University of Melbourne, and received his PhD degree from Monash University in 1974. He is a Fellow of Engineers Australia.

Early in his career, Dr Rogers worked at ICI Australia (now Orica) in their agricultural chemicals and plastics businesses and at their production facilities in Victoria and NSW. In 1980, he was appointed Staff Manager at ICI Australia (Melbourne).

In 1984, he was appointed to ICI PLC headquarters in London. He was a Director of ICI's subsidiary and associated companies, including ICI Bangladesh and ICI Bangladesh Trading Company. Between 1985 and 2000, Dr Rogers was a Director of the London-based Board of Employment Conditions Abroad Ltd. He later established the International Consultants Centre, a consulting company he led for more than 25 years. In 2015, the company was transferred to staff.

In 2009, Dr Rogers was appointed Chairman of Monash University Engineering and Information Technology Foundation Board. During his eight years in this role, the Leadership Program, the Monash Industry Team Initiative and three research institutes were established, including the Monash Institute of Medical Engineering.

Dr Rogers was elected to the Board of Hepburn Wind in 2011 – Australia's first community-owned wind farm located at Daylesford, Victoria. During his tenure, $10m capital fundraising, construction and commissioning was carried out. For his work, Dr Rogers was awarded the Victorian Premier's Award, World Wind Energy Award and Banksia Award.

He was also awarded a Monash Distinguished Service Medal in 2008, Rotary Paul Harris Fellow 2008 and the UCSD Jacobs School of Engineering medal in 2013. In 2014, Dr Rogers was awarded an Honorary Doctor of Laws by Monash University.

LEADERSHIP ADVISORY BOARD

Dr Duncan Thomson

Dr Duncan Thomson consults in the regenerative medicine and animal health sectors, bringing a pragmatic passion for translational commercialisation.

He is an executive with more than 25 years of experience in animal health, healthcare and pharmaceutical industries, having worked in senior marketing, sales and management roles in Europe, the US and Australia.

Dr Thomson has extensive knowledge of what it takes to translate and commercialise and minimise risk and avoid some of the pitfalls.

He began his career as a veterinarian in the largest vet practice in Sydney and has always been at the cutting-edge of development. He then worked in the United Kingdom, Switzerland and the United States and completed his Master of Business Administration (MBA) in the UK. In 2001, he joined Novartis Animal Health where he came to fully appreciate the process of drug development, registration, marketing and sales.

Dr Thomson returned to Australia and had his first encounter with regenerative medicine in Regeneus, which he joined in 2010. He saw the company expand and succeed – growing from treating small animals (dogs) to larger ones (horses), moving to allogeneic treatments and then into human products, culminating in a cell therapy treatment licence in Japan.

Mr Silvio Tiziani

Mr Silvio Tiziani is Director of External Strategy and Planning at ARMI and Chief Operating Officer for the Centre for Commercialisation of Regenerative Medicine (CCRM) Australia.

At ARMI, his focus is on external engagement, strategic planning and communications for the Institute, as well as identifying and developing the Institute's national and international strategic alliances.

Mr Tiziani played a central role in establishing CCRM Australia to support the commercialisation of Australian regenerative medicine technologies, securing operational funding for the initiative and developing a national network of partner organisations.

His knowledge of the national and international regenerative medicine ecosystem including current academic and clinical research, government policy, private funding organisations and the biotechnology and pharmaceutical industries is central to his success in establishing initiatives that promote and build Australia's regenerative medicine capacity.

Ms Sonya Walker

Ms Sonya Walker is a business leader (matrix roles across Region Manager/General Manager/Commercial Management/Program and Project Director) with strengths in the building of strong teams and the delivery of results. She has an excellent track record in the delivery of major organisation change initiatives with integrated commercial and consulting services components.

With a background in information technology, banking and finance, commercial and public sectors Ms Walker is also engaged in numerous community projects and has contributed as an MC, panel guest and Adviser for Australian IT Industry Association (AIIA), ICT, Public sector and Sustainability in Innovation initiatives.

Meeting dates

16 February
25 May
17 August
16 November

EXECUTIVE TEAM

Our Executive Team comprises members appointed from ARMI's research and professional staff. The Executive Team is now working with the Institute's staff, stakeholders and Board and subcommittee members to implement the strategic plan's (Strategic Plan 2020–2025) recommendations.

Professor Peter Currie, Director of ARMI
Emeritus Professor Claude Bernard, Interim Deputy Director of ARMI
Professor Graham Lieschke, Group Leader, ARMI
Associate Professor Edwina McGlinn, Group Leader, ARMI
Associate Professor Mikaël Martino, Group Leader, ARMI
Dr Jennifer Zenker, Group Leader, ARMI
Mr Silvio Tiziani, Director, External Strategy and Planning, ARMI
Ms Carolyn Hornstra, Acting Institute Manager, ARMI (from March 2022)
Ms Penny Rowlett, Institute Manager, ARMI (until March 2022)
Ms Lorraine Mascarenhas, Executive Officer, Executive Assistant to ARMI Director

DEVELOPMENT ENGAGEMENT COMMITTEE

The Development Engagement Committee is a subcommittee of the ARMILAB. As requested by the ARMILAB, the committee supports major funding submissions to government, trusts and foundations, corporations, major philanthropists, venture philanthropists and investors.

Mr Luke Belfield
Mr Richard Dent
Ms Madeleine McManus
Mr Robert Papworth
Dr Peter Rogers (Chair)
Dr Chris Sotiropoulos
Mr Silvio Tiziani, Secretary, External Strategy and Planning

Meeting dates
11 October

STRATEGY ADVISORY COMMITTEE

The Strategy Advisory Committee's primary role is to provide independent and objective advice to the ARMI Leadership Advisory Board for the implementation and progress of the ARMI Strategic Plan 2020–2025.

Emeritus Professor Claude Bernard (Chair)
Professor Peter Currie
Professor Graham Lieschke
Associate Professor Edwina McGlinn
Ms Penny Rowlett (until March 2022)
Mr Silvio Tiziani
Ms Carolyn Hornstra (from March 2022)
Ms Sonya Walker
Dr Jennifer Zenker

Meeting dates
1 February
3 May
19 July
11 October

INDUSTRY ADVISORY COMMITTEE

The Industry Advisory Committee is a subcommittee of the ARMILAB. The committee ensures that ARMI is attuned to industry-related regenerative medicine trends by acting as a strategic scanning mechanism and assisting ARMI in identifying needs and opportunities. It advises ARMILAB and Institute leadership on current and emerging regenerative medicine industry practice and technological development to inform the Institute's research program and related activities.

Dr Duncan Thompson, Chair – Consultant, Duncan Thomson Consulting; National Projects Manager – Regenerative Medicine, AusBiotech

Dr Paul Bello – Innovation Lead, Industrial Biotechnology, Innovate, UK

Dr Julie M Cherrington – Member of the Scientific Advisory Board, Clearity Foundation, USA; Advisor in entrepreneurship initiatives, UC San Francisco, UC Davis and CLSI, USA

Dr Julian Chick – Director SkinLife Products, Australia

Ms Leanne Daly – Business Development Manager, Imagion Biosystems, Inc; Non-executive Director, Lenexa Medical; Business Development Director, Reagency Pty Ltd; Member, AusBiotech; Member, Women on Boards; Member, Australian Institute of Company Directors

Dr Jonathan Fitzgerald – Vice-President of Program Management, Torque Therapeutics, USA

Dr Lusia Guthrie – Chairman, Clever Culture Systems AG, Switzerland; Non-executive Director, 4Dx Limited, Australia; Director, ANDHealth, Australia; Chair, Industry Advisory Committee, Medicines Manufacturing Innovation Centre, Monash University, Australia; Member, ARMI Industry Advisory Committee, Monash University, Australia

Ms Sara Mary Hall – Senior Advisor, Oxford BioMedica (UK) Ltd; Member, Board of Directors University of Kansas Innovation and Collaboration (KUIC), USA; Member of the commercialisation arm of Kansas University Main Campus/ Kansas University Medical Center, USA; Director and Executive Committee member, BioKansas, USA

Mr Brian Hanrahan – Business Development Manager, Planet Innovation

Professor Abid Khan – Deputy Vice-Chancellor and Vice-President (Global Engagement) Monash University, Australia

Dr Bianca Lê – Executive Director, Cellular Agriculture Australia

Professor Kenneth Lee – Chief, Developmental and Regenerative Biology Thematic Research Program, School of Biomedical Sciences at the Chinese University of Hong Kong (CUHK), China; Director, Key Laboratory for Regenerative Medicine, Ministry of Education, China; Director, CUHK-Southampton Joint Laboratory for Stem Cell and Regenerative Medicine, China; CEO, StapWorks Stem Cell Limited, Hong Kong, China; Prestigious Professor, Chinese Academy of Science, China; Visiting Professor, Robert Gordon University, Scotland, UK

Dr Linda Somerville – Director, Linfaws Consulting Limited

Mr Silvio Tiziani – Director of External Strategy and Planning at ARMI and Chief Operating Officer for the Centre for Commercialisation of Regenerative Medicine (CCRM) Australia

Professor Alan Trounson – Emeritus Professor, Monash University; Distinguished Scientist, Hudson Institute of Medical Research; CEO, Cartherics Pty Ltd, Australia

Mr Gordon Waldron – CEO, Sequoia Business Solutions, France

Meeting dates

1 February

3 May

26 July

25 October

COMPLIANCE AND ETHICS COMMITTEES

To ensure that ARMI complies with external standards, regulations and genetic guidelines for genetic manipulation and biosafety, the Institute follows the rules and regulations outlined by the following committees:

Monash University Institutional Biosafety Committee (MUIBC)

Monash University Human Research Ethics Committee (MUHREC)

Monash University Animal Ethics Committee (MARP, BSCI and MIPS)

Monash University Radiation Advisory Committee

STAFF

EXECUTIVE

Professor Peter Currie, Director of ARMI

Emeritus Professor Claude Bernard, Interim Deputy Director of ARMI

Professor Graham Lieschke, Group Leader, ARMI

Associate Professor Edwina McGlinn, Group Leader, ARMI

Associate Professor Mikaël Martino, Group Leader, ARMI

Dr Jennifer Zenker, Group Leader, ARMI

Mr Silvio Tiziani, Director, External Strategy and Planning, ARMI

Ms Penny Rowlett, Institute Manager, ARMI (until March 2022)

Ms Carolyn Hornstra, Acting Institute Manager, ARMI (from March 2022)

Ms Lorraine Mascarenhas, Executive Officer, Executive Assistant to ARMI Director

OFFICE OF THE DIRECTOR

Mr Silvio Tiziani, Director, External Strategy and Planning, ARMI

Ms Penny Rowlett, Institute Manager, ARMI (until March 2022)

Ms Carolyn Hornstra, Acting Institute Manager, ARMI (from March 2022)

Ms Jane McCausland, Student Programs Manager, ARMI

Ms Renae Hayle, Manager, Resources and Scientific Services

Ms Lisa Douglas, Senior Administrative Officer, ARMI and CCRM (from September 2022)

Ms Lorraine Mascarenhas, Executive Officer, ARMI

RESOURCES AND SCIENTIFIC SERVICES

Ms Renae Hayle, Manager

Ms Radana Ninkovic (until April 2022)

Mr Justin Stepnell (from August 2022)

Mr Taylor Graham

ARMI COMMITTEES

GROUP LEADERS COMMITTEE

Professor Peter Currie

Dr Gonzalo del Monte-Nieto

Associate Professor Jan Kaslin

Professor Andrew Laslett (CSIRO)

Professor Graham Lieschke

Associate Professor Mikaël Martino

Associate Professor Edwina McGlinn

Professor Andras Nagy

Dr Nadinath Nillegoda

Professor Susie Nilsson (CSIRO)

Dr Alberto Roselló-Díez

Dr Jennifer Zenker (Chair)

Ms Penny Rowlett (Institute Manager; until March 2022)

Ms Carolyn Hornstra (Acting Institute Manager; from March 2022)

Ms Lorraine Mascarenhas

Meeting dates

27 January

24 February

24 March

5 May

26 May

23 June

28 July

27 September

27 October

14 December

SCIENTIFIC SERVICES COMMITTEE

Ms Renae Hayle
Manager, Resources and Scientific Services

Mr Justin Stepnell
Technical Assistant

Dr Leon Teo
Bourne Group

Mr Pralesh Devkota
del Monto-Nieto Group

Ms Alexandra Tichy
Janovjak Group

Dr Sam Crossman
Kaslin Group

Mrs Brenda Briones Miranda
Lieschke Group

Dr Julien Legrand
Martino Group

Dr Lulu Xing
Merson Group

Ms Lisa Wong
McGlinn Group

Dr Jan Manent
McGlinn Group, alternative member

Ms Maddie Fulton
Nilsson Group

Dr Yasith Mathangasinghe
Nillegoda Group

Dr Sue Mei Lim
Polo Group

Ms Xinli (Cindy) Qu
Roselló-Díez Group

Dr Jessica Greaney
Zenker Group

ARMI COMMITTEES

SAFETY COMMITTEE

Ms Renae Hayle
Manager – Resources & Scientific Services and Safety Officer

Ms Renae Hayle
Biosafety Officer

Ms Renae Hayle
Radiation Safety Officer

Mr Alex Zuperman
Faculty Occupational Health and Safety (OHS) Adviser

Ms Rebecca Dale
Student Representative

Mr Rodney Glanvill
Aquarium Manager

Meeting dates

16 March

22 June

24 August

16 November

STUDENT PROGRAMS COMMITTEE

Professor Graham Lieschke
Chair, HDR Coordinator

Associate Professor Mikaël Martino
Deputy Chair, ARMI and EMBL Australia Group Leader

Associate Professor Edwina McGlinn
ARMI Group Leader

Dr Tobias Merson
ARMI Group Leader (until February 2022)

Dr Sam Crossman
ARMI postgraduate representative (from December 2022)

Dr Julien Legrand
ARMI postgraduate representative (from December 2022)

Professor Andrew Laslett
ARMI/CSIRO Group Leader (until February 2022)

Dr Ben Cao
CSIRO academic representative (from August 2022)

Dr Chau Khuong
Associate Course Coordinator, Master of Biotechnology

Dr Jan Manent
ARMI Honours Coordinator

Ms Jane McCausland
Student Programs Leader

Ms Azadeh Anbarlou
Student representative

Mr Yuan Ji
Student representative

Ms Carolyn Hornstra
Acting ARMI Institute Manger (from March 2022)

Meeting dates

15 February

7 May

16 August

6 December

APPENDIX 1 – PUBLICATIONS

1. Alshoubaki YK, Nayer B, Das S, Martino MM. Modulation of the activity of stem and progenitor cells by immune cells. *Stem Cells Translational Medicine*. 2022;11(3):248–258. DOI: 10.1093/stcltm/szab022.
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11. Charitakis N, Ramialison M, Nim HT. Comparative analysis of packages and algorithms for the analysis of spatially resolved transcriptomics data. In: Passos GA (ed.) *Transcriptomics in Health and Disease*. 2nd edition. Switzerland: Springer, 2022. p. 165–186. DOI: doi.org/10.1007/978-3-030-87821-4_7.
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13. Choo XY, McInnes LE, Grubman A, Wasielewska JM, Belaya I, Burrows E, Quek H, Martín JC, Loppi S, Sorvari A, Rait D, Powell A, Duncan C, Liddell JR, Tanila H, Polo JM, Malm T, Kanninen KM, Donnelly PS, White AR. Novel anti-neuroinflammatory properties of a thiosemicarbazone-pyridylhydrazone copper(II) complex. *International Journal of Molecular Science*. 2022;23(18):10722. DOI: 10.3390/ijms231810722.
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35. Kurolap A, Kreuder F, Gonzaga-Jauregui C, Duvdevani MP, Harel T, Tammer L, Xin B, Bakhtiari S, Rice J, van Eyk CL, Gecz J, Mah JK, Atkinson D, Cope H, Sullivan JA, Douek AM, Colquhoun D, Henry J, Wlodkowic D, Parman Y, Candayan A, Kocasoy-Orhan E, Ilivitzki A, Soudry S, Leibu R, Glaser F, Sency V. Undiagnosed Diseases Network, Ast G, Shashi V, Fahey MC, Battaloğlu E, Jordanova A, Meiner V, Innes AM, Wang H, Elpeleg O, Kruer MC, Kaslin J, Baris Feldman H. Bi-allelic variants in neuronal cell adhesion molecule cause a neurodevelopmental disorder characterized by developmental delay, hypotonia, neuropathy/spasticity. *American Journal of Human Genetics*. 2022;109(3):518–532. DOI: 10.1016/j.ajhg.2022.01.004.

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APPENDIX 1 – PUBLICATIONS

52. Serrano RJ, Clara Lee C, Douek A, Kaslin J, Bryson-Richardson RJ, Sztal TE. A novel pre-clinical model for CDKL5 deficiency disorder. *Disease Models and Mechanisms*. 2022;15(3):dmm049094. DOI: 10.1242/dmm.049094.

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APPENDIX 2 – STUDENT SUPERVISION

Student name	Position	Team	Supervisor	Co-supervisor	Project title
Seyed Hosseini Fin Nafiseh	HDR Student	Bourne Group	Professor James Bourne	Dr Leon Teo	Elucidating the role of microglia in the maturation of the primate neocortex
Jack Scott	HDR Student	Bourne Group	Professor James Bourne	Dr Leon Teo	Examining changes to behaviour in the marmoset following early-life lesions of the medial pulvinar
Kwan William	HDR Student	Bourne Group	Professor James Bourne	Professor Cornelius Gross	An optogenetic strategy for dissecting the neural circuits implicated in neurological disorders
Angela (Yuxin) Fan	HDR Student	Bourne Group	Professor James Bourne	Dr Leon Teo	Using DREADDs to manipulate the visual attention circuit in the marmoset as a model for SCZ
Tuan Anh Hoang	HDR Student	Bourne Group	Professor James Bourne	Dr Leon Teo	Predictive model of astrocyte transcriptomic changes through time
Mervyn Dauer	HDR Student	Currie Group	Professor Peter Currie	Dr Joachim Berger	The role of Myo18b in sarcomere assembly
Jessica Manneken	HDR Student	Currie Group	Professor Peter Currie	Professor Graham Lieschke / Dr Margo Montandon	Investigating the dynamics of Fibroadipogenic Progenitors (FAPs) in muscle injury and muscle wound repair
Rebecca Dale	HDR Student	Currie Group	Professor Peter Currie	Associate Professor Edwina McGlinn	Evolution of vertebrate muscle patterning systems
Abbas (Adrian) Salavaty Hosein Abadi	HDR Student	Currie Group	Professor Peter Currie	Associate Professor Mirana Ramialison	Identification and functional analysis of novel long non-coding RNAs involved in drifting, clonal expansion and differentiating muscle stem cells
Duy Tran	HDR Student	Currie Group	Professor Peter Currie	Dr Avnika Ruparelia	Characterisation of muscle aging and macrophage in zebrafish
Kevin (Yansong) Lu	HDR Student	Currie Group	Professor Peter Currie	Dr Avnika Ruparelia	Investigating the clonal drift dynamic in zebrafish skeletal muscle growth
Eashwar Anbupalam	HDR Student	Currie Group	Professor Peter Currie	Dr Margo Montandon	Analyze macrophage populations to profile specific signals involved in macrophage polarization
Taylor Graham	HDR Student	Currie Group	Professor Peter Currie	Dr Avnika Ruparelia / Professor Andrew Laslett	The development of FBS-free fish iPSC lines for cellular agriculture
Shabnam Sabetkish	HDR Student	Currie Group	Professor Peter Currie	Professor Laurence Meagher	Using novel imaging technologies and tissue engineering techniques for treatment of muscle diseases
Safoura Zardadi	HDR Student	Currie Group	Professor Peter Currie	Dr Avnika Ruparelia	Studying molecular mechanisms in LAMA2-related zebrafish models to explore potential therapies for congenital muscular dystrophy type 1A (MDC1A)

APPENDIX 2 – STUDENT SUPERVISION

Student name	Position	Team	Supervisor	Co-supervisor	Project title
Eman Mohamed	HDR Student	del Monte-Nieto Group	Dr Gonzalo del Monte-Nieto	Dr Ekaterina Salimova	Characterization of KLFs as new causative factors for non-compaction cardiomyopathy
Masoud Pourhaghgouy	HDR Student	del Monte-Nieto Group	Dr Gonzalo del Monte-Nieto	Dr Ekaterina Salimova	Characterization of the cardiomyocyte extracellular environment for heart regeneration
Yuan Ji	HDR Student	del Monte-Nieto Group	Dr Gonzalo del Monte-Nieto	Dr Yen Tran	Study of the role of biomechanical forces in cardiac trabeculation
Diptarka Saha	HDR Student	del Monte-Nieto Group	Dr Gonzalo del Monte-Nieto	Dr Yen Tran	Characterization of ventricular septation during heart development to better understand VSDs
Zhijian Wu	HDR Student	del Monte-Nieto Group	Dr Gonzalo del Monte-Nieto	Dr Yen Tran	Characterization of the endocardial contribution of Nkx2-5 progenitors cells during heart development
Christina Gangemi	HDR Student	Janovjak Group	Associate Professor Harald Janovjak	Dr Robin Hobbs	Optical stimulation of pancreatic beta-cells: regenerating blood glucose levels in diabetes
Sebastian Stamatis	HDR Student	Kaslin Group	Associate Professor Jan Kaslin	Dr Toby Merson	Making and shaping a vertebrate brain: defining the cellular and genetic drivers of CNS growth
Alon Douek	HDR Student	Kaslin Group	Associate Professor Jan Kaslin	Dr Alberto Roselló-Díez	Investigating neural stem and progenitor cell fate determinants in the regenerating zebrafish brain
Florian Kreuder	HDR Student	Kaslin Group	Associate Professor Jan Kaslin	Associate Professor Michael Fahey (external)	Investigating genetic components of cerebral palsy
Oliver Trusler	HDR Student	Laslett Group	Professor Andrew Laslett	Professor Jane Visvader (external) / Dr Jacob Goodwin	Differentiation of human pluripotent stem cells to mammary cell types: influence of BRCA mutations
Abdulsalam Isiaku	HDR Student	Lieschke Group	Professor Graham Lieschke	Professor Peter Currie / Dr Vahid Pazhakh	Neutrophil antimicrobial activities during infection in vivo – studies using zebrafish models
Azadeh Anbarlou	HDR Student	Lieschke Group	Professor Graham Lieschke	Dr Vahid Pazhakh	The influence of nuclear plasticity on leukocyte migration: studies in macrophages
Yasmin Alshoubaki	HDR Student	Martino Group	Associate Professor Mikaël Martino	Dr Ekaterina Salimova / Dr Gonzalo del Monte Nieto	The role of T cells in cardiac repair – mechanisms and therapeutic targets
Celeste Piotto	HDR Student	Martino Group	Associate Professor Mikaël Martino	Dr Julien Legrand	Promoting tissue regeneration via specific delivery of miRNAs to macrophages
Bhavana Nayer	HDR Student	Martino Group	Associate Professor Mikaël Martino	Dr Jean Tan	In vivo reprogramming of somatic cells into multipotent stem cells capable of tissue regeneration
Surojeet Das	HDR Student	Martino Group	Associate Professor Mikaël Martino	Professor Peter Currie	Immunomodulatory hydrogels for application in bone regeneration

APPENDIX 2 – STUDENT SUPERVISION

Student name	Position	Team	Supervisor	Co-supervisor	Project title
Wenhao You	HDR Student	Martino Group	Associate Professor Mikaël Martino	Dr Remy Robert / Dr Julien Legrand	Engineering cell-specific drug delivery system for treating ischemic injuries
Nan Hu	HDR Student	Martino Group	Associate Professor Mikaël Martino	Dr Julien Legrand / Dr Angel Lu	Promoting tissue regeneration by delivering engineered factors derived from regulatory T cells
Parikshit Banerjee	HDR Student	Martino Group	Associate Professor Mikaël Martino	Dr Angel Lu	Biomimetic hydrogels for efficient T cell delivery
Yuxuan Luo	HDR Student	Martino Group	Associate Professor Mikaël Martino	Dr Julien Legrand	Investigate the role of factors from immune cells in tissue repairing and its therapeutic approach
Jasmine Poh	HDR Student	Merson Group	Dr Toby Merson	Dr Lulu Xing	The role of intrinsic and extrinsic cues in regulating remyelination of the central nervous system
Masoud Baghi	HDR Student	McGlinn Group	Associate Professor Edwina McGlinn	Dr Alberto Roselló-Díez	Clonal analysis of the murine neuromesodermal progenitor
Xiaoxue Ma	HDR Student	Nagy Group	Dr Natalie Payne	Professor Andras Nagy	Developing safe 'designer' stem cell therapies for the treatment of multiple sclerosis
Yasith Mathangasinghe	HDR Student	Nillegoda Group	Dr Nadinath Nillegoda	Dr Tracy Heng	Characterisation of the protein disaggregation activation program (DAP) in neurodegenerative disease
Raju Kalidindi	HDR Student	Nillegoda Group	Dr Nadinath Nillegoda	Dr Nitin Patil	Regulation of protein disaggregase function and cell/ tissue repair
Claire Pritchard	HDR Student	Nilsson Group	Professor Susie Nilsson	Dr Ben Cao	The role of alpha9beta1 integrin in the drug resistance of acute lymphoblastic leukaemia
Joseph Chen	HDR Student	Polo Group	Professor José Polo	Assistant Professor Owen Rackham	Using the Mogrify algorithm to study induced pluripotency and direct reprogramming
Esther Miriklis	HDR Student	Polo Group	Professor José Polo	Dr Yu Bo Yang / Dr Toby Bell	Real-time visualisation of stembody inheritance required for embryonic cell fate specification
Lisa Waylen	HDR Student	Ramialison Group	Associate Professor Mirana Ramialison	Associate Professor Kelly Smith / Dr Lan Nguyen	Formation of boundaries in the lateral plate mesoderm
Ehsan Razmara	HDR Student	Roselló-Díez Group	Dr Alberto Roselló-Díez	Dr Shanika Amarasinghe / Associate Professor David Powell	Studying the clonal dynamics of cartilage stem cells during normal and perturbed bone growth
Azelle Hawdon	HDR Student	Zenker Group	Dr Jenny Zenker	Professor Andrew Laslett	Real-time visualization of stembody inheritance required for embryonic cell fate specification
Oliver Anderson	HDR Student	Zenker Group	Dr Jenny Zenker	Dr Jessica Greaney	Whole cell organelle segmentation and 3D reconstruction of preimplantation embryos

APPENDIX 2 – STUDENT SUPERVISION

Student name	Position	Team	Supervisor	Co-supervisor	Project title
Sebastian Palacios Martínez	HDR Student	Zenker Group	Dr Jennifer Zenker	Dr Jessica Greaney	Live embryo visualization to uncover how microtubule remodelling directs cell lineage specification
Fahmida Islam	External HDR Student	Catherics	Professor Alan Trounson	Professor Graham Lieschke / Professor Richard Boyd / Dr Pollyanna Goh / Dr Runzhe Shu	Dual specificity CAR iNK cells to reduce tumour escape and engage macrophages
Matthew Tiedemann	External HDR Student	Catherics	Professor Alan Trounson	Professor Richard Boyd / Dr Vera Evtimov / Dr Nicholas Boyd	Developing a clinically-translatable iPSC-derived immunotherapy
Rachelle Duffin	External HDR Student	Catherics	Professor Alan Trounson	Professor Richard Boyd / Dr Walid Azar	Enhancing anti-tumour immune responses through combination therapies
Rasa Islam	External HDR Student	Catherics	Professor Alan Trounson	Professor Richard Boyd / Dr Vera Evtimov / Dr Nicholas Boyd / Dr Runzhe Shu	Optimising the function of anti-cancer killer T cells
Thi Van To	External HDR Student	Catherics	Professor Alan Trounson	Professor Richard Boyd / Dr Vera Evtimov / Dr Runzhe Shu	Optimising the function of anti-cancer killer T cells: the role of endogenous TCR in CAR-T function
Neda Rahmani Mehdiabadi	External HDR Student	Elliot Group	Associate Professor David Elliot	Associate Professor Enzo Porrello	Harnessing stem cells to develop regenerative therapies for childhood heart disease
Peter Kaltzis	2022 Honours Student	del Monte Nieto Group	Dr Gonzalo del Monte Nieto	Not applicable	Development of image analysis tools for the study of cardiac trabeculation in the mouse.
Emerson Archari	2022 Honours Student	Martino Group	Associate Professor Mikaël Martino	Dr Julien Legrand	Developing therapeutic targets for IL-33 tissue regeneration
Pauline Mascarinas	2022 Honours Student	McGlinn Group	Associate Professor Edwinna McGlinn	Dr Jan Manent	Identifying functionally important enhancers during axial elongation
YuanYuan Zhao	2022 Honours Student	Nillegoda Group	Dr Nadinath Nillegoda	Not applicable	Ex vivo regulation of mitochondrial DNAJA3 activity via the phosphorylation of YY motif
Piera Sfameni	2022 Honours Student	Zenker Group	Dr Jennifer Zenker	Not applicable	To explore the effects of bacterial metabolites on mammalian preimplantation embryogenesis and reproductive failure
Dinasha Wimalasiri	2022 Honours Student	Zenker Group	Dr Jennifer Zenker	Dr Jessica Greaney	Spatiotemporal quantification of microtubule polymerisation in live preimplantation mouse embryos

APPENDIX 2 – STUDENT SUPERVISION

Student name	Position	Team	Supervisor	Co-supervisor	Project title
Haizhong Chen	Master of Biotechnology Student – Research project BRM5021	Currie Group	Professor Peter Currie	Dr Margo Montandon	Defining the role of immune cells in the progression of Duchenne Muscular Dystrophy using the zebrafish model
Mingyue Li	Master of Biotechnology Student – Research project BRM5021	Currie Group	Professor Peter Currie	Dr Frank Tulenko	Evolution of appendage muscle patterning systems across vertebrates
Abhijit Nadavallil Alex	Master of Biotechnology Student – Research project BRM5021	del Monte Nieto Group	Dr Gonzalo del Monte Nieto	Dr Jan Manent	Characterization of the cardiac defects present in the MIR503HG loss of function mouse model
Hao-Ruei Hsu	Master of Biotechnology Student – Research project BRM5021	Lieschke Group	Professor Graham Lieschke	Ms Azadeh Anbarlou	Migrasome formation by migrating zebrafish cells
Seung Hoon Byun	Master of Biotechnology Student – Research project BRM5021	Martino Group	Associate Professor Mikaël Martino	Dr Julien Legrand	Engineering novel NAMPT variants to promote muscle regeneration
Chun Yin Cheung	Master of Biotechnology Student – Research project BRM5021	Martino Group	Associate Professor Mikaël Martino	Dr Angel Lu	Exploring the signals that activate nociceptors during the tissue healing process
Er (Amy) Tang	Master of Biotechnology Student – Research project BRM5021	Martino Group	Associate Professor Mikaël Martino	Dr Jean Tan	Determining the role of regulatory T-cells in mice hair cycle and follicle regeneration
Sayantani Guha	Master of Biotechnology Student – Research project BRM5021	McGlinn Group	Associate Professor Edwinna McGlinn	Dr Jan Manent	Dissecting the role of miR-196 in developmental haematopoiesis
Jingxuan (Lexi) Li	Master of Biotechnology Student – Research project BRM5021	McGlinn Group	Associate Professor Edwinna McGlinn	Dr Jan Manent	Towards a molecular understanding of how Nr6a1 functions during axial elongation
Basma Siddique	Master of Biotechnology Student – Research project BRM5021	McGlinn Group	Associate Professor Edwinna McGlinn	Dr Jan Manent	Manipulating miR-196 function to enhance in vitro hematopoietic stem cell genesis
Rishika Turaga	Master of Biotechnology Student – Research project BRM5021	McGlinn Group	Associate Professor Edwinna McGlinn	Dr Jan Manent	Dissecting the role of Nr6a1 in haematopoietic stem cell production

APPENDIX 2 – STUDENT SUPERVISION

Student name	Position	Team	Supervisor	Co-supervisor	Project title
Jimmy Meng	Master of Biotechnology Student – Research project BRM5021	McGlinn Group	Associate Professor Edwinna McGlinn	Dr Jan Manent	Identification of transcription factors crucial for axial elongation associated with the Sox2N1 enhancer
Sheng Hsu	Master of Biotechnology Student – Research project BRM5021	Polo Group	Dr Anja Knaupp	Not applicable	Comparison of different single genomic locus analysis approaches to characterise mammalian regulatory complexes
Yutong Chen	Master of Biotechnology Student – Research project BRM5021	Roselló-Díez Group	Dr Alberto Roselló-Díez	Not applicable	Establishing new models of rodent chimeras to study limb growth regulation
Zhitong Chen	Master of Biotechnology Student – Research project BRM5021	Roselló-Díez Group	Dr Alberto Roselló-Díez	Not applicable	Investigating the limb size determination mechanism through rodent chimera model
Carren Thomas	Master of Biotechnology Student – Research project BRM5021	Roselló-Díez Group	Dr Alberto Roselló-Díez	Dr Chee Ho H'ng	Regulatory mechanisms and roles of Egr1 in long bone catch-up growth
Nelson (Sibo) Yu	Master of Biotechnology Student – Research project BRM5021	Roselló-Díez Group	Dr Alberto Roselló-Díez	Not applicable	Perichondrial stem cells: the origin of cartilage stem cells and the key for catch-up growth?
Terry Chow	UROP Student	Bourne Group	Professor James Bourne	Not applicable	Bioinformatics and data modelling approaches to unravel the diversity of reactive astrocytes after stroke
Maggie Pewtress	UROP Student	Currie Group	Professor Peter Currie	Dr Avnika Ruparelia	Understanding the mechanisms regulating skeletal muscle wasting using zebrafish
Morgan Lockwood	UROP Student	del Monte Nieto Group	Dr Gonzalo del Monte Nieto	Not applicable	Molecular regulation of ventricular trabeculation during heart development in mice
Luke Toohey	UROP Student	Kaslin Group	Associate Professor Jan Kaslin	Not applicable	Neural regeneration and developmental disease modelling
Alessandria Sarmiento	UROP Student	Nillegoda Group	Dr Nadinath Nillegoda	Not applicable	Characterization of novel post translational modifications that regulate the Hsp70 protein disaggregases linked to neurodegenerative diseases
Catlin Soto	UROP Student	McGlinn Group	Associate Professor Edwinna McGlinn	Not applicable	Gastruloid technology to dissect vertebra formation

APPENDIX 2 – STUDENT SUPERVISION

Student name	Position	Team	Supervisor	Co-supervisor	Project title
Edward Tang	UROP Student	McGlinn Group	Associate Professor Edwinna McGlinn	Not applicable	Investigating the role of the nuclear receptor Nr6a1 in the formation of the limb
Sarah Yang	UROP Student	Roselló-Díez Group	Dr Alberto Roselló-Díez	Not applicable	Activation of resident and external stem cell populations in genetically injured developing long bones
Israa Hameed	UROP Student	Zenker Group	Dr Jennifer Zenker	Not applicable	Identifying pluripotent cells by a characteristic microtubule cytoskeleton

HDR – Higher Degree by Research includes Doctor of Philosophy (PhD), research Masters degrees and other professional higher degrees by research.

UROP – the Undergraduate Research Opportunities Program offers paid (casual) research experience in research laboratories.

APPENDIX 3 – GRADUATING STUDENTS

Student name	Position	Team	Supervisor	Co-supervisor	Project title
Oliver Trusler	HDR Student	Laslett Group	Professor Andrew Laslett	Professor Jane Visvader (external) / Dr Jacob Goodwin	Differentiation of human pluripotent stem cells to mammary cell types: influence of BRCA mutations
Abdulsalam Isiaku	HDR Student	Lieschke Group	Professor Graham Lieschke	Professor Peter Currie / Dr Vahid Pazhakh	Neutrophil antimicrobial activities during infection in vivo – studies using zebrafish models
Yasmin Alshoubaki	HDR Student	Martino Group	Associate Professor Mikaël Martino	Dr Ekaterina Salimova / Dr Gonzalo del Monte Nieto	The role of T cells in cardiac repair – mechanisms and therapeutic targets
Xiaoxue Ma	HDR Student	Nagy Group	Dr Natalie Payne	Professor Andras Nagy	Developing safe 'designer' stem cell therapies for the treatment of multiple sclerosis
Claire Pritchard	HDR Student	Nilsson Group	Professor Susie Nilsson	Dr Ben Cao	The role of alpha9beta1 integrin in the drug resistance of acute lymphoblastic leukaemia
Joseph Chen	HDR Student	Polo Group	Professor José Polo	Assistant Professor Owen Rackham	Using the Mogrify algorithm to study induced pluripotency and direct reprogramming
Peter Kaltzis	2022 Honours Student	del Monte Nieto Group	Dr Gonzalo del Monte Nieto	Not applicable	Development of image analysis tools for the study of cardiac trabeculation in the mouse
Emerson Archari	2022 Honours Student	Martino Group	Associate Professor Mikaël Martino	Dr Julien Legrand	Developing therapeutic targets for IL-33 tissue regeneration
YuanYuan Zhao	2022 Honours Student	Nillegoda Group	Dr Nadinath Nillegoda	Not applicable	Ex vivo regulation of mitochondrial DNAJA3 activity via the phosphorylation of YY motif
Piera Sfameni	2022 Honours Student	Zenker Group	Dr Jennifer Zenker	Not applicable	To explore the effects of bacterial metabolites on mammalian preimplantation embryogenesis and reproductive failure
Haizhong Chen	Master of Biotechnology Student – Research project BRM5021	Currie Group	Professor Peter Currie	Dr Margo Montandon	Defining the role of immune cells in the progression of Duchenne Muscular Dystrophy using the zebrafish model
Abhijit Nadavallil Alex	Master of Biotechnology Student – Research project BRM5021	del Monte Nieto Group	Dr Gonzalo del Monte Nieto	Dr Jan Manent	Characterization of the cardiac defects present in the MIR503HG loss of function mouse model
Seung Hoon Byun	Master of Biotechnology Student – Research project BRM5021	Martino Group	Associate Professor Mikaël Martino	Dr Julien Legrand	Engineering novel NAMPT variants to promote muscle regeneration

APPENDIX 3 – GRADUATING STUDENTS

Student name	Position	Team	Supervisor	Co-supervisor	Project title
Chun Yin Cheung	Master of Biotechnology Student – Research project BRM5021	Martino Group	Associate Professor Mikaël Martino	Dr Angel Lu	Exploring the signals that activate nociceptors during the tissue healing process
Sayantani Guha	Master of Biotechnology Student – Research project BRM5021	McGlinn Group	Associate Professor Edwinna McGlinn	Dr Jan Manent	Dissecting the role of miR-196 in developmental haematopoiesis
Jingxuan (Lexi) Li	Master of Biotechnology Student – Research project BRM5021	McGlinn Group	Associate Professor Edwinna McGlinn	Dr Jan Manent	Towards a molecular understanding of how Nr6a1 functions during axial elongation
Rishika Turaga	Master of Biotechnology Student – Research project BRM5021	McGlinn Group	Associate Professor Edwinna McGlinn	Dr Jan Manent	Dissecting the role Nr6a1 in haematopoietic stem cell production
Sheng Hsu	Master of Biotechnology Student – Research project BRM5021	Polo Group	Dr Anja Knaupp	Not applicable	Comparison of different single genomic locus analysis approaches to characterise mammalian regulatory complexes
Yutong Chen	Master of Biotechnology Student – Research project BRM5021	Roselló-Díez Group	Dr Alberto Roselló-Díez	Not applicable	Establishing new models of rodent chimeras to study limb growth regulation
Zhitong Chen	Master of Biotechnology Student – Research project BRM5021	Roselló-Díez Group	Dr Alberto Roselló-Díez	Not applicable	Investigating the limb size determination mechanism through rodent chimera model
Carren Thomas	Master of Biotechnology Student – Research project BRM5021	Roselló-Díez Group	Dr Alberto Roselló-Díez	Dr Chee Ho Hng	Regulatory mechanisms and roles of Egr1 in long bone catch-up growth
Nelson (Sibo) Yu	Master of Biotechnology Student – Research project BRM5021	Roselló-Díez Group	Dr Alberto Roselló-Díez	Not applicable	Perichondrial stem cells: the origin of cartilage stem cells and the key for catch-up growth?

HDR – Higher Degree by Research includes Doctor of Philosophy (PhD), research Masters degrees and other professional higher degrees by research.

APPENDIX 4 – 2022 EXTERNAL SPEAKERS SERIES

Date	Speaker	University/company	Title
15 February	Professor Denis Duboule	École Polytechnique Fédérale de Lausanne, Switzerland	The Hox timer in embryos and pseudo-embryos
8 March	Professor Gilbert Weidinger	University of Ulm, Germany	Zebrafish fin regeneration requires generic and regeneration-specific responses of oesteoblasts to trauma
26 April	Dr Julien Vermot	Imperial College, UK	Mechanotransduction in the developing cardiovascular system
10 May	Dr Maria Alcolea	Wellcome-MRC Cambridge Stem Cell Institute, UK	Epithelial cell fate transitions: an oesophageal tale
21 June	Professor Margaret Sunde	University of Sydney, Australia	Herpesviruses employ amyloid-based mechanisms for sequestration of the host necroptosis machinery
19 July	Professor Robert G Parton	Institute of Molecular Bioscience, University of Queensland, Australia	New insights into the structure and function of caveolae
2 August	Professor Fiona Watt	Centre for Stem Cells & Regenerative Medicine, King's College London, UK	Differentiation and dedifferentiation in adult mammalian epidermis
8 November	Professor Annemarie Meijer	Leiden University, Netherlands	Interplay between autophagy and cell death in mycobacterial infection
29 November	Assistant Professor Shane Liddelow	New York University, USA	What do reactive astrocytes (really) do?
13 December	Associate Professor Kristy Red-Horse	Stanford University, USA	Development, regeneration and repair of blood vessels in the heart

Please note: In 2022, the seminars were held online.

APPENDIX 5 – GRANTS

NEW GRANTS

Primary chief investigator	Granting body	Description/Title	Total funding ($)
Professor Peter Currie	MDA Basic Research Grant	Therapeutic significance of FKRP's regulation of glycosylation within the Golgi	438,296
	MRFF	A national functional diagnostic program for therapy development in congenital muscle disease	597,460
	MRFF	Australian Stroke and Heart Research Accelerator (ASHRA)	249,729
	MRFF	Gene modified pluripotent stem cells to generate and empower innate immune cells against poor-prognosis cancers	215,708
	Department of Health and Aged Care	Myostellar	249,135
Dr Benoit Haerlingen	Wallonia-Brussels International	Evolution of stem cell-dependent tissue regeneration	41,852
Dr Peter Hudson	NHMRC Ideas Grant	Engineering bone marrow-derived stromal cells to express anti-fibrotic cargo as a treatment for chronic kidney disease	98,126
Associate Professor Jan Kaslin	NHMRC Ideas Grant	Precursor neurons on standby fast track neural repair	814,423
	Sanfilippo Children's Foundation	Discovery and validation of translational biomarkers for Sanfilippo childhood dementia	423,103
Professor Graham Lieschke	ARC Linkages Infrastructure, Equipment and Facilities (LIEF)	Advanced lattice light sheet microscope optimised for biological imaging	1,125,000
	MRFF	Gene modified pluripotent stem cells to generate and empower innate immune cells against poor-prognosis cancers	431,433
	NHMRC Equipment Grant	Zeiss Zen offline software for lattice light sheet 7 image processing	32,490
Associate Professor Mikaël Martino	MRFF	Australian Stroke and Heart Research Accelerator (ASHRA)	249,729
	MRFF	Gene modified pluripotent stem cells to generate and empower innate immune cells against poor-prognosis cancers	215,708
	Department of Health and Aged Care	Myostellar	249,135
	Viertel Foundation	Harnessing the potential of immune cells to design the next generations of regenerative strategies	1,250,000
Associate Professor Edwina McGlinn	NHMRC Ideas Grant	MicroRNA targeting to enhance haematopoietic stem cell function	912,474
Professor José Polo	ARC Industrial Transformation Research Program	Reprograming of different cell types into podocytes	40,000
Dr Jennifer Zenker	NHMRC Investigator Grant	Mitochondria live imaging in mammalian preimplantation embryos	814,024

APPENDIX 5 – GRANTS

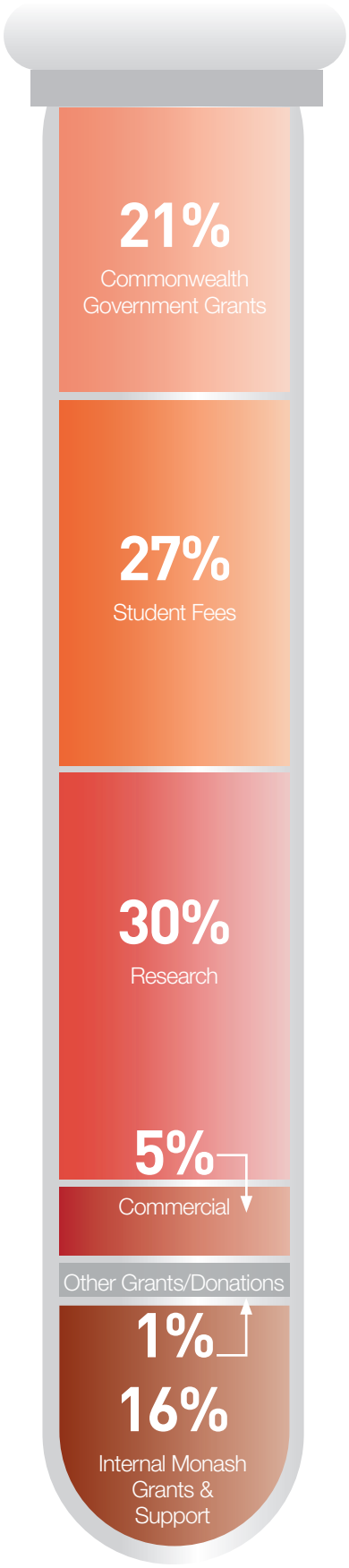
CONTINUING GRANTS

Primary chief investigator	Granting body	Description/Title	Total funding ($)
Professor James Bourne	ARC Discovery Project	From gene to duty: the emergence of the complex brain	560,876
	NHMRC Investigator Grant	The pulvinar is instrumental in the development of the visual cortical networks	1,207,780
	NHMRC Postgraduate Award	An optogenetic approach In identifying novel neural circuits for visual attention and cognition	91,050
	MRFF	The SPRINTS Project: Stroke – Prevention of Reperfusion Injury and Neuroinflammation – a Therapeutic Strategy	323,283
Professor Peter Currie	Muscular Dystrophy Australia	Correcting muscle stem cell dynamics in Duchenne Muscular Dystrophy	390,621
	NHMRC Investigator Grant	Defining the molecular basis of macrophage-mediated muscle stem cell activation	496,444
	MRFF	Developing novel cellular therapies and tissue engineering approaches for the treatment of muscle injury and wasting disorders using tissue resident muscle stem cells	387,506
	ARC Discovery Project	Fins to limbs: Investigating the evolution of complex limb musculature	376,900
	NHMRC Fellowship	Genetic basis for skeletal muscle formation and regeneration in development and disease	883,575
	NHMRC Ideas Grant	Harnessing macrophage-derived cytokine signalling in skeletal muscle regeneration	999,603
Dr Gonzalo del Monte Nieto	ARC Discovery Projects	Genetic, cellular and molecular analysis of cardiac septation	361,620
	Heart Foundation Fellowship	New integrated models in the study of cardiac development and disease	384,100
	Heart Foundation Project	New integrated models in the study of cardiac development and diseases	160,000
Associate Professor Harald Janovjak	Juvenile Diabetes Research Foundation	Optical stimulation of pancreatic beta-cells – regenerating blood glucose levels in diabetes	18,000
Associate Professor Jan Kaslin	ARC Discovery Project	Neurovascular pericytes in development, cell-cell communication and brain regeneration	332,400
	ARC Discovery Project	Shaping the vertebrate brain: defining the cellular and genetic drivers	351,544
	Cerebral Palsy Alliance	Using zebra fish to model genetic causes of cerebral palsy	125,000
Professor Graham Lieschke	ARC Discovery Project	The macrophage nucleus – its form and function during migration in vivo	389,962
	NHMRC Investigator Grant	Defining the molecular basis of macrophage-mediated muscle stem cell activation	496,444
	Health Research Council of New Zealand	Uncovering the earliest events leading to tophaceous gout	29,962
Associate Professor Mikaël Martino	MRFF	Developing novel cellular therapies and tissue engineering approaches for the treatment of muscle injury and wasting disorders using tissue resident muscle stem cells	230,854
	NHMRC Investigator Grant	Development of immune-centric regenerative strategies	627,250

APPENDIX 5 – GRANTS

Primary chief investigator	Granting body	Description/Title	Total funding ($)
Dr Tobias Merson	Metals Manufactures Pty Ltd	MS International Fellowship	600,000
	NHMRC Investigator Grant	Reversing age-related impairment of myelin repair – a novel therapy for MS	931,042
Professor Andras Nagy	PanCELLA	PanCELLA marmoset project	530,994
Dr Nadinath Nilegoda	NHMRC Investigator Grant	Counteracting age-associated neurodegenerative diseases using chaperone-based amyloid disaggregases	649,743
Professor José Polo	ARC Discovery Projects	How do transcription factors control cell fate transitions?	746,430
	ARC Future Fellowship	Unveiling the epigenome dynamics through the pluripotency continuum	918,126
	ARC Industrial Transformation Research Program	ARC training centre for cell and tissue engineering technologies	688,548
	ARC Linkage Infrastructure, Equipment and Facilities (LIEF)	Tracking the single molecule dynamics of transcription factors in a living cell	289,341
	NHMRC Ideas Grant	Developing an in vitro model of a human blastocyst	890,062
	NHMRC Ideas Grant	Reprogramming human fibroblasts into induced trophoblast stem cells	889,064
	Cancer Council Victoria	Targeted reprogramming of prostate cancer	433,805
	Department of Health and Human Services	Evaluating direct and indirect effects of SARS-CoV-2 on multiple organ systems using stem cell-derived human tissues	1,000,000
Associate Professor Mirana Ramialison	ARC Discovery Project	Formation of boundaries in the developing embryo	247,320
	NHMRC Ideas Grant	Role of human non-coding DNA regulatory elements (REs) in heart development and disease	703,227
Dr Alberto Rosello-Díez	HFSP – Career Development Awards	Chasing entelechy: cell interactions and collective behaviours underlying organ growth regulation	423,082
	NHMRC Ideas Grant	Identification of novel mediators of bone catch-up growth	1,055,849
Dr Avnika Ruparelia	ARC Linkage Infrastructure, Equipment and Facilities (LIEF)	Identification of therapies for Collagen V1-related congenital muscular dystrophy	38,303
Mr Silvio Tiziani	National Foundation for Australia-China Relations	Showcasing Australian-Chinese biomedical innovation and commercialisation	100,000
Dr Lulu Xing	NHMRC Ideas Grant	A novel discovery pipeline for regenerative therapies targeting multiple sclerosis	861,460
Dr Jennifer Zenker	NHMRC Ideas Grants	Shedding light onto the structural secrets inside pluripotent stem cells in real-time	562,165
	Canadian Institute for Advanced Research	Microtubule remodelling during cell differentiation and dedifferentiation	116,267
	Canadian Institute for Advanced Research	Real-time effects of embryo-microbe interactions on mammalian embryo implantation	31,707

APPENDIX 6 – FINANCIAL SNAPSHOT



REVENUE

Revenue	2022 ($)	2021 ($)	2020 ($)	2019 ($)
Commonwealth Government Grants	$2,777,914	$3,151,177	$2,181,736	$1,910,813
Student Fees[1]	$3,634,810	$2,730,716	$3,315,318	$1,863,120
Research[2]	$3,997,810	$5,765,431	$5,930,297	$6,282,141
Commercial	$644,776	$108,066	$314,099	$427,964
Other Grants & Donations	$160,753	$265,573	$245,734	$4,352
Other Revenues	$56,100	$24,398	$10,000	$1,262
Internal Monash Grants & Support	$2,108,949	$1,946,410	$1,981,101	$3,715,685
TOTAL	$13,381,112	$13,991,770	$13,978,285	$14,205,338

1 Student programs includes Higher Degree Research (HDR), Honours, Undergraduate Research Opportunities, Masters and Masters of Biotechnology

2 Includes Australian Competitive Grants funding (Category 1–4) received for individual and collaborating grants

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CONTACT AND LOCATION INFORMATION

CONTACT

Australian Regenerative Medicine Institute
15 Innovation Walk
Monash University Clayton Campus, Clayton, VIC, 3800
Australia
Tel: +61 3 9902 9600
Fax: +61 3 9902 9729
www.armi.org.au

Copies of this document can be obtained via www.armi.org or by contacting ARMI.

LOCATION