# in focus

SVI
St Vincent's Institute
MEDICAL RESEARCH

## Funding boost for heart repair research

A two-year grant from the Medical Research Future Fund's Cardiovascular Health Mission will support a team led by Dr Shiang (Max) Lim to develop stem-cell-based therapy for people suffering heart attack.

One person is hospitalised every nine minutes for heart attack in Australia, and every day an average of 19 people die from the condition.

"Stem cells have the potential to improve recovery from heart attack by producing beneficial, healing factors," explains Max, Head of the Cardiac Regeneration Lab in SVI's O'Brien Department.

*Story continues page 3* >

## Cancer Australia takes project to 'next level'

Professor Louise Purton, one of Australia's leading blood disease researchers, has recently been awarded a Cancer Australia grant to improve therapies for myelodysplastic syndromes (MDS).

"All blood cells originate from blood-forming stem cells," says Louise. "MDS are a blood cancer that occurs due to changes in these stem cells."

*Story continues page 3* >

*SVI IN FOCUS*
SPRING 2022

## Tom says

The end of 2022 is approaching with alarming speed and the remainder of the year is rapidly filling with meetings, functions and events. SVI is no exception, and we have several events long on hold coming up between now and Christmas – I hope to see you at one of these.

Many medical and scientific societies are also holding conferences as global travel re-opens. Last weekend I presented three talks on our group's work on diabetes in Seoul, Korea and Kobe, Japan. I would have loved to visit both and especially try the famed Kobe beef delicacy, but unfortunately, I didn't get out of my study nook at home.

While these sorts of presentations are a valuable way to disseminate our work to a wide audience, of course they lack the congeniality and spark of actually being there. Although I really appreciate the flexibility that new styles of working allow – especially at peak hour – I definitely miss the casual interactions with colleagues that can be so rewarding. Virtual attendance isn't nearly as good, even if it saves on airfares. It's good to get away sometimes too.

In Fitzroy, meanwhile, the Aikenhead Centre for Medical Discovery (ACMD) project is rapidly moving forward. As one of the partners in this exciting new initiative, we will be relocating up to 45 of our staff and students to the new building, currently under construction on the corner of Nicholson Street and Victoria Parade.

Our research at SVI is inspired by discovery and driven by purpose. The availability in ACMD of skills and expertise we don't currently have will help us make a real-world difference to important problems for the good of all in the community. In particular, ACMD should help to bring our projects to the attention of industry.

This connection with industry is likely to be a feature of our revised Strategic Plan, due for completion later in the year.

The State Government has also recently released its medical research strategy for 2022-2027 and it was great to see how closely aligned it is with our plans. Despite budgetary pressures, we hope for continuing support from the State and the new Federal Government.

> **Now is the time to continue strong support for medical research, which plays such an important role in underpinning our health system.**

***Professor Tom Kay***
***SVI Director***

# Funding boost for heart repair research *continued.*

"However, the common method of injecting stem cells directly into the heart muscle is invasive and risky. The cells quickly die, resulting in only short-term beneficial effect."

Max and his team have identified an existing safe and minimally invasive medical device to deliver beneficial factors from stem cells to the heart in a sustained manner to facilitate long-term repair – research that will be advanced with this funding.

**"This new funding boost will accelerate development of our concept to clinical reality."**

"It will enable us to test our concept in preclinical animal models – the penultimate step to human trials," says Max.

"We'll be using clinical-grade stem cells provided by Cynata Therapeutics, Australia, and the clinical-grade device from Procyon Technologies, USA."

"If successful, this new phase of our work will provide evidence and knowledge to progress to human trials with heart attack patients."

*The two-year project, "Sustained delivery of stem cell secretome for cardiac repair", has received almost $1 million over two years from the Medical Research Future Fund's Cardiovascular Health Mission.*

*Max and his team are grateful for support from the Stafford Fox Foundation, the St Vincent's Hospital Research Endowment Fund and The CASS Foundation in development of this project.*

## About stem cells

The human body is comprised of more than 200 different types of cells – skin cells, kidney cells, blood cells and others – each having a specific job. Stem cells are unspecialised cells found in many tissues and organs, which can develop into different cell types with a more specific function.

# Cancer Australia takes project to 'next level' *continued.*

Currently, the only cure for MDS is via stem cell transplant. But the majority of MDS patients diagnosed are more than 60 years old, by which point it is often too late to undergo a stem cell transplant.

Louise's research led to the discovery that overexpression of a protein called HOXA1 in blood-forming stem cells causes MDS. Subsequent studies in her lab helped identify drugs that are already approved for other diseases that might be used to treat MDS. However, these drugs can also affect healthy stem cells.

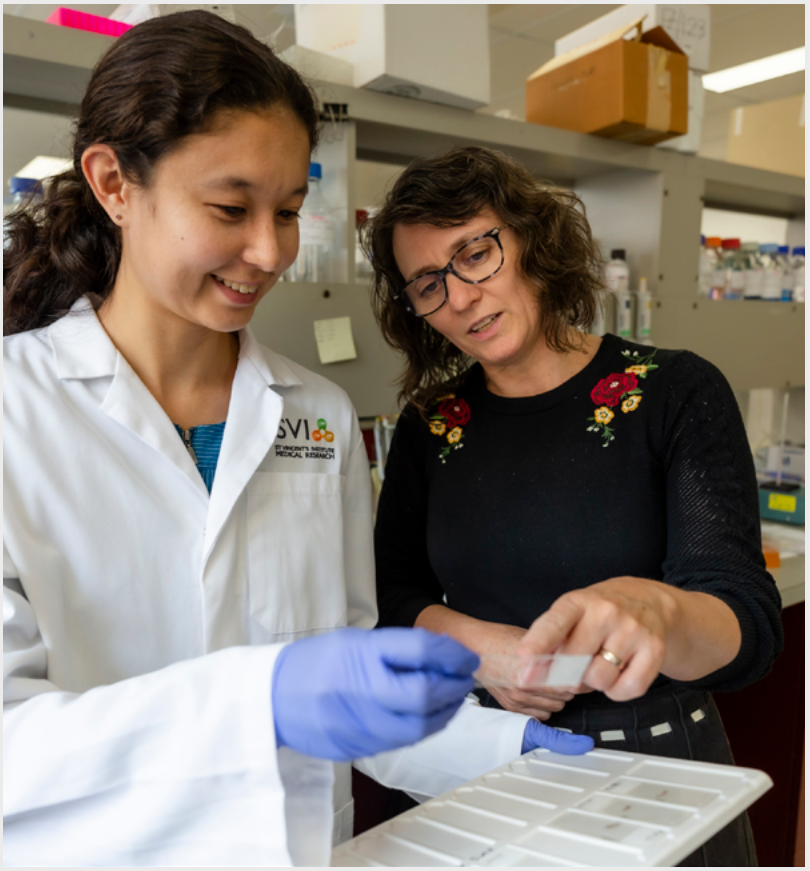
Louise's new grant, in collaboration with RMIT's Dr Jess Holien, will enable her to identify targeted therapies that affect the cancerous stem cells but spare healthy stem cells. Studies in her lab will then trial these potential therapies in preclinical models of MDS to identify the best ones that may lead to clinical trials.

"If we can find therapies that selectively target HOXA1-overexpressing cells, there is a strong chance they may be used to treat other cancers as well, because HOXA1 is increased in a range of other cancer types," says Louise.

*Louise is the first Australian female researcher to be awarded the prestigious McCulloch and Till Award from the International Society for Experimental Hematology, in recognition of her exceptional contributions to blood and stem cell research.*

*Louise and her team are grateful for support from the Leukaemia Foundation, Cancer Council Victoria and Zig Inge Foundation in the development of this project.*

**"Better therapies are needed for MDS patients," says Louise, who has been studying MDS for 12 years.**



# Donors key to solving bone mysteries

Throughout our lives, bone is continuously broken down and rebuilt at a cellular level. But as we age, bone breaks down more quickly than it is built – leading to conditions like osteoporosis.

"Fractures due to osteoporosis result in chronic pain, disability, loss of independence and premature death. If we can find the means to strengthen bone, we could avoid considerable pain and prevent elderly people from dying sooner than they otherwise would have," says Dr Natalie Wee.

For almost a decade, Natalie has focused on understanding the roles of the different cells that make up our bones. She joined the lab of internationally recognised bone biologist Professor Natalie Sims at SVI in 2020 thanks to a Fellowship from the Marion and EH Flack Trust.

"Professor Sims is well-known in bone research internationally, and I have been an admirer of her work for many years. I was thrilled when I had the opportunity to work with her at SVI," Natalie says. Since joining Professor Sims' lab, Natalie's work has also increasingly gained recognition, both at home and abroad.

"My research focuses on the hard outer shell of our bones, called the periosteum, about which surprisingly little is known. Cells in the periosteum make our bones thicker and stronger – I am investigating how we could potentially stimulate these cells to build new bone to protect against bone loss," she explains.

> **"Given how common osteoporosis is, if we can find the means to strengthen bone, that could be life-saving for millions of people over the long term."**

This year, Natalie has been recognised with a John Haddad Young Investigator Award from the American Society of Bone and Mineral Research, a Weary Dunlop Foundation grant and an SVI Rising Star Award, with the support of the Alice O'Brien Trust.

"Natalie's work has the potential to provide new treatment pathways for people living with conditions where bones are progressively weakened," says Professor Sims, SVI's Deputy Director.

"Her efforts to understand the signals that stimulate bone formation in the periosteum are an important step forward in supporting the design of new drugs, for instance to specifically strengthen the wrist and hip – sites where current osteoporosis treatments are much less effective."

"Bone breaks in elderly people often lead to rapid health decline and earlier death," says Natalie Wee. "I am hugely excited that my work could find ways to reverse that."

*Above: Dr Natalie Wee (left) in the lab with Professor Natalie Sims (right)*

# A gift that will last forever

Jacinta Costello's mum Alice was always focused on other people.

"We didn't have much growing up," says Jacinta. "My mum worked hard as a seamstress when we were younger. She wasn't a frivolous person but was always generous when it came to giving to others."

Thanks to good financial advice, Alice managed to make savings over the course of her later life that she was keen to use for the greater good.

"Mum had Alzheimer's and passed away in 2007 from a fall at the age of 89. She made sure that the family was looked after and insisted that the rest of her estate was to go to charity and research. My eldest brother Tony and I look after two trusts that she set up," says Jacinta. "My son Simon had the foresight to say if we spent a dedicated amount each year, our mother's legacy can go on forever."

Jacinta's mum specifically mentioned arthritis in her Will; most likely because her father suffered from osteoarthritis, and Jacinta added osteoporosis to their research investment strategy.

"I knew SVI as a reputable place that was dedicated to doing good science. But what impressed me most was when they invited me to meet Dr Natalie Wee and see the work she is doing in bone disease."

> **"I thought, 'This is great!' – I knew I had found the right place to invest."**

Jacinta made a three-year commitment to fund a Rising Star Award for Natalie, and to fund equipment and software for SVI's Bone Cell Biology & Disease Lab, via SVI's Catalyst Circle program.

Jacinta especially liked the synergy of investing in Natalie, as her mum "would've liked anything to do with women," and supporting a female bone researcher also strongly resonated with Jacinta.

"I started my business, 'Ladies Back On Your Bike', nine years ago to help women learn how to get back to cycling. So many women are candidates for arthritis/osteoporosis; I see the importance of strong bones and the impact regular exercise has on them, both mentally and physically," she says.

Jacinta and her siblings are confident their SVI investment would get their mother's approval. "She would know her money is being spent wisely," says Jacinta.

*Below: Alice O'Brien (at front in red), with her five children (L to R): Tony, Philip, Josephine, Jacinta (behind) and Peter.*

# About SVI's Catalyst Circle

Ground-breaking medical research takes more than skill; it also requires infrastructure – laboratories, tools and technologies. Without this, the ideas and theories generated by even the brightest minds will never be translated into effective treatments.

By joining the SVI Catalyst Circle, you can help create the high-tech environment our researchers need to excel, and to break new scientific ground. Donors to the Catalyst Circle help fund the purchase of powerful equipment and instrumentation.

Joining the Catalyst Circle is your chance to lay a vital foundation for world-class research that will change lives.

*For more information, contact the SVI Foundation at foundation@svi.edu.au or 03 9231 2480.*

# Could an mRNA ‘vaccine’ be the answer to type 1 diabetes?

Government and philanthropic funds are combining at SVI to push forward development of a new approach to treating type 1 diabetes, adapting concepts from rapidly advancing mRNA science.

“Type 1 diabetes occurs when the body’s own immune system mistakenly attacks insulin-producing cells in the pancreas as if they were disease-causing organisms,” says Associate Professor Mark Chong. “Our aim is to use specific mRNA molecules to reprogram the immune system, changing the message from ‘let’s attack’ to ‘there’s nothing to see here, let’s move on’.”

The immune system identifies and destroys potential pathogens by recognising specific molecular markers, called antigens. In the case of an autoimmune disease like type 1 diabetes, the immune system recognises antigens that belong to the body’s own cells – these are known as ‘self-antigens’.

Building on recent developments in mRNA vaccine technology and on decades of work at SVI to identify key self-antigens implicated in type 1 diabetes, the aim of the new project is to suppress the immune response against insulin-producing cells in the pancreas.

**“Antigen-specific therapy would be ideal for treating an autoimmune disease like type 1 diabetes, because it does not suppress the entire immune system.”**

“What we want to achieve is targeted ‘immune tolerance’ to a specific set of self-antigens, so the person’s immune system does not attack useful cells and remains otherwise functional – continuing to protect the body,” Mark explains.

Without the ability to produce insulin to regulate blood glucose levels, people with type 1 diabetes are dependent on replacement insulin for the rest of their lives.

“There is a clear, unmet clinical need for new, more effective treatments that go to the heart of the problem – the abnormal immune response – rather than just replacing insulin after the body has lost the ability to produce it,” says Mark.

“Thanks to development of mRNA technology over the past 20 years, we now have new avenues for treatment that could help millions of people worldwide.”

*We acknowledge the Victorian State Government for supporting this project through the Victorian mRNA Research Acceleration Fund, as well as the support of philanthropic donations to the SVI Foundation.*

# Targeting immune cells to treat Alzheimer's

Almost half a million Australians live with dementia, with some 1.6 million people involved in their care. Alzheimer's disease is the most common form of dementia among older adults.

To date, there are no drugs that effectively treat Alzheimer's. However, evidence suggesting that the disease is caused by a combination of biological processes that go awry as we age is providing new avenues for research.

While most researchers agree there is a relationship between disease progression and the build-up of abnormal protein deposits in the brain, more recently other pathways, such as the brain's innate immune system, have also been implicated.

**In the search for new treatments, Professor Michael Parker and his team at SVI have focused on different ways that the power of specialised immune cells in the brain – called microglia – can be harnessed.**

"While microglia make up only a small percentage of the cells in the brain, they play an important function as the brain's garbage collectors," says Michael. "By removing dying neurons and toxic proteins, they are thought to support healthy functioning of the brain."

The researchers aim to stimulate the activity of microglia using a compound that binds to a particular protein on their surface.

"This protein is genetically linked to Alzheimer's disease," says Michael. "It is thought that it acts like a handbrake on the microglia, slowing down their ability to clear toxins. The drugs we are developing are designed to release that handbrake."

In another project, Michael and his team are developing a drug which can bind toxic proteins, combined with a honing mechanism for the microglia. They have evidence that this drug enhances the microglia's ability to remove the proteins.

These research projects have recently been funded by the Alzheimer's Drug Discovery Foundation and the Dementia Australia Research Foundation.

"Alzheimer's is a difficult problem that will, unfortunately, touch all of us in some way at some stage," says Michael. "We are grateful for this funding, which is critical to help us find new treatments for this terrible disease."

> It is my hope that Professor Parker and his team will develop a medical intervention that can slow down the early signs of Alzheimer's and control it before the disease gets worse
>
> *- SVI donor Alison*

***Join SVI's Health Matters webinar on 9 November to hear more about Michael Parker's latest findings.***

*Full webinar details are on the back page of this newsletter.*

# Donating to SVI

*Please mail this slip in the reply-paid envelope to:* ***9 Princes Street, Fitzroy, Victoria 3065***

*To give online:* ***svi.edu.au/support/donate***

**I would like to support SVI and allocate my gift to:**

- ☐ SVI Discovery Fund (research support)
- ☐ SVI Rising Stars (young scientists)
- ☐ SVI Catalyst Fund (equipment)
- ☐ SVI's highest priorities

**Please accept my monthly* recurring gift:**

☐ $42 ☐ $63 ☐ $85 ☐ Other $_____

** gift is ongoing unless you notify us otherwise*

**Please accept my one-off gift of:**

☐ $500 ☐ $750 ☐ $1,000

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**Please make my receipt out to:**

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Date of birth ____ / ____ / _____

**To make my gift:**

☐ Cheque
*(please make payable to St Vincent's Institute)*

☐ Credit card
*(please tick one of the following cards and complete details)*

Card type *(please tick)*

☐ Visa ☐ Mastercard ☐ Amex

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Expiry date

Donation amount

Name on card

Signature

**Have you considered making a gift in your Will to SVI?**

- ☐ I have already included SVI in my Will
- ☐ I am intending to/considering leaving a gift to SVI in my Will
- ☐ I would like more information

# SVI upcoming events

## Health Matters webinar – About Alzheimer's

Almost half a million Australians live with dementia, and some 1.6 million people are involved in their care. Alzheimer's disease is the most common form of dementia among older adults, with the size of the issue increasing as our population ages.

At this *Health Matters* webinar, you will hear from Professor Michael Parker, one of Australia's leading structural biologists. In the search for new treatments for Alzheimer's, Professor Parker and his team at SVI have focused on different ways that the power of specialised immune cells in the brain – called microglia – can be harnessed. His team have identified a number of potential drugs which could provide new treatments.

The lived experience of Alzheimer's disease will be discussed by a Dementia Australia advocate, sharing their thoughts on life beyond diagnosis.

### Speakers

Professor Michael Parker, leading Alzheimer's researcher

Dementia Australia Advocate

**Host:** Professor Natalie Sims, Deputy Director SVI

Wednesday 9 November 2022

1pm - 2pm

Webinar

FREE

You can register on our website at ***svi.edu.au/support/events_tours/*** or please contact Debbie Dervenis on 03 9231 3538 or email ***foundation@svi.edu.au.***

RSVP by Friday 4 November 2022

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