2021 – 2022

SVI Year

SCIENCE
WITH
PURPOSE

SVI
St Vincent's Institute
MEDICAL RESEARCH

2021 – 2022

SVI Year

SVI acknowledges the Aboriginal lands on which we live and work, and pays respect to Traditional Owners, ancestors and elders.

Welcome

At SVI, we are inspired by discovery and driven by purpose.

Together, our researchers are tackling many of the world's critical disease challenges – cancer, diabetes, infectious disease, osteoporosis, heart disease and dementia.

In this Research Review, we look both back – over the year past – and forward, to the next phase of our quest to improve the treatment, diagnosis and prevention of disease.

The past 12 months have seen two new laboratories established at SVI: one, led by Associate Professor Elaine Sanij, focused on ovarian cancer, a disease that kills more than 1,000 Australian women each year; and another, led by Dr Julian Vivian, who aims to advance understanding of the structure of immune proteins with implications for diseases as diverse as cancer and multiple sclerosis.

New knowledge has been developed about lipoedema, a condition often misdiagnosed as obesity, giving hope to people living with this debilitating chronic disease.

Our type 1 diabetes clinical trial, BANDIT, is now fully subscribed ahead of schedule, with early results due next year. And two more major projects, funded by JDRF and the Medical Research Future Fund in 2021, are pushing ahead our goal of changing the treatment paradigm for people living with type 1 diabetes – accelerating the path to new immunotherapy treatments.

We've commenced a raft of research projects, thanks to new grant funding, aiming to help those living with higher genetic risk of cancer (a Medical Research Future Fund grant to Professor Carl Walkley, Dr Monique Smeets and colleagues), those recovering from bone marrow transplant or cancer therapy (a Cancer Australia grant to Dr Gavin Tjin), and those with liver disease (a National Health and Medical Research Council grant to Associate Professor Geraldine Mitchell and Dr Kiryu Yap). In addition, new funding is helping us build a quality assurance program for COVID-19 rapid antigen tests in low- and middle-income nations (Foundation for Innovative and New Diagnostics grant to the NRL division).

SVI was established thanks to a generous bequest from racehorse trainer Jack Holt. More than 60 years later, we continue to be inspired by our generous supporters. In 2021 this included Gerald Snowden, who gave a $1 million gift to SVI's Discovery Fund. Donors at the *For the Love of Science* event funded seven Rising Star Awards for young researchers to pursue ambitious new projects. Members of SVI's Catalyst Circle contributed to the purchase of a new high-performance microscope that is progressing the search for new treatments for complex diseases like breast cancer, heart disease and diabetes.

Biology – in health, and in disease – has no regard for labels. That's why, at SVI, we're keen to remove artificial barriers to discovery. We pursue fundamental science alongside translational research and clinical trials because – as the global pandemic has shown – both are required to conquer disease.

> **Without new understanding, there are no breakthroughs, no new treatments, no cures.**

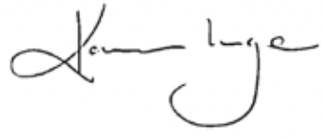
We are grateful to our key government and organisational funders for their ongoing support: the State Government of Victoria (through the Operational Infrastructure Support Program), the Australian Government (through the National Health and Medical Research Council, the Medical Research Future Fund and the Australian Research Council), the Board of St Vincent's Health Australia and the Trustees of the Mary Aikenhead Ministries.

We are also humbled by the continuing contribution of our Board members and thank them for their diligence and professionalism.

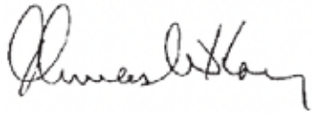
At SVI, we believe that science can – and should – make a real contribution to the society it serves, for the good of all.

We invite you to join with us in discovery – in the following pages, and into the months and years to come.

Tony Reeves, Chair, SVI Board



Karen Inge, Chair, SVI Foundation



Tom Kay, Director

Year at a glance

224
STAFF

111
PUBLICATIONS

44
STUDENTS

21
LABORATORIES

8
RESEARCH THEMES

Professor Louise Purton was named recipient of the prestigious McCulloch & Till Award from the International Society for Experimental Hematology – the first Australian woman and the second Australian ever to receive the accolade.

A new oncology-focused research collaboration has been established with Pfizer's Centers for Therapeutic Innovation, led by Associate Professor Wayne Crismani. The goal is more effective and less toxic cancer treatments through targeting the DNA damage response, common to most cancers.

Associate Professor Wayne Crismani was awarded a four-year $700,000 Victorian Cancer Agency Fellowship for research to improve treatment and screening for people with increased genetic risk of cancer.

New SVI research on lipoedema provides a path to potential drug treatments and development of a diagnostic screening test.

ONE PURPOSE
MEDICAL DISCOVERIES THAT TRANSFORM LIVES

Dr Julian Vivian established SVI's new Structural Immunology Laboratory, which will advance visualisation of the three-dimensional structure of immune proteins. Julian's goal is to develop the next generation of immunotherapies to treat diseases as diverse as cancer and multiple sclerosis.

Two immunotherapy initiatives aim to accelerate new treatments for people living with type 1 diabetes. Professors Tom Kay and Helen Thomas are leading multidisciplinary teams awarded major grants: $2.5 million from JDRF Australia for a new SVI-led Australasian clinical trials collaborative, and $2.7 million from the Medical Research Future Fund to bring immunotherapies into patient care, once proven in clinical trials.

Research led by Associate Professor Andrew Deans and published in *Proceedings of the National Academy of Sciences* (USA) sheds new light on the role of a gene key to DNA copying and repair. The findings have implications for improving diagnosis and treatment of cancer and providing insight into the rare genetic condition Bloom Syndrome.

SVI's BANDIT clinical trial for people recently diagnosed with type 1 diabetes filled within a year of opening – ahead of schedule. The trial is testing whether the drug baricitinib can help stop the immune system from attacking insulin-producing cells in the pancreas. Early trial results should be available in 2023.

SVI's partnership in the Aikenhead Centre for Medical Discovery (ACMD) – Australia's first collaborative, hospital-based biomedical engineering research centre – took another step forward. Planning for the building, located at St Vincent's Hospital Melbourne, is now approved and construction underway. The $206 million centre is scheduled to be completed by 2024.

Time for type 1 diabetes

This year marks a century since insulin was first used to treat type 1 diabetes – a landmark event that has since saved the lives of millions. For SVI Director, Professor Tom Kay, an internationally recognised type 1 diabetes authority, the centenary is a timely reminder of where we stand today – on the cusp of the next milestone.

"Insulin is not a cure for diabetes," says Tom. "Some advances, such as the islet transplant program SVI helped establish, have made a dramatic difference for individuals, particularly those with severe disease. But it is remarkable that treatment for a significant condition like type 1 diabetes has remained basically the same since 1922."

"Our goal is to change the treatment paradigm: to get at the source of this disease, which is the action of the immune system against the body's own healthy cells."

2022 not only marks Tom's 20th year as Director of SVI, but also heralds two significant new projects bringing us closer than ever to a world beyond insulin.

Thanks to funding from JDRF Australia, key researchers and clinicians are now able to join together as the Australasian Type 1 Diabetes Immunotherapy Collaborative (ATIC) to drive clinical trial opportunities for people living with type 1 diabetes.

Focused on a new generation of treatments that act directly on the immune system, ATIC is co-led by SVI and The Royal Melbourne Hospital and involves more than 35 collaborators across Australia and New Zealand.

Separately – but very much related – Tom is leading a four-year Medical Research Future Fund initiative to accelerate new immunotherapy treatments into patient care, once proven in clinical trials.

"Our expert team includes endocrinologists, laboratory researchers and health economists, to bridge the gap between new knowledge coming from research and its application in care. Together, we will be better placed to identify biomarkers, improve workforce education and develop a one-stop national expert immunotherapy advice network for patients and clinicians."

150,000
Australians have type 1 diabetes

7 new cases diagnosed **each day**, mostly children and young adults

Immunotherapy explained

"Type 1 diabetes occurs when the immune system mistakenly destroys a person's insulin-producing cells in the pancreas, as if they were a foreign invader," explains Professor Helen Thomas, Head of SVI's Islet Biology Laboratory.

"Insulin regulates the body's use of glucose. When a critical mass of insulin-producing cells have been killed, insulin production plummets, blood glucose levels rise and the symptoms of type 1 diabetes soon follow. Once destroyed, the insulin-producing cells are gone forever, and affected people require replacement insulin from then on."

But what if we could slow or stop the action of the immune system?

"We have three main aims," Helen explains. "We want to develop screening tools for people at risk of developing type 1 diabetes, so we know when the disease process begins and can intervene early to delay or completely stop immune system attack before a critical mass of insulin-producing cells is lost."

"Second, we will identify and test treatments for those recently diagnosed – as in our current BANDIT trial, supported by JDRF Australia and JDRF International – that might reduce the autoimmune response. The more cells that can be preserved, the less reliant the person will be on replacement insulin."

"Third, there is the potential to replace insulin-producing cells in people already living with type 1 diabetes, combined with treatments to stop immune system attack on those new cells."

"Working closely with clinicians and hospitals nationwide and connecting with colleagues across the globe, we are beginning to see how immunotherapy could radically change the treatment of type 1 diabetes in years to come."

> People don't realise that type 1 diabetes is exhausting...
>
> **Kirsten, mum to 13-year-old Finn**

The trials of type 1

Living with type 1 diabetes is not something that Kirsten – mum to two teenagers with the condition – ever envisaged. "It was a real shock," she says. "It's not in our family otherwise, so we wonder: what has caused this?"

Since his diagnosis last year, Kirsten's younger son, 13-year-old Finn, has joined SVI's BANDIT clinical trial.

"I had heard about the trial through diabetes networks. When we began to see symptoms in Finn, I immediately started asking our doctors about it. We were very keen to be involved, and it means a lot to us to have this opportunity."

So far, Finn's diabetes is relatively stable and easier to manage than his elder brother's condition was in the early stages.

"People don't realise that type 1 diabetes is exhausting," says Kirsten. "It's relentless. It doesn't go on holidays – in fact, on holidays things can be even harder, because you're out of your usual routine. You are constantly counting foods, checking for signs, monitoring your child's blood sugar – day and night."

Finn is a very keen participant in the trial – not least because of the focaccia and milkshake he gets each time for his meal-test visits at the hospital. "He also loves his diabetes clinical team," says Kirsten.

"I tell my children that everything they have access to today in medicine exists because of research. I feel that, so long as we have the capacity to be involved, we all have an obligation to give something back – both for those that went before us, and those that come after."

"I believe type 1 diabetes will be cured in my children's lifetimes. We just need to keep them well until science finds a way."

Three women, one purpose

Every day, five Australian women are diagnosed with ovarian cancer, and three will go on to die from the disease – more than 1,000 women each year.

Bernadette Dennis, reflecting on lives lost

"Ugly" is how Bernadette Dennis characterises ovarian cancer, the insidious disease that claimed the lives of both her mother and sister.

"In 1989, my mother was diagnosed with stage four ovarian cancer. She passed away on Christmas Eve that year. Then, in 2003, my sister Pauline was also diagnosed at stage four, with a different form of the same cancer. After several attempts at chemotherapy, doctors advised her there was nothing else that could be done," Bernadette recalls.

"What I realised at that time was that there was not a lot of support for research or new treatments for this cancer. Although there was a 15-year gap between my mother and sister being diagnosed, it was clear that little had really changed."

"My sister Trish started raising funds to support a clinical trials nurse, and some of Pauline's friends and I joined in this ultimately successful campaign."

This first determined foray into fundraising led Bernadette to become passionate about the transformative impact of philanthropy. She is now a member of the SVI Foundation Board and of the SVI Discovery Fund.

"For the many families who have experienced the loss of loved ones to ovarian cancer, it is wonderful to see this specialist research happening at SVI," says Bernadette. "I know every member of my family will endorse the need for more awareness and discovery, with the ambition of better care, life-expectancy and quality of life for women like my mother and sister."

In Australia, one woman dies from ovarian cancer **every 8 hours**

Around 250,000 women diagnosed worldwide every year

Only 29% of women diagnosed at a late stage will survive more than 5 years

> **Many ovarian cancer treatments used today are virtually unchanged since the 1990s. New and more personalised treatments are desperately needed.**
>
> **Associate Professor Elaine Sanij**

Associate Professor Elaine Sanij, seeking new cancer treatments

Associate Professor Elaine Sanij joined SVI in March 2021 to establish a new laboratory focused on ovarian cancer – supported by the SVI Discovery Fund.

Elaine uses a pioneering approach to selectively cause high stress inside cancer cells. Her goal is to delay or prevent relapse by overcoming the cancer's ability to develop drug resistance.

"Many ovarian cancer treatments used today are virtually unchanged since the 1990s. New and more personalised treatments for this cancer are desperately needed," says Elaine. "I am pushing forward the potential for new drugs, by validating effectiveness in the laboratory, and – when we find strong candidates – initiating clinical trials."

Elaine is also developing a new cross-disciplinary partnership investigating Australia's second most common blood cancer, multiple myeloma.

"Almost seven Australians are diagnosed every day with multiple myeloma. The cancer can be treated, but patients commonly relapse, and – similar to ovarian cancer – it becomes more and more resistant to treatment over time," says Elaine. "While new drugs have emerged to treat this disease, treatment resistance remains an urgent challenge."

Christine Tarascio AM, funding the way forward

Christine's SVI journey began 16 years ago, with a moment of connection. "One of my sons, Sam, has psoriatic arthritis. I was invited on a laboratory tour and the SVI team told me about research they were doing in that field. I would do anything for my children, so I was hooked," she says.

Inspired by the dedication of SVI's scientists to understand disease and make a difference to health, Christine went on to establish a fund in their honour – the SVI Discovery Fund.

"I've witnessed the huge ongoing challenge researchers face in gaining sustainable support, and I wanted to do something about that. So I set about convincing my contacts to pledge $10,000 a year for five years, with the initial aim of building an endowment of $5 million."

In March 2020, just before Australia's nationwide COVID-19 lockdown, Christine's vision was achieved.

"There has been a lot of work, and a lot of loyalty from fabulous donors – many of whom are friends – so much so that we are now heading towards $10 million," she says. "For many, the year 2020 didn't offer much to celebrate, so it was nice to have something positive to focus on."

In addition to the SVI Discovery Fund, Associate Professor Elaine Sanij has Fellowship funding from the Victorian Government acting through the Victorian Cancer Agency. Her work is also supported by the National Health and Medical Research Council, The CASS Foundation and the St Vincent's Hospital Melbourne Research Endowment Fund.

Steps that lessen the pain

New SVI research on lipoedema – a debilitating chronic disease often misdiagnosed as obesity – provides a path to potential drug treatments and development of a diagnostic screening test.

Led by Dr Tara Karnezis and Associate Professor Ramin Shayan, the new study identified a stem cell in people affected by lipoedema, along with a gene that drives excess fat growth – elements key to diagnosing and treating the condition.

"Our findings confirm, consistent with the lived experience of families, that lipoedema is a legitimate medical condition, and that it is not the same as obesity," Tara explains. "Our results reveal some of the genetic and molecular mechanisms that underpin the condition."

"We investigated tissue from people with and without lipoedema and identified stem cells that are only found in lipoedema patients. We all have fat stem cells – from which fat cells usually grow at a regular rate. But people with lipoedema have fat stem cells that differ from those in normal fat in almost every way. We found that the usual mechanisms controlling the number of fat cells produced do not function properly and these cells undergo unrestricted growth."

The team identified a gene involved in cellular growth within the abnormal lipoedema stem cells, which can drive more stem cells to form more fat cells. By introducing drugs that inhibit this gene pathway, the team was then able to block fat stem cell growth to a baseline, or 'normal', level – showing the potential for treatment.

"For years I have lived with lipoedema, and I've been told that diet and exercise was the path to better health," says Nola Young, Chair of Lipoedema Australia. "Now science is starting to explain why I could never curb my body's excess fat production through lifestyle controls – I am not obese and have a real medical condition that needs treatment."

"The shape of my legs is more than aesthetics. It's the pain I feel every day, the clothes I wear, my mobility and movement and my quality of life. This research is exactly the kind of breakthrough that people like me have been waiting for. It provides renewed hope for me, and that my children may not have to suffer the way I have suffered all my life."

Associate Professor Ramin Shayan is a plastic and reconstructive surgeon who deploys liposuction and surgery as one of the few available treatments for lipoedema.

"People with lipoedema can be identified by an excessive formation of painful, swollen, lumpy fatty tissue, most commonly on their legs and hips, and sometimes on their arms," he explains. "The condition gives the body an exaggerated bottom-heavy, disproportionate shape, which can make movements as simple as walking very difficult, due to the excessive amount of fat tissue on the legs. It can, in turn, lead to other health issues and has a massive destructive impact on ankle, hip and knee joints."

"It is not uncommon for people with lipoedema to also suffer mental health disorders such as depression – due to social stigma – or eating disorders, as they try to manage the condition through diet and exercise."

The next step for the lipoedema team is to confirm their laboratory findings and test potential drug therapies in animal models. Says Tara: "Our hope is that this further work will pave the way for clinical trials in people living with lipoedema in coming years."

Published in the International Journal of Obesity, *the lipoedema study involved collaborators at the Monash Institute of Pharmaceutical Sciences and the Diamantina Institute in the Faculty of Medicine at The University of Queensland. Funding was provided by the McMullin Family Trust, the Wicking Trust, the O'Brien Foundation Hummingbirds and the Stafford Fox Medical Research Foundation. The study wouldn't have been possible without the participation and support of Lipoedema Australia and their members.*

For years I have lived with lipoedema, and I've been told that diet and exercise was the path to better health. Now science is starting to explain why I could never curb my body's excess fat production through lifestyle controls...

I am not obese. I have a real medical condition that needs treatment... This research is exactly the kind of breakthrough people like me have been waiting for.

Nola Young, Chair of Lipoedema Australia

What is bioinformatics?

Not too long ago, all medical research was done in ‘wet’ laboratories – with liquids, test tubes and pipettes. But a revolution of sorts has been quietly underway in recent decades, the move to establish ‘dry’ laboratories alongside the ‘wet’ – where research is done with high-powered computing, algorithms and novel software.

This new ‘data biology’ – bioinformatics – is as deep, vast and complex as the ‘wet’ variety. And it is being super-charged by vast rivers of biological data now flowing from new technologies in medicine.

“Bioinformatics, as a discipline, has exploded in growth over the past two decades,” says Dr Davis McCarthy, SVI’s Head of Bioinformatics and Cellular Genomics. “Technologies like genomic sequencing and molecular imaging are making new insights possible like never before. But with all this data comes the greatest challenge: to make sense of it.”

“Information is never an end in itself. Data only has meaning when interpreted – when we can find patterns, correlations and connections. My team and I are harnessing the ever-growing global profusion of biological data, so we can better analyse it to create real-world human benefit.”

Davis came to SVI in 2018 after seven years in the UK and Europe – a joint appointment with The University of Melbourne as the Holyoake Research Fellow, supported by former SVI Board member Paul Holyoake and his wife, Marg Downey.

> Bioinformatics, as a discipline, has exploded in growth over the past two decades...

In the four years since establishing his bioinformatics group at SVI, Davis has grown a team deployed across multiple areas of Institute research, as well as on collaborations with hospitals, universities and fellow institutes.

Scan the QR code to view a short video of Dr Davis McCarthy

Data-powered medicine

Generating insights from biological data has the potential to drive quantum leaps in our knowledge of disease – particularly in how medical care might be personalised for better individual outcomes.

“The sequencing and interpretation of DNA – genomics – is generating a plethora of data,” says Davis.

“Human DNA has more than three billion components, so the exact links between what’s ‘written’ in our genes and individual disease outcomes are mind-bogglingly complex. And while we know that genetic inheritance affects our individual risk and trajectory of disease, environmental factors are also in play throughout our lives.”

> **There are really no limits to what we can do with data.**
>
> **The barriers are finding people with the right skills and knowledge – a mix of computational and scientific – then being able to put in place the collaborations and the big computing infrastructure that can push their work forward.**
>
> **Dr Davis McCarthy**

"The combination of computational grunt and human statistical ingenuity can really make a difference in creating sense of these many variables. Mapping associations between genes and disease will be incredibly powerful in helping us improve diagnosis, treatment and – ultimately – focus on preventative care."

Machine learning has in recent years been gaining prominence across a number of domains, and this technology also has strong potential for application in bioinformatics and healthcare. A sub-field of artificial intelligence, machine learning involves 'teaching' a computer program to learn from its experience of data, resulting in better recognition of patterns over time.

"Working with Adjunct Associate Professor Helen Frazer, from St Vincent's Hospital Melbourne BreastScreen Victoria clinic, alongside experts from the Universities of Melbourne and Adelaide, we're using machine learning to improve the analysis of mammograms," Davis explains.

"In testing to date, we're seeing how digital 'intelligence' can augment human expertise in identifying breast cancers. Ultimately, our goal is to help women get more accurate results more quickly."

Bioinformaticians at SVI are also studying single-cell gene expression – how and why genes can do different things in different cells. This work has huge potential to offer insight into the growth and behaviour of cancer cells, as well as other complex diseases including diabetes and lung disease.

"Technology now enables us to investigate differences in what genes are doing, cell by cell: we call this 'single-cell genomics'. But we don't yet have statistical or analytical methods to match the complexity of the data we can produce with this technology," says Davis.

"Our research at SVI will drive the innovative modelling techniques needed to take full advantage of these new data streams – which will, in turn, accelerate discovery in cancer and other diseases."


Thermo
SCIENTIFIC
Duo
HIV / Syphilis

Testing the quality of a COVID RAT

Rapid antigen testing (RAT) for COVID-19 has quickly become a regular routine for many Australians, as a tool to support our return to schools, workplaces and 'normal' life.

But while rapid tests enable results to be delivered real-time where we live and work, it is a huge challenge to bring quality assurance to these results in the same way as with laboratory-based tests such as PCR.

"There are all sorts of challenges with ensuring the quality of rapid tests," explains Wayne Dimech, Executive Manager for Scientific and Business Relations for SVI's NRL division.

"There are obvious challenges – like the fact these tests are not performed by trained healthcare workers. But there are also less visible factors, such as storage conditions, the in-built 'sensitivity' of the test itself, or the particular virus variants circulating in different regions of the world at different times."

NRL is a global leader in quality assurance for laboratory-based testing for infectious disease – supporting the work of labs in more than 70 countries worldwide. Now, Wayne and his team are bringing this rigor to non-laboratory testing – developing and trialling a quality assurance program for COVID-19 rapid antigen tests in low- and middle-income nations – with the support of the Foundation for Innovative and New Diagnostics.

"Rapid testing is proving a useful tool in our fight against the spread of COVID," says Wayne. "But we need to ensure its ongoing quality, so people can feel confident with rapid testing regimes. Our new program will enable the collection of quality assurance data from community-based settings across multiple nations – a new and invaluable resource – alongside better tools to monitor the tests in action, quality assurance protocols and training to support health authorities."

"Critical to this project is the development of mobile phone technology using QR codes, to deliver real-time result verification. This will be a game-changer."

"In recent years, we've been monitoring the growth of point-of-care testing generally, for diseases including HIV/AIDS, influenza and COVID-19. NRL has been directly involved in developing a quality assurance program for a hepatitis C rapid test that is now being administered by healthcare workers in Australia's remote communities," Wayne explains.

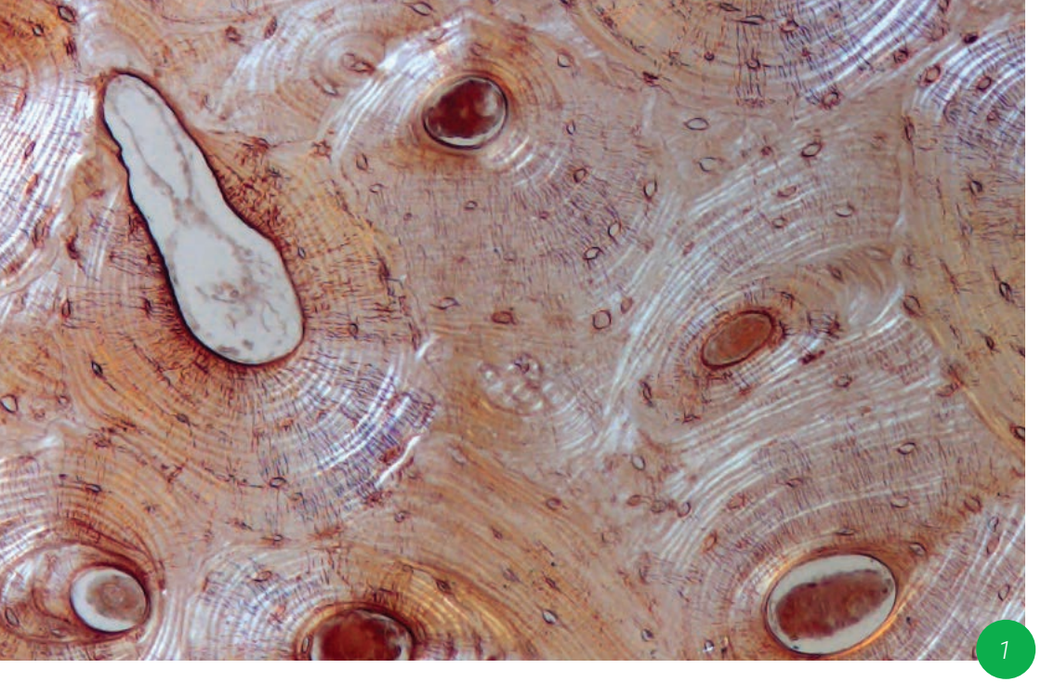
"This new funding will enable our scientists to develop a systematic quality approach for COVID-19 rapid antigen tests that is directly targeted to the challenges experienced in low- and middle-income countries."

Wayne and his team have a unique insight into these challenges, through a global network of laboratories – from Peru, to Vanuatu, to Mongolia.

"We talk regularly with laboratory colleagues across the globe as they've struggled through the COVID pandemic," he says.

"Rapid antigen testing is just the latest in a huge number of logistical and technical challenges that every nation continues to face. We hope our new project can lift the burden a little, providing some surety that rapid testing – which we are all increasingly relying on as we live with COVID – is the best it can be for everyone in the world."

> **There are all sorts of challenges with ensuring the quality of rapid tests.**
>
> **Wayne Dimech**



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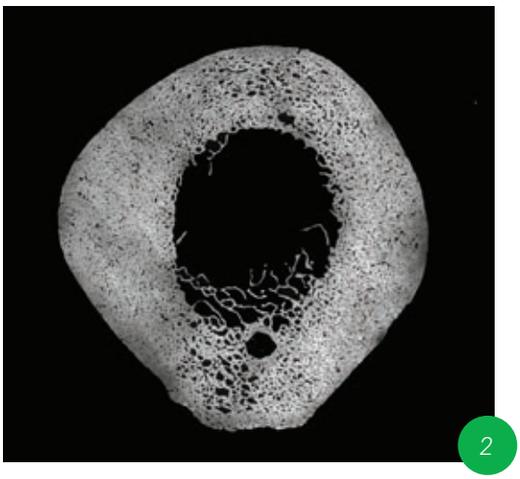

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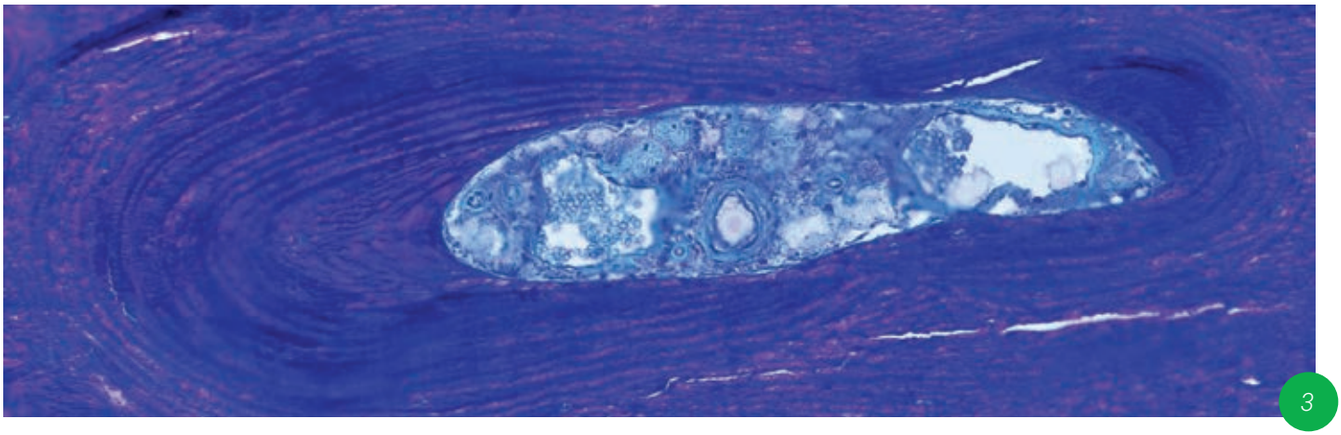

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In the bones

These images are of microscopic sections of human upper leg bones, from the Melbourne Femur Research Collection, a unique set of samples from healthy individuals aged 19 to 91, whose families donated their bones to research.

"This forensic collection of bones is unique. It covers the entire human life span, and the bones are from people who died unexpectedly and without any major predisposing medical conditions or long periods of immobilisation," explains Professor Natalie Sims, Head of SVI's Bone Cell Biology and Disease Laboratory.

"Our study of these bones, funded by the Zig Inge Foundation, is potentially the first in the world to identify differences in the dense outer substance of bone, in unprecedented detail, between normal young and aged human bone."

The Melbourne Femur Collection is housed at the Melbourne Dental School, The University of Melbourne.

1: The structure of the osteocyte network, in brown, the cells that form a communication network within the concentric layers of bone.

2: A cross-section of a femur, showing how porous human bone is.

3: Multiple blood vessels inside a bone's pore, surrounded by concentric layers.

In the blood

Our bone marrow is a factory for making blood, creating billions of blood cells every day. But, as in any factory, when parts get damaged this can affect production – potentially resulting in blood cancers.

"Our blood cell factory is extraordinarily complex, with different non-blood cell types acting as 'stations' along microscopic production lines," explains Professor Louise Purton, Head of SVI's Stem Cell Regulation laboratory.

"Each 'station' makes different factors that stimulate the birth and growth of blood-forming cells – ultimately producing the many complex components of our blood: platelets, red blood cells and the different types of white blood cells."

Louise has played a leading role in international efforts to understand the mechanics of bone marrow 'factory' cells, and has recently been named winner of the prestigious McCulloch & Till Award from the International Society for Experimental Hematology (ISEH) – the first Australian woman and the second Australian ever to receive the accolade.

Recent results from Louise and her colleagues, published in *Blood* – the top-ranking journal for blood cell researchers worldwide – build understanding of exactly how blood cells are made, with implications for blood cancer treatment.

One of Louise's co-authors is light microscopy expert, Dr Gavin Tjin. Gavin's use of cutting-edge imaging techniques to investigate blood cells has recently won him a major grant from Cancer Australia, as well as a 2021 SVI Rising Star Award.

> **About 2,000 Australians undergo a bone marrow transplant to treat blood cancer every year,**
>
> **Gavin explains.**

"Following surgery, about a third of these transplant recipients have a low platelet count – leading to increased risk of bleeding, infection and, in severe cases, death. Low platelet counts are also a problem for people undergoing chemotherapy, and can persist for more than six months after treatment."

Low blood counts are a common reason for delaying cancer treatment cycles, which significantly contributes to the failure of chemotherapy.

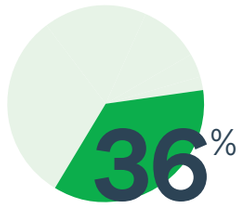
"We know that 'niche' cells – where platelets and other blood components are created – become damaged by cancer treatment, but it is unclear how this affects patient recovery and how we can intervene," says Gavin. "Surprisingly little is known about the inner workings of platelet production."

"I'll be using nine-colour microscopy imaging to identify changes in the cells that create platelets, and in the bone marrow 'niches' where platelets are made. Like a super-sized magnifying glass, the light microscope uses visible light to detect tiny objects. The more colours I apply to these images, the more clearly we can identify structures and changes within the bone marrow."

Says Louise: "We look forward to our insights building new pathways and treatments for people recovering from cancer treatment or bone marrow transplant – leading to fewer complications and more robust and sustained recovery."

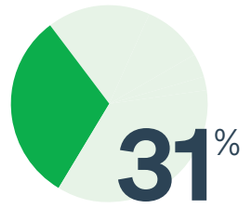
Financials

Income



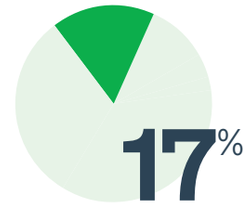
36%

Competitive research grants



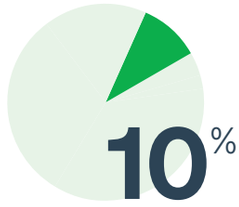
31%

Contracts and other income



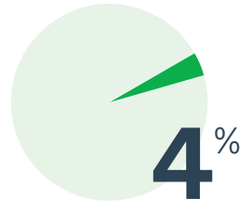
17%

Legacies, bequests and donations



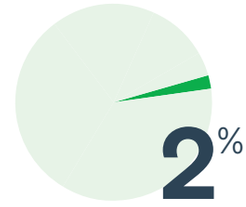
10%

Government infrastructure support



4%

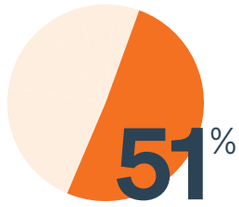
Investment income



2%

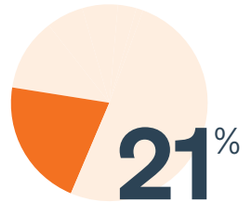
Government jobkeeper support

Expenditure



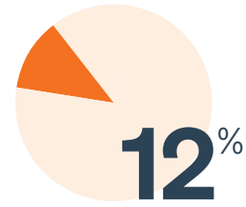
51%

Research



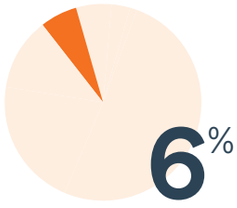
21%

Contract services



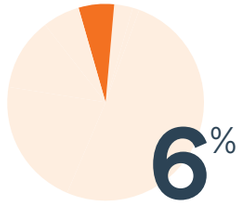
12%

Administration



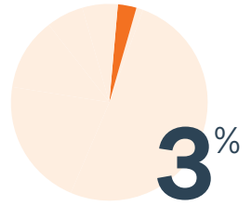
6%

Transfers to collaborators



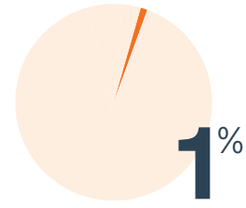
6%

Building operations



3%

Foundation



1%

Commercial development

Statement of financial position as at 31 December

	2021 ($)	2020 ($)
Assets		
Current assets	8,909,688	13,743,417
Non-current assets	33,603,658	27,587,080
Total assets	**42,513,346**	**41,330,497**
Liabilities		
Current liabilities	9,166,539	10,686,793
Non-current liabilities	1,430,763	1,228,736
Total liabilities	**10,597,302**	**11,915,529**
Net assets	**31,916,044**	**29,414,968**
Equity		
Retained surplus	29,581,689	28,921,718
Reserves	2,334,355	493,250
Total equity	**31,916,044**	**29,414,968**

Statement of profit or loss and comprehensive income for the year ended 31 December

	2021 ($)	2020 ($)
Revenue	15,122,517	13,442,390
Other income	17,971,729	18,752,846
Total revenues	**33,094,246**	**32,195,236**
Consumables and general research expenses	(7,810,800)	(7,208,102)
Employee benefits expense	(18,668,030)	(17,887,142)
Depreciation and amortisation	(1,175,122)	(912,473)
Administration expenses	(2,685,609)	(2,053,192)
Transfers to collaborators	(2,094,714)	(1,813,313)
Total expenses	**(32,434,275)**	**(29,874,222)**
Surplus (Deficit) for the year	**659,971**	**2,321,014**
Other comprehensive income (loss):		
Net gain (loss) on revaluation of financial assets	1,841,105	(1,488,119)
Total comprehensive income for the year	**2,501,076**	**832,895**
Total comprehensive income attributable to members of the entity	**2,501,076**	**832,895**

Note 1: Government Grants		
National Health and Medical Research Council:		
– Independent Research Institutes Infrastucture Support Scheme	1,904,978	1,355,804
– Research grants	6,687,409	7,470,288
Australian Research Council	**163,349**	**124,562**
Victorian State Government - Operational Infrastructure Support Program	**1,240,014**	**1,393,712**
Job Keeper Government Support	**577,691**	**3,653,205**

The summary financial information shown above does not include all the information and notes included in the entity's statutory set of financial statements. The full set of Statutory Financial Statements can be obtained upon request to the Chief Financial Officer. The Statutory Financial Statements comply with the Australian Accounting Standards and an unqualified audit opinion was issued by the auditors, William Buck Audit (Vic) Pty Ltd.

Thank you for your support

"The world-class science undertaken at SVI is inspired by discovery and driven by purpose. And it is enabled by our philanthropic partners."

"At SVI, we believe that science can – and should – make a real contribution to the society it serves, for the good of all."

Professor Tom Kay
SVI Director

Rising stars

SVI is committed to growing the next generation of researchers through our Rising Star Program.

- Rising Star Awards, donated by attendees at 'For the Love of Science' events, support research projects among our brightest postdoctoral scientists.
- Rising Star Fellowships from generous donors offer salary support for early career researchers for three to five years.
- PhD Top-up Scholarships donated through SVI Support Group activities attract the best young scientists in training.

I received a 2021 Rising Star Award to progress my work aimed at devising solutions for people affected by blood cancer. The support I have received from SVI donors provided a platform to progress my research to the next level.

Dr Gavin Tjin

Top technology

Cutting-edge research requires cutting-edge equipment. New technology gives SVI's scientists the advantage they need to push boundaries and redefine what is possible. The Catalyst Circle of donors raises funds to support equipment purchases to help drive scientific discovery.

> Thanks to the Catalyst Circle and a grant from The Ian Potter Foundation, in 2021 we were able to purchase a high-powered fluorescent microscope – the Leica Thunder Imager – which is helping us see deep inside the workings of cells. This technology is driving forward my research on the most difficult-to-treat breast and ovarian cancers, as well as many other projects underway at the Institute.

Associate Professor Wayne Crismani

Commitment to better outcomes

SVI has loyal supporters who direct their donations to specific areas of research in which they have a passionate interest. These donors support research into diseases as diverse as breast and ovarian cancer, Fanconi Anaemia, type 1 diabetes, lipoedema, heart disease and osteoporosis.

> This past year saw the filling of places on our BANDIT clinical trial, which aims to change the lives of people diagnosed with type 1 diabetes. While the trial itself is possible thanks to JDRF's support, the decades of work behind it wouldn't have happened without the faithful support of donors committed to better outcomes for people with type 1 diabetes.

Professor Helen Thomas

A passion for discovery

Without new understanding, there are no breakthroughs, no new wonder drugs, no cures.

The SVI Discovery Fund is a perpetual endowment established by long-time supporter Christine Tarascio AM, inspired by family members and friends who have been affected by disease. Having achieved its initial capital goal of $5 million, the Discovery Fund made its first distribution in 2021, supporting the recruitment of cancer biologist Associate Professor Elaine Sanij.

> It is a career-defining opportunity to establish a new laboratory – for which I am hugely thankful. I am committed to finding ways to alleviate the pain and suffering caused by cancer – that is what motivates me every single day."

Associate Professor Elaine Sanij

Visionary gifts

I know SVI's scientists share my desire to find ways to prevent or alleviate human suffering.

Gerald Snowden

Ten years ago, Gerald Snowden's beloved wife Patricia – with whom he raised their 11 children – passed away with breast cancer.

In the decade that has passed since her death, Gerald has reflected on the far-reaching potential of medical research to improve treatments and prevent disease for families such as his own.

"Patricia did so much for so many," he says. "I wanted to turn my frustration at being unable to help her into something positive – something that reflected the type of person she was and would also help provide hope to others."

After supporting SVI over a number of years, Gerald last year made a donation of $1 million to the Discovery Fund in honour of Patricia's memory. An endowment established by long-time supporter Christine Tarascio AM, the SVI Discovery Fund builds stability and longevity for research at the Institute.

"In supporting the Discovery Fund, I really feel I'm making a difference," says Gerald. "I know the calibre of research done at SVI is second-to-none. I've met many of the scientists, and I know they share my desire to find ways to prevent or alleviate human suffering."

"I look forward to seeing my gift support discoveries for many years to come."

The Gerald and Patricia Snowden Room at SVI has been named in honour of the couple in perpetuity. It has a bright and beautiful view over Carlton Gardens and provides an energising space for leading scientists and students alike to explore questions, envision solutions and drive forward their research.

Longer-term, Gerald has also announced his intention to make a gift in his Will to the Institute.

"It's really important that you can clearly communicate what you want to happen beyond your own life," he says. "I'd encourage everyone to do that planning sooner, so that family and friends understand your intentions and what's important to you in celebrating your life."

Gerald is Patron of SVI's Jack Holt Society, a group that encourages bequests to the Institute, named in honour of the man whose substantial gift founded SVI more than 60 years ago.

"Everyone at SVI has been touched by Gerald's generosity," said SVI Director, Professor Tom Kay. "We deeply value the legacy that Gerald and Patricia are leaving for future generations, in enabling life-changing research."

Pictured left to right: Christine Tarascio AM, The Honourable Kathy Williams, Gerald Snowden

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To discuss how you could make a difference to the lives of others by supporting medical research, contact David Drysdale, CEO, SVI Foundation on 0400 661 897 or ddrysdale@svi.edu.au

Jo Hastings, SVI's Planned Giving Consultant, is available to discuss making a gift to SVI in your Will: jhastings@svi.edu.au

Our purpose

We are inspired by discovery and driven by purpose.

We seek new knowledge to transform lives through medical discovery.

We are dedicated, committing all our skills and energy to the pursuit of research excellence.

We bring the best minds to solve critical health challenges, and we provide them with the tools that allow them to push the boundaries of medical research.

We build relationships – with clinicians, philanthropists, fellow researchers, industry and the community – to meet the need, head-on.

We will stay the course, because we believe that for every question there is an answer. We just need to find it.

SVI Year *is the annual research review from St Vincent's Institute of Medical Research.*

This publication is printed on paper made from 100% recycled post-consumer content, which has Forest Stewardship Council (FSC) certification.

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

☐ Other $_____

Please make my receipt out to:

Title First name

Surname

Address

Suburb

P/code State

Email

Tel

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

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