

breakthrough

Discover DNA's
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.....

Seeing the invisible
Meet the hidden biological world



GARVAN
INSTITUTE
OF MEDICAL RESEARCH

From the CEO



Andrew Giles, Chief Executive Officer, Garvan Research Foundation

This year at Garvan we've taken exciting steps towards making the invisible visible. This might sound like something out of science fiction, but the work our researchers have been producing around data visualisation is truly bringing the future forward.

Researchers are using the incredible amount of data gathered from genome sequencing in ways that will allow us to find trends and make inferences. This will eventually lead to more knowledge about the diseases we study at Garvan. You can read more about these projects on data visualisation on pages 6 to 7.

These projects are helping to change the landscape of the medical and scientific community. They would not be possible without supporters like you, so thank you for the part you are playing in breakthrough research.

We continue to embrace change with a new Chairman of the Board of the Foundation, Russell Scrimshaw. He brings a wealth of knowledge from the business world as well as three years as an Institute board member. Read about his appointment on page 11.

And in late-breaking news, after more than six years as Executive Director, Professor John Mattick will leave the Institute in June to take up the prestigious appointment of inaugural Chief Executive Officer of Genomics England. Under his leadership, Garvan has forged a reputation for placing human genomic information at the centre of research. John's leadership will be missed, but we have an outstanding succession in place.

Garvan's strength is its outstanding people, including our supporters in the community who help to continue our vision to achieve the ultimate goal of prevention, treatment or cure of major diseases.

Do you have a friend who loves to read your copy of *Breakthrough*? Let them know they can get it sent to them by calling Supporter Services on 1300 73 66 77.



Cover image by Mark Arrebola. Representation of DNA and proteins within the nucleus of a cell. This image is captured from a Virtual Reality experience created as a collaborative project with Garvan's Dr Kate Patterson and the 3D Visualisation and Aesthetic Laboratory at UNSW Art and Design.

New research

DIABETES AND METABOLISM

Muscles talk

Even though it's a known 'fact' that exercise is good for your whole body, it's not fully understood why in scientific terms. Research by Garvan's Diabetes and Metabolism Division has uncovered a method of communication between muscles and the rest of the body. Division head Professor Mark Febbraio co-led the study with Dr Martin Whitham (Group Leader, Myokine Biology, Diabetes and Metabolism Division). They identified thousands of proteins that are released in tiny packages, called vesicles, in our bloodstream. "It makes a lot of sense that many of these exercise-liberated vesicles may be emanating from muscle and heading to the liver," says Professor Febbraio, "because we know that liver function is vastly improved by regular exercise."

Watch a video about this at garvan.org.au/vesicles.



IMMUNOLOGY

Making immune system memories

As well as defending our bodies at the moment of infection, our immune system gives us long-term protection against the same invader – so we usually catch a given disease only once. New research from Professor Rob Brink and colleagues has now solved a key piece of the puzzle of how the immune system 'remembers' past infection. The researchers devised a new way to track cells called memory B cells – which attack disease that the body has tackled before. They observed, for the first time, the early development of memory B cells in the germinal centre – "a kind of training camp where B cells go to learn their craft," as Professor Brink puts it. This provides evidence that memory B cells give us protection against versions of a disease – such as flu strains that change year on year. The findings could aid the rapid development of new vaccines against emerging diseases.

Read the full story at garvan.org.au/total-recall.



GENOMICS AND EPIGENETICS

A map of every cell

When the human genome was first sequenced, it led to the discovery of more than 1,900 disease genes. This generation's similarly ambitious goal – the Human Cell Atlas – will likely bring a new wave of revelations. The initiative aims to map each of the 37.2 trillion cells in the human body. The monumental endeavour will require contribution from across the international scientific community. Scientists from 14 of Australia's top biomedical institutions, including Garvan, have joined forces as part of a coordinated national approach. While it has only just commenced, the Human Cell Atlas holds exciting potential for health discoveries and could help to create a map for predicting disease.

Read the full story at garvan.org.au/human-cell-atlas.





Dr Martin Smith
monitors GridION
technology reading
DNA in real time.

How to read DNA in real time

A future where our researchers and clinicians can watch DNA and RNA as it is sequenced – and even interact with the experiments while they are running – is not so far away.

Dr Martin Smith, Genomic Technologies Program Leader at Garvan's Kinghorn Centre for Clinical Genomics (KCCG), and his team have honed the use of Oxford Nanopore Technologies' MinION and GridION sequencers. Garvan was only the second organisation in the world to achieve certification to provide nanopore sequencing as a service.

The technology works by driving DNA or RNA molecules through thousands of tiny tubes, called nanopores, that sit in a membrane. As the molecules move through a nanopore, each base (or letter in the genetic sequence) disrupts the electric current. These disruptions are recorded to determine the sequence. Researchers can process samples and start analysing the sequences in as little as 15 minutes.



The MinION sequencer allows researchers to sequence DNA on their laptops.

The real power of nanopore sequencing lies in its 'long-read' capabilities. It can read thousands upon thousands of DNA letters (or bases) from a single molecule of DNA, setting it apart from most other genome sequencing technologies that read relatively short stretches of DNA then reassemble the sequences computationally. Late last year, Martin's team achieved the milestone for the first genome sequencing read over one million bases in a single DNA molecule.

THE RESEARCH GAME-CHANGER

Long-read sequencing is particularly powerful in cancer. As a cell progresses to being cancerous, it acquires a host of changes to its genome, such as structural rearrangements – which involve the relocation of stretches of DNA from one part of the genome to another. These changes are readily assessed with this technology.

Professor Vanessa Hayes, who leads Garvan's Human Comparative and Prostate Cancer Genomics lab, studies how large-scale DNA changes impact prostate cancer. "We know prostate cancer is likely to be driven by complex rearrangements of DNA – when a gene has been deleted, transferred to another chromosome or multiplied many times," she says. "Being able to attain long reads on prostate cancer genomes is a game changer."

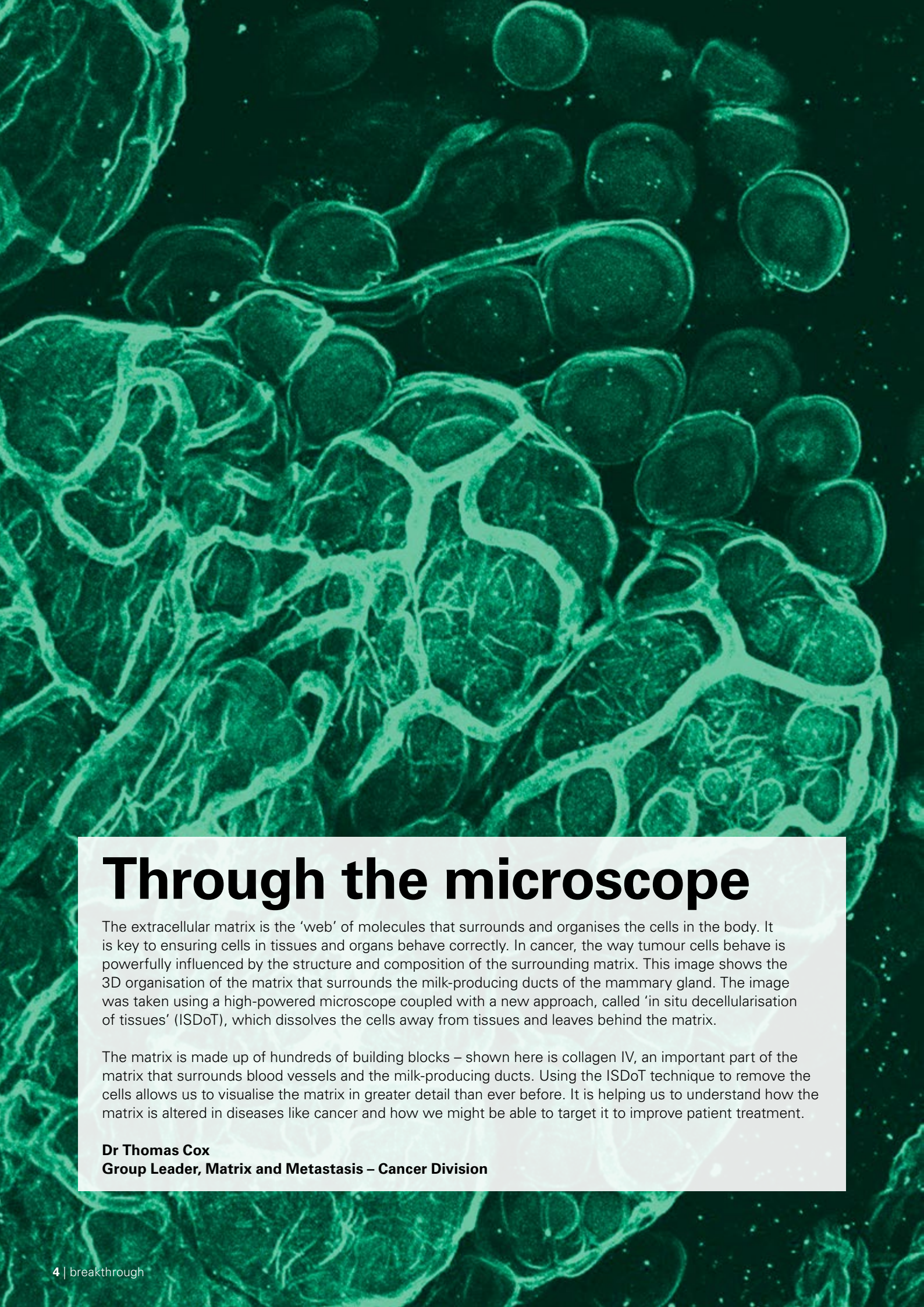
Nanopore sequencing can even pick up chemical changes to DNA and RNA – which are collectively known as epigenetic marks. "This technology is going to transform research into RNA biology," says Dr Smith. "RNA has over 200 known modifications, and we have little idea of how these modifications are involved in biology and disease. If we can read the epigenetic marks on RNA directly, we'll be in a far better position to make sense of what they're doing in the cell."

“Researchers can start analysing the sequences in as little as 15 minutes.”

Researchers at Garvan and beyond now have access to both short-read and long-read genome sequencing, which are complementary. Dr Smith and his team will seek to improve capacity to process samples more quickly, cost-effectively and accurately. "The clinical implications could one day be enormous," Dr Smith says. "If a patient's dying because of an infection, and a clinician can identify the pathogen quickly and accurately, you could save a life."

Watch a video about this technology at garvan.org.au/nanopore.





Through the microscope

The extracellular matrix is the 'web' of molecules that surrounds and organises the cells in the body. It is key to ensuring cells in tissues and organs behave correctly. In cancer, the way tumour cells behave is powerfully influenced by the structure and composition of the surrounding matrix. This image shows the 3D organisation of the matrix that surrounds the milk-producing ducts of the mammary gland. The image was taken using a high-powered microscope coupled with a new approach, called 'in situ decellularisation of tissues' (ISDoT), which dissolves the cells away from tissues and leaves behind the matrix.

The matrix is made up of hundreds of building blocks – shown here is collagen IV, an important part of the matrix that surrounds blood vessels and the milk-producing ducts. Using the ISDoT technique to remove the cells allows us to visualise the matrix in greater detail than ever before. It is helping us to understand how the matrix is altered in diseases like cancer and how we might be able to target it to improve patient treatment.

Dr Thomas Cox
Group Leader, Matrix and Metastasis – Cancer Division

A remarkable gift from the Norma Wilson Trust will enable the screening and treatment of many new rare cancer sufferers in Garvan's Genomic Cancer Medicine Program clinical trials.

Tom Wood and Norma Wilson never met, but they've become forever connected through the dedication of their friends and family to find a cure for Ewing sarcoma, the aggressive bone cancer that took Tom's life in 2009, at age 28.

Norma Wilson was born in Melbourne and lived out her final years in the Trentham Bush Nursing Hospital in regional Victoria. She died in 1994 – but two years earlier she made her Will, which established the Norma Wilson Trust. “When I met Norma around 1990, she was wheelchair-bound but very bright and cheery,” says Jill Oreo, one of the trustees. “She set up her charitable trust to benefit medical, scientific and educational charities. She also loved young people, which has influenced the bequests we have made over the years.”

Tom's family describes him as athletic, vibrant, perceptive, courageous and much admired and loved. “When Tom passed away, we were determined to make a difference,” says David Wood, Tom's father. “Our objective was to give Tom's passing some meaning by raising funds for sarcoma research so that other families could be afforded hope.”

Over the following years, Tom's family and friends have raised approximately \$150,000 to date in numerous ways, such as forming the Run for Tom team to participate in RunMelbourne and Sydney's City2Surf. Through their fundraising efforts in the community, Tom's family was able to make an even larger impact on sarcoma research by spreading awareness and attracting the interest of the Norma Wilson Trust.



Prof David Thomas and Dr Mandy Ballinger with Kati and David Wood.



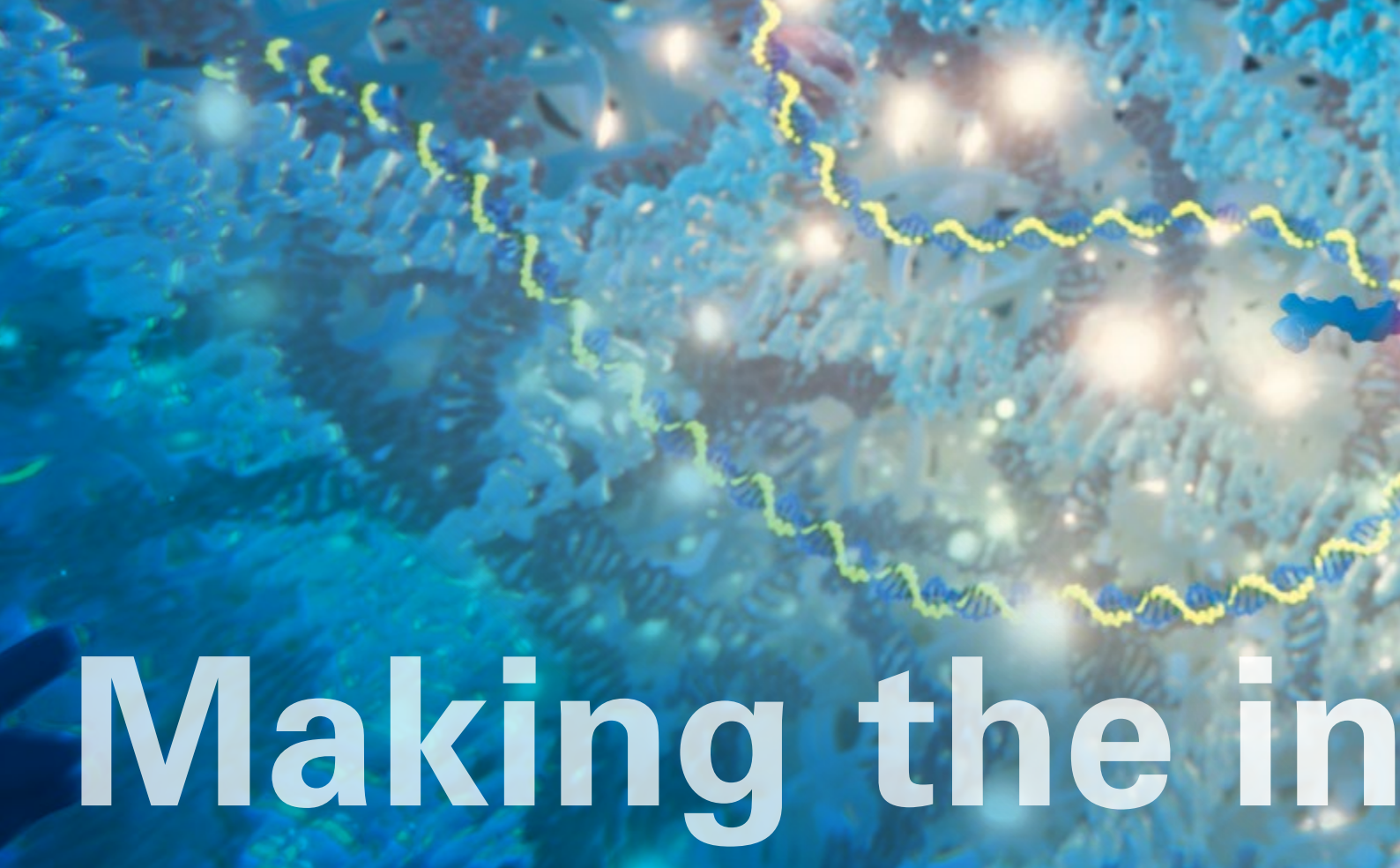
“Soon after Tom's death, we became acutely aware of the lack of research funding for sarcoma and rare cancers,” says Kati Wood, Tom's stepmother. “We met David Thomas [Head of Garvan's Cancer Division] when he was chair of the Australasian Sarcoma Study Group. Through our dealings with David and Mandy Ballinger [Group Leader, Genetic Cancer Risk] we came to realise how difficult it is to attract government funding in the field of rare cancers. In August 2017, we were delighted to hear Garvan's Genomic Cancer Medicine Program [GCMP] had been launched,” says Kati.

Meanwhile, after many contributions by the Norma Wilson Trust, the trustees deemed it timely to wind it up. Jill approached the Woods for their thoughts on where to direct the remainder of the Trust. “We had no hesitation in proposing the GCMP,” says Kati. The trustees agreed this was an ideal way to honour Norma's wishes.

“The generous donation from the Norma Wilson Trust is a major contribution to the goal of the GCMP,” says Professor Thomas. “When Tom became ill, the genomic approach to cancer treatments did not yet exist. Our goal is a national program that will meet the needs of those with rare and uncommon cancers, especially young people, who have no other treatment options and are fighting for their lives.”

You can also help by making a donation on the back page of this issue of *breakthrough* or organising a fundraiser in your community. To find out more, visit garvan.org.au/fundraise.





Making the in

Well-designed data visualisation can help explain the hidden biological

There are three billion letters in the human genome. If read out loud for 24 hours a day, it would take a century to finish. Garvan has now sequenced more than 15,000 human genomes. And this is just the tip of the research data iceberg we're collecting across our six divisions and our centres.

So how do researchers make sense of this huge amount of information that's not humanly possible to 'read' in a traditional way? Garvan is creating new ways to digest the overwhelming size and complexity of this research data.

THE MOMENT OF INSIGHT

"Our researchers gather data and then analyse it in various ways. But, ultimately, they have to look at it in order to make sense of it," says Professor Seán O'Donoghue, Garvan's Head of Biodata Visualisation and Office of the Chief Executive Science Leader at CSIRO's Data61.

"Most discoveries have been made shortly after someone 'saw' the data and thought about what they saw. And so our goal is to take the data plus analysis and create a system that puts it in front of the right researcher at the right time, so they can see something and have that moment of insight."

To achieve this, Garvan has created a new Biodata Visualisation Centre. "Single cell sequencing is one example. They need completely new solutions that can be applied to completely new biological problems. If a view is going to be insightful, it has to have clarity to facilitate discovery and insight," explains Professor O'Donoghue.

"The systems we're building for the researchers enable them to navigate through the data to see patterns."

In another realm of the visualisation sphere, Dr Kate Patterson, Senior Visual Science Communication Officer, is creating new ways to reveal the fascinating interior worlds our researchers are exploring. "To see a process happening, rather than read about it, can make a huge difference in people's understanding of complex scientific concepts and medical problems," says Dr Patterson. "The real advantage of having immersive technologies to communicate biological information is that you can take the audience to a place they can't physically go."

Dr Patterson, a scientist and animator, began by making animations for the screen. "These were viewed at festivals and online. People kept asking me if they could interact with the molecules and get a more meaningful experience."

IMMERSIVE EXPERIENCES

The Cell Observatory is an immersive visualisation dome, using a planetarium-style projection device. It's open to the public on Garvan Discovery Tours. "In the observatory it feels like you're inside a cell," says Dr Patterson. "You can have a curated explanation about what's happening."

“

The real advantage of having immersive technologies is ... you can take the audience to a place they can't physically go.

”

The other experience is in virtual reality (VR). The first step was to create an app designed for Google Cardboard. Users can download GarvanVR to look at 3D animation in 360 degrees. "They can see molecules up close – see what it is



visible visible

cal world and reveal discoveries that might otherwise remain buried.

the scientists have been working on at the molecular level.” The appeal of Google Cardboard is that it’s so accessible – anyone can purchase one to use with their own smartphone.

The extension of this is a room-based VR experience using HTC Vive technology, called *Cell Explorer*. In this environment, users are able to grab molecules with controllers. “You can transport yourself through a cell membrane, into the nucleus. You can manually activate gene transcription or turn off a gene by wrapping DNA around proteins called nucleosomes,” describes Dr Patterson. “It’s really powerful being able to control your own experience.”

A JOURNEY OF DISCOVERY

Dr Patterson’s ambition for Garvan’s animation and VR creations, is that it will inspire users to continue their journey of education. “I’d like everyone to take action to find out more, whether that be to go to the website, speak to a scientist, have more awareness. Presenting it in an interesting way aids understanding of biological processes and encourages conversation; that’s really the beginning.”

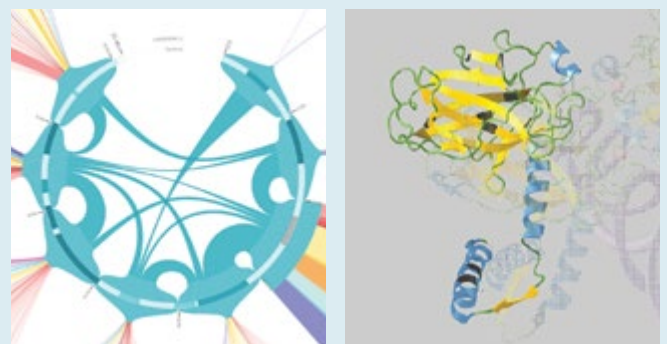
Professor O’Donoghue says there’s a strong need for data visualisation in a clinical setting, both in how data is presented to clinicians, and how they communicate those insights to their patients. He says the third leading cause of death in the US is medical error.

“Most misdiagnoses are by informed clinicians with the right data in front of them but making cognitive errors. Ideally, data visualisation off-loads the cognitive burden so clinicians can better serve their patients and researchers can see results in new ways, which will hopefully initiate new findings.”

ABOVE: Representation of DNA and proteins within the nucleus of a cell, captured from a virtual reality experience created by Mark Arrebola as a collaborative project with Dr Kate Patterson and the 3D Visualisation and Aesthetic Laboratory at UNSW Art and Design.

Two views of TP53

Biodata visualisation can give scientists new understandings of research. Here, two different views of the TP53 gene, (which provides instructions for making tumour protein p53) are shown in 2D and 3D in Rondo and Aquaria softwares respectively. These views allow researchers to explore the variables.



Prof Seán O'Donoghue



Dr Kate Patterson

Read about how Dr Patterson creates an animation plus get the link to the GarvanVR app at garvan.org.au/vr.



Whole genome sequencing is becoming more accessible, immediate and informative, thanks to Garvan's wholly-owned subsidiary Genome.One.

If you could, would you choose to find out if you're carrying a gene variant that could affect your future health? What would you do with the information if you had it? Do you think it would influence you to change your health habits, take preventative action or inform your children of their potential risks?

This is not the stuff of science fiction or even an opportunity only affordable to a Gates or a Rinehart. Genome sequencing, analysis and risk assessment is available, here and now.

In 2016, Garvan launched its wholly owned subsidiary Genome.One to diagnose Australians living with rare and genetic conditions, such as cancers and cardiac conditions.

In 2017, Genome.One broadened its capabilities and clinical services to offer personal genome testing for people interested in discovering whether they have increased genetic risk for specific diseases where monitoring and intervention could be of benefit. This service can be accessed with a doctor's referral or as part of a comprehensive health management program.

UNDERSTANDING YOUR RISK

The genetic information from this test can help you to understand your risk of developing around 50 conditions that result from changes in more than 200 genes, as well as your likely response to more than 220 medications.

"Personal genomic information not only empowers individuals to take control of their health and potentially prevent disease, it can also optimise treatment in the clinic," says Associate Professor Marcel Dinger, the Head of Garvan's Kinghorn Centre for Clinical Genomics (KCCG) and CEO of Genome.One.

Each gene included in the assessment is associated with a condition that is possible to treat, manage, monitor or prevent with present-day medical tools.

Important to note, this service is not one of the now-commonplace online DNA tests that provide information about ancestry.

Instead, Genome.One's genomic tests are part of a clinical service that requires a doctor's referral and involves genetic counselling with healthcare professionals to help people understand, use and share their information.

"By itself, genomic information provides insights into a person's risks for the future – but it is best used in a healthcare context in combination with their personal and clinical information," Dr Dinger explains. "A person's genome doesn't generally change over time, so it can continue to provide them with an additional layer of health information across their lifetime or be shared with their family and children."

People who take up the Genome.One test can also choose to share their data for ongoing research. As more genomic data is collected and analysed, researchers will gain even greater understanding of how each person's unique genome can give insights into their individual health.

Garvan researchers are rapidly accelerating the knowledge we have about the human genome. This will ensure a growing impact on our ability to prevent and treat disease.

And, as more discoveries are made linking gene variants with health, those with their DNA already sequenced can have their data reanalysed to incorporate new evidence and a broader range of conditions. This could identify new opportunities to improve their and their family's health.

To find out more about how genomic information can be used in precision healthcare, please visit genome.one/breakthrough.



Case study 1

When Linda* had her genome sequenced, a variant was found that could cause a reaction to a general anaesthetic. She shares half of her DNA with her immediate family members, so this variant could also be present in her children. At the age of 10, her son needed to undergo a routine procedure, so Linda worked with her doctor to take extra precautions in case her son reacted to the anaesthetic.



Case study 2

Malcolm* had a health and genomic risk assessment both for curiosity and to provide a record for his children and grandchildren. He had raised cholesterol levels and a genetic variant known to be linked with familial hypercholesterolaemia, which can increase the risk of premature cardiovascular disease. His pharmacogenomics report suggested he would respond to particular medications. Malcolm was referred to a specialist and this information helped guide his care.



*Not their real names.

Living with MS

Garvan's Deputy Director, Professor Chris Goodnow, with Mr George Saliba, a Partner for the Future.



**"I cannot control the fact that I have multiple sclerosis, but what I can control is my attitude."
– George Saliba, Garvan Partner for the Future.**

George Saliba lives by this mantra in every way, and has done so for the past 20 years. While he's been in a secondary progressive phase of the autoimmune disease for a decade, the progress has slowed. "I'm in a wheelchair 90 per cent of the time these days, but I've been stable for about four years. I work out at the gym twice a week, eat well – I maintain a healthy lifestyle."

An architectural draftsman and designer by profession, George began working from home due to the fatigue caused by MS. He's now an accredited access consultant with his own business, Access Mobility Solutions, advising the architectural industry on Australian Standards for accessibility. "I wanted to stay active in my community, and being a wheelchair user has given me perspective on how important accessibility is not only for those with disabilities but also parents with prams and the ageing population. Accessibility helps everyone."

“Because Garvan studies both cancer and MS, I feel as though this is exactly the right place for my bequest – I'm also doing something for cancer patients in memory of my mother.”

George and his family and friends have been fundraising for MS Australia for many years. Annually, 'Camp Saliba' has a highly visible presence at the MS Walk + Fun Run. So far they've raised approximately \$80,000 in support of MS Australia with a portion going to MS Research Australia.

Last year, George began to plan his Will and decided to make a bequest to support medical research. George's mother, Saydie, had died two and a half years previously from cancer, so Garvan resonated with George. "Because Garvan studies both cancer and MS, I feel as though this is exactly the right place for my bequest – I'm also doing something for cancer patients in memory of my mother."

Professor Chris Goodnow, Garvan's Deputy Director and Head of the Immunogenomics Lab, met with George to discuss Garvan's work in MS through the Hope study into targeted therapies for 36 autoimmune diseases. "Through this hugely ambitious project, the division is investigating the potential to shut down the rogue clones that cause MS."

"It's people from the wider community, like George, who inspire us," adds Professor Goodnow. "We see their names on the honour board as we walk into work and are reminded that achieving our goals will have very real outcomes."

"I'm not sure of the right word ... it's gratifying or fulfilling ..." says George, "putting this gift in my Will. I know I'll be helping others even after I've passed. And knowing that puts a smile on my face."

**Left: George with his nephew Kaelan at the MS Walk 2017.
Below: Camp Saliba has raised more than \$80,000 for MS Australia.**



If you would like information about leaving a gift to Garvan in your Will and becoming a Partner for the Future, please contact Donna Mason, Senior Bequest Coordinator, on 9295 8559 or visit garvan.org.au/bequest.





Staff profile

Julia Kiss

Public Engagement
Officer – Garvan
Research Foundation

HOW DID YOU BECOME A SCIENCE EDUCATOR?

I had an interest in medicine and science from a very young age and followed this passion by completing a number of degrees in health science, biomedical science and science education. Initially I worked in labs and hospitals in endocrinology, haematology and radiology triage but found that I had a knack for communicating scientific concepts. I landed a position at UNSW in The Museum of Human Disease as an educator and curator and loved it! Since then I've continued to develop myself as an educator. Now at Garvan I'm passionate about my role and I look forward to expanding and developing our outreach and public programs.

WHAT DOES YOUR ROLE INVOLVE?

Public tours are a big part of what I do to inform people about our work at Garvan. These are free and it's wonderful to be able to answer questions and dispel confusion about what's happening in medicine and research. Our seminars give

people insight into our latest research. This year we're holding six seminars, which means every division will be able to share their current research. There's a need for education for the whole community around the importance of medical research and how it impacts treatment. We're engaging communities and groups across Australia through events and initiatives and I'm looking forward to bringing in school groups so they can learn about disease and disease prevention, and the potential of careers in medical science and research.

DO YOU MISS DOING SCIENCE?

Every time I walk into a lab I miss being there, but I love talking with people – both researchers and the public – so I'm very happy to be here.

Find out more about Garvan's events program at garvan.org.au/events. Do you know a school that would like to bring a group of students? Contact Julia Kiss on (02) 9295 8561.



Researcher profile

Dr Joanne Reed
Senior Research Officer,
Immunogenomics –
Immunology Division

TELL US ABOUT THE 2017 YOUNG GARVAN EDGY IDEAS AWARD.

I proposed an idea to a panel of Garvan scientists. They pick three finalists. I then received guidance on how to 'sell' my idea from a business mentor. We pitched our ideas to the Young Garvan Committee – young professionals who work in areas besides science – and the audience at the Edgy Ideas event. For me it was unique to be mentored by someone who wasn't a scientist on how to try to get investment. I was encouraged to pitch something quite high-risk. The prize money will allow me to try out my idea.

AND WHAT WAS YOUR EDGY IDEA?

It came from the project that I've been working on for 18 months now with Professor Chris Goodnow. We've seen the rogue clones in Sjögren's syndrome, but we think it's applicable to other autoimmune diseases. My idea is to be able to detect the cells more easily in blood using the flow cytometry facilities in the Garvan-Weizmann Centre for Cellular Genomics. The flow cytometer can look at a huge number of parameters on a cell surface. I'm trying to detect rogue cells in a blood sample, rather than having to do expensive, complicated sequencing.

WHAT FIRST ATTRACTED YOUR INTEREST IN AUTOIMMUNE DISEASE?

I found it really fascinating that the body has this system that's so powerful it can recognise and fight bacteria and viruses, but then it can also turn on itself and cause disease. My main area is Sjögren's syndrome and I'm now working with patients with lupus. The Hope Research project will extend our study of rogue clones to 34 other autoimmune diseases.

WHAT DO YOU THINK THE COMING YEAR WILL BRING?

We want to get a good start on finding more rogue clones in people and I'm keen to publish the first rogue project I did with a Sjögren's patient last year. What we're doing here is a first, because no-one's been able to link those cells with the autoantibody that is causing the disease in humans. Being here allows me to work with Professor Chris Goodnow at an institute that is investing in the latest technology. They're willing to try high-risk but high-payoff kind of work.

Read more about the Hope Research project's revolutionary work at garvan.org.au/hope-research.



Making news

Introducing the Foundation's new Chair

We're pleased to announce Russell Scrimshaw has commenced as Chairman of the Board of Directors of Garvan Research Foundation. "Throughout his career, Russell has proven what strong leadership can achieve, and he'll bring this to the Foundation's Board," says Andrew Giles, the Foundation's Chief Executive Officer.

Russell has also been a member of the Garvan Institute board for three years. "My goal is to encourage Australians to greatly increase their commitment to philanthropy that is targeted at ensuring a healthier future for mankind," says Russell. "It's an honour to be in such a position of responsibility in shaping the future of medical research and healthcare for Australians and the world."



2018 Foundation Board of Directors (from left): Helen McCabe, Jane Allen, Loftus Harris AM, Peter Young AM, John Schubert AO, Russell Scrimshaw (Chair), Jeanne-Claude Strong, Simon Mordant AM, Gabriel Farago, Michael Cannon-Brookes.

Australia's innovation future

In January, Innovation and Science Australia (ISA) released its *Australia 2030: Prosperity through Innovation* report. ISA is an independent board that provides advice to the Australian Government. Its Chair is Bill Ferris, the immediate past Chair of the Garvan Institute Board of Directors. Dr Alan Finkel AO, Australian Chief Scientist, is the Deputy Chair. The 2030 Plan makes 30 recommendations to the Australian Government. It highlights Australia's local talent in technology and science. "ISA recommends that Australia seek to become the healthiest nation on earth through the integration of genomics and precision medicine capabilities into the Australian health system," says Mr Ferris.



Clinical services suite opens

Located on the ground floor of The Kinghorn Cancer Centre, Suite 1 is the new home of Genome.One Clinical Service as well as a range of other clinical services. "This is the first private clinical genomics service in Australia," says Professor John Mattick, Director of the Institute. The clinic's genetic health professionals provide face-to-face, telehealth and phone consultations to a wide range of patients, including individuals referred for personal health genomics at Genome.One and those seeking diagnoses for complex conditions. Turn to page 8 to learn more about Genome.One.



Karen Calayag, Clinical Practice Manager, and Mary-Anne Young, Genome.One Genetic Counsellor.

Ten years of world-class research support

The Garvan-owned-and-operated Australian BioResources (ABR) southwest of Sydney, will celebrate a decade of service to the medical research community with a public open day in August. The state-of-the-art facility employs around 50 people from the NSW Southern Highlands region.

ABR is accredited by the National Association of Testing Authorities as a facility providing high quality animal husbandry, breeding and scientific services such as cryopreservation and genome editing using CRISPR-Cas9 technology. The more than 800 different lines of mice at ABR are critical to Garvan's research across a diverse spectrum of medical areas.



Garvan will celebrate ABR's anniversary with an open day in August. To book a tour, visit garvan.org.au/abr-open-day.

Ask Garvan

ROSIE, FROM ALLENBY GARDENS, SA, ASKS

“My six-year-old grandson was recently diagnosed with type 1 diabetes. Can you tell me what research is being undertaken to fight this condition, particularly in children?”

**ASSOCIATE PROFESSOR SHANE GREY,
TRANSPLANTATION IMMUNOLOGY LAB HEAD**

It's always challenging to discover that a child is afflicted with a lifelong disease. An exciting development is a device that both monitors blood glucose levels and provides insulin as needed. This 'artificial pancreas' is intended for adults and teenagers 14 and up. Studies show that it helps control blood sugars and evens out the 'high' and 'lows'. This may have potential for younger children in the future.

Garvan is exploring several paths that could have profound results for people with type 1 diabetes. A priority is to understand why an immune system turns on itself and destroys the insulin-producing beta cells in the pancreas. In a remarkable piece of high-tech detective work, the just-launched Hope Research project is searching for those 'rogue' immune cells through single cell sequencing. If we can find the early causes of type 1 diabetes we can focus on blocking these before damage to the pancreatic islets is done.

We are also working on new immune therapies to allow islet transplantation without the need for immunosuppression. Islet transplantation is currently only ready for adults with type 1 diabetes, but new immune therapies would see this treatment available to more patients.

To read the news releases about all our recent research findings in diabetes, visit garvan.org.au/t1diabetes.
Do you have a medical research question?
Email our experts at breakthrough@garvan.org.au.



You're invited

Please join us for our popular public seminar program, where you can meet Garvan scientists and hear about their life-changing research, as well as ask questions.

Topic: Immunology

Date: Wednesday 13 June, 10am – midday

Location: Garvan Auditorium, Garvan Institute of Medical Research, 384 Victoria Street, Darlinghurst, Sydney, and live on Facebook.

Seminars are free of charge, but space is limited so bookings are essential. To find out more about this and future seminars, and book your place, visit garvan.org.au/public-seminars or call 1300 73 66 77.

To watch videos of our past seminars, please visit garvan.org.au/previous-seminars.

Be part of progress

Please use this coupon if you would like to make a donation to Garvan's breakthrough medical research, or if you would like further information. We would love to hear from you.

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Yes! I want to help Garvan make progress with a gift of

☐ \$50 ☐ \$100 ☐ \$250 ☐ \$500 ☐ \$1000 ☐ Gift of choice \$ _____

☐ My cheque/money order made payable to Garvan Research Foundation is enclosed

OR Please deduct the above amount ☐ once ☐ monthly ☐ annually from my ☐ Visa ☐ MasterCard ☐ Amex ☐ Diners

Card number

Expiry date 2018 BT02

Cardholder's name

Signature

Donations of \$2 and above are tax deductible.

Please complete this coupon and mail it to:

✉ Garvan Research Foundation
Reply Paid 68593, Darlinghurst NSW 2010

☎ Call: 1300 73 66 77 (9am to 5pm)

☎ Fax: (02) 9295 8136
(you can use this coupon)

🖱 Online: garvan.org.au/donate



In memoriam

Between 1 and 31 January, 2018, donations were made in memory of

Bill and Barbara	Glenise Lang
Esme Brown	Gloria Lardelli
Jill and Connie	Fanny Lazarides
Mike Andrews	Daryl Lewis Graham Levy
Trevor William Annetts	Julia May Linyard
Peorie Armstrong	John Lippiatt
Keith Ash	Julie Malouf
Beverley Bolton	Margaret McKnight
Alan Booth	Ronald Miles
Gordon James Bourke	Adrian Notley
William Geoffrey Bradley	Denise Petersen
Gail Burgin	Maryanne Pickup
Viola Butters	Robert Preston
Georgina Camenzuli	John Prior
Mee-Na Robyn Cheok	Robert John Rice
Noel Connor	Martin Samociuk
Norma and Robert Cook	John Serafim
Suann Croker	Barry Sheedy
Simon Curtis	Ken Simmons
Janelle Kaye Davis	Cyril Snell
Helen Kay Dawson	John Stackpool
Sue Dowlan	Goldie Sternberg
Bridget Laing Dunn	Deidre Stewart
Julie Anne Fakes	Chris Taris
Corel Garling	Marjorie and Jeffrey
Michael John Harris	George Tims
John Hester	Tara Tobin
Anders Hillerstrom	Angela Tsakos
Roxy Holder	Ronald Tuck
Ash Hugget	Patricia Josephine Watts
Evi Joannou	Ann Wolstenholme
Richard Michael Kim	Helen Wong
Veliye Kucuk	Pamela J Young

In celebration

Thank you to the wonderful people who sent good wishes to Garvan on their special day

Roy Abrams' 70th Birthday	Charlotte Lowenstein's 100th Birthday
Dirk Diepeveen	Margo Makin
George Dimos' 60th Birthday	Abraham Nathan-Valentine's Bar Mitzvah
Paul and Sue Dowd's wedding	Alison Quigley's grandma's cookbook
Dr Corazon Francisco's Birthday	Dimity's Birthday
Bronwyn Harvey's wedding	Jordan Reid's Bar Mitzvah
Weesuda Jaratlerdsiri	Lisa Sciberras
Greg Lake's 70th Birthday	Lenny White
Helen Leonard	
Renata Litton's 70th Birthday	

Come in and discover

A tour of our buildings in Sydney's Darlinghurst will give you the chance to see Garvan's state-of-the-art scientific facilities and learn about our latest findings from our medical researchers.

Garvan Discovery Tours start at 10am and run for one and a half hours, including coffee or tea. They are held multiple times throughout the month with a maximum of 15 participants per tour. We're also happy to organise free private tours for groups and clubs. **Tours are free and open to the public, but bookings are essential.**

Book online at garvan.org.au/tours.



Experience the Cell Observatory on a Garvan Discovery Tour.

Clinical studies

Appetite study

Gastric emptying time is the time taken for food to leave the stomach and may affect your appetite and satiety. We are looking for healthy male volunteers between the age of 20 and 52 to participate in our trial investigating appetite regulation and gastric emptying in a genetic form of obesity called Prader-Willi syndrome.

For further information please contact:

Alex Viardot or Amanda Hor on (02) 8382 2622 or email pws@garvan.org.au (St Vincent's HREC Ref 15/SVH/437)

Prediabetes study

Volunteers needed for a study testing blood sugar control in response to diabetes medications or weight loss. We are looking for men and women aged 20-70 years who DO NOT have diabetes, but have an increased risk of developing diabetes (e.g. have had an occasional increased blood sugar, or have had gestational diabetes, or a family history of type 2 diabetes). Study visits are conducted at the Garvan Institute of Medical Research and St Vincent's Hospital, Darlinghurst, Sydney. Principal Investigators: Professor Jerry Greenfield and Dr Dorit Samocha-Bonet.

For further information, please contact:

(02) 9295 8215 or predict@garvan.org.au (St Vincent's HREC Ref SVH 17/080)