breakthrough

How one city redefined osteoporosis

The Kinghorn Cancer Centre: five years in

The wisdom of a single cell

An act of kindness for the future
From the CEO

Welcome to the August 2017 issue of breakthrough. You’ll see that the line-up of stories includes an introduction to the fascinating field of cellular genomics, the branch of research at the heart of an exciting new facility based at The Kinghorn Cancer Centre.

The Garvan-Weizmann Centre for Cellular Genomics is the first major achievement of a new partnership between the Garvan Institute of Medical Research and Israel’s Weizmann Institute of Science. Through joint programs, cutting-edge technologies and the combined expertise of our two institutes, the centre will allow discovery of unprecedented detail in cancer, immune diseases, metabolic disorders and more. This purpose-built centre will be Australia’s only fully integrated, multidisciplinary facility for cellular genomics.

I cannot stress enough the importance of this collaboration. Far more than a facility, its research will shape the future. By implementing a shared vision for a multidisciplinary centre for cellular genomics, the Garvan and Weizmann Institutes bring together a critical mass of expertise and equipment that is a first on the world stage and will enable ambitious experimental projects that virtually no other centre can offer.

I extend my personal thanks to the NSW Government and the very generous donors who have made this unique centre possible. However, ongoing funding is required to continue and develop the innovative and promising research it carries out. If you would like to help Garvan and Weizmann researchers to pursue bold, inventive research projects, I encourage you to visit garvan.org.au/garvan-weizmann or phone (02) 9295 8513.

Another must-read story is the update on the Dubbo Osteoporosis Epidemiology Study, which is now nearly 30 years strong. Among its many achievements is the ‘Know Your Bones’ online self-assessment tool (knowyourbones.org.au), where you can create a tailored self-test for your unflagging support of Garvan and the vital work for your health.

For the first time, Garvan scientists have shown that a family of untethered proteins builds up in the cells of children with a rare and serious genetic condition, known as mevalonate kinase deficiency (MKD). Individuals with MKD experience debilitating childhood disease. Proteins on the loose in a debilitating childhood disease

For the first time, Garvan scientists have shown that a family of untethered proteins builds up in the cells of children with a rare and serious genetic condition, known as mevalonate kinase deficiency (MKD). Individuals with MKD experience debilitating childhood disease.

Proteins on the loose in a debilitating childhood disease

For the first time, Garvan scientists have shown that a family of untethered proteins builds up in the cells of children with a rare and serious genetic condition, known as mevalonate kinase deficiency (MKD). Individuals with MKD experience debilitating childhood disease.

Making news

CANCER

A one-two punch for pancreatic cancer

Garvan scientists have uncovered a promising new approach for treating pancreatic cancer, by targeting the tissue around the tumour to make it “softer” before chemotherapy. Remarkably, this sequential two-step approach doubled survival time in mice and impaired the spread of cancer to other tissues.

Pancreatic cancer has a five-year survival rate of just 7 per cent, a figure that has scarcely changed in the past 40 years.

Dr Paul Timpson, who co-led the study with Dr Marina Pajic, says his work aims to improve this dismal statistic. “Our team is inspired by an international goal to double pancreatic cancer survival by 2020 – so it’s particularly exciting that we have been able to achieve this in preclinical models.”

Prostate cancer map reveals a new world of DNA changes

In a world first, Garvan researchers have developed a next-generation “map” of a prostate cancer genome, which has uncovered 10 times more large-scale DNA rearrangements than previously detected in the disease.

“We know that prostate cancer is more likely driven by large complex rearrangements of DNA. This is different to most cancers, which are driven by small DNA mutations in a number of key genes. Until now, we had no way of observing these DNA rearrangements or structural variants in prostate cancer,” says Professor Vanessa Hayes, who led the study.

The findings could one day be used to help characterise an individual’s prostate tumour and reveal previously unrecognised information that could influence clinical treatment.

Through the microscope

Proteins on the loose in a debilitating childhood disease

For the first time, Garvan scientists have shown that a family of untethered proteins builds up in the cells of children with a rare and serious genetic condition, known as mevalonate kinase deficiency (MKD). Individuals with MKD experience repeated and frequent attacks of high fever and other symptoms. The findings pinpoint a key feature of MKD that could be used to fast-track a diagnosis – a process that is often difficult and protracted.

The research team showed that, within blood cells of people with MKD, proteins from the Rab family had no isoprenoid “tail”, which is believed to function as a molecular tether. Without this, the proteins are free to move into other parts of the cell. It is thought that this could set off the disease process in MKD, triggering inflammation.

We know vaccines stimulate the production of long-lived plasma cells that can make lots of antibodies, so that if a virus or bacteria comes along they will neutralise it. But they also create memory B cells, which can rapidly become plasma cells.

The question has always been, how and where do those memory B cells get reactivated? My PhD student, Imogen Moran, has found a new structure in the lymph node where it looks like memory B cells get activated, very rapidly expand and then very rapidly turn into plasma cells.

This image shows interactions between B cells (red), T cells (green) and follicular dendritic cells (magenta) inside the germinal centre of a lymph node. The capsule of the lymph node is in blue. Germinal centres are the factories where B cells busy themselves, running around getting the right instructions from T cells and follicular dendritic cells to transform into plasma cells that make high quality antibodies. It is these antibodies that neutralise and protect us from infectious organisms.

Dr Tri Phan
Lab Head – Intravital Microscopy, Immunology Division

BONE BIOLOGY

Proteins on the loose in a debilitating childhood disease

For the first time, Garvan scientists have shown that a family of untethered proteins builds up in the cells of children with a rare and serious genetic condition, known as mevalonate kinase deficiency (MKD). Individuals with MKD experience repeated and frequent attacks of high fever and other symptoms. The findings pinpoint a key feature of MKD that could be used to fast-track a diagnosis – a process that is often difficult and protracted.

The research team showed that, within blood cells of people with MKD, proteins from the Rab family had no isoprenoid “tail”, which is believed to function as a molecular tether. Without this, the proteins are free to move into other parts of the cell. It is thought that this could set off the disease process in MKD, triggering inflammation.

GENOMICS & EPIGENETICS

Prostate cancer map reveals a new world of DNA changes

In a world first, Garvan researchers have developed a next-generation “map” of a prostate cancer genome, which has uncovered 10 times more large-scale DNA rearrangements than previously detected in the disease.

“We know that prostate cancer is more likely driven by large complex rearrangements of DNA. This is different to most cancers, which are driven by small DNA mutations in a number of key genes. Until now, we had no way of observing these DNA rearrangements or structural variants in prostate cancer,” says Professor Vanessa Hayes, who led the study.

The findings could one day be used to help characterise an individual’s prostate tumour and reveal previously unrecognised information that could influence clinical treatment.

Making news

CANCER

A one-two punch for pancreatic cancer

Garvan scientists have uncovered a promising new approach for treating pancreatic cancer, by targeting the tissue around the tumour to make it “softer” before chemotherapy. Remarkably, this sequential two-step approach doubled survival time in mice and impaired the spread of cancer to other tissues.

Pancreatic cancer has a five-year survival rate of just 7 per cent, a figure that has scarcely changed in the past 40 years.

Dr Paul Timpson, who co-led the study with Dr Marina Pajic, says his work aims to improve this dismal statistic. “Our team is inspired by an international goal to double pancreatic cancer survival by 2020 – so it’s particularly exciting that we have been able to achieve this in preclinical models.”

Prostate cancer map reveals a new world of DNA changes

In a world first, Garvan researchers have developed a next-generation “map” of a prostate cancer genome, which has uncovered 10 times more large-scale DNA rearrangements than previously detected in the disease.

“We know that prostate cancer is more likely driven by large complex rearrangements of DNA. This is different to most cancers, which are driven by small DNA mutations in a number of key genes. Until now, we had no way of observing these DNA rearrangements or structural variants in prostate cancer,” says Professor Vanessa Hayes, who led the study.

The findings could one day be used to help characterise an individual’s prostate tumour and reveal previously unrecognised information that could influence clinical treatment.

Making news

CANCER

A one-two punch for pancreatic cancer

Garvan scientists have uncovered a promising new approach for treating pancreatic cancer, by targeting the tissue around the tumour to make it “softer” before chemotherapy. Remarkably, this sequential two-step approach doubled survival time in mice and impaired the spread of cancer to other tissues.

Pancreatic cancer has a five-year survival rate of just 7 per cent, a figure that has scarcely changed in the past 40 years.

Dr Paul Timpson, who co-led the study with Dr Marina Pajic, says his work aims to improve this dismal statistic. “Our team is inspired by an international goal to double pancreatic cancer survival by 2020 – so it’s particularly exciting that we have been able to achieve this in preclinical models.”

Prostate cancer map reveals a new world of DNA changes

In a world first, Garvan researchers have developed a next-generation “map” of a prostate cancer genome, which has uncovered 10 times more large-scale DNA rearrangements than previously detected in the disease.

“We know that prostate cancer is more likely driven by large complex rearrangements of DNA. This is different to most cancers, which are driven by small DNA mutations in a number of key genes. Until now, we had no way of observing these DNA rearrangements or structural variants in prostate cancer,” says Professor Vanessa Hayes, who led the study.

The findings could one day be used to help characterise an individual’s prostate tumour and reveal previously unrecognised information that could influence clinical treatment.

Making news

CANCER

A one-two punch for pancreatic cancer

Garvan scientists have uncovered a promising new approach for treating pancreatic cancer, by targeting the tissue around the tumour to make it “softer” before chemotherapy. Remarkably, this sequential two-step approach doubled survival time in mice and impaired the spread of cancer to other tissues.

Pancreatic cancer has a five-year survival rate of just 7 per cent, a figure that has scarcely changed in the past 40 years.

Dr Paul Timpson, who co-led the study with Dr Marina Pajic, says his work aims to improve this dismal statistic. “Our team is inspired by an international goal to double pancreatic cancer survival by 2020 – so it’s particularly exciting that we have been able to achieve this in preclinical models.”

Prostate cancer map reveals a new world of DNA changes

In a world first, Garvan researchers have developed a next-generation “map” of a prostate cancer genome, which has uncovered 10 times more large-scale DNA rearrangements than previously detected in the disease.

“We know that prostate cancer is more likely driven by large complex rearrangements of DNA. This is different to most cancers, which are driven by small DNA mutations in a number of key genes. Until now, we had no way of observing these DNA rearrangements or structural variants in prostate cancer,” says Professor Vanessa Hayes, who led the study.

The findings could one day be used to help characterise an individual’s prostate tumour and reveal previously unrecognised information that could influence clinical treatment.
Happy birthday

TKCC

This month marks five years since The Kinghorn Cancer Centre (TKCC) launched its mission to bring leading-edge science into the heart of the clinic.

That sounds a very simple thing to achieve but what we’ve done over the past five years is establish the Southern Hemisphere’s most powerful genomics facility and develop a completely new clinical trials design to bring the power of that technology to the service of patients,” says Professor David Thomas, Director of TKCC and Garvan’s Cancer Division Head, who is also a practising oncologist.

A joint facility of Garvan and St Vincent’s Hospital, the building brings cancer research and treatment under one roof, and houses the Kinghorn Centre for Clinical Genomics, Genome One and the Garvan-Weizmann Centre for Cellular Genomics.

Realising such an ambitious vision was only possible thanks to significant investment from the philanthropic community, notably The Kinghorn Foundation, whose generous support has been transformational for medical research in NSW.

“We believe in medical research and its ability to improve health outcomes for all Australians,” says Jill Kinghorn, co-founder of The Kinghorn Foundation. “Personalised medicine is the future of health care and the team at Garvan are making exciting breakthroughs in the field – most recently, in clinical research trials for children and adults with advanced and rare cancers. We are pleased to be involved and excited for what the future holds.”

It’s a future that has much promise, says Thomas: “The things that we’ve established to date will only grow over the next five years. Our vision is that every patient with advanced cancer, who has run out of options, will see The Kinghorn Cancer Centre as the place to come where they can get access to tomorrow’s medicines.”

Professor David Thomas answers a reader’s question in Ask Garvan, page 11.

In August 2015 I was privileged to win the Professor Rob Sutherland AO Make a Difference Award bestowed by the Cancer Institute NSW, in recognition of my “extensive and ground-breaking discoveries over the last 20 years relating to epigenetics and cancer DNA biology”.

I thought long and hard about how to best use the grant, and ultimately decided it was the right time to go on sabbatical. Over three months I would speak at a number of international meetings and embed myself in world-leading genome and epigenome centres to learn more about how they tick.

The schedule was ambitious, covering three continents, eight cities and 18 talks, but my trip has succeeded in establishing a number of networks and created real opportunities, excitement and areas of collaboration that we wouldn’t have been aware of otherwise. For me it was also an incredible opportunity to reboot and get totally absorbed in the science.

Highlights included the Dynamics of Genome Structure and 4D Genome workshop in Barcelona, which addressed an exciting new direction in our field. Beyond a linear, two-dimensional DNA sequence of ATCG bases, the three-dimensional genome shows how DNA is folded into a structure where distant parts of the sequence interact. The four-dimensional genome, in turn, reveals how these interactions change over time, such as during an embryo’s development or when they are disrupted in diseases like cancer. Understanding the genome and epigenome in all their dimensions is an enormous challenge, but it is the direction our science needs to embrace if we are to fully understand the impact of variation in our genetic code.

In Grand Rapids, Michigan, I spent six weeks at the acclaimed Center for Epigenetics at the Van Andel Institute, which allowed me to initiate collaboration opportunities that bring together their expertise in epigenomic research and ours in genomics. Van Andel leads the Epigenetics Dream Team of the Stand Up 2 Cancer initiative, and we’re exploring the possibility for Garvan and St Vincent’s Hospital to become the first Australian node for clinical trials. This is an immensely promising field because, unlike a genetic change, which you can’t easily fix, epigenetic therapy modifies how a gene is expressed. Watch this space!

The sabbatical has left me with invaluable insight into the global state of play for genomic and epigenomic research. Clearly, the fields are moving as fast as new and exciting technologies underpin the next wave of growth. I believe Garvan’s competitive edge is in our integration of knowledge across both. We are so very well positioned to sequence to disease. It’s a thrilling time in our science and Garvan is a thrilling place to be as the discoveries unfold.

For an extended version of this story, please see the Breakthrough Blog: garvan.org.au/breakthrough

Susan Clark’s world tour

Last year, Garvan’s Genomics and Epigenetics Division embarked on a three-month research expedition and returned with renewed excitement about the future of her field. Here, she shares her experiences

1. Brussels, Belgium: ILP4PRINT International Human Epigenome Consortium meeting

2. Barcelona, Spain: CNAG residency (National Centre for Genomic Analysis), Dynamics of Genomic Structure and 4D Genome workshop, Centre for Genomic Regulation

3. Grand Rapids, Michigan, USA: Van Andel Institute residency

4. Cambridge, UK: Epigenomics of Common Diseases meeting, Wellcome Trust

5. New York City, USA: New York Genome Center Epigenetics in Cancer: Translational Medicine Approaches with VelociGene, New York Academy

6. Washington DC, USA: National Institutes of Health

7. Baltimore, USA: John Hopkins Hospital

8. Tampa, Florida, USA: Molecular and Cellular Basis of Breast Cancer Risk and Prevention conference

This month marks five years since The Kinghorn Cancer Centre (TKCC) launched its mission to bring leading-edge science into the heart of the clinic.

When the glass doors of 370 Victoria Street slid open on Tuesday 28 August 2012, they signalled more than the foothall of any dignitary or ribbon-cutter. Rather, the day marked a new chapter in cancer research and treatment at The Kinghorn Cancer Centre (TKCC) launched its mission to bring leading-edge science into the heart of the clinic.

“That sounds a very simple thing to achieve but what we’ve done over the past five years is establish the Southern Hemisphere’s most powerful genomics facility and develop a completely new clinical trials design to bring the power of that technology to the service of patients,” says Professor David Thomas, Director of TKCC and Garvan’s Cancer Division Head, who is also a practising oncologist.

A joint facility of Garvan and St Vincent’s Hospital, the building brings cancer research and treatment under one roof, and houses the Kinghorn Centre for Clinical Genomics, Genome One and the Garvan-Weizmann Centre for Cellular Genomics.

Realising such an ambitious vision was only possible thanks to significant investment from the philanthropic community, notably The Kinghorn Foundation, whose generous support has been transformational for medical research in NSW.

“We believe in medical research and its ability to improve health outcomes for all Australians,” says Jill Kinghorn, co-founder of The Kinghorn Foundation. “Personalised medicine is the future of health care and the team at Garvan are making exciting breakthroughs in the field—most recently, in clinical research trials for children and adults with advanced and rare cancers. We are pleased to be involved and excited for what the future holds.”

It’s a future that has much promise, says Thomas: “The things that we’ve established to date will only grow over the next five years. Our vision is that every patient with advanced cancer, who has run out of options, will see The Kinghorn Cancer Centre as the place to come where they can get access to tomorrow’s medicines.”

Professor David Thomas answers a reader’s question in Ask Garvan, page 11.

In August 2015 I was privileged to win the Professor Rob Sutherland AO Make a Difference Award bestowed by the Cancer Institute NSW, in recognition of my “extensive and ground-breaking discoveries over the last 20 years relating to epigenetics and cancer DNA biology.”

I thought long and hard about how to best use the grant, and ultimately decided it was the right time to go on sabbatical. Over three months I would speak at a number of international meetings and embed myself in world-leading genome and epigenome centres to learn more about how they tick.

The schedule was ambitious, covering three continents, eight cities and 18 talks, but my trip has succeeded in establishing a number of networks and created real opportunities, excitement and areas of collaboration that we wouldn’t have been aware of otherwise. For me it was also an incredible opportunity to reboot and get totally absorbed in the science.

Highlights included the Dynamics of Genome Structure and 4D Genome workshop in Barcelona, which addressed an exciting new direction in our field. Beyond a linear, two-dimensional DNA sequence of ATCG bases, the three-dimensional genome shows how DNA is folded into a structure where distant parts of the sequence interact. The four-dimensional genome, in turn, reveals how these interactions change over time, such as during an embryo’s development or when they are disrupted in diseases like cancer. Understanding the genome and epigenome in all their dimensions is an enormous challenge, but it is the direction our science needs to embrace if we are to fully understand the impact of variation in our genetic code.

In Grand Rapids, Michigan, I spent six weeks at the acclaimed Center for Epigenetics at the Van Andel Institute, which allowed me to initiate collaboration opportunities that bring together their expertise in epigenomic research and ours in genomics. Van Andel leads the Epigenetics Dream Team of the Stand Up 2 Cancer initiative, and we’re exploring the possibility for Garvan and St Vincent’s Hospital to become the first Australian node for clinical trials. This is an immensely promising field because, unlike a genetic change, which you can’t easily fix, epigenetic therapy modifies how a gene is expressed. Watch this space!

The sabbatical has left me with invaluable insight into the global state of play for genomic and epigenomic research. Clearly, the fields are moving as fast as new and exciting technologies underpin the next wave of growth. I believe Garvan’s competitive edge is in our integration of knowledge across both. We are so very well positioned to sequence to disease. It’s a thrilling time in our science and Garvan is a thrilling place to be as the discoveries unfold.

For an extended version of this story, please see the Breakthrough Blog: garvan.org.au/breakthrough

Susan Clark’s world tour

Last year, Garvan’s Genomics and Epigenetics Division embarked on a three-month research expedition and returned with renewed excitement about the future of her field. Here, she shares her experiences

1. Brussels, Belgium: ILP4PRINT International Human Epigenome Consortium meeting

2. Barcelona, Spain: CNAG residency (National Centre for Genomic Analysis), Dynamics of Genomic Structure and 4D Genome workshop, Centre for Genomic Regulation

3. Grand Rapids, Michigan, USA: Van Andel Institute residency

4. Cambridge, UK: Epigenomics of Common Diseases meeting, Wellcome Trust

5. New York City, USA: New York Genome Center Epigenetics in Cancer: Translational Medicine Approaches with VelociGene, New York Academy

6. Washington DC, USA: National Institutes of Health

7. Baltimore, USA: John Hopkins Hospital

8. Tampa, Florida, USA: Molecular and Cellular Basis of Breast Cancer Risk and Prevention conference
The power of one

Every cell is unique, but their singular mysteries have remained unknowable, until now

In 1665, learned Englishman Robert Hooke draped his Restoration-era curls over a microscope to observe a sliver of cork. His handmade lens revealed a honeycomb of tiny compartments, which Hooke dubbed “cells” for their resemblance to monastic living quarters. In the following centuries, it became clear that all living things are made of cells and that tissue is a highly varied mixture of different cell types.

Hooke’s successors have continued to characterise cells by shape, size, function and aspects of their molecular state. Increasingly it is clear, however, that microscopes will only take us so far. How do we know exactly which among a diverse mixture of different cell types.

In contrast to whole genome sequencing, which provides a read-out of what cells have in common – their DNA – cellular genomics considers the different ways each cell expresses its role in the disease. “It’s still baby steps but it’s in an exponential growth phase,” says Goodnow. “We’ve got all that basic science and now the tools to move those discoveries into the clinic. The same is happening, or will happen in neuroscience, in diabetes, in bone disorders and in many other ways. It’s exciting times.”

“Suddenly you can see a level of resolution about what these cells are actually doing in a way that you couldn’t before” depleting the cells or helping them proliferate depending on their role in the disease. “It’s still baby steps but it’s in an exponential growth phase,” says Goodnow. “We’ve got all that basic science and now the tools to move those discoveries into the clinic. The same is happening, or will happen in neuroscience, in diabetes, in bone disorders and in many other ways. It’s exciting times.”
Take 5000 people, scrutinise for three decades and what do you get?
A wholly new understanding of osteoporosis for starters, and the insights keep on coming

What did 1989 have in store for you? For residents of the 2830 postcode aged 60 or over, this was the year they received an invitation to become founding members of the medical research cohort that, to this day, underpins the Dubbo Osteoporosis Epidemiology Study (DOES).

Over the decades since, we have seen a transformation in our knowledge of osteoporosis, much of which is due to this study, one of the world’s largest and longest-running for the disease.

“Used to think that osteoporosis was only something that happened in ‘little old ladies’ – you’d think of hip fractures and people bent over. What we’ve realised is that it’s something that occurs across a wider age range, it affects both men and women, it affects virtually every bone in your body, and it’s associated with huge impacts on the quality of life, health care costs and indeed premature mortality,” says Professor John Eisman, who founded DOES and is one of its principal researchers alongside Professors Jacqueline Center and Tuan Nguyen.

So such understanding is hard-earned in the face of a disease that is insidious on multiple levels. Symptom-free, osteoporosis often lurks undetected in the skeleton until a bump or minor fall leads to a fracture. Although bone density is useful for identifying those at high risk, it is not a reliable predictor of nor protector from fragility fracture. Despite its devastating impacts, fracture does not attract the same attention as cardiovascular disease or cancer in either the general or medical communities, and there remains a perception that it is a normal part of aging rather than the outcome of disease. As such, osteoporosis continues to be underdiagnosed and undertreated.

“The fact is that men and women are similarly poorly treated even after a fracture,” says Eisman. “People see the fracture being treated and think their bones are fine, not realising what you should be concerned about is the next fracture or the premature death associated with it. Once you’ve fractured, as a woman you’re more likely to die in relation to osteoporosis, as you might to breast cancer. As a man, you’re more likely to die in relation to osteoporosis than prostate cancer or lung cancer.”

Osteoporosis is also tricky to pin down in a research setting, and DOES has required one of the most ambitious and resource-intensive methodologies out there: the longitudinal cohort study. As fractures are relatively infrequent in a lifetime, it is necessary to follow a large number of people for a long time to accumulate meaningful data. Such data can then be analysed to link events with outcomes, as Center points out. “The study is incredibly valuable precisely because it is so long-term. It has enabled us to follow what happens to people prior to fracture, what happens to risk factors, what happens to the change in people over time and what happens to outcomes. You can’t actually do that unless you have a study that goes on for many, many years.” Dubbo, too, is an ideal setting because, apart from the population’s size, stability and capacity to extrapolate to the rest of Australia, it has the only major hospital in the region and thus captures all the medical events the residents might experience.

Despite being a remarkable achievement in science, DOES’s true heroes are the thousands of Dubbo residents who have volunteered their time and biological information for medical research. Every two to three years, each undergoes a series of tests – bone mineral density, blood tests, a total body scan, balance tests, muscle tests, touch tests, questions about lifestyle, medications, other illnesses, sleep and quality of life. If the client has had a fracture they submit to further enquiries about its every detail. Given such scrutiny it is remarkable that the drop-out rate is minimal, which is largely attributable to the attentiveness and care of the nurse managers in Dubbo, Janet Watters, recently retired, and Josie Martin. “It’s always been my main criterion in this clinic that everyone who leaves here is smiling and happy to come back again,” says Watters.

The wealth of data and insight has certainly validated the approach. Among DOES’s many findings are four “greatest hits”:

• As the cohort was unique for including both men and women, DOES showed that osteoporosis is also a man’s disease. While women are more likely to undergo an initial fracture, men are at greater risk of subsequent fractures and premature mortality.

• Again, spending previous wisdom, DOES found that bone loss continues as age advances rather than stabilising around age 60.

• Osteoporosis medications such as bisphosphonates may reduce the deaths following a fracture and grant extra years of life. Additionally, premature death is not only associated with hip fractures, but also extends to vertebral and all major fractures.

• In DOES’s most recent major contribution, the team developed an algorithm to identify the full suite of risk factors, which then became the Garvan Fracture Risk Calculator. Now re-launched as the Know Your Bones web tool (knowyourbones.org.au), anyone can assess their own bone health and create a report to take to their GP for an informed discussion, granting them a greater share of knowledge and empowerment in health decisions.

Perhaps the most enduring contribution of DOES, however, is in its role as a resource for the research community. In 2016 Dr Yvonne Selecki and Mohammad Ali Moni won the Ridley Ken Davies Award, which allowed them to transform the study’s unparalleled archive of data into a web-based portal. The 2017 award winner, Dr Thomas Cox, will use the data for breast cancer research, demonstrating its versatility beyond osteoporosis. The DOES team, too, has plans to maximise the study’s potential in this new age of genomic technology. “My vision for the future of the study is threefold,” says Nguyen. “Firstly, if we can sequence the genomes we would have a wonderful genomic reference database. But the major question is the combination of genes and the environment. These days with a single drop of blood we can analyse up to 500 markers of environmental exposure, or the ‘exposome’. Then we can integrate the genome and exposome and discover how they interact. And that leads me to the third perspective, the ‘diseasome’. A person does not have just one disease; they have multiple diseases, which seem to link, surprisingly. Then, we can study not just osteoporosis but the diseases that are linked to it in the ‘diseasome’.”

While we celebrate DOES’s achievements, both to date and to come, the science is underscored by a respect and gratitude towards the people who have contributed their time, data and biomaterials to medical research. As Watters says, “It’s the people who make the study and they’re wonderful people. They know they’re here to help mankind, they know they’re here for the future of their children, their grandchildren, their great-grandchildren, and this is their way of participating in that future.” Through the participants’ contribution, the name “Dubbo” has gained new meaning in medical parlance and they leave better health for all as their legacy.

“Take 5000 people, scrutinise for three decades and what do you get? A wholly new understanding of osteoporosis for starters, and the insights keep on coming.”

August 2017 | 9
What kinds of events does Garvan host?

It’s our duty and pleasure to educate the community on the importance of medical research, and to provide access to our amazing buildings and scientists. The main way we do this is through our Public Engagement Program of tours, seminars, and community presentations, and special events for Garvan supporters including our wonderful Partners for the Future.

What kinds of events do you organise as an event?

I organise all the supporter activities each year, which takes a lot of planning and coordination. Periodically disease obsessed, I like to organise events with positivist notes and lists. I am primarily responsible for event logistics, such as program timings, managing the venue, catering and taking care of health and safety. I’m also very fortunate to have a dedicated group of regular volunteers who donate many hours of their time to help out – I couldn’t do it without them! So, an event is a success if it runs on time, there are no hiccups and I get good feedback from the attendees.

Why did you choose to pursue cancer research as a career?

What drives me is working out why something is not doing what it should. Growing up, I was forever taking things apart under the premise of trying to understand how they work. Nothing is more complex – and thus has more potential to go wrong – than human biology, and I believe that science holds the key to understanding and treating all human disease. After my undergraduate degree I knew I wanted to pursue a career in science and a really promising degree I knew I wanted to pursue a career in science and a really promising PhD project happened to be in cancer research. From there it just blossomed.

Why did you choose to pursue cancer research as a career?

Nothing is more complex – and thus has more potential to go wrong – than human biology, and I believe that science holds the key to understanding and treating all human disease. After my undergraduate degree I knew I wanted to pursue a career in science and a really promising PhD project happened to be in cancer research. From there it just blossomed.

What is the extracellular matrix and what is its potential for medical research?

I have three major hobbies. I’m very much into my food. I love to try new restaurants, especially around the world. I also love to travel – I’ve been to most continents, and South America is next on the list. Then hand in hand with that is another big passion, scuba diving, which I do at least once or twice a year. The ultimate dream is to scuba dive around the Galápagos Islands. As a scientist to go to the Galápagos, home to an enormous array of unique species and the place where Darwin developed his theory of evolution, would be such an amazing experience.

Outside of work, what do you do with yourself?

Objects are to occupy the pair for the next 25 years, first in breeding and showing, and then in machine-knitting garments from the exquisite fleece, which they sold at Canberra’s Old Bus Depot Markets. Their momentum, however, came to a halt in September 2013 when Joe was diagnosed with aggressive mantle cell lymphoma. During his six-month course of heavy chemotherapy, the Banhidis’ eyes were opened to how distressing impacts on people – and how medical research can help.

When you see the young ones suffering from cancer, it breaks your heart,” says Betty. “You don’t know how or why that happens but hopefully through research they can receive the proper treatment.”

Joe, now in his second year of remission, conveys a sense of gratitude to medical research for saving his life. “When I was told that the cancer wasn’t curable it was a shock, but it’s manageable, and God willing it will become more manageable as science advances further. The more we read and learn the more fascinating it is. What is a cancer? What’s the mechanism of it? What’s happening in our bodies? I just can’t leave it alone!”

The Banhidis’ new interest led them to Garvan, through a Pelican tour of the Australian Staffie Foundation facility in Moss Vale. Impressed, they decided to enrol as Partners for the Future and give Garvan a portion of their estate in their wills. “We are enjoying the benefit of those who contributed to medical research before us,” says Joe. “So in a way we are transferring our thanks through that donation towards the future.” Thank you to Joe and Betty, and all of Garvan’s Partners for the Future, for your generosity towards the next generation.

If you would like information about leaving a gift to Garvan in your Will and becoming a Partner for the Future, please contact our Bequest Manager, Carol O’Carroll on (02) 9295 8117.

The kindness of strangers

There is life beyond cancer for Joe and Betty Banhidi, who have chosen to repay their good fortune with a very special gift

Joe and Betty Banhidi thought they had retired in 1992, but their plans to relax on hold when Joe read a news story about the new Australian Alpaca Centre in the Southern Highlands. “Seeing the alpaca on the front page I thought they were just beautiful animals. Even now, I forget all the other activities I had in mind for retirement,” he says.

Alpacas were to occupy the pair for the next 25 years, first in breeding and showing, and then in machine-knitting garments from the exquisite fleece, which they sold at Canberra’s Old Bus Depot Markets. Their momentum, however, came to a halt in September 2013 when Joe was diagnosed with aggressive mantle cell lymphoma. During his six-month course of heavy chemotherapy, the Banhidis’ eyes were opened to how distressing impacts on people – and how medical research can help.

When you see the young ones suffering from cancer, it breaks your heart,” says Betty. “You don’t know how or why that happens but hopefully through research they can receive the proper treatment.”

Ask Garvan

Mariane from Quairading, WA, asks:

Are there more cases of cancer in 2017 than there were in 1950?

This issue’s answer comes from Professor David Thomas, Cancer Division Head and Director of The Kinghorn Cancer Centre.

A: The answer is yes: the incidence of cancer is now slightly higher than it was in the 1950s. This likely has two major contributing factors. The first is that the mortality from cardiovascular disease, such as heart attack and stroke, has markedly diminished over the same period. This means more people survive to an age when cancer is diagnosed. The second reason is that we are probably diagnosing cancer more effectively than previously. For example, we are likely diagnosing more prostate cancer than we were in 1950, much of which is not leading to death and did not have been detected in 1950. Some cancers, such as lung cancer, have become less commonly diagnosed, probably because of the effectiveness of smoking cessation programs.

What is impressive is that cancer mortality has progressively declined since 1950 – meanig that more people are being cured of cancer, once diagnosed. In 1970, more than half of all patients diagnosed with cancer would succumb to the disease. By contrast, in 2010, more than 60 per cent of people diagnosed with cancer were cured. This is likely due to improved early detection and treatment, proving that medical research does save lives!

Got a science question? Just ask!

Garvan’s experts are standing by to answer a selected medical research question in the next issue of breakthrough, so pop your question to Garvan Research Foundation

If you are concerned about your health, please see your doctor.

We cannot review personal health information or provide medical advice.

If you would like information about leaving a gift to Garvan in your Will and becoming a Partner for the Future, please contact our Bequest Manager, Carol O’Carroll on (02) 9295 8117.

Got a science question? Just ask!

Garvan’s experts are standing by to answer a selected medical research question in the next issue of breakthrough, so pop your question to Garvan.

Got a science question? Just ask!

Garvan’s experts are standing by to answer a selected medical research question in the next issue of breakthrough, so pop your question to Garvan Research Foundation.

If you would like information about leaving a gift to Garvan in your Will and becoming a Partner for the Future, please contact our Bequest Manager, Carol O’Carroll on (02) 9295 8117.

We cannot review personal health information or provide medical advice.

If you are concerned about your health, please see your doctor.

We cannot review personal health information or provide medical advice.

If you are concerned about your health, please see your doctor.
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.

Tell us what you think
Which scientific areas are you interested in?

What stories do you like reading in breakthrough?

Other feedback?

In memoriam
Between 1 February and 30 June 2017, donations were made in memory of:

- Bill
- Carole
- Dean
- French
- Jack
- Jenny
- Max
- Robert
- David Abbott
- Margaret Allen
- Nevus Amrit
- Trevor W Annett
- Greg Ayre
- Clive Bailey
- Family Bain
- Paul G Baker
- Susan G Ballantine
- Arthur H Barkeit
- Margaret Barnes
- Colleen M Bellman
- Emile and Lucie Bernard
- John Bilderbeek
- John Birt
- Beryl Blake
- Linda Borsato
- Robert Bryce
- Grahame Bunyan
- Michael Burgess
- Gordon Burt
- Valerie Burt
- Andrew Butters
- John R Bye
- Georgia
- Camenzuli
- David Cathels
- Jean Cave
- Garth Chewings
- Peter Clarke
- Louise Clews
- Ian Coan
- Jessie Rose
- Cobie-Fewings
- Noela Colbert
- Tony Comelli
- Conlon
- Mother & Grandmother Corbett
- Anna Costan
- Donald Convery
- Declan Cregan
- Siann Croker
- Brigitte Crovther
- Simon Curtis
- Toni & Ray Curtis
- Geraldine D’Arcey
- Janelle K Davis
- Sheryl de Ryck
- Dennis DelleBaite
- Tony Denny
- David Demeddie
- Hector Destro
- Thelma Dobson
- Lyn Dolman
- Donna’s Mum
- Kerrie Donohue
- Sue Dowlan
- Bridget L Dunn
- Evan Dutton
- Rod Elton
- Eddie Fairnie
- Julie Fakes
- Paula Farley
- Gino Fazekas
- Pamela A Fentie
- Fran Ferguson
- Erich, Margaret & Karen Forbes
- Colin Forster
- Janie Forsterling
- Tim Fowler
- Corel Garling
- Alva Garvan
- Josephine Gaylor
- Rita Giotatis
- Bev Gledenning
- Audrey Godfrey
- John Godfrey
- Rochelle Goulburn
- Evelyn Gould
- Derek Graham
- Andrew Grant
- Rodney Grant
- Jean F Grossman
- Emma Hamilton
- George Harris
- Iris Harris
- Jan Harrison
- William J Harvey
- Philip Hemstritch
- James Herde
- Sue Horan
- Stuart J H oy
- Ash Huggett
- William Edward Hughes
- Michael Huston
- The Jefferson
- Family
- Anne Jensen
- Evi Joannou
- Jenny Johnson
- Philip Kelly
- Susan Kelly
- Andrew Kendall
- Margaret Kennett
- Maria Kenyon
- John Kerkvliet
- Jaqui Ken
- Grant Knight
- Linda King
- Shirley Knmame
- Winnie Kwkko
- Henry Kyaw
- Lucy Lack
- Stephanie Lawson
- Sue Leahy
- Anita Lean-Fore
- Daryl L Levy
- Paul Lewis
- Ellen Liddon
- Julia M Linyard
- Bill Lomas
- Margaret Lovat
- Emma Love
- Tim & Andrew Lynch
- Dr Lee
- MacCormick Edwards
- Cecilia Maddock
- Jack and Yvonne Maloney
- Georgie Malos
- Diny Malone
- The late parents of Mr Wadie Mansour
- Robert Markham
- Lynda Matthews
- Bridie Magill
- Jan McAluliffe
- Kevin Michael & Doreen Julia McCabe
- Hugh McLeod
- Ciode
- Donald F Mcscll
- Elizabeth Minter
- Francesco
- Miigiliani
- Elizabeth Mitchell
- Katrina Moine
- Myra Montoya
- Glenn Moore
- Julie Mortensen
- Margaret Murray
- Mrs Ahadi’s beloved father
- Ann Margaret
- Nadzra
- Ross Nelso
- Michael Nissen
- Binnie Norman
- Adan Natley
- Lawrence & Anthony O’Brien
- Don & Ken Olds
- Dianne Oids
- Pat Palmer
- Erica Lesley Parker
- Colm J Parsons
- Maryanne Pickup
- Nice Pontes
- Delia Pont
- John Poscha
- Marianne Prentice
- Deanne Prior
- Jerry Raffos
- Nicholas Raffos
- Anne Ramsden
- Monty Ranawake
- Dougls Raupach
- John Raynor
- Anna Reid
- Robert J Rice
- Karen Ristevski
- Aileen Rogers
- Jane Roneym
- Roger Rose
- Heather Rosevear
- Helena Ross
- Kerryn Rufus
- Mollie Ruprecht
- Connie Sant-Ruth
- Martin Samocik
- Emilia R Schaeffer
- Max Serher
- Chi K Shang
- Adrian Short
- Mary Simpson
- Valerie Sing
- Robert A Smith
- Brinnie Snow
- Marcia Solomon
- Ben Spalding
- Ronald Spry
- Warren Squires
- John Stackpool
- Vernon Clarence
- Steven
- Blagoja Stoevski
- Rhonda Stone
- Sherry Tattersall
- Marjorie & Jeffrey Taylor
- Robert Teagle
- Ling Tee
- Michael Tindale
- Tara Tobin
- Mark Todd
- Bruno Trevisan
- Leonard A Unger
- Kay Vocigli
- Carol Wake
- Arden Wake
- Keni Wara
- Jenny Warehaim
- Margaret Waugh
- Susan Wells
- Paul Welsh
- Maureen Weston
- Adrian Wilden
- Beth Wilkinson
- Elizabeth J Williams
- Peter Williams
- Nick Wilson
- Winn’s Mum
- Helen Wong
- Judy Woods
- Marie J Young
- Danuta Zmitrowicz
- Ethel Zogolomyer

In celebration
Thank you to the wonderful people who sent the good wishes to Garvan on their special days.

Congratulations to newlyweds Dean Davis and Michelle Jacobs, and to Ronald and Kay McKertich on your golden anniversary!

And happy birthdays to Elizabeth Sapi and John Vallis, and also William Walker who turned 101!

Coming up
Please join us for our popular public seminar program. 
In October, we mark World Osteoporosis Day with a closer look at this devastating disease. In November, Pancreatic Cancer Awareness Month, we reveal the research that is rising to the challenge to double survival by 2020.

Topic: Osteoporosis
Date: Friday 20 October
Time: 10am – 12pm
Location: Garvan Auditorium, Garvan Institute of Medical Research, 384 Victoria Street, Darlinghurst, Sydney
Seminars are free of charge, but space is limited and bookings are essential.

To reserve your place, call 1300 73 66 77 or visit garvan.org.au

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 normal or overweight male volunteers who are between the ages of 20 and 30 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:
Amanda Hor 0433 166 033 or email a.hor@garvan.org.au (St Vincent’s HREC Ref HREC/15/SVH/437)

Ovarian cancer study
We are looking for volunteers with NO personal history of cancer to donate approximately 50-80mL of blood to be used to optimise experimental protocols and/or biobanked for future use in cancer versus controls comparisons. This work is part of a project aimed at developing a blood-based test for early ovarian cancer.

To volunteer, or for more information, contact:
Dr Kristina Warton 0438 649 073 or email k.warton@garvan.org.au (St Vincent’s HREC Ref SVH/14/257)

Brown fat and blood pressure study
Brown fat is a special kind of fat which burns fat in the body. We are looking for volunteers who have high blood pressure to participate in a trial investigating the effect of a medication on brown fat. Participants must be aged 18 to 38 and have high blood pressure to participate in a trial investigating the effect of a medication on brown fat.

To reserve your place, call (02) 9295 8497 or email a.warton@garvan.org.au (St Vincent’s HREC Ref SVH/14/257)