



HARRY PERKINS INSTITUTE
OF MEDICAL RESEARCH

Annual Report 2014



HARRY PERKINS INSTITUTE
OF MEDICAL RESEARCH



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Most of the stunning fluorescent cell images displayed in this publication were created by researchers who entered the annual Perkins photography competition in 2014.



Perkins

HARRY PERKINS INSTITUTE
OF MEDICAL RESEARCH

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About the Perkins

Our vision

The Perkins is a world leader in medical research delivering global improvements in human health.

Our mission

To conduct innovative research that translates into lasting health benefits.

Our values

Respect

Respect is at the core of our organisation. We treat our colleagues and everyone in our diverse community with honesty, integrity and respect.

Innovation

We are a talented group of like-minded individuals at the forefront of modern medical research, using our creativity and the latest technology in our relentless quest for medical breakthroughs.

Passion

We bring a passion and commitment to every aspect of our work.

Collaboration

We recognise the power of working closely with each other and our collaborators to achieve the outstanding results for which we strive.

Driving
discovery
delivering
hope

Our name



The Harry Perkins Institute of Medical Research was named in honour of our inaugural Chairman, the late Harry Perkins AO, who played a pivotal role in the creation of the Institute.

Harry's vision and commitment to improving the lives of Western Australians led to the creation of the Western Australian Institute for Medical Research (WAIMR) in 1998.

The respect in which he was held and his unrelenting drive to boost medical research in Western Australia were instrumental in bringing together The University of Western Australia and the Royal Perth and Sir Charles Gairdner hospitals as the founding partners. He also led the team which raised the funds for the establishment of the Institute. One of the major gifts was a \$5 million donation from Wesfarmers.

A farmer in the Bruce Rock area, where he was born, Harry Perkins went on to a distinguished business career, culminating in 16 years as Chairman of Wesfarmers Limited. He died of cancer in 2002.

Harry was one of those rare individuals who, having identified a need, went out and did something about it.

The annual Harry Perkins Oration commemorates his great service to the people of Western Australia.

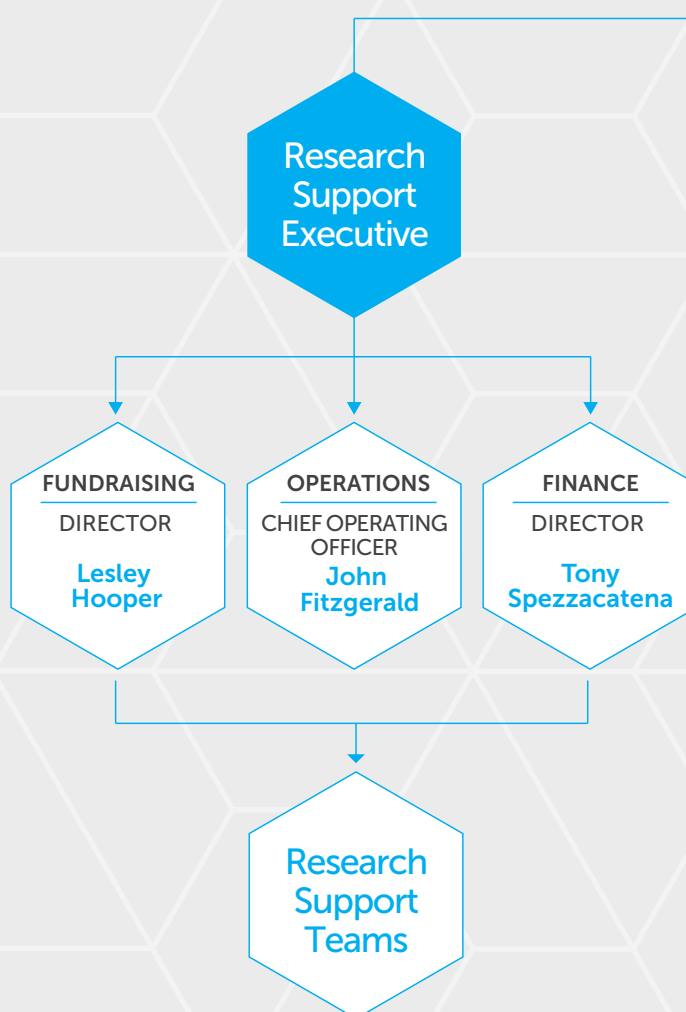
The name in our logo is based on Harry Perkins' actual signature.

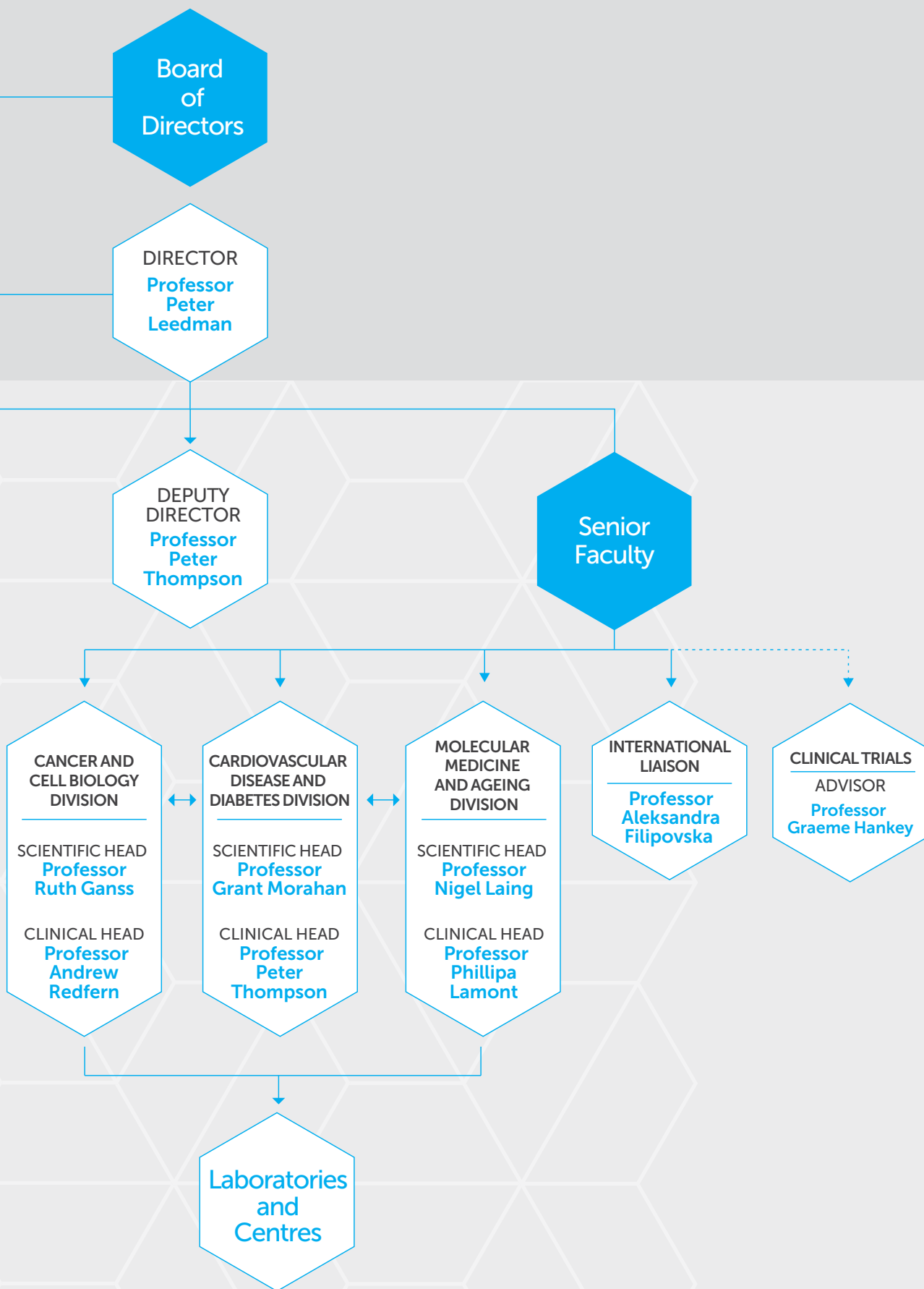




HARRY PERKINS INSTITUTE
OF MEDICAL RESEARCH

ORGANISATIONAL STRUCTURE





Chairman's Report

Thank you for reading the 2014 Annual Report of the Harry Perkins Institute of Medical Research, and for your support of its important work.

The opening of the Perkins Nedlands building in March 2014 by the Prime Minister was a very special occasion. In the presence of many distinguished guests, eminent scientists, community leaders and supporters of medical research, we dedicated this magnificent new research facility to the people who are themselves dedicated in the pursuit of medical research for the greater understanding of disease, and ultimately for a healthier and brighter future for all of us.

Researchers from the Institute and many other research organisations moved into the building over the year and the positive effect on morale and research was almost immediate. The fundamental principle of collaboration that the late Harry Perkins imbued in all of us has at last been given a wonderfully encouraging new environment.

Another major change took place at the opening, when we also farewelled inaugural and long-serving Institute Director Professor Peter Klinken, who retired after nearly 15 years in the role. At the same time we welcomed Professor Peter Leedman as the new Director of the Perkins Institute. The former Deputy Director of the Institute, Peter Leedman has taken up the position as Director with great enthusiasm, and on behalf of the Board and staff of the Institute I thank him sincerely for his sheer hard work and fantastic dedication.

Later in the year we held a very moving celebration of Peter Klinken's extraordinary 15 year plus career leading the Institute in the new McCusker Auditorium, with many speakers giving their insights into Peter's wonderful qualities and interests. The video message from son Christian from Europe on behalf of his family completed the surprise for Peter! We are proud that Peter Klinken is our inaugural Perkins Senior Fellow, and were delighted when he was appointed Chief Scientist of Western Australia in June.

It is fitting to recognise that Professor Peter Klinken and new Director Professor Peter Leedman had worked together for many years on the vision of the new buildings, and the Institute has been fortunate to have such a seamless transfer between these two close colleagues.

The Institute's past chairman, and Harry Perkins' successor in that role, Dick Lester AM, was Chair of both the Implementation Committee that represented the funding partners, and the Project Control Groups, which oversaw much of the building detail. Dick was tireless in his efforts for the Nedlands building and the new Perkins facility which was completed later in the year within the Fiona Stanley Hospital precinct. The planting of the "Lester Oak" in the gardens adjacent to the Nedlands Perkins building is a small token of our appreciation.

My sincere thanks to the Board who have guided the Institute's affairs with great care and commitment over the past year, and also to the dedicated staff and researchers at the Institute. It is an honour to work with you and on behalf of medical research.



Laurence Iffla
Chairman,
Harry Perkins
Institute of Medical
Research

A portrait of Larry Iffla, a middle-aged man with short brown hair, smiling. He is wearing a dark suit, a white shirt, and a red patterned tie. The background is dark and out of focus. A blue hexagonal graphic is overlaid on the left side of the image.

"We are looking
forward to the
future with great
excitement
and anticipation"

LARRY IFFLA



"I hope you share my enthusiasm for this vision of the Perkins, and I invite you to join with us on our journey going forward, as we need your continued support and involvement at all levels"

PETER LEEDMAN

Director's Report

It is a pleasure to write my first Director's message in an annual report for the Harry Perkins Institute of Medical Research.

In March 2014 the Prime Minister of Australia officially opened the doors of our north facility at Nedlands and on the same day I became the Director. As I told our guests on that occasion, I felt I had just been given one of the best jobs in the world, uniting my twin passions of science and medicine.

I am both a scientist and a practicing physician. With my scientific hat on I am passionate about the Institute making new discoveries, embracing and developing new technologies, and fostering the careers of young scientists.

With my physician hat on I am passionate about improving the health and care of my patients, translating the innovations made at the laboratory bench into clinical outcomes and fostering the research careers of young medical doctors.

As a doctor I have worked in the public health system for over 20 years. Not only has it grounded me, it also gives me the opportunity to directly connect innovation and discovery made in the Perkins with advances in clinical trials and new treatments - connecting the "bench to the bedside."

Our new buildings are definitely examples of how big is beautiful! We are now able to think big and be bold, think outside the box, and foster new local and global collaborations.

On that note, it is an incredibly exciting time to be involved in medical research because advances in technology are having a major impact on everything we do. For example, we are using advanced technology to sequence parts of our genome at lightning speed and relating that information back to the patient and we are generating new therapies with much higher specificity than ever thought possible before, embracing the concept of 'precision medicine', which we hope will deliver medicines that are more effective with less side-effects.

The Perkins has established three Divisions in the past year: Cancer and Cell Biology, Cardiovascular Disease and Diabetes and Molecular Medicine and Ageing. The Perkins is focusing on these diseases because they continue to take the lives of our loved ones, our neighbours, colleagues and friends - and because we believe we can make a difference.

Within each Division we are working in multidisciplinary teams where our top scientists are working side by side with medically trained doctors, pathologists, biostatisticians, clinical trials and bioinformatics experts who can crunch through the tsunami of data and make it clinically relevant. Collaboration within and across the Divisions is a core component of our success.

We are actively recruiting new world-class scientists and clinicians to the Perkins who are being attracted to the environment which is one of cutting edge innovation mixed with passion, collaboration and a focus on the translation of our discoveries into improving clinical outcomes.

I hope you share my enthusiasm for this vision of the Perkins, and I invite you to join with us on our journey going forward, as we need your continued support and involvement at all levels.



Professor Peter Leedman
Director, Harry Perkins
Institute of Medical Research

Board of Directors



Mr Laurence Iffla
Chair

Mr Iffla has been Non-Executive Director since March 2005 and Chairman of the Board from 20 May 2009. He is a partner in the legal firm, Iffla Wade and prior to that was a partner for 25 years with the national legal firm Mallesons Stephen Jaques. He practices primarily in the area of commercial property law, State taxes and trusts and joint ventures. Mr Iffla is a non-executive Director of the Perron Group and is Chairman of not-for-profit body Future Living Trust Inc. He is a former member of the Council of Law Society of Western Australia and previously held the position of Treasurer at the Society.



Dr Stephen Davis

Dr Davis joined the Board in 2012. He is a Radiologist and Partner of Perth Radiological Clinic. He is a medical graduate of UWA, a Member of the Royal College of Physicians UK and Fellow of the Australian and New Zealand College of Radiologists. He has clinical experience in Australia, England and the USA, including 14 years as a Consultant at Sir Charles Gairdner Hospital. Dr Davis was Chairman of Perth Radiological Clinic for 9 years. He has experience as a non executive director in England and Australia and is a Fellow of the Australian Institute of Company Directors.



Dr Bob Every AO

Dr Every joined the Board in April 2013. He is a Metallurgist by profession having completed his Bachelor's Degree in 1968 and a Doctorate in 1971. In 2000 he was awarded a Centenary Medal and in 2012 was recognised as an Officer of the Order of Australia. His first role as a CEO of a listed company was as Chief Executive Officer of Steel & Tube Holdings Limited in New Zealand from 1988-91 and then was appointed Managing Director and CEO of Tubemakers. He subsequently worked for BHP and held a number of senior roles before becoming President of BHP Steel in 1999. He took up the role of Managing Director and CEO of OneSteel in February 2000. He is now Chairman of Wesfarmers Limited and Chairman of Boral Limited, as well as a Patron of Redkite.



**Professor
Gary Geelhoed**

Professor Geelhoed, the Chief Medical Officer of WA, joined the Board in June 2013. He is a Paediatric Emergency Physician who received his qualifications at The University of Western Australia. Previously he was Director of the Emergency Department at Princess Margaret Hospital for 21 years. He is a federal and WA AMA Councillor; Chairman of the Drug and Alcohol Organisation and is a member of the Healthway Board. He is a past President of the Australian Medical Association WA. Professor Geelhoed's main research interest lies in acute respiratory illness in children.



Mr Keith Kessell

Mr Kessell joined the Board in August 2010. He was Executive General Manager, Corporate Affairs at Wesfarmers Limited for 12 years, retiring in 2008. Previously he worked as a journalist in Western Australia and Canberra and as a senior adviser to the Hon Fred Chaney and with Dr John Hewson, Leader of the Federal Opposition. Mr Kessell has been a member of the Board of the West Australian Symphony Orchestra since June 2007.



Mr Peter Leonhardt

Mr Leonhardt has been a Non-Executive Director since 1998 and is responsible for the Perkins Finance Committee. He is an independent company director and advisor with extensive business, financial and corporate experience. He is a Chartered Accountant, former Senior Partner with PricewaterhouseCoopers and Managing Partner of Coopers & Lybrand in Western Australia. He is Chairman of Carnarvon Petroleum and a non executive director of CTI Logistics Limited together with a number of private companies. He is also a member of the Cancer Research Trust. Mr Leonhardt is a member of a number of professional bodies including the Australian Institute of Company Directors of which he is a life member and a former State Councillor.



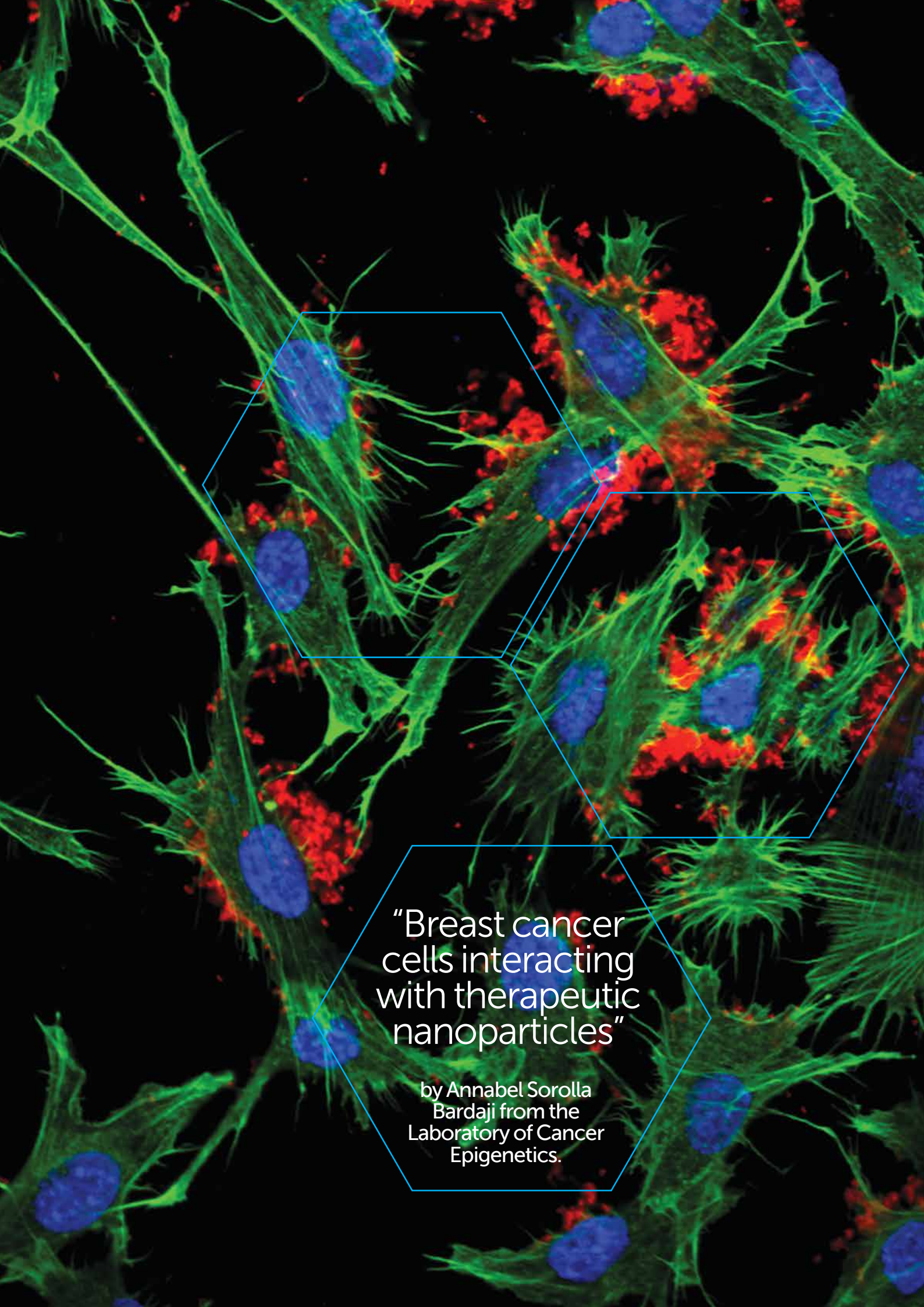
Dr Erica Smyth

Dr Smyth joined the Board in 2013. She has over 30 years experience in the mineral and petroleum industries. She was Principal Geologist for BHP Minerals Limited and BHP-Utah Minerals International's Beenup Project Manager, Manager Gas Market Development WA for BHP Petroleum and General Manager, Corporate Affairs for Woodside Petroleum Limited. She has a Bachelor of Science from The University of Western Australia and an Applied Master of Science from McGill University in Montreal, Canada. In 2008 she was awarded an Honorary Doctor of Letters from the University of Western Australia and in 2012 was elected as a Fellow of the Australian Academy of Technological Sciences and Engineering. She was the Chair of Toro Energy Limited for nine years before stepping down in 2015. She is the Chair of Scitech and the Diabetes Research Foundation of WA and a Director of Emeco Holdings Ltd.



Winthrop Professor
John Challis

Winthrop Professor John Challis joined the Board in June 2014 as proxy for the Vice Chancellor of The University of Western Australia. He commenced his position as Pro Vice-Chancellor for Health and Medical Research in February 2014 and holds the title of University Professor Emeritus at the University of Toronto, and Adjunct Professor at the University of British Columbia and at Simon Fraser University. John completed his training at the University of Cambridge, University of California, San Diego and Harvard Medical School and held a Junior Research Fellowship at Wolfson College, University of Oxford, before moving to McGill University, Montreal, Canada. More recently he served as Chair of the Department of Physiology at the University of Toronto, and later as Vice President Research and Associate Provost of that University. He was the inaugural Scientific Director of the Canadian Institutes for Health Research, Institute of Human Development, Child and Youth Health and served as President and CEO of the Michael Smith Foundation for Health Research in Vancouver BC.



"Breast cancer
cells interacting
with therapeutic
nanoparticles"

by Annabel Sorolla
Bardaji from the
Laboratory of Cancer
Epigenetics.



2014 Highlights

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New Headquarters for Harry Perkins Institute of Medical Research

The Australian Prime Minister, the Hon. Tony Abbott MP, officially opened the Harry Perkins Institute of Medical Research's new \$122 million flagship research facility at Nedlands in March.

More than 400 guests, including His Excellency the Governor and Mrs McCusker and Western Australian Health Minister Kim Hames were present for the ceremony, held at the main entrance to the spectacular new 10-storey building which houses laboratories, office spaces and clinical research areas.

"This facility is of the highest international standard," said Professor Peter Klinken, who was instrumental in obtaining funding for the QEII building, as well as another facility in Murdoch.

The Commonwealth contributed \$70 million to the cost of the building and the State government paid \$25 million which was matched by the University of Western Australia.

Together, Lotterywest and the McCusker and Perron Charitable Foundations provided a further \$7 million.

The Lions Eye Institute also provided vital support while the QEII Trust leased the land to the Institute.

The Chairman of the Perkins, Larry Iffla, said the towering glass building was a visible sign of growth for the Institute which is also expanding in prominence.

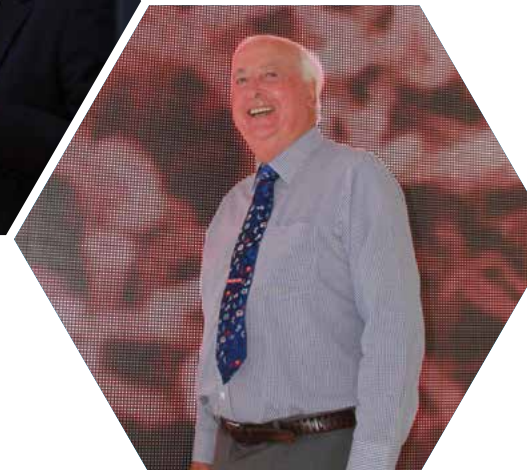
He said 200 medical researchers were already busy in the building's laboratories and there was room to accommodate 750 scientists, doctors and students.

The opening ceremony also served as an official handover of the Directorship.

Professor Peter Klinken, who was Director of the Institute previously known as the Western Australian Institute for Medical Research (WAIMR) for close to 15 years, handed over the role to Professor Peter Leedman and wished him well.

"We are now able to think big and be bold, think outside the box, and foster new and exciting collaborations"

PETER LEEDMAN



Former Chairman, Dick Lester, was tireless in his efforts for the new building.

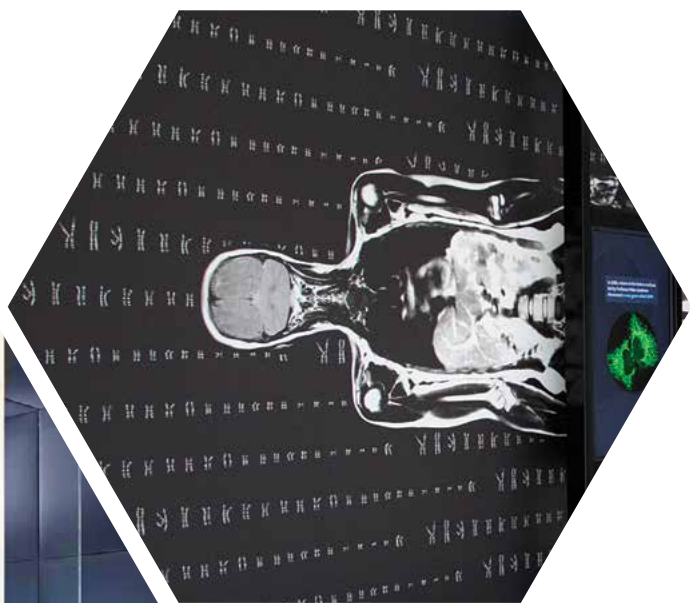




PERKINS NORTH
Queen Elizabeth II
Medical Centre,
Nedlands

Collaborative
environments for
groundbreaking
research

PERKINS SOUTH
Fiona Stanley Hospital
Murdoch



Perkins North

Queen Elizabeth II Medical Centre, Nedlands

Perkins researchers and support staff have moved into two custom-built research facilities, including a 10-storey building in Nedlands, which is the Institute's headquarters.

The facility was constructed by Doric and designed by Hames Sharley, which was honoured at the Australian Institute of Architecture State Awards with the top award in the Public Architecture category and an Architecture Award for Interior Architecture.

Hames Sharley Director, James Edwards said that the Institute's dramatic departure from the orthodoxy of laboratory design set it apart from other medical research institutes.

"We proposed a radically different approach built around a central highly activated core with the laboratories running north to south with natural light on two sides," said Mr Edwards.

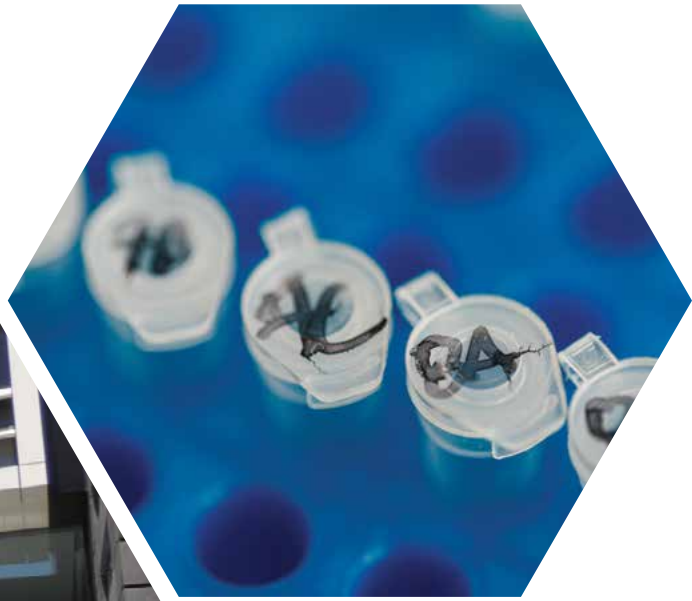
"To walk between the offices and the laboratories researchers have to move through the centre which houses the meeting rooms, lunch rooms, lifts, toilets and a striking chromosome-inspired stairway that spirals up the core of the building."

Mr Edwards said the idea was that as researchers encountered each other in these central spaces, relationships would build and ideas would be exchanged.

As well as Perkins researchers, the building includes levels devoted to research by the University of WA, the Lions Eye Institute, the Lung Institute of WA, the Heart Research Institute and the Centre for Nursing Research.

There are also stimulating exhibitions and educational opportunities for the public in the foyer and on the first level. Read the Community Engagement section in this report to learn more about the interactive areas in the Nedlands building.





Perkins South

Fiona Stanley Hospital, Murdoch

The new Perkins South facility is prominently located at the entrance to the new Fiona Stanley Hospital in Murdoch.

Also designed by architects Hames Sharley, the 5-storey building was constructed by Brookfield Multiplex.

The facility includes clinical research, laboratory research, health education academic offices, and research office space, all complementary to the clinical services planned for the adjacent Fiona Stanley tertiary teaching hospital.

The new research building has the capacity to accommodate 360 medical researchers who also come from State Health research groups and UWA research groups together with UWA academic staff. It is located adjacent to the new Integrated Education Facility and the Pathwest facility.

Hames Sharley Director, James Edwards said the south building had been designed with its own identity that complemented the architecture of the hospital.

"Like the north building, research and academic spaces are organised to break down barriers and promote collaboration," he said.

"Offices are grouped with full height internal glass walls supporting strong visual connections between offices areas and the labs as well as permitting optimum natural light. This arrangement supports teams of varying size and maximises opportunities for contact between researchers."



Surprise 'Thank you' for Professor Peter Klinken



Left to right: Professor Peter Leedman, Mr Keith Kessell, Mr Dick Lester AM, Professor Peter Klinken, Mr Larry Iffla, Dr Louise Winteringham, Professor John Funder AO, Mr John Poynton AM.



There were reminiscences, laughter and a few tears when the end of an important era was celebrated in December 2014.

Professor Peter Klinken, who was Director of WAIMR from 1998 to 2000, then 2002 to 2014 when it was renamed the Harry Perkins Institute of Medical Research, was surprised by the secretly organised 'thank you' event in the McCusker Auditorium.

As well as current and former colleagues, Professor Klinken was joined by his family for the celebration of his Directorship. His son, Christian sent his best wishes in a video message.

Professor Klinken's many achievements over 20 years were detailed in stories by Mr Dick Lester AM (former chair of WAIMR/Perkins), Mr John Poynton AM (a friend involved in early fundraising), Mr Keith Kessell (Board member and connected through Wesfarmers), Professor John Funder AO (member of the Scientific Advisory Committee and long term friend), Professor Alan Robson AO (Former Vice Chancellor of UWA), Dr Louise Winteringham (from the Leukaemia Laboratory) and new Perkins Director, Professor Peter Leedman.

Professor Klinken received a number of gifts from the Perkins, including a book which is a pictorial history of his time as Director. The Institute has also named the science exhibition walkway on Level 1 of the Perkins North building, KLINKEN WALK.

Professor Klinken remains in the Perkins Leukaemia laboratory, as well as working in his new State government advisory role as the Chief Scientist of WA.

2014 Wesfarmers Harry Perkins Oration

The 2014 Wesfarmers Harry Perkins Oration featured guest speaker, Professor Garry Jennings AO, Director and Chief Executive Officer of the Baker IDI Heart and Diabetes Institute.

A renowned cardiologist, Professor Jennings spoke about the latest medical research on the causes, prevention and treatment of heart disease.

Professor Jennings warned that "Sitting is the new Smoking" and said that sedentary lifestyles were contributing to heart attacks. He also updated the public audience on the latest medical research and treatments available for patients.

The 2014 Oration also provided the ideal occasion for the announcement of a substantial philanthropic gift from Wesfarmers.

The Chairman of the Harry Perkins Institute of Medical Research, Laurence Iffla, announced that Wesfarmers had donated \$5 million to the Perkins to establish Western Australia's first Professorial Chair in Women's Cancers.

"This gift will enable the appointment of an outstanding scientist to lead the new Perkins Centre for Women's Cancer Research"

LARRY IFFLA



Wesfarmers Chairman, Dr Bob Every AO with Professor Garry Jennings AO and Perkins Chairman, Larry Iffla.

Inaugural Weekend to End Women's Cancers

The Weekend to
End Women's
Cancers
Benefiting
HARRY PERKINS INSTITUTE
OF MEDICAL RESEARCH



Perth's first Weekend to End Women's Cancers raised an impressive \$2.2 million for breast and ovarian cancer research projects at the Harry Perkins Institute of Medical Research.

An enthusiastic crowd of 845 women and men challenged themselves to the gruelling 60 kilometre walk over two days, making it WA's largest ever fundraising walk for women's cancers.

The funds have already been allocated to a newly established Centre for Women's Cancers, which will focus on cancer prevention and detection as well as finding targeted and personalised treatments for women's cancers.

Professor Pilar Blancafort told walkers that her team was determined to make a difference in cancers which often have a poor prognosis.

"My research aims to develop new methods to target cancers that are difficult to treat and associated with poor outcome, such as triple negative breast cancers and serious ovarian cancers," Professor Blancafort said.

The successful and inspirational "Weekend" will be held again in 2015.



Top fundraising team MACA raised \$1.4 million for cancer research at the Perkins



2014 Ride to Conquer Cancer

Participants in this year's Sunsuper Ride to Conquer Cancer braved wet, windy conditions to complete the 200 kilometre cycling event.



The ride raised \$5.2 million for cancer research projects at the Harry Perkins Institute of Medical Research. 1311 riders participated despite bad weather making the long ride even more challenging than previous years. "This is the third annual Ride and Australia's largest cycling fundraising event," said Perkins Director, Professor Peter Leedman, who thanked the riders for their amazing fundraising efforts.

"Funds raised through The Ride ensure sustainability for our research, along with supporting new cancer research projects, purchasing new equipment and supporting our cancer research teams."

Cancer is a leading cause of death in Australia with one in two Australian men and one in three Australian women diagnosed with cancer before the age of 85.

The 2015 Ride will be held on the 17th and 18th of October, with Mining and Civil Australia (MACA) taking over as title sponsor for the event.

[Register now at conquercancer.org.au](http://conquercancer.org.au)

Awards for Research Excellence

Nigel Laing

University of Western Australia
Vice-Chancellor's Senior
Research Award.

Nigel Laing

UWA Excellence in
Teaching Award,
Category "Research
Supervision".

Ruth Ganss

Cancer Council WA, Cancer
Researcher
of the Year 2013 - awarded
March 2014.

Ruth Ganss

UWA Excellence in Teaching
Award, Category
"Research Supervision".

Evan Inglely

Awarded the Inaugural
Sock-it-to-Sarcoma Senior
Research Fellowship.

Aleksandra Filipovska

Awarded the Merck Millipore
Research Medal 2014.

Aleksandra Filipovska

The Vice Chancellor's
Mid-Career Excellence Award,
The University
of Western Australia.

Oliver Rackham

Scopus Young Researcher
Award, Runner Up – Elsevier.

Kevin Pfleger

The Endocrine Society of
Australia Mid-Career
Research Award.

Osvaldo Almeida

Government Employees
Superannuation Board (GESB)
Award for improved outcomes in
Seniors Mental Health, presented
by the Mental Health Commission.

Osvaldo Almeida

Awarded the Royal Australian and
New Zealand College of
Psychiatrists
Senior Research Award.

Julian Heng

Travelling Fellowship,
Asian Pacific Society for
Neurochemistry,
Taiwan, 2014.

Archa Fox

The Vice Chancellor's Mid-Career
Research Award, The University
of Western Australia.

Vance Matthews

Nominated for a University of
Western Australia Faculty of
Medicine, Dentistry and Health Sciences
"Excellence in Teaching" Award.

Gina Ravenscroft

UWA Vice Chancellor's
Early Career Investigator
Research Award.

Dr Archa Fox




Associate Professor
Oliver Rackham



Professor Nigel Laing



Professor Ruth Ganss



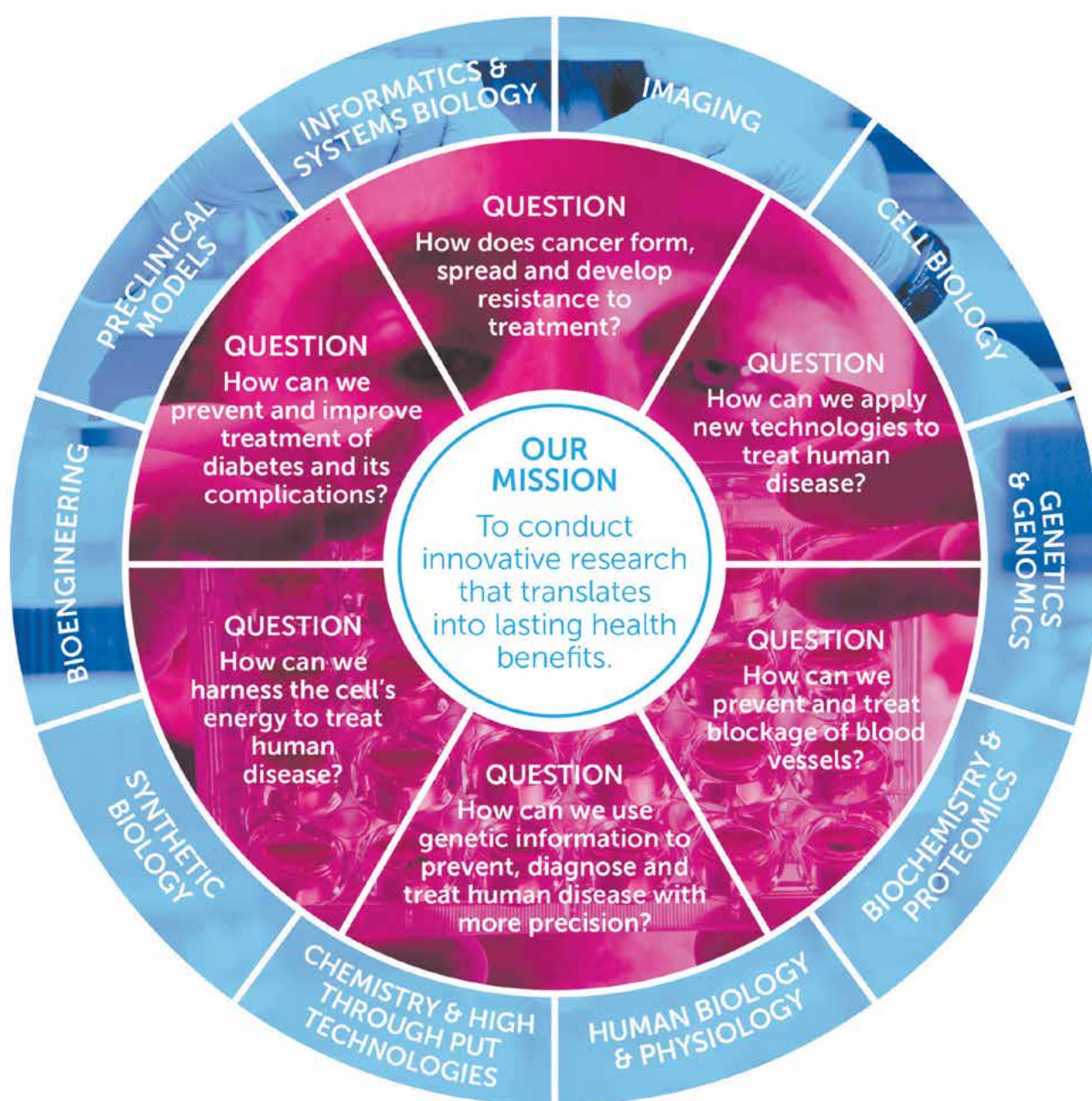
“Normalising
pancreatic
tumour vessels to
enhance anti-tumour
therapies”

by Anna Johansson,
Laboratory of Vascular
Biology and stromal
targeting.

Our Research

Research at the Perkins: Our disease focus

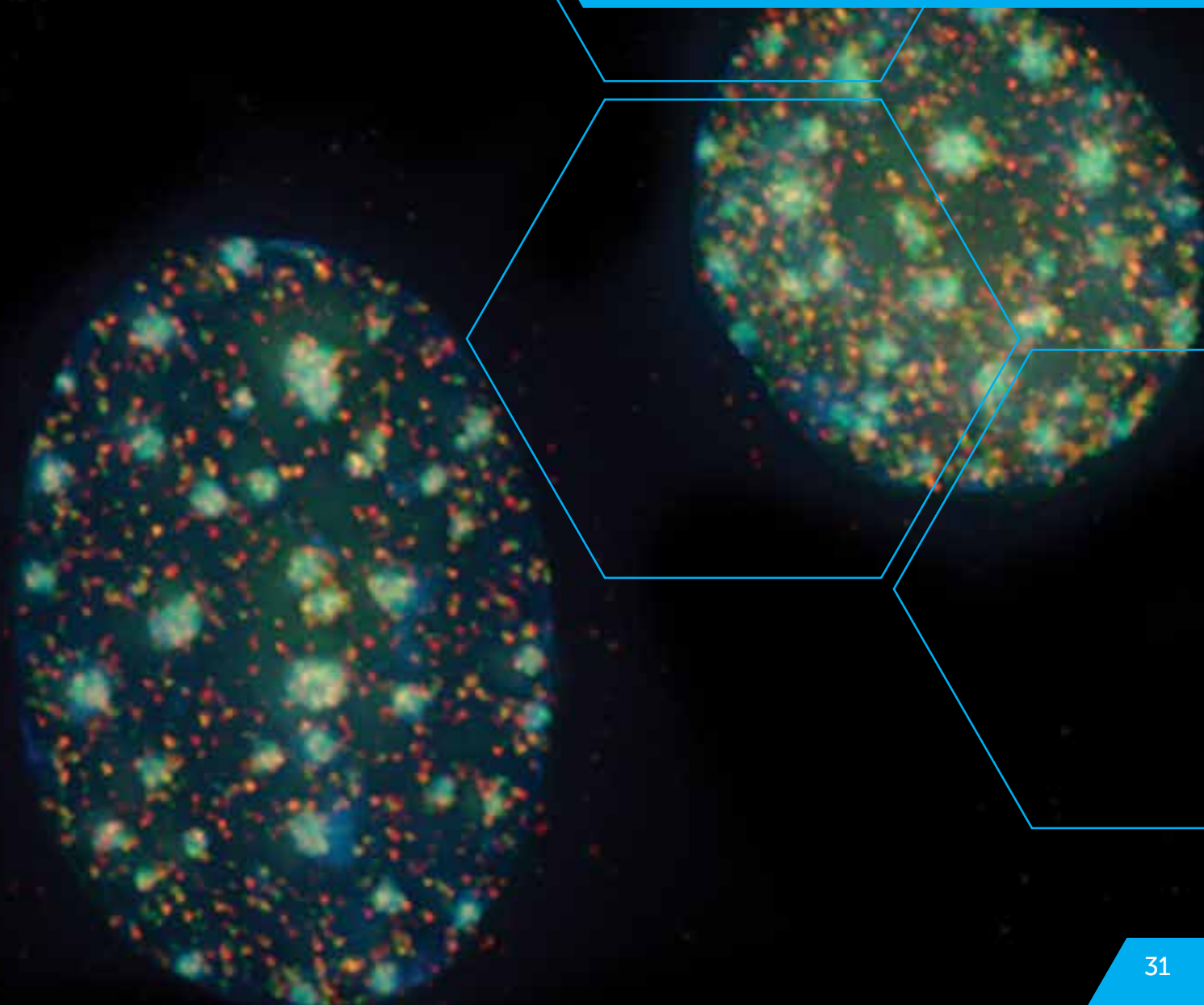
Perkins researchers focus on some of the major diseases that affect our community. In particular we focus on cancer and diabetes and we have an increasing investment in cardiovascular disease research.



"Topoisomerase II and Manp during Interphase"

by James Allen from the
Leukaemia Laboratory

Cancer and
Cell Biology



Cancer Epigenetics Laboratory

Laboratory Head

Associate Professor Pilar Blancafort



Benjamin Garcia-Bloj MD,
Research Associate

Dr Annabel Sorolla, Research Associate

Rabab Rashwan MD, PhD student

Colette Moses, PhD student

Ciara Duffy, Honours Student

Moleshri Paliwal, Research assistant

Mahira Arooj, PhD Student

James Constantine, Student

Agustin Sgro, Student

Shreyas Thiruvengadam,
Honours Student

Edina Wang, PhD Student

Associate Professor Pilar Blancafort and her team joined the Harry Perkins Institute of Medical Research in 2014. Associate Professor Blancafort is a specialist in genome engineering and gene targeting and her laboratory has pioneered the development of engineered DNA binding proteins to modulate the epigenetic state of cancer cells and delivery strategies for tumour targeting in pre-clinical studies.

Recently the Blancafort laboratory has also produced small mini-transcription factors or interference peptides able to block oncogenic transcription factors over expressed in specific breast cancer subtypes.

The team has begun the generation of targeted nanoparticles to encapsulate the aforementioned agents in both human cells and tumour tissues in mice models. The overall goal of the laboratory is to bring these new agents in pre-clinical and Phase I trials for metastatic basal-like breast cancer.

2014 Highlights

- The Cancer Epigenetics Laboratory moved from the APHB school at UWA campus to the Harry Perkins Institute of Medical Research
- The laboratory published this year in the journals *Oncogene* (Beltran AS et al) and *Nucleic Acids Research* (Grimmer MR et al)
- Dr. Anabel Sorolla received a postdoctoral fellowship from the National Breast Cancer Foundation (NBCF): "Novel targeted therapies for triple negative breast cancer based on the use of engineered nanoparticles"
- We received an ARC grant in collaboration with Professor K.S. Iyer at the School of Chemistry and Biochemistry at UWA
- We received a Cancer Council Western Australia (CCWA) grant with Professor K.S. Iyer for engineering of interference peptides (iPeps) to target basal-like breast tumours
- Associate Professor Pilar Blancafort was invited to present her work at the Dana Farber Cancer Institute, Harvard Medical School
- Associate Professor Pilar Blancafort was invited as plenary speaker at the FASEB Conference in Nassau, Bahamas on genome engineering: cutting edge research and applications.
- Associate Professor Pilar Blancafort was invited at the genome engineering conference in Melbourne.
- Perkins photo competition prize (Dr. Anabel Sorolla)

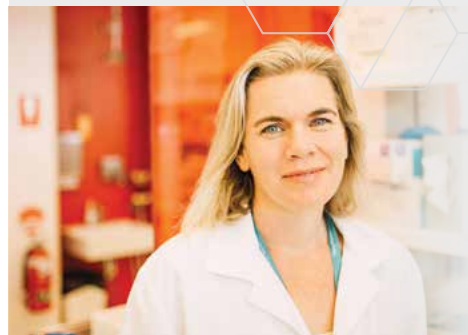


Laboratory for Cancer Gene Regulation

The laboratory of Cancer Gene Regulation investigates how genes are turned on and off in cancer and a variety of other diseases. Specifically, the group studies unusual sub-nuclear bodies termed 'paraspeckles', and investigates their role in diseases, as well as how these can be used as a model system for understanding oncogenic complexes.

In 2014 the group published several findings of importance to the field. The first was an International study involving researchers from Japan, Australia and France, jointly led by Dr. Fox, in which it was shown that paraspeckles use a new mechanism for controlling gene expression, and that this is particularly relevant when cells are stressed. This paper was published in "Molecular Biology of the Cell" and involved PhD student Ruohan Li, as well as Dr. Fox. Another study was a collaboration with a group in the US showing that paraspeckles and NEAT1 are highly upregulated in advanced aggressive prostate cancer, and thus represent a new therapeutic target. This was published in "Nature Communications" and included Ruohan Li, former post-doctoral Fellow, Sven Hennig, and Dr. Fox. The third major study was published in the "Journal of the National Cancer Institute" and was the first demonstration that a specific paraspeckle protein, NONO, is a key oncogene in the devastating childhood cancer, neuroblastoma. This finding was a collaboration with Dr. Tao Liu of the Children's Cancer Institute in NSW, and represents an important new collaboration for Dr. Fox.

Laboratory Head Dr Archa Fox



Simon Kobelke, Research Officer
Ellen Fortini, PhD student
Ruohan Li, PhD student
Geraldine Kong, RA
Agata Sadowska, RA
Pei Wen Lee, RA

2014 Highlights

2014 saw Dr. Fox honoured with the University of WA Vice Chancellor's mid-career research award. Dr. Fox also presented her work with an oral presentation at the annual meeting of the RNA society (Canada), with over 1000 registrants. PhD student Ruohan Li travelled to the US to attend the Cold Spring Harbour Conference on RNA regulation, and he also spoke at the Asian Conference on Transcription (Melbourne, VIC).



Cell Signalling Group

Laboratory Head
Associate Professor Evan Ingley



Dr. Janice Lam, Research Associate
Cindy Le, Research Assistant
Rachel Jones, PhD Student
Priya Muralldharan, PhD Student
Matt Lee, International Student Internship
Rebecca Shapiro, International Student Internship
Morgane Davies, Summer Student
Alex Discombe, Summer Student

Cancer cells have over active enzymes of the type called protein tyrosine kinases (PTK) that function as on/off switches to control cancer cell growth and malignancy. My team investigates the functions of a subtype of PTK, known as Src Family kinases (SFK). We have discovered new interactions and pathways that SFK enzymes regulate in leukemia and bone cancer (sarcoma) cells that influence their ability to survive and become invasive. We also study the effects of drugs that target the SFK enzymes on normal as well as cancer/leukemia cells and have discovered that these drugs have significant effects on normal cell function that could explain some of their side effects. These drugs are starting to be trialed in several different cancers (including sarcoma, breast and prostate cancer) and as with all such treatments resistance is likely to eventually occur. Consequently, we are assessing the mechanisms that cancer cells of these types can acquire resistance to these drugs and identify potential alternative pathways that could then be targeted when resistance occurs.

2014 Highlights

During 2014 we have established new collaborations with groups in Verona (Italy), Dresden (Germany) and New York (USA) to investigate the function of SFK enzymes in leukemia and normal blood cells. This was as a direct result of our publications in the journals Blood in late 2013 and Biochemical Journal in 2014, and our group giving invited presentation as well as one-on-one meetings with these collaborators.

We have been successful in 2014 in attaining funding from Sock it to Sarcoma to continue our sarcoma research, as well as from the Cancer Council of WA for our leukemia research, and presented our research at national conferences (including the Garvan Signalling Symposium, Sydney).



Laboratory for Cancer Medicine

Our research focuses on the mechanisms that regulate hormone action in various cancers (eg breast and prostate cancer) as well as identifying and utilizing microRNAs as therapeutics in cancer. In the hormone action group, the focus has been on nuclear receptors and their coregulators, whilst in the microRNA group the focus has been on microRNA-7 (miR-7) and miR-331. The two arms of the laboratory are linked by their common interest in RNA biology and applying these findings in a translational sense in preclinical animal models with a longer-term view towards therapeutic application.

The Leedman team is driving translational studies using microRNAs to help fight cancer. The team from the Leedman laboratory is working on preclinical translational models of head and neck, cerebral gliomas, prostate and liver cancer.

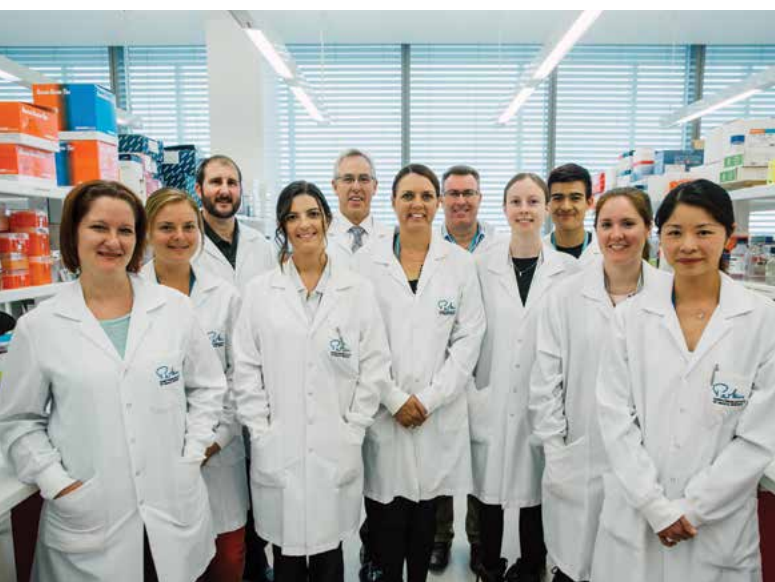
The Leedman team has also shown that another protein discovered in the laboratory, SLIRP, is a potent tumour suppressor in colorectal cancer. This results from analysis of human colorectal cancer tissue microarrays of over 1000 patients. Preclinical animal models are in progress with the SLIRP knock out mouse to evaluate if they can recapitulate the human scenario. This work was also funded from NHMRC and ongoing involves analysis of human colorectal cancer tissues for stem like cells and potential treatments directed at reducing colorectal cancer metastasis.

Leedman is also part of a human breast cancer consortium that published works in 2014 that have identified new potential nuclear receptor targets in breast cancer. These papers identified several new nuclear receptors as playing key roles in breast cancer and has set up the foundation for exploration of several of those receptors in murine models of breast cancer, in order to translate the findings towards potential targeted therapeutics. Several translational models of breast cancer are being explored in mice, including the PyMT model of breast cancer.

Laboratory Head Professor Peter Leedman



Dr Shane Colley, Research Fellow
Dr Andrew Woo, MRF Fellow
Dianne Beveridge, Senior Research Officer
Lisa Stuart, Senior Research Officer
Rikki Brown, Graduate Research Assistant
Michael Epis, Research Officer
Clarissa Ganda, Graduate Research Assistant
Jessica Horsham, PhD student
Felicity Kalinowski, Research Officer
Kirsty Richardson, Senior Technician Animal House
Larissa Wintle, Research Assistant



Leukaemia Research Laboratory

Laboratory Head
Dr Louise Winteringham



Professor Peter Klinken,
Chief Scientist

Ms Jennifer Beaumont
Research Associate

Mr James Allen, PhD Student

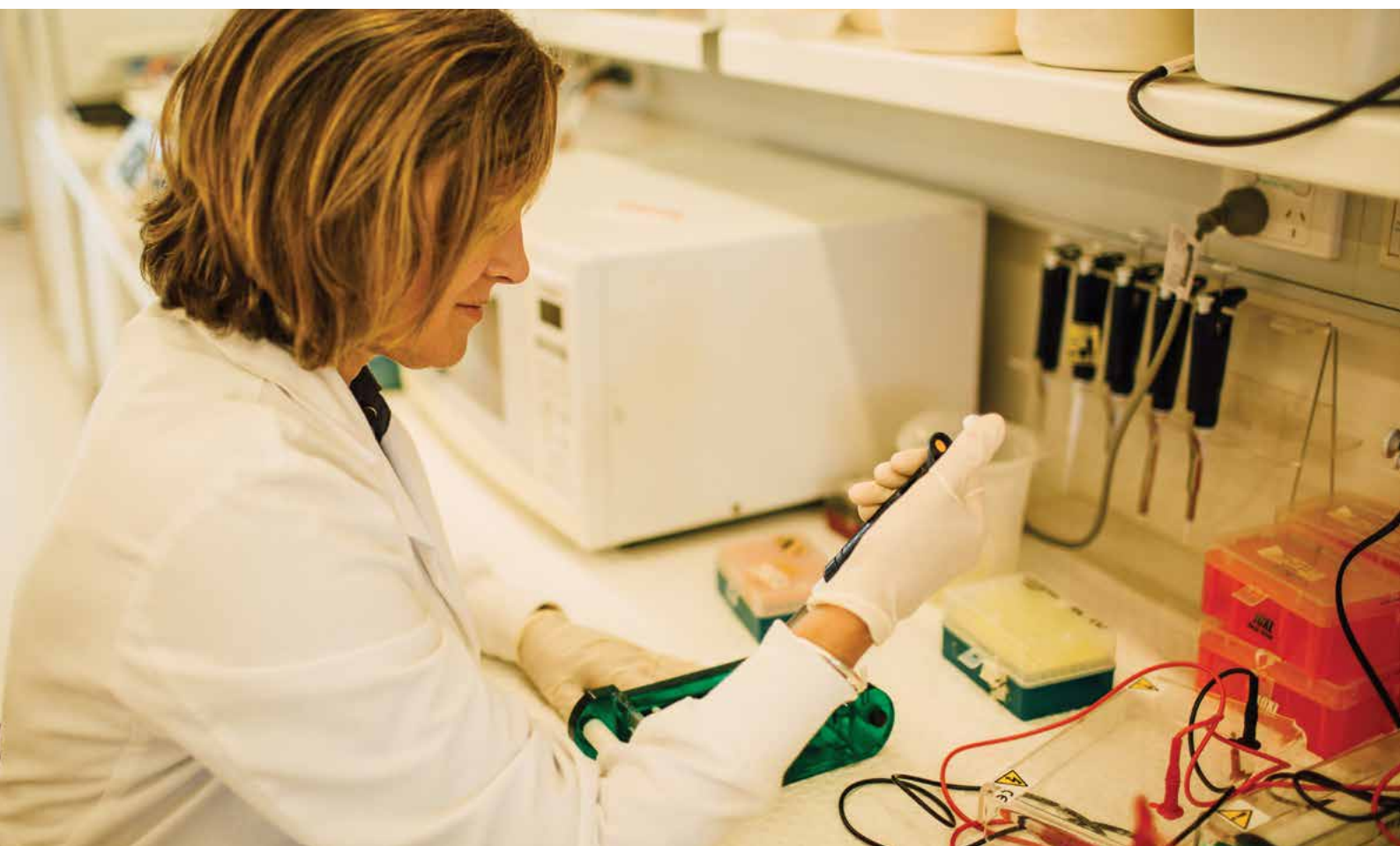
Ms Joanne van Vuuren, PhD student

Ms Karolina Gorsevski,
Honours Student

There are a number of disorders associated with abnormal blood cell production. These include anaemias and cancers of the blood or leukaemias. Normal blood cells can be transformed into abnormal cells by genetic mutations ie changes to the DNA. One of the challenges in finding new treatments for Acute Myeloid Leukemia is that there are few common genetic mutations. Perhaps even more challenging, is that often important genes become de-regulated due to mutations in the regions of DNA that control gene expression rather than the genes themselves.

At the Perkins we are studying new ways that leukaemia genes are regulated, in particular, the role of gene enhancers and micro RNAs (miRNA). MiRNAs are small pieces of RNA that can regulate gene expression by degrading the gene message before it can be translated into a protein. We have identified a number of key miRNAs that regulate blood cell development, and these appear to be deregulated in leukaemia. Importantly, miRNAs are now being trialed as a new form of treatment for some cancers. This work has been carried out as part of a large multinational collaboration called FANTOM5 and has resulted in two very high profile publications in Nature "An atlas of active enhancers across human cell types and tissues" and "A promoter-level mammalian expression atlas."

In another area of our research, we, along with four other groups around Australia have formed the Australian Diamond-Blackfan Anaemia (DBA) Research Collaborative. This group has pooled resources to work towards understanding the causes of this disease and to identify better treatments for children born with this type of anaemia. In the laboratory, we have developed red blood cells that contain the mutated gene responsible for this disease. Using these cells we have been able to identify all the genes that are affected by this mutation. We are now testing each of these genes to determine which ones affect red blood cell development and therefore could be novel targets for new DBA therapies.



Liver Disease and Carcinogenesis

Our objective is to realise the use of a liver progenitor cell (LPC) for cell therapy to treat liver disease. Currently organ transplant is the only successful solution to cure end-stage liver disease. Large numbers of mouse LPCs can be generated and they readily differentiate into functional hepatocytes in culture. They can be used to treat mouse models of liver disease. We have also produced LPCs from mouse embryonic stem cells. Their ability to differentiate is being evaluated. In the longer term our animal studies will be applied to human liver disease using human LPCs. Towards achieving this objective, we have identified human LPCs in patients with liver disease.

During long term maintenance of our LPC lines, some lines have become cancerous. This highlights two important issues. First we have to be extremely cautious in using LPCs for any form of therapy, as we have to ensure we do not cause cancer. Second, if LPCs can give rise to cancer, are they the source of liver cancer in patients with chronic liver disease? These findings have led us to focus on the molecular changes that accompany the change in our LPCs from being non-tumorigenic to tumorigenic.

Knowledge of these alterations will be valuable in identifying tumorigenic LPCs that are unsuitable for use in therapy and developing methods that avoid their transformation. This may also be useful for documenting changes that occur during liver cancer development in patients.

2014 Highlights

Professor George Yeoh's Presidency of the Cancer Council of WA and being an invited speaker to the Asian Pacific Association for the Study of the Liver 12-14 March 2014, Brisbane. The laboratory also acquired a Droplet Digital PCR instrument.

Laboratory Head Professor George Yeoh



Dr Luke Diepeveen, Postdoctoral Research Fellow

Dr Magda Ratajska, Research Fellow

Mr Ken Woo, Graduate Research Assistant

Ms Michel Watson, Graduate Research Assistant

Ms Sarah McSpadden, PhD student

Mr Adam Passman, PhD student

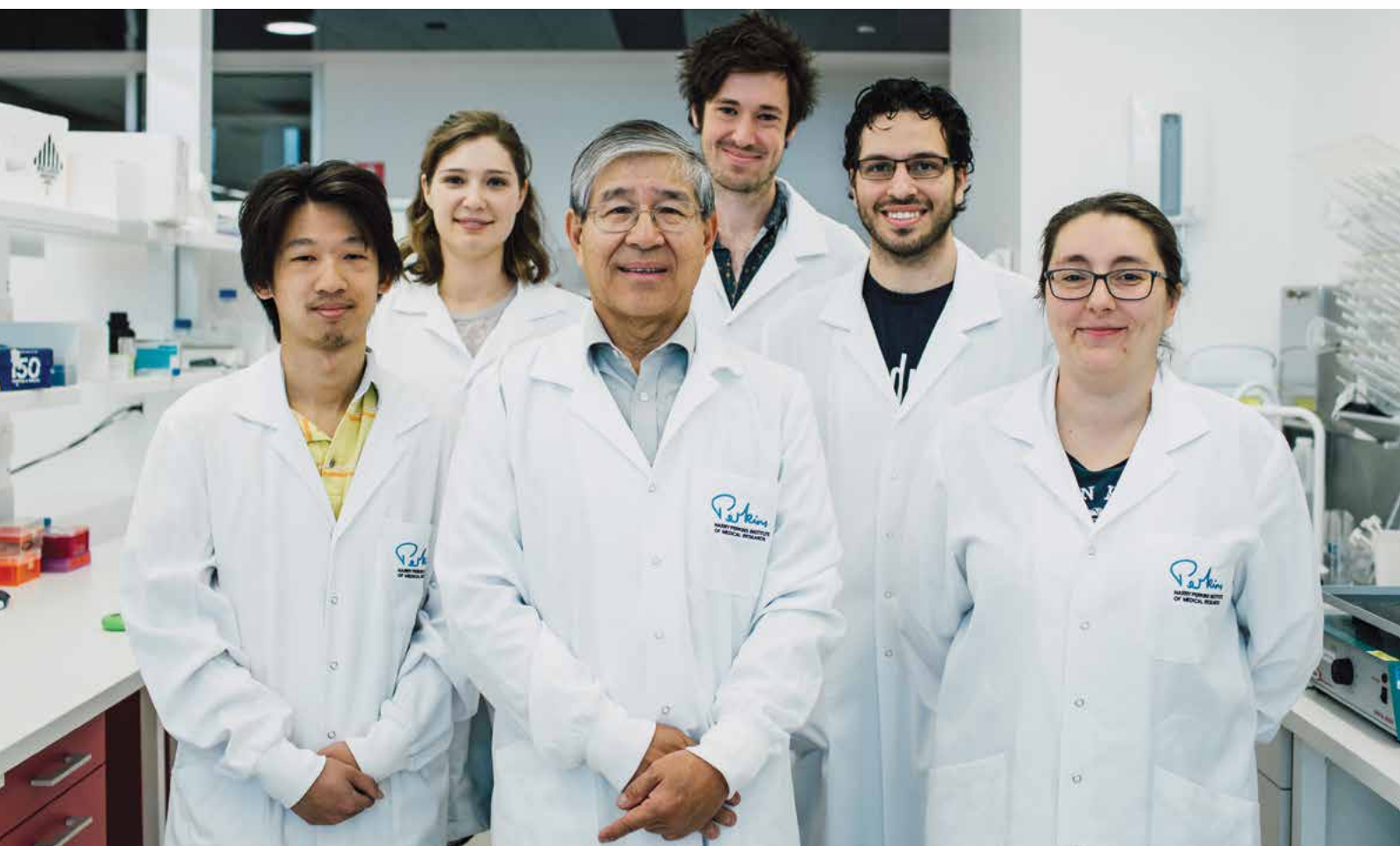
Ms Megan Finch, PhD student

Ms Robyn Strauss, PhD student

Mr Philip Hardy, PhD student

Ms Anne Kramer, PhD student

Mr Neil Andrewartha, PhD student



Mitochondrial Medicine and Biology

Laboratory Head
Professor Alesksandra Filipovska



Dr Tara Richman, Postdoctoral Scientist

Dr Bharti Morar, Research Associate

Anne-Marie Shearwood, Research Assistant

Judith Ermer, Research Assistant

Giulia Rosetti, Research Assistant

Stefan Siira, PhD student

Kara Perks, PhD student

Peter Alfrich, Honours student

Nicola Ferreira, Honours student

Mitochondria are microscopic, energy producing machines that are found in all human cells. Mitochondria contain a small set of genes that must work properly to make the energy our bodies require for health. Defects in the expression of mitochondrial genes cause debilitating diseases for which there are currently no cures. We have identified several different disease causing mutations in human cells, developed a complete new set of analyses to understand how these mutations cause disease and provide insights into possible treatments. We have developed several different models of mitochondrial disease in mice.

2014 Highlights

- We have designed new tools to regulate gene expression in mitochondria published in Nature Communications
- We have developed a mouse model of mitochondrial disease caused by a mutation that compromises protein synthesis and energy metabolism published in PLOS Genetics
- We have identified that estrogen can mediate the regulation of mitochondrial gene expression published in Molecular Endocrinology
- We have characterised a new protein with dual functions in mitochondria published in Nucleic Acids Research
- We have established diagnostic pipelines for the analyses of mutations in genes encoding mitochondrial proteins
- We have hosted the biannual national conference on mitochondrial research, AussieMit2014
- Prof Filipovska was awarded the Merck Medal that is given annually to an outstanding Australian biochemist or molecular biologist and she delivered the Merck Millipore Medal Lecture at the ComBio meeting in Canberra
- Prof Filipovska was awarded the Vice-Chancellor's Mid Career Excellence Award
- We have been awarded NHMRC project grant funding to investigate the cause and pathology of mitochondrial diseases



Synthetic Biology and Drug Discovery

Research in this group focuses on re-engineering bacteria and yeast for use as microscopic drug factories. Large, high quality libraries of new drugs are absolutely essential resources to find new medicines. However, their use is restricted to a few pharmaceutical giants. We are engineering cells to make a wide variety of drug-like molecules, providing a unique drug discovery resource accessible to almost any scientific laboratory. As each cell can make a different molecule of interest, billions of different potential drugs could be produced in a single tube. This technology provides an opportunity to put the future of drug discovery in the hands of the wider scientific community and provides new tools for Australian industries. Furthermore, these synthetic biology studies will provide insights into the fundamental biological processes that are essential for all living cells.

Recent findings from this group have produced proteins designed to enable the therapeutic manipulation of mammalian gene expression. These engineered proteins can be made to control the expression of any gene of interest and the lab is now working to target genes that cause cancer and mitochondrial disease.

2014 Highlights

- Our work on making protein machines to control genes was published in Nature Communications.
- We hosted the National Mitochondrial Conference "AussieMit" in collaboration with Professor Filipovska's lab.
- A/Prof Oliver Rackham was awarded the Cancer Council WA Research Fellowship.
- Our work was presented at prestigious international conferences including NanoBio and FEBS-EMBO Paris as invited talks.

Laboratory Head
Associate Professor Oliver Rackham



Tiong Sun Chia, PhD Student
Moira Hibbs, Research Assistant
Chris Kleemann, Work Experience Student
James Lingford, Research Assistant
Anima Poudyal, Research Assistant
Sue Powell, Research Assistant
Doctor Muhammad Fazril bin Mohamad Razif, Visiting Scientist
Louis Scott, PhD Student
Christopher Wallis, PhD Student
Lachlan Wheeler, PhD Student



Targeted drug delivery, imaging and therapy

Laboratory Head
Assistant Professor
Juliana Hamzah



Meenu Chopra, Research Assistant
Jenny Wang, Research Assistant
Yen Ling Yeow, Research Assistant

We focus on developing strategies to specifically target diseases such as cancer and atherosclerosis for diagnostic imaging and local therapeutic interventions.

A major challenge to detect and treat chronic inflammatory diseases such as cancer and atherosclerosis (i.e. hardening of the arteries due to fat accumulation) is to effectively deliver contrast agents and therapeutics into the pathological tissues whilst avoiding off-target binding and consequent cytotoxic effects. Our team focuses on developing tools and strategies to target the microenvironment of cancers (i.e. breast carcinoma, insulinoma and hepatocellular carcinoma) and atherosclerotic plaques for imaging and therapy.

We have recently characterised a number of small molecules (i.e. peptides) that specifically bind to the abnormal cellular and non-cellular components in cancers and atherosclerotic lesions, including blood vessels, macrophages and extracellular matrix. These tumour and plaque –specific peptides can then be used as a drug delivery agent into the pathological tissues.

Using chemical coupling, bioengineering and nanotechnology approaches, we have developed imaging contrast agents and therapeutics fused with these targeting peptides for in vivo applications in pre-clinical models of cancers and atherosclerosis, as well in human cancers and vascular diseases.

2014 Highlights

- We have been awarded NHMRC and Cancer Council WA project grant funding to develop nano-delivery and therapeutic reagents for arterial disease and cancer.
- Jenny Wang (biologist, University of Melbourne) and Meenu Chopra (nanotechnologist/chemist, University of Science and Technology, Haryana, India) have been recruited to join our team.
- We established collaboration with Dr. Farah Abdul Aziz (Director, Breast Centre, Sir Charles Gairdner Hospital) and Dr. Greg Sterrett (PathWest) to investigate the translational application of our reagents in human breast cancer.



Vascular Biology and stromal targeting

The Vascular Biology and Stromal Targeting Laboratory focuses on blood vessels as a crucial component of normal tissue function and in disease. We study the role of blood vessels in cancer, and importantly, design new strategies/drugs to manipulate blood vessels within the cancerous tissue for improved anti-cancer therapy. This treatment also enables better access of immune cells into malignant tissue which is particularly interesting with the arrival of immunotherapy in the clinic. We have developed intellectual property rights on one lead compound in 2014 which opens highly translational opportunities. Ruth Ganss has been awarded the inaugural Cancer Researcher of the Year 2014 Cancer Council WA Award for her novel studies and breakthroughs in the field.

Our laboratory also studies blood vessels and regulatory pathways in other important vascular diseases such as hypertension and pregnancy-related complications, for instance preeclampsia, which manifests in high blood pressure in the mother and placental abnormalities. The cause of these pregnancy complications is so far unknown, but represents a serious health problem for the mother and the child.

2014 Highlights

In 2014, we discovered that pre-existing maternal cardiovascular problems increase the risk for preeclampsia which challenges the current dogma that preeclampsia is caused by poor placentation. In addition, we discovered new regulatory pathways and potential new drug targets for a currently incurable disease which warrants clinical evaluation. In 2014, Ruth Ganss was awarded the UWA Faculty of Medicine, Dentistry and Health Sciences teaching award for "Excellence in Research Supervision". This Award followed NHMRC/fellowship success of early career researchers in the team and demonstrates the lab's strong commitment to mentoring.

Laboratory Head, Scientific
Leader of Perkins Cancer and
Cell Biology Division
Professor Ruth Ganss



Dr. Anna Johansson, Research Associate
Dr. Jacky Li, Research Associate
Dr. Niloufer Johansen,
Research Associate
Dr. Bo He, Research Officer
Dr. Jennifer Burchell, Research Officer
Dr. Vasyl Holobotovskyy, Research
Officer
Mr. Yee Seng Chong, PhD Student
Ms. Devina Lakhiani, Research Assistant





A microscopic image of a kidney glomerulus, showing a dense network of capillaries. The image is overlaid with several white hexagonal outlines. A blue banner is positioned on the right side, and a green hexagon is located in the lower right quadrant.

Cardiovascular, Diabetes and metabolism

“Glomerulus:
one of the filtering
units of the kidney”

by Dr Aron Chakera,
Laboratory of Translational
Renal Research

Diabetes

**Director of Centre for
Diabetes Research**
Professor Grant Morahan



A/Prof Fang-Xu Jiang
Dr Sylvia Young, Research Fellow
Lois Balmer, Senior Research Assistant
Emily Chivers, Student
Mailby De Bastiani, Student
(International)
Jonathan Grasko, PhD student
Emma Jamieson, Research Assistant
Munish Mehta, Senior Bioinformatics
Officer
Quang Nguyen, Research Assistant
Natalia Portini, Student (International)
Ramesh Ram, Research Associate
Lakshini Weerasekera, PhD student
Dr Kevin Li, Research Associate

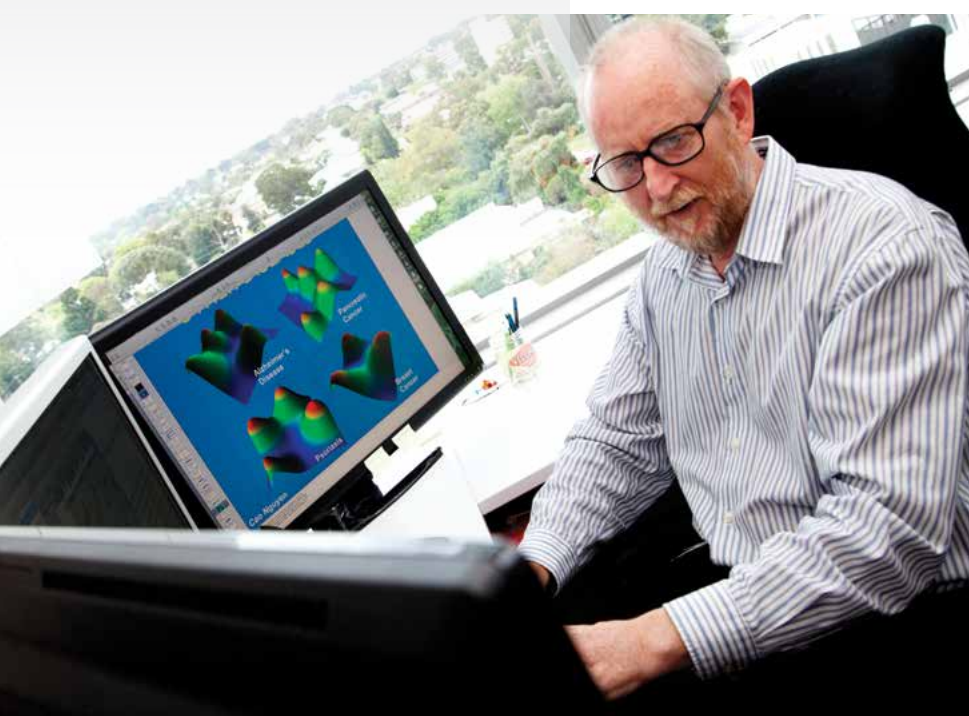
At The Centre for Diabetes Research, our research is aimed at understanding and preventing diabetes and its complications. Diabetes is recognized as a major public health problem and is Australia's fifth "national health priority area". Diabetes is characterized by increased blood sugar levels, and has two major forms: Type 1 diabetes, which results from the person's own immune system destroying the insulin-producing cells; and Type 2 diabetes, which results from the person's growing inability to respond normally to insulin. Both forms of diabetes are caused by complex interactions between many genes and environmental factors. Our particular focus is on the genetics of Type 1 diabetes.

We are developing "systems genetics" technologies, which integrate multiple levels of data with underlying genetic information, allowing the definition of networks of interacting genes. These methods have allowed us to define "genetic signatures" that indicate a person's risk of developing diabetic complications and other disease outcomes.

Our group is part of the world-wide Type 1 Diabetes Genetics Consortium, and led collaborative networks across Australia and the Asia-Pacific region in assembling resources to identify and characterise the genes which affect the risk of developing Type 1 diabetes. We also study animal models of type 2 diabetes and diabetes complications. Our work has resulted in the identification of genes affecting each form of diabetes in both humans and mice. We are now investigating ways that we can restore the ability to produce insulin by developing stem cell treatments.

Finally, we established the world-leading genetic resource, The Gene Mine, which enables rapid discovery of genes for complex traits and development of new animal models of disease. The Gene Mine is particularly useful for making "systems genetics" discoveries.

The Centre for Diabetes Research gratefully acknowledges the support of the Diabetes Research Foundation of WA.



2014 Highlights

- Developed methods to define subtypes of Type 1 diabetes and Type 2 diabetes
- Developed methods to predict a person's risk of disease outcomes, such as surviving melanoma; having a heart attack or stroke; or developing diabetic complications.
- Performed proof-of-principle demonstration that The Gene Mine can provide rapid identification of genes mediating complex traits.

Translational Renal Research

One in six Australians has impaired kidney function, with one in three at risk of developing kidney disease. In most cases kidney disease is asymptomatic until almost all function is lost, making early diagnosis challenging. For people who progress to end stage (more than 2,000 people annually), outcomes are worse than for many cancers.

The Translational Renal Research group is focused on improving outcomes for patients with renal diseases, by translating advances in basic science from the bench to the bedside and developing ways to enhance the care of patients with renal diseases.

Research in the laboratory is looking at the immune system and how it is affected by immunosuppression. As infectious diseases are common problems in renal patients, by studying host responses to pathogens we are defining factors that may predict the likelihood of disease and responses to treatment.

Current areas of interest are:

1. Host responses to common viruses (in particular CMV and BKV) after renal transplantation
2. Interactions between bacteria and peritoneal mesothelial cells
3. The antimicrobial properties of short chain fatty acids

Current clinical projects include:

1. Early treatment of post-transplant diabetes mellitus with DPP-4 inhibitors
2. Economic evaluation of an assisted peritoneal dialysis program
3. The impact of CMV reactivation on clinical outcomes following renal transplantation

2014 Highlights

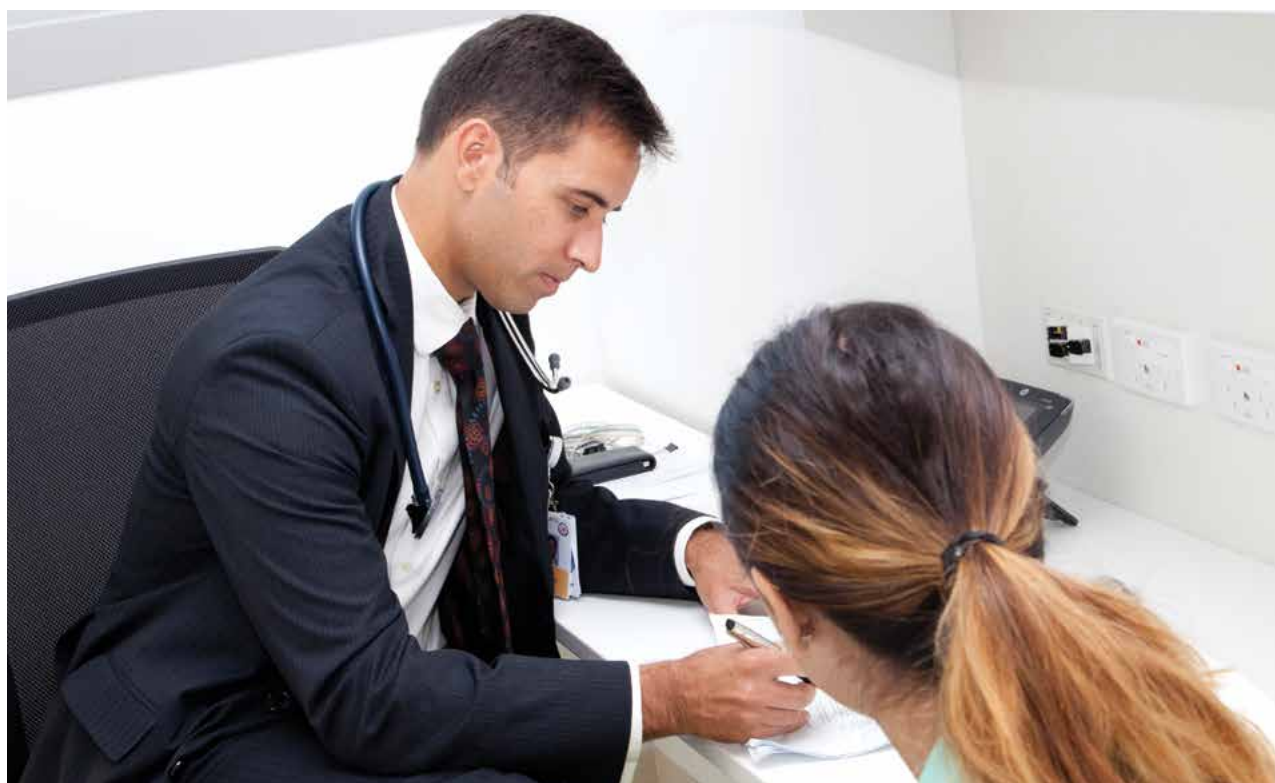
Successful SHRAC funding for the implementation of a pilot assisted peritoneal dialysis program in Western Australia

Funding from the Diabetes Foundation of Western Australia to investigate the utility of DPP4 inhibitors in reducing post-transplant diabetes mellitus

Laboratory Head
Dr Aron Chakera



Christine Carson,
Senior Post-Doc Researcher
Amanda McGuire, Research Officer



Metabolic Dysfunction

Laboratory Head
Assistant Professor
Vance Matthews



Prostate cancer is the most prevalent cancer in men and is a significant burden in Australia and other western countries.

The molecular mechanisms that promote prostate cancer progression remain to be fully investigated.

The metalloproteinase known as ADAM28 was first identified on lymphoid cells. Our collaborator, Yasunori Okada in Japan (Keio University) is an expert in the functionality of ADAM28 and has previously demonstrated that ADAM28 activity plays a critical role in the pathogenesis of breast cancer, head and neck cancer and non-small lung cancer. One of the major substrates of ADAM28 is Insulin-like growth factor binding protein-3 (IGFBP-3). This finding may have major clinical relevance for prostate cancer as IGFBP-3 cleavage may result in liberation of IGF-1 which is a potent growth factor for prostate cancer cells. We are also investigating the role of another metalloproteinase known as ADAM19 in human prostate cancer.

Over nutrition promotes obesity, which greatly increases the risk of type 2 diabetes and cardiovascular disease. It is generally acknowledged that current therapeutic strategies to arrest Type 2 diabetes have failed. It is of prime importance to develop

new human therapeutics to alleviate Type 2 diabetes. Work from our group and others have implicated a number of soluble factors such as the pro-inflammatory cytokine TNF- α in the aetiology of obesity and insulin resistance. Activation of the metalloproteinase tumor necrosis factor- α converting enzyme (TACE) or ADAM17 is critically required for the release of TNF- α into the circulation. Excitingly, we recently gained data implicating a relatively newly discovered metalloproteinase known as ADAM19 in inflammation, obesity and type 2 diabetes. Published studies have highlighted that ADAM19 may cleave TNF- α and alpha-2 macroglobulin which increases the half-life of TNF- α . Our current project aims to determine whether the metalloproteinase ADAM19 may promote inflammation and insulin resistance in vitro and in vivo. Numerous studies have already illustrated that reducing TACE activity effectively reduces obesity induced insulin resistance. Our study will further support that metalloproteinase inhibition is a potential therapeutic target for anti-obesity agents in humans.



Islet Cell Development Program

1. Understand molecular mechanisms by which the insulin-secreting cells become fully functional and matured.
2. Understand molecular mechanisms why the insulin-secreting cells loss function and lead to diabetes
3. Identify regulators that stimulate restore function of failed insulin-secreting cells and therefore may be used to cure diabetes.
4. Establish models that we can use to understand molecular mechanisms of failure of insulin-secreting cells.

2014 Highlights

Our patent application entitled "methods for generation of matured insulin-secreting cells" was submitted for an international examination.

An invited review was published in *Stem Cells & Development* to summarise the state and controversy of pancreatic stem cells (Jiang & Morahan).

- Jiang, F.-X. 2014 Pancreatic Stem Cells: Remaining Unresolved. Kingdom of Saudi Arabia Stem Cells in Science and Medicine Symposium. Riyadh, KSA (Invited keynote speaker)
- Jiang, F.-X. 2014 Generating neurogenin 3-expressing islet progenitors: key towards functional insulin-secreting cells. Kingdom of Saudi Arabia Stem Cells in Science and Medicine Symposium. Riyadh, KSA (Invited keynote speaker)
- Jiang, F.-X. 2014 Generating functional insulin-secreting cells from islet progenitors for a diabetes regenerative therapy. UCL-UWA-HMGU Collaborative Research Network. London, UK (Invited speaker).
- Jiang, F.-X. 2014 Pancreas-specific Deletion of Bmpr1a Impairs glucose homeostasis Linked to Overexpression of Tph1. Australian Diabetes Society Annual Meeting, Melbourne. (Speaker selected from abstracts)
- Jiang, F.-X. 2014 Diabetes regenerative strategies in Perkins UWA. 3rd Shanghai Jiaotong Translational Medicine Symposium. Perth (invited speaker).

Laboratory Head

Associate Professor Fang-Xu Jiang

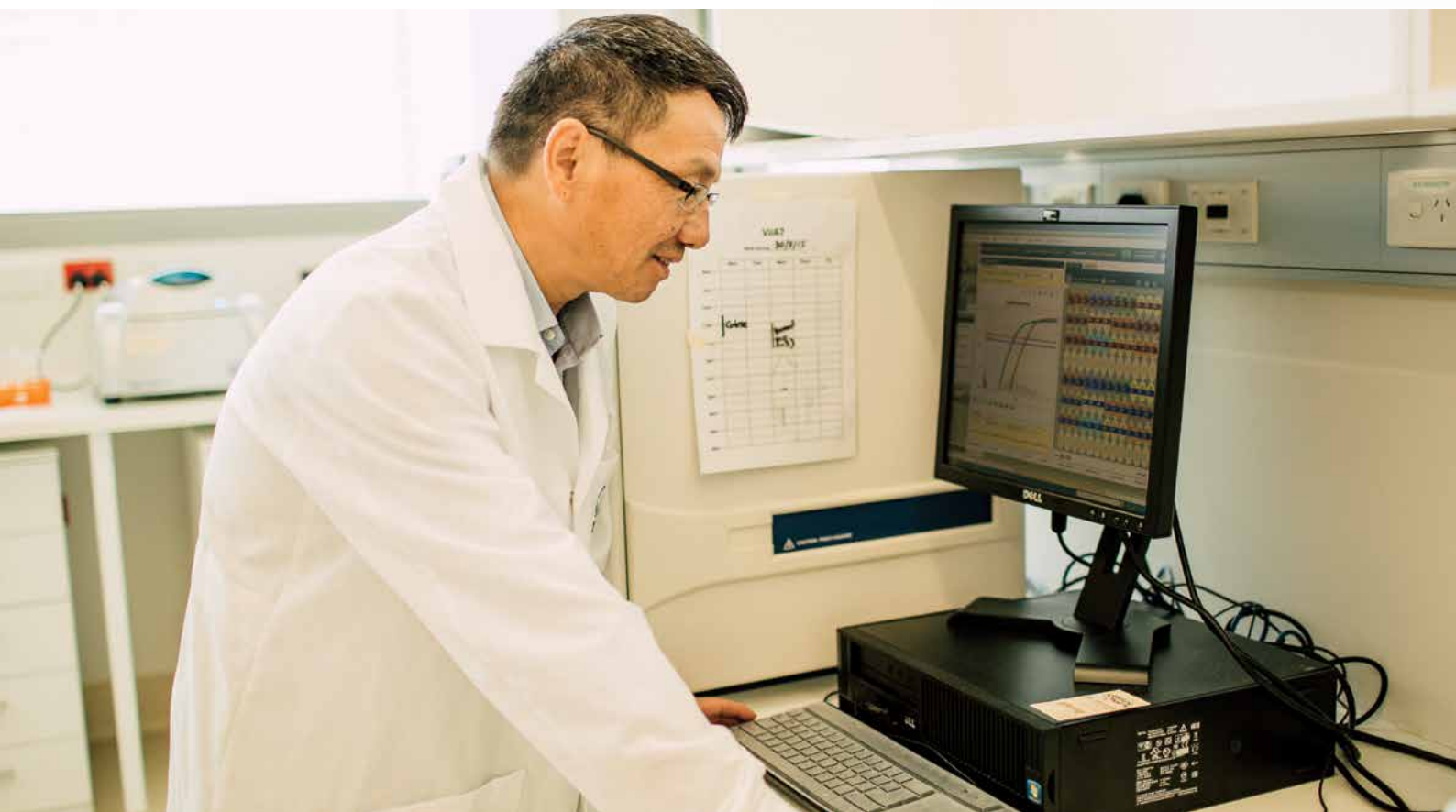


Associate Professor Hongtu Li,
Visiting scientist

Associate Professor Wei Wang,
Visiting scientist

Mr Abrahan John, PhD student

Ms Farhana Ruma, PhD student







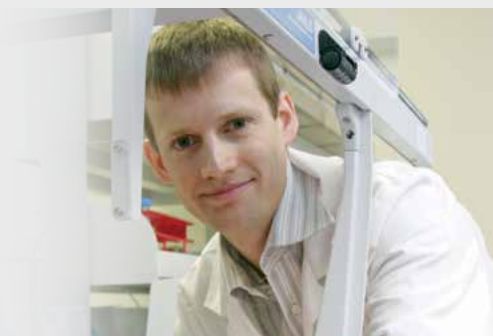
Molecular Medicine and Ageing

"Fetal brain
cells stained in
three colours"

by Associate Professor Julian
Heng, Laboratory for Brain
Growth and Disease

Molecular Endocrinology and Pharmacology

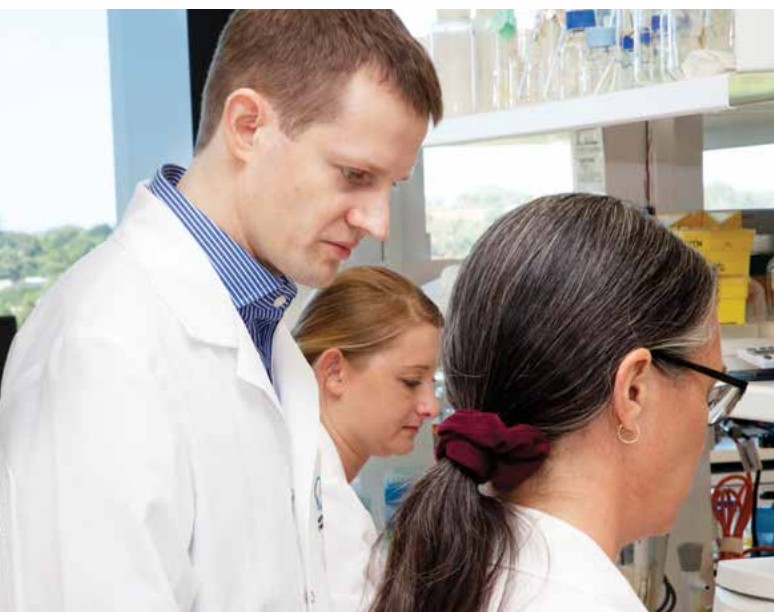
Laboratory Head
Associate Professor Kevin Pflieger



Dr Renae Barr, Research Fellow
Dr Carl White, Research Associate
Ruth Seeber, Research Officer
Heng See, Graduate Research Assistant
Rekhathi Abhayawardana, Graduate Research Assistant
Elizabeth Johnstone, PhD Student
Professor Stephen Hill, Adjunct Professor
Gwen Pflieger, Laboratory Manager

The Laboratory for Molecular Endocrinology and Pharmacology is studying how different molecules, particularly hormones, bind to our cells and transmit distinct signals into them. This communication is absolutely essential for coordination of our cells, tissues and organs. We have known for many years that the 'receptors' for these molecules have evolved to respond with great precision, and consequently, represent exceptional targets for pharmaceuticals. However, we now realise that in addition to precision, receptor combinations (termed 'heteromers') provide enormous potential for signal integration. Could it be that many medication side-effects are due to our lack of understanding this integration? Can we use this knowledge to develop better pharmaceuticals? Our laboratory is developing and successfully applying our world-leading patented technologies to answer these questions, including the Receptor-Heteromer Investigation Technology (Receptor-HIT). This research is being translated through the Perkins spin-out company Dimerix Bioscience Ltd, of which Laboratory Head Associate Professor Kevin Pflieger is Chief Scientific Advisor.

The laboratory published two papers in *Frontiers in Endocrinology* and a third in the *British Journal of Pharmacology* in 2014. Work of the laboratory was presented at conferences and seminars locally, across Australia (Adelaide, Melbourne and Sydney), and internationally (Leicester, Nottingham and London in the UK; Madison, Boston and Houston in the US). Kevin Pflieger was awarded an NHMRC Career Development Fellowship (Level 2), two NHMRC project grants as Chief Investigator B and the prestigious Endocrine Society of Australia Mid-Career Research Award 2014. Dr Carl White was awarded an NHMRC Early Career (CJ Martin) Fellowship, to be supervised by Kevin Pflieger at the Perkins, and globally-recognised pharmacologist Professor Stephen Hill at The University of Nottingham. Professor Hill carried out his sabbatical at the Perkins in 2013-2014 as a Raine Visiting Professor, and has since been appointed as an Adjunct Professor of The University of Western Australia.



Molecular Endocrinology – Cellular Regulation

Steroid Hormone Action, Calcium Receptor and Mutations in Clinical Bone Disease

Professor Tom Ratajczak's team continues to investigate hormone action with a translational bias in several different paradigms including prostate cancer and speech defects, as well as disorders of calcium homeostasis and bone disease. The work presents a great example of clinically relevant "translational bench-to-bedside research" in action.

The Ratajczak lab is credited with the discovery of cyclophilin 40 (CyP40), an estrogen receptor-associated protein involved in modulating steroid receptor function. In recent work by the team, supported by a New Concept Grant from the Prostate Cancer Foundation of Australia, increased expression of CyP40 in androgen receptor-positive prostate cancer cells was shown to upregulate expression of androgen-regulated genes.

In an exciting new development, collaborators at the Melbourne Brain Centre have identified a mutation in the CyP40 (PPID) gene that is strongly associated with a severe speech disorder in a large Australian family. With the support of a grant-in-aid the Ratajczak team has begun investigations aimed at understanding the causal relationship between the mutation and the speech disorder, leading to better treatment outcomes for affected individuals.

The Ratajczak lab continues to characterise new mutations in the calcium receptor that are responsible for gain-of-function and loss-of-function abnormalities. The team provides mutation detection and diagnosis for the State of WA, and is actively working on the functional biology of specific mutations, so that the information gained can be translated back in clinical practice.

The Ratajczak team is also focused on genetic studies of genes involved in the development of Paget's disease of bone (PDB). Paget's disease is a chronic and progressive disorder affecting around 3% of Australians in which bone is excessively remodelled. Mutations in the sequestosome 1 (SQSTM1) gene have been identified and the lab continues to sequence additional patients looking for new mutations. In addition, via one of their collaborators, using genome-wide approaches, they have identified novel proteins associated with PDB (e.g. CSF1, encoding macrophage colony-stimulating factor, M-CSF; NUP205, encoding nucleoporin; TM7SF4, encoding dendritic cell-specific transmembrane protein, DC-STAMP; OPTN, encoding optineurin; RIN3, encoding Ras and Rab interactor 3; PML, encoding promyelocytic leukaemia protein, PML).

Laboratory Head
Professor Tom Ratajczak



Dr Bryan Ward, Research Associate
Sarah Rea, Research Fellow
Carmel Cluning, Research Officer
Melanie Sultana, Research Assistant



Neurogenetic Diseases Group

**Group Leader, NH&MRC
Principal Research Fellow**

Professor Nigel Laing



Dr Kristen Nowak, Deputy Group
Leader, ARC Future Fellow

Dr Gina Ravenscroft, Pathophysiology
Theme Leader, NH&MRC Early Career
Fellow

Dr Rachael Duff, Post-doc

Ms Elyshia McNamara,
Laboratory Manager

Mr Royston Ong, Graduate
Research Assistant

Mr Kyle Yau, PhD Student

Ms Emily Todd, PhD Student

Mr Jordan Boutilier, PhD Student

Dr Macarena Cabrera-Serrano,
PhD Student

Ms Klair Bayley, Masters Student

Ms Sarah Beecroft, Honours Student

The Neurogenetic Diseases Group has five themes to its research:

- 1) Disease gene discovery (finding genes which, when they are mutated, cause genetic diseases.
- 2) Functional genomics (proving that a novel variant in a gene is in fact disease-causing
- 3) Development of therapies for selected neurogenetic diseases.
- 4) Development of better molecular diagnostic tools to provide more patients with a diagnosis
- 5) Research into the prevention of genetic diseases through newborn screening and preconception carrier screening.

The Group had 15 publications in 2014, including two new disease genes LMOD3 and SPEG, which were shown to be associated with severe (including paralysis before birth) congenital myopathies nemaline myopathy and centronuclear myopathy respectively.

In 2014, the Group was awarded the largest Australian National Health and Medical Research Council Project Grant won by a group at the University of Western Australia. The grant, for \$2.4m over the five years 2015-2019, is for the Group's disease gene discovery research. The grant is funding a collaboration between the Perkins Group, the Institute for Neuromuscular Research, Westmead Sydney, Murdoch Children's Research Institute and the Monash University zebrafish facility (both in Melbourne) and the Broad Institute in Boston, one of the world's foremost genomics research institutes.

Professor Laing was awarded the University of Western Australia Vice Chancellor's Senior Research Award and Dr Gianina Ravenscroft a Junior Vice Chancellor's Research Award.

The next generation sequencing diagnostic researched by PhD Student Kyle Yau has now been implemented in the Neurogenetics Unit, PathWest Diagnostic Genomics for over a year and is proving highly successful. This has reinforced the Neurogenetics Unit as the National Referral Centre for Neuromuscular molecular diagnostics.

Members of the Group gave overseas invited presentations in Heidelberg, Germany, Nice in France, Shenzhen in China and many of the Group presented at the World Muscle Society Annual Congress in Berlin.



Brain Growth and Disease

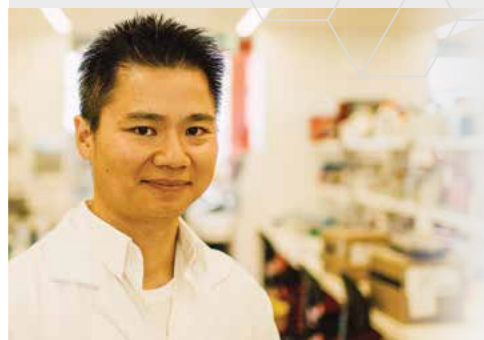
In August 2014, Associate Professor Julian Heng established the Brain Growth and Disease Laboratory at the Perkins. The goal of his research is to understand the genetic causes of childhood brain disorders such as intellectual disability, epilepsy and autism spectrum disorder. This work will enable health practitioners and clinicians to improve the diagnosis and treatment of children with these conditions.

Associate Professor Julian Heng is a former Science graduate of the University of Western Australia, and has trained all over the world to develop novel experimental approaches to investigate the fundamental basis of brain development and disease. In 2014, his research on the functions for a novel brain disease-causing gene in humans (Ngo et al, Human Molecular Genetics, 2014) was the focus of media attention by the Guardian (UK) and the Herald Sun (Melbourne, Australia). Associate Professor Heng is working with local, National and International researchers to define the genetics of brain development, with a long-term goal to identify the key molecular mechanisms which underpin the formation of brain circuits as well as their functionality.

2014 Highlights

2014: Travelling Fellowship, Asian Pacific Society for Neurochemistry, Taiwan.

Laboratory Head
Associate Professor Julian Heng



Linh Ngo, Graduate Research Assistant
Hayley Cullen, Graduate Research Assistant
Isabel Hemming, Summer Vacation Student





Perkins
HARRY PERKINS INSTITUTE
OF MEDICAL RESEARCH



Research Centres

“Heart colony
of melanoma
cells”

by Rikki Brown,
Kirkbride Melanoma
Centre

Kirkbride Melanoma Centre

(formerly Scott Kirkbride Melanoma Centre, SKMRC)

The Kirkbride Melanoma was established following the death of Scott Kirkbride, whose life was cut short by melanoma when he was just 27 years old.

Kirkbride Melanoma Centre Committee

Mr Graeme Morgan, Chairman
Mrs Yvonne Kirkbride
Mr Nick Kirkbride
Professor Peter Leedman,
Medical Director
Professor Peter Klinken
Mr Rob Scott
Professor John Thompson
Mr Peter Toll
Mr Grant Vernon

Scientific Advisory Committee

Professor Nick Hayward
Professor Graham Mann
Professor Grant McArthur

2014 Highlights

New Look Kirkbride

December 2014 saw the launch of the SKMRC branding makeover, which included a new name and refreshed logo.



Melanoma Research

- The Kirkbride Centre opened applications in 2014 for the inaugural Kirkbride Professor of Melanoma Research.
- During the year, the Kirkbride Centre maintained its translational research projects linked to a microRNA molecule known as miR-7. The molecule shows great potential as a treatment to stop melanoma spreading as it is able to reduce the processes that promote the growth of melanoma. Research investigating predictors of a patient's response to therapies and disease recurrence also continued.

Discovery Grants Program

- The Kirkbride Melanoma Centre established Discovery 'Priming' Grants for basic melanoma research five years ago. To strengthen the work being undertaken, the Suncorp Melanoma Research Discovery Grant program commenced in 2011. Both programs provided \$75,000 annually for research projects, with the aim of generating suitable preliminary data to support future grant applications to national funding bodies such as the National Health and Medical Research Council (NHMRC.)
- The success of the grants programs has been demonstrated by all recipients publishing melanoma research findings, answering some of the complex questions about this disease.



2014 Discovery Grants recipients:

- **Dr Keith Giles, Rikki Brown and Professor Peter Leedman (Harry Perkins Institute of Medical Research)**

"A new approach to preventing the spread of melanoma: Evaluation of a new microRNA-based approach to block melanoma metastasis", which aimed to identify whether this microRNA molecule is a potential treatment for metastatic melanoma.

- **Professor Prue Hart and Dr Shelley Gorman (Telethon Kids Institute)**

"How sun exposure links with melanoma initiation and progression: A novel immune component of the susceptibility formula for melanoma", which aimed to elucidate the sunlight-initiated process whereby immune cells in the bone marrow are altered and become less competent in recognising and destroying melanoma.

Western Australian Melanoma Health Study (WAMHS)

This study was established by the Kirkbride Centre 2006 and aimed to invite all patients in Western Australia who had been diagnosed with invasive melanoma to participate. Blood samples, histo-pathology data and information on exposure and other risk factors were collected from 1643 consenting patients to form an extensive population-based database and linked bio-specimen resource. This resource has been used widely by melanoma researchers around Australia resulting in several significant journal publications. The study is due to reopen in late 2015.

National Melanoma Conference

After the success of Australia's inaugural national melanoma conference, which was hosted in Perth by the Kirkbride Melanoma Centre in 2012, the centre ran a second national conference in 2014. The conference, held on the 10th and 11th October, presented scientific information about developments in melanoma research such as recent breakthroughs as well as challenges in the detection and treatment of melanoma.

The National Melanoma Conferences have provided a high benchmark for future meetings and have been accepted wholeheartedly by the melanoma community as an event to attend on the biennial meeting calendar.

Melanoma Community Breakfast 2014

As part of the 2nd National Melanoma Conference in October 2014, the Kirkbride Melanoma Centre, in conjunction with melanoma WA, hosted a forum for the general public. The informal session provided an opportunity for guests to speak to distinguished melanoma experts from around Australia and the USA. Discussions included the latest treatments, new research, clinical trials and the importance of support networks.

Annual Community Forum

Every year, for the benefit of the community, the Kirkbride Centre hosts an informative and interactive forum presented by a specialist in melanoma. On 26th March 2014 Dr Mark Shackleton, Head of the Melanoma Research Laboratory at the Peter MacCallum Cancer Centre in Melbourne, spoke about the need for investment in basic research as it is an area that provides quantum leaps in treatments for patients. He also discussed the new immune therapies soon to be reported and the critical importance of continuing research into this aggressive cancer.

The mission of the Kirkbride Centre is to establish Western Australia as a world leader in basic and clinical melanoma research by providing crucial breakthroughs for improved diagnosis and treatment of melanoma.



Centre for Clinical Research in Emergency Medicine

Professor Simon Brown
 Professor Daniel Fatovich
 A/Professor Glenn Arendts
 A/Professor Shelley Stone
 A/Professor Stephen MacDonald
 Professor Yusuf Nagree
 Miss Abbie Creamer, PhD student
 Dr Lisa Stone, PhD student

The Centre for Clinical Research in Emergency Medicine (CCREM) is a unique unit established at Royal Perth Hospital, Perth, Western Australia that brings together clinical staff working in the Emergency Department (ED) and laboratory scientists using immunological and molecular biological techniques. CCREM investigates a number of conditions within the spectrum of disease treated in Emergency Departments.

2014 was notable for the continued success of the pneumothorax study – an international multicentre clinical trial, coordinated by CCREM, of interventional vs conservative management of primary spontaneous pneumothorax. This study was successful in obtaining NHMRC funding and recruitment has now passed the halfway mark to the target sample size.

Previous work by CCREM was acknowledged by two awards at the annual scientific meeting of the Australasian College for Emergency Medicine: the John Gilroy Potts Award (best paper published in emergency medicine) for our anaphylaxis paper published in the Journal of Allergy and Clinical Immunology; and the Emergency Care Institute best paper on best practice pain management in the Emergency Department.

Sepsis and critical illness continues to be a focus of CCREM. Our Critical Illness and Shock study has enrolled over 1000 patients. We now have a rich cohort of samples for study. This led to A/Prof Stephen Macdonald being successful in being awarded the inaugural New Investigator Grant from the Australasian College for Emergency Medicine Research Foundation, to examine sepsis biomarkers. This is also invaluable for our new PhD student.

CCREM continues to pursue extensive clinical collaborations. A/Prof Glenn Arendts is leading our work in the study of geriatric syndromes, especially admission avoidance for elderly patients and others with complex needs. Prof Yusuf Nagree continues his work investigating chest pain in the Emergency Department.



Neurotrauma Research Program

- The Neurotrauma Research Program (NRP) supports scientific and clinical research projects which are aimed at improving functional recovery from injuries to the central nervous system (neurotrauma), as well as projects that help the community avoid trauma to the nervous system from road accidents.
- The NRP receives funding from the Road Safety Council and private donations, and has supported scientists in Western Australia to become prominent internationally in the field of neurotrauma research. We support and bring together basic scientists and clinicians in collaborative research programs that are improving the lives of people affected by neurotrauma in Western Australia.
- This year has seen further very successful outcomes from NRP funded research projects, and Western Australia continues to be a significant contributor to global neurotrauma research. A/Professor Bruno Meloni has found that certain peptides administered to rats can reduce brain damage after a stroke, and future studies will move towards clinical trials. The incidence of stroke in our community is increasing, and this is a significant breakthrough as there are currently no neuroprotective treatments available.
- Professor Dunlop's team have received funding to join an Australia-wide trial looking at hypothermia and decompression surgery to improve outcomes following spinal cord injury. This project has the potential to reduce the number of people in Australia who face a future of permanent paralysis.
- A major cause of brain and spinal injury is road trauma, modifying driver behaviour is an important tool in reducing the incidence of neurotrauma. A/Professor Troy Visser has received funding to develop simulated driving programs for younger and older drivers which improve alertness and reduce response to distractions.
- The NRP also recognises the importance of training our next generation of neuroscientists, and we have supported several PhD students during 2014. The NRP provides travel bursaries for students to attend the Australasian Neuroscience Society (ANS) annual scientific meeting, as well as funding prizes for young researchers presenting at the Symposium for Western Australian Neurosciences.

Chairman
Professor Bryant Stokes

Executive Committee:
Professor Peter Leedman,
Professor Barry Marshall,
the Hon Liz Behjat MLC,
Mr Peter Sarich, Mr Anton Zappelli.

2014 Executive Officers:
Ms Louise Goodes,
Ms Vidya Findlay



Our vision is that through promoting excellence in neurotrauma research, nobody will have to live with permanent disability from traumatic brain or spinal cord injury.

Western Australian Centre for Health and Ageing

Better health in mid-life and beyond

The Western Australian Centre for Health and Ageing (WACHA) is dedicated to improving health in mid-life and beyond. Our research focuses on finding new treatments, to prevent disease and discovering cures for disabling diseases such as, dementia, depression and frailty.

2014 Research Highlights

- The development of a culturally acceptable depression screening tool for remote living Indigenous Australians. This tool has been instrumental in improving the lives and health of older Indigenous Australians and has been pivotal in bringing about a positive change. As with our dementia screening tool, the Kimberley Indigenous Cognitive Assessment (KICA) designed at the Centre, there has been huge interest in this research, internationally and around Australia.
- Research has confirmed that people with a severe mental disorder who reach older age have a lower life expectancy compared to their peers. These results demonstrate that it is never too late to intervene. Intervening at this late stage of life would make a marked difference to the quality of life of people living with mental illness and would decrease the long term costs associated with their medical care.
- Improving current anti-depressant medication treatment, by supplementing medication with B vitamins improves response to treatment. Our researchers have proven that using vitamin B12 and folate every day for at least a year, can enhance the effectiveness of anti-depressant treatment, and helps prevent relapse of major depression in middle-aged and older adults

A large group of older men have been helping our research unlock the secrets on how to live to a ripe old age and along the way are challenging long-held beliefs about ageing. This group of Western Australian men have periodically shared their health statistics, blood

samples and health checks, with our researcher for over nineteen years. In 1996, 12,000 men aged between 65 -80 years were recruited from the electoral roll to join this landmark study. Over the years many important findings have come from combining the data with data from the WA data linkage system. Some of the findings of 2014 include:

- Biomarkers have been identified that make some people more vulnerable to depression as they age. This is an important finding as medical professionals might be able to do things to address this.
- They found that physical activity was another way to reduce the risk of depression. Older adults who were physically active not only have a lower risk of dying over time but they have a lower risk of depression and better quality of life. Men who became active during the Health in Men study reaped the rewards, indicating that it is never too late to start. Similar associations were also found between physical activity and cognitive function.

Our researchers are also looking at ways to postpone further memory decline in people living with Alzheimer's disease, through cognitive exercise and physical activity. We expect to release some preliminary data next year.

Older adults benefit from medication de-prescription. Our researchers have proved the idea that withdrawal from one selected drug over a two month period has improved the health and quality of life of older adults. Our researchers are now running a large randomised control trial, across 2 states, to examine the effects of measured medication withdrawal in frail people who reside in residential care facilities.

Awards

- Our research director and leading psychiatrist in old age, Professor Osvaldo Almeida has been recognised for his research excellence with a prestigious Royal Australian and New Zealand College of Psychiatrists Senior Research Award. This is only the second time a Western Australian has received the award, in the awards 35 year history.
- Professor Osvaldo Almeida was also awarded the Mental Health Commission's GESB Award for his contribution to improving outcomes in Seniors Mental Health.
- Up-and-coming Indigenous health and ageing research Ms Roslyn Malay was awarded the Australian Association of Gerontology WA bursary to attend the AAG conference in Adelaide. She is a member of the Aboriginal and Torres Strait Islander Ageing Advisory Group and looks forward to making a bigger impact on improving the lives of older Indigenous people who live in remote areas of Australia, in particular the Kimberley.



Professor Osvaldo Almeida,
Research Director WACHA and
Chair of Geriatric Psychiatry, UWA



Professor Leon Flicker, WACHA
Director and Chair of Geriatric
Medicine, UWA



Research fellow,
Dr Zoë Hyde



Research Facilities

“Vascular
networks in
pancreatic
tumours”

by Dr Anna Johansson,
Laboratory of Vascular
Biology and stromal
targeting

Linear Clinical Research

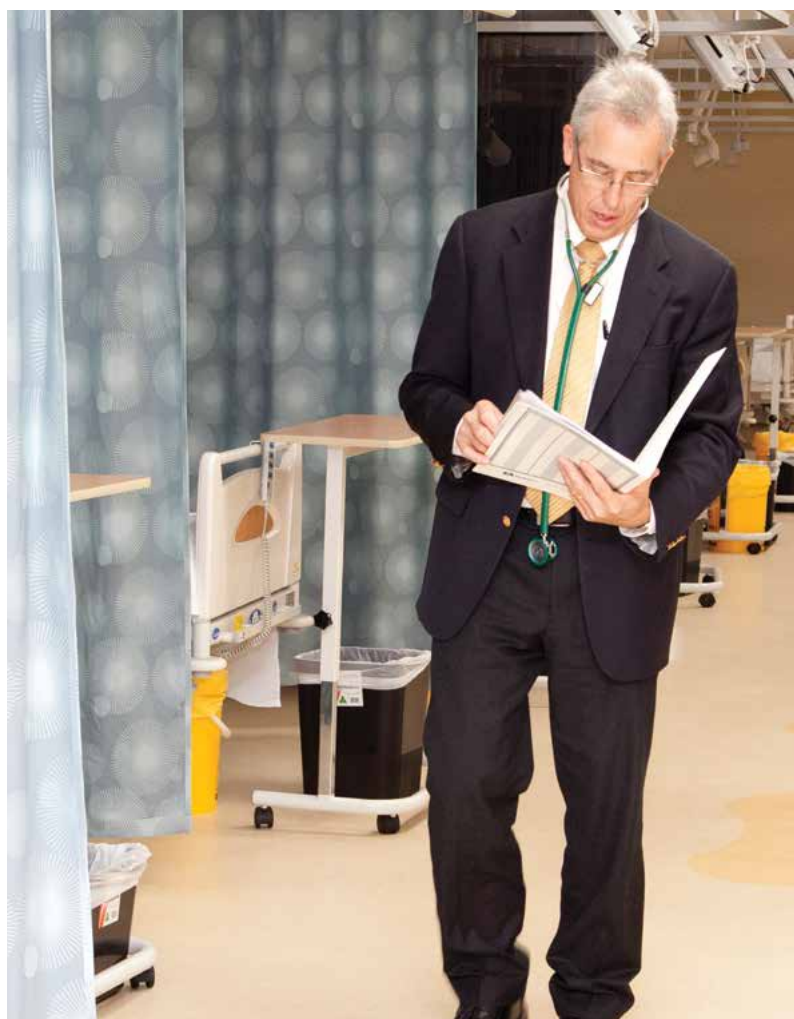
Linear Clinical Research Ltd is the Perkins' award-winning flagship in translational clinical research. Linear has completed almost 100 studies, and in 2014 was very active, the unit being full virtually all of the time.

2014 Highlights

- 23 new clinical trials commenced in 2014
- Over 500 healthy volunteers and over 100 patients enrolled in clinical trials across 10 different therapeutic areas
- Winner of WA Industry & Export Award – Healthcare and Biotechnology (2013 & 2014)
- Linear strengthened its position in the Asian market by conducting its foremost "First Time in Human" Phase 1 Study for both a Japanese and Chinese Sponsor.
- Reached 35 full time employees.

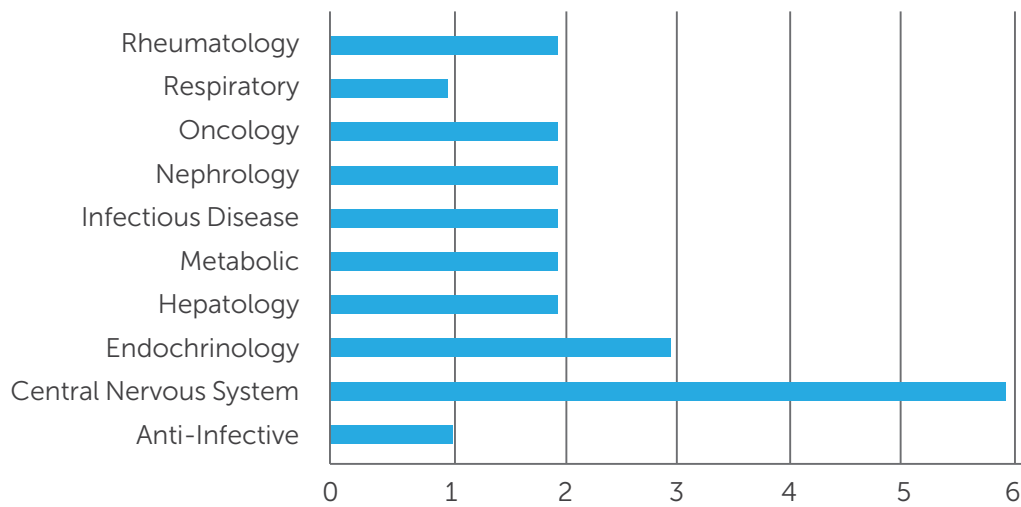


CEO of Linear Clinical Research
Dr Janakan Krishnarajah

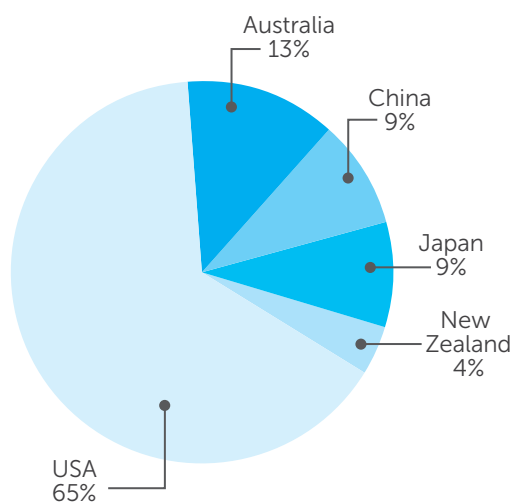


Chairman of the Board of Linear Clinical Research
Professor Peter Leedman

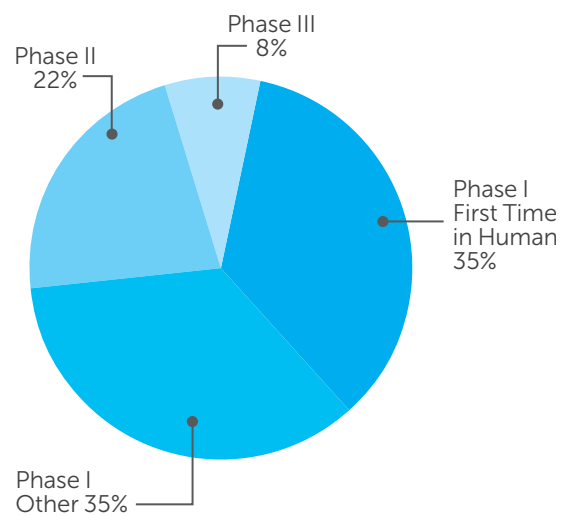
Therapeutic Area



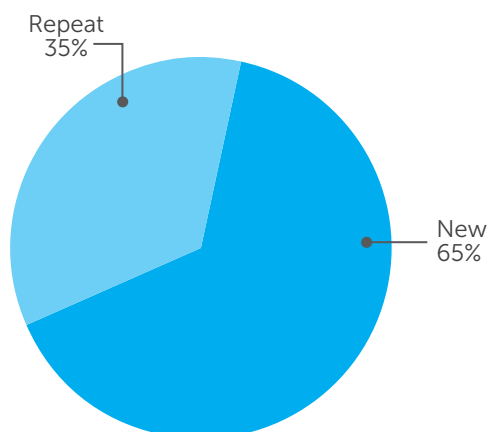
Sponsor Origin



Study Phase



Client Type



Monoclonal Antibody Facility

Laboratory Head
Kathleen Davern



Pauline Van Eeden, Laboratory Services Manager
Jessica Lonsdale, Research Assistant
Victor Last, Technical Assistant
Annette Thompson, Technical Assistant
Michael Bradley, Technical Assistant
Rod Quinn, Research Support

Led by Kathy Davern the Institute's monoclonal antibody facility provides a service for Researchers, Clinicians, and Commercial groups across the nation and overseas.

The Facility generates top-class serum-based products, including novel antivenom agents and multiple monoclonal antibodies for use in a variety of clinical and preclinical arenas.

The Davern lab continues to generate multiple antibodies during 2014, to a range of target antigens including human Hepatitis C virus, mesothelioma, human carcinomas, and molecules involved in muscular dystrophies, taste, cancers, diabetes and lung disease.



Australian Cancer Research Foundation Cancer Imaging Facility

WA's ground breaking state facility

In 2014, the Perkins established a high end preclinical imaging facility (the ACRF Cancer Imaging Facility, CIF) at its main headquarters on the QEII Medical Centre campus at Nedlands. This preclinical equipment is essential in the fight against human cancer, by helping experts in the field move towards earlier disease detection, prevention strategies and assessment of the efficacy of new cancer treatments.

The preclinical MRI, PET/CT and SPECT/CT scanners in the CIF are non-invasive, high resolution monitoring tools that are smaller versions of human imaging equipment, allowing researchers to examine tumour development in pre-clinical models of cancer and determine effective forms of treatment.

Investigating tumours in these models is a critical bridge between discoveries in the laboratory and the development of therapeutics to treat cancer patients.

The ACRF Cancer Imaging Facility at the Perkins offers unparalleled access to an imaging platform unsurpassed in Australia. Importantly, researchers in WA now have the capacity for longitudinal studies in preclinical models previously not possible. With the ability to undertake research on a par with our European counterparts, supported by a professional team of clinical and bio-resource experts we are well placed to drive ground breaking cancer research.

- The Australian Cancer Research Foundation funded State Cancer Imaging Facility was fully operative in its temporary home in B Block, QEII MC from January to October 2014, when it closed to move to its new state-of-the-art purpose built premises within the Perkins Bioresources unit.
- Imaging technologists from Nuclear Medicine and Radiology were appointed on a part-time basis to establish the facility, and ensure the machines were fully commissioned and functional. The Facility comprises a suite of cutting edge technologies unique within Australia.
- The Facility will allow sophisticated imaging to be performed for the first time in WA, and will provide a major advance for translational research in the State. World-class images from several projects have already been acquired.
- Some of the early work has focused on mesothelioma. The outcome of this work has been to fast-track the translation of basic research in this area into clinical models of disease.
- The ACRF CIF imaging staff last week completed some advanced imaging applications in PET and MRI on site with the imaging specialist from France.





A microscopic image of a plant structure, likely a flower or seed head, showing intricate details of its internal components. The structure is primarily white and light brown, with prominent blue and purple mineral crystals visible along the central axis and at the base of the structure. The image is overlaid with a hexagonal grid pattern.

Community Engagement

Image by a student
visiting the Lotterywest
BioDiscovery Centre,
showing mineral crystals
under the
microscope.



Exhibition areas at the Perkins

Welcoming the community

Most Western Australians have been touched by at least one of the serious diseases afflicting the community; cancers, diabetes, heart disease and stroke. However, few understand how the mutations in genes cause these diseases.

The Harry Perkins Institute of Medical Research aims to demystify medical research by demonstrating to members of the community how our talented scientists are working to prevent, treat and cure diseases.

Community engagement programs allow visitors to experience science through customised programs in a purpose-built laboratory setting, using high-tech equipment and guided by real medical researchers.

The centre uses a variety of strategies to engage visitors, including guided tours of the facility, presentations by renowned Perkins researchers and practical workshops. Colourful exhibition spaces were designed by Freeman Ryan Design and funded by Lotterywest.

A tour of the building's exhibition spaces offers a visual history of medical research, from the discovery of penicillin to a chronicle of Australian Nobel Prize Laureates.

Three 4-metre tall double-sided LED banners display colourful microscopic cell images with an accompanying interactive iPad app describing the research involved in creating the image.

Two huge, male and female MRI scans are on display in the foyer, with two LCD monitors moving across the scans and stopping on sections of the body to describe related research.

There are also public seminars held in the evenings and meeting rooms which can be hired by the community include the 250 seat McCusker Auditorium, a 100 seat seminar room and a 70 seat Lotterywest Community Resource room.

Customised programs were developed for the following groups in 2014:

- Community groups (eg. Lions, Probus)
- Participants from local major fundraising events, the Ride to Conquer Cancer and the Weekend to End Women's Cancers
- Corporate groups for team building research-based activities
- Secondary school students



Three 4-metre tall double-sided LED banners display colourful microscopic cell images with an accompanying interactive iPad app describing the research involved in creating the image.

Lotterywest BioDiscovery Centre

The new Lotterywest BioDiscovery Centre at the Harry Perkins Institute of Medical Research is successfully increasing community awareness about the importance of medical research.

With the vision to develop and enhance health literacy in the Western Australian community, the Centre provides hands-on interactive experiences. The activities explore the intricacies of our most challenging human diseases such as cancer, diabetes, cardiovascular and neuromuscular diseases.

The Lotterywest BioDiscovery Centre Manager, Pauline Charman, has recruited a dynamic team of talented medical researchers, including Honours and PhD students from within the Harry Perkins Institute of Medical Research to help visitors with activities that are run in both a "wet lab" laboratory environment and a "dry lab" Community Resources Room.

Customised programs have been developed for the following groups.

1. Community groups (eg. Rotary, Lions, Probus)
2. Participants from local major fundraising events, the Ride to Conquer Cancer and the Weekend to End Women's Cancers
3. Corporate groups for team building research-based activities
4. Upper primary and secondary science students

Visitors to the laboratory are immersed in a fully interactive experience, which reveal how our scientists work with molecules that aren't visible to the naked eye. This includes being taught how to extract DNA, look at cells under a microscope and use the technical tools of a medical research scientist.

The 'Next Gen' School program is linked to the new Australian Curriculum requirements.

These high-tech activities are designed to illustrate and provide real life applications of new science content that cannot be duplicated in a classroom. School students from rural and metropolitan WA have experienced the latest biotechnology including techniques to amplify genes, staining and imaging cancer cells under the guidance of scientists. The use of iPads to document aspects of the activities in an e-journal was also a feature, including streaming images to the iPad from a specialist microscope.

A specialist STEM (Science, Technology, Engineering and Mathematics) focused course known as 'Perkins Profs Academy' offers a special medical research framework for bright science/maths students.

Visitors to the PC2 laboratory use advanced technology not available for public use anywhere else in Western Australia.





Lotterywest
**BioDiscovery
Centre**



Scientific Publications

Authors

Macdonald, S.P.J., Stone, S.F., Neil, C.L., Van Eeden, P.E., Fatovich, D.M., Arendts, G., Brown, S.G.A.
Boyle, T., Fritschi, L., Tabatabaei, S.M., Ringwald, K., Heyworth, J.S.
Li Kwok Cheong, J.D., Croft, K.D., Henry, P.D., Matthews, V., Hodgson, J.M., Ward, N.C.
Stasinska, A., Heyworth, J., Reid, A., Callan, A., Odland, J.T., Trong Duong, P., Van Ho, Q., Hinwood, A.
Mooranian, A., Negruj, R., Chen-Tan, N., Al-Sallami, H.S., Fang, Z., Mukkur, T.K., Mikov, M., Golocorbin-Kon, S., Fakhoury, M., Watts, G.F., Matthews, V., Arfuso, F., Al-Salami, H.
Fisher, S.A., Cleaver, A., Lakhiani, D.D., Khong, A., Connor, T., Wylie, B., Lesterhuis, W.J., Robinson, B.W.S., Lake, R.A.
Mooranian, A., Negruj, R., Al-Sallami, H.S., Fang, Z., Mikov, M., Golocorbin-Kon, S., Fakhoury, M., Watts, G.F., Matthews, V., Arfuso, F., Lambros, A., Al-Salami, H.
Robinson, C., Alfonso, H., Woo, S., Olsen, N., (Bill) Musk, A.W., Robinson, B.W.S., Nowak, A.K., Lake, R.A.
Fox, A.H.
Gunawardena, D., Tresham, J., Hardie, M., Phillips, M., Wylie, E.
Agrawal, P.B., Pierson, C.R., Joshi, M., Liu, X., Ravenscroft, G., Moghadaszadeh, B., Talabere, T., Viola, M., Swanson, L.C., Haliloğlu, G., Talim, B., Yau, K.S., Allcock, R.J.N., Laing, N.G., Perrella, M.A., Beggs, A.H.
Robinson, C., Alfonso, H., Woo, S., Walsh, A., Olsen, N., Musk, A.W., Robinson, B.W.S., Nowak, A.K., Lake, R.A.
Garg, A., O'Rourke, J., Long, C., Doering, J., Ravenscroft, G., Bezprozvannaya, S., Nelson, B.R., Beetz, N., Li, L., Chen, S., Laing, N.G., Grange, R.W., Bassel-Duby, R., Olson, E.N.
Brown, S.A.
Viola, H.M., Adams, A.M., Davies, S.M.K., Fletcher, S., Filipovska, A., Hool, L.C.
Liu, P.Y., Erriquez, D., Marshall, G.M., Tee, A.E., Polly, P., Wong, M., Liu, B., Bell, J.L., Zhang, X.D., Milazzo, G., Cheung, B.B., Fox, A., Swarbrick, A., Hüttelmaier, S., Kavallaris, M., Perini, G., Mattick, J.S., Dinger, M.E., Liu, T.
Mullins, R.J., Brown, S.G.A.
McQualter, J.L., Anthony, D., Bozinovski, S., Pre [†] le, C.M., Laurent, G.J.
Isbister, G.K., Page, C.B., Buckley, N.A., Fatovich, D.M., Pascu, O., MacDonald, S.P.J., Calver, L.A., Brown, S.G.A.
Stone, S.F., Bosco, A., Jones, A., Cotterell, C.L., Van Eeden, P.E., Arendts, G., Fatovich, D.M., Brown, S.G.A.
Kalinowski, F.C., Brown, R.A.M., Ganda, C., Giles, K.M., Epis, M.R., Horsham, J., Leedman, P.J.
Finsterer, J., Stöhlberger, C., Brandau, O., Laccone, F., Bichler, K., Laing, N.G.
Finch, M.L., Marquardt, J.U., Yeoh, G.C., Callus, B.A.
Sim, M., Dawson, B., Landers, G.J., Swinkels, D.W., Tjalsma, H., Wiegerinck, E.T., Trinder, D., Peeling, P.
Lesterhuis, W.J., Bosco, A., Lake, R.A.
Goh, L.G.H., Dhaliwal, S.S., Welborn, T.A., Thompson, P.L., Maycock, B.R., Kerr, D.A., Lee, A.H., Bertolatti, D., Clark, K.M., Naheed, R., Coorey, R., Della, P.R.
Needham, M., White, R.B., Giles, K.M., Dunlop, S.A., Thomas, M.G.
Lynch, B.M., Boyle, T.
Daly, A., Pollard, C.M., Phillips, M., Binns, C.W.
Humbert, C., Silbermann, F., Morar, B., Parisot, M., Zarhrate, M., Masson, C., Tores, F., Blanchet, P., Perez, M.-J., Petrov, Y., Khau Van Kien, P., Roume, J., Leroy, B., Gribouval, O., Kalaydjieva, L., Heidet, L., Salomon, R., Antignac, C., Benmerah, A., Saunier, S., Jeanpierre, C.
North, K.N., Wang, C.H., Clarke, N., Jungbluth, H., Vainzof, M., Dowling, J.J., Amburgey, K., Quijano-Roy, S., Beggs, A.H., Sewry, C., Laing, N.G., Bönnemann, C.G., Aloysius, A., Apkon, S., Bellini, J., Bertini, E., Biancalana, V., Birnkrant, D., Bushby, K., Connolly, A.M., Estournet-Mathiaud, B., Ferreira, A., Fitzgerald, D., Florence, J.M., Richard Gee, P.T., Giannetti, J.G., Glanzman, A., Goebel, H., Guillet, M., Hofmeister, B., Labelit, S., Laporte, J., Little, D., Kemp, J., Koumbourlis, A.C., Main, M., Matthews, D., Morrison, L.A., Munns, C., Muntoni, F., Navarro, C., Panitch, H., Pelin, K., Rose, K., Santiago, M.T., Schroth, M.K., Sejersen, T., Simonds, A., da Silva, H.C., Rinsky, L., Romero, N., Schochet, P., Schuler, P.M., Shapiro, F., Storhaug, K., Wallgren-Pettersson, C., Wallis, C., Weiss, H., Yuan, N.
Robinson, C., Alfonso, H., Woo, S., Olsen, N., Musk, A.W.B., Robinson, B.W.S., Nowak, A.K., Lake, R.A.
Campbell, N.R.C., Appel, L.J., Cappuccino, F.P., Correa-Rotter, R., Hankey, G.J., Lackland, D.T., Macgregor, G., Neal, B., Niebylski, M.L., Webster, J., Willis, K.J., Woodward, M.
Richman, T.R., Rackham, O., Filipovska, A.
Slavova-Azmanova, N.S., Kucera, N., Louw, A., Satiaputra, J., Handoko, A., Singer, P., Stone, L., McCarthy, D.J., Klinken, S.P., Hibbs, M.L., Ingleby, E.
Goode, A., Long, J.E., Shaw, B., Ralston, S.H., Visconti, M.R., Gianfrancesco, F., Esposito, T., Gennari, L., Merlotti, D., Rendina, D., Rea, S.L., Sultana, M., Searle, M.S., Layfield, R.
Hankey, G.J., Stevens, S.R., Piccini, J.P., Lokhnygina, Y., Mahaffey, K.W., Halperin, J.L., Patel, M.R., Breithardt, G., Singer, D.E., Becker, R.C., Berkowitz, S.D., Paolini, J.F., Nessel, C.C., Hacke, W., Fox, K.A.A., Califf, R.M.
Yuen, M., Sandaradura, S.A., Dowling, J.J., Kostyukova, A.S., Moroz, N., Quinlan, K.G., Lehtokari, V.-L., Ravenscroft, G., Todd, E.J., Ceyhan-Birsoy, O., Gokhin, D.S., Maluenda, J., Lek, M., Nolent, F., Pappas, C.T., Novak, S.M., D'Amico, A., Malfatti, E., Thomas, B.P., Gabriel, S.B., Gupta, N., Daly, M.J., Ilkovski, B., Houweling, P.J., Davidson, A.E., Swanson, L.C., Brownstein, C.A., Gupta, V.A., Medne, L., Shannon, P., Martin, N., Bick, D.P., Flisberg, A., Holmberg, E., Van Den Bergh, P., Lapunzina, P., Waddell, L.B., Sloboda, D.D., Bertini, E., Chitayat, D., Telfer, W.R., Laquerrière, A., Gregorio, C.C., Ottenheijm, C.A.C., Bönnemann, C.G., Pelin, K., Beggs, A.H., Hayashi, Y.K., Romero, N.B., Laing, N.G., Nishino, I., Wallgren-Pettersson, C., Melki, J., Fowler, V.M., MacArthur, D.G., North, K.N., Clarke, N.F.
MacTiernan, A., Fritschi, L., Slevin, T., Jalleh, G., Donovan, R., Heyworth, J.
Hankey, G.J.
Brown, S.G.A., Ball, E.L., Macdonald, S.P.J., Wright, C., Mcd Taylor, D.
Ram, R., Mehta, M., Balmer, L., Gatti, D.M., Morahan, G.
Lamont, P.J., Wallefeld, W., Hilton-Jones, D., Udd, B., Argov, Z., Barboi, A.C., Bonneman, C., Boycott, K.M., Bushby, K., Connolly, A.M., Davies, N., Beggs, A.H., Cox, G.F., Dastgir, J., Dechene, E.T., Gooding, R., Jungbluth, H., Muelas, N., Palmio, J., Penttilä, S., Schmedding, E., Suominen, T., Straub, V., Staples, C., Van den Bergh, P.Y.K., Vilchez, J.J., Wagner, K.R., Wheeler, P.G., Wraige, E., Laing, N.G.
Larcombe, A.N., Phan, J.A., Kicic, A., Perks, K.L., Mead-Hunter, R., Mullins, B.J.
Richman, T.R., Davies, S.M.K., Shearwood, A.-M.J., Ermer, J.A., Scott, L.H., Hibbs, M.E., Rackham, O., Filipovska, A.

Title	Publication
Sustained elevation of resistin, NGAL and IL-8 are associated with severe sepsis/septic shock in the emergency department	PLoS ONE
Smoking, alcohol, diabetes, obesity, socioeconomic status, and the risk of colorectal cancer in a population-based case-control study	Cancer Causes and Control
Green coffee polyphenols do not attenuate features of the metabolic syndrome and improve endothelial function in mice fed a high fat diet	Archives of Biochemistry and Biophysics
Polybrominated diphenyl ether (PBDE) concentrations in plasma of pregnant women from Western Australia	Science of the Total Environment
Microencapsulation as a novel delivery method for the potential antidiabetic drug, Probuco	Drug Design, Development and Therapy
Neoadjuvant anti-tumor vaccination prior to surgery enhances survival	Journal of Translational Medicine
Probuco Release from Novel Multicompartmental Microcapsules for the Oral Targeted Delivery in Type 2 Diabetes	AAPS PharmSciTech
Effect of NSAIDs and COX-2 inhibitors on the incidence and severity of asbestos-induced malignant mesothelioma: Evidence from an animal model and a human cohort	Lung Cancer
The noncoding RNA revolution	International Journal of Biochemistry and Cell Biology
Suspicious mammographic parenchymal abnormalities that are occult at ultrasonography	Journal of Medical Imaging and Radiation Oncology
SPEG interacts with myotubularin, and its deficiency causes centronuclear myopathy with dilated cardiomyopathy	American Journal of Human Genetics
Statins do not alter the incidence of mesothelioma in asbestos exposed mice or humans	PLoS ONE
KLHL40 deficiency destabilizes thin filament proteins and promotes Nemaline myopathy	Journal of Clinical Investigation
Fluid resuscitation for people with sepsis: It's time to challenge our basic assumptions	BMJ (Online)
Impaired functional communication between the L-type calcium channel and mitochondria contributes to metabolic inhibition in the mdx heart	Proceedings of the National Academy of Sciences of the United States of America
Effects of a novel long noncoding RNA, lncUSMycN, on N-Myc expression and neuroblastoma progression	Journal of the National Cancer Institute
Ant venom immunotherapy in Australia: The unmet need	Medical Journal of Australia
Harnessing the potential of lung stem cells for regenerative medicine	International Journal of Biochemistry and Cell Biology
Randomized Controlled Trial of Intravenous Antivenom Versus Placebo for Latrorectism: The Second Redback Antivenom Evaluation (RAVE-II) Study	Annals of Emergency Medicine
Genomic responses during acute human anaphylaxis are characterized by upregulation of innate inflammatory gene networks	PLoS ONE
microRNA-7: A tumor suppressor miRNA with therapeutic potential	International Journal of Biochemistry and Cell Biology
Novel MYH7 mutation associated with mild myopathy but life-threatening ventricular arrhythmias and noncompaction	International Journal of Cardiology
Regulation of microRNAs and their role in liver development, regeneration and disease	International Journal of Biochemistry and Cell Biology
A seven day running training period increases basal urinary hepcidin levels as compared to cycling	Journal of the International Society of Sports Nutrition
Comment on "Drug discovery: Turning the titanic"	Science Translational Medicine
Cardiovascular disease risk score prediction models for women and its applicability to Asians	International Journal of Women's Health
Regulation of human PAX6 expression by miR-7	Evolutionary Bioinformatics
Distinguishing sedentary from inactive: implications for meta-analyses	British Journal of Cancer
Benefits, barriers and enablers of breastfeeding: Factor analysis of population perceptions in Western Australia	PLoS ONE
Integrin alpha 8 recessive mutations are responsible for bilateral renal agenesis in humans	American Journal of Human Genetics
Approach to the diagnosis of congenital myopathies	Neuromuscular Disorders
Effect of NSAIDs and COX-2 inhibitors on the incidence and severity of asbestos-induced malignant mesothelioma: Evidence from an animal model and a human cohort	Lung Cancer
A Call for Quality Research on Salt Intake and Health: From the World Hypertension League and Supporting Organizations	Journal of Clinical Hypertension
Mitochondria: Unusual features of the mammalian mitoribosome	International Journal of Biochemistry and Cell Biology
Lyn kinase plays important roles in erythroid expansion, maturation and erythropoietin receptor signalling by regulating inhibitory signalling pathways that control survival	Biochemical Journal
Paget disease of bone-associated UBA domain mutations of SQSTM1 exert distinct effects on protein structure and function	Biochimica et Biophysica Acta - Molecular Basis of Disease
Intracranial hemorrhage among patients with atrial fibrillation anticoagulated with warfarin or rivaroxaban: The rivaroxaban once daily, oral, direct factor xa inhibition compared with vitamin K antagonism for prevention of stroke and embolism trial in atrial fibrillation	Stroke
Leiomodin-dysfunction results in thin filament disorganization and nemaline myopathy	Journal of Clinical Investigation
Public perceptions of cancer risk factors: A Western Australian study	Health Promotion Journal of Australia
Intracranial hemorrhage and novel anticoagulants for atrial fibrillation: What have we learned?	Current Cardiology Reports
Spontaneous pneumothorax: a multicentre retrospective analysis of emergency treatment, complications and outcomes	Internal Medicine Journal
Rapid identification of major-effect genes using the collaborative cross	Genetics
Novel Mutations Widen the Phenotypic Spectrum of Slow Skeletal/ β -Cardiac Myosin (MYH7) Distal Myopathy	Human Mutation
Route of exposure alters inflammation and lung function responses to diesel exhaust	Inhalation Toxicology
A bifunctional protein regulates mitochondrial protein synthesis	Nucleic Acids Research

Scientific Publications

Authors
Hankey, G.J., Lacey, B.
Ivanov, I.S., Azmanov, D.N., Ivanova, M.B., Chamova, T., Pacheva, I.H., Panova, M.V., Song, S., Morar, B., Yordanova, R.V., Galabova, F.K., Sotkova, I.G., Linev, A.J., Bitchev, S., Shearwood, A.M.J., Kancheva, D., Gabrikova, D., Karcagi, V., Guergueltcheva, V., Geneva, I.E., Bozhinova, V., Stoyanova, V.K., Kremensky, I., Jordanova, A., Savov, A., Horvath, R., Brown, M.A., Tournev, I., Filipovska, A., Kalaydjieva, L.
Forrest, A.R.R., Kawai, H., Rehli, M., Baillie, J.K., De Hoon, M.J.L., Haberle, V., Lassmann, T., Kulakovskiy, I.V., Lizio, M., Itoh, M., Andersson, R., Mungall, C.J., Meehan, T.F., Schmeier, S., Bertin, N., Jørgensen, M., Dimont, E., Arner, E., Schmid, C., Schaefer, U., Medvedeva, Y.A., Plessy, C., Vitezic, M., Severin, J., Semple, C.A., Ishizu, Y., Young, R.S., Francescato, M., Altschuler, I.A., Albanese, D., Altschule, G.M., Arakawa, T., Archer, J.A.C., Arner, P., Babina, M., Rennie, S., Balwierz, P.J., Beckhouse, A.G., Pradhan-Bhatt, S., Blake, J.A., Blumenthal, A., Bodega, B., Bonetti, A., Briggs, J., Brombacher, F., Burroughs, A.M., Califano, A., Cannistraci, C.V., Carbajo, D., Chen, Y., Chierici, M., Ciani, Y., Clevers, H.C., Dalla, E., Davis, C.A., Detmar, M., Diehl, A.D., Dohi, T., Drabløs, F., Edge, A.S.B., Edinger, M., Ekwall, K., Endoh, M., Enomoto, H., Fagiolini, M., Fairbairn, L., Fang, H., Farach-Carson, M.C., Faulkner, G.J., Favorov, A.V., Fisher, M.E., Frith, M.C., Fujita, R., Fukuda, S., Furlanello, C., Furuno, M., Furusawa, J.-I., Geijtenbeek, T.B., Gibson, A.P., Gingeras, T., Goldowitz, D., Gough, J., Guhl, S., Guler, R., Gustincich, S., Ha, T.J., Hamaguchi, M., Hara, M., Harbers, M., Harshbarger, J., Hasegawa, A., Hasegawa, Y., Hashimoto, T., Herlyn, M., Hitchens, K.J., Sui, S.J.H., Hofmann, O.M., Hoof, I., Hori, F., Huminiacki, L., Iida, K., Ikawa, T., Jankovic, B.R., Jia, H., Joshi, A., Jurman, G., Kaczowski, B., Kai, C., Kaida, K., Kaiho, A., Kajiyama, K., Kanamori-Katayama, M., Kasianov, A.S., Kasukawa, T., Katayama, S., Kato, S., Kawaguchi, S., Kawamoto, H., Kawamura, Y.I., Kawashima, T., Kempfle, J.S., Kenna, T.J., Kere, J., Khachigian, L.M., Kitamura, T., Klinken, S.P., Knox, A.J., Kojima, M., Kojima, S., Kondo, N., Koseki, H., Koyasu, S., Krampitz, S., Kubosaki, A., Kwon, A.T., Laros, J.F.J., Lee, W., Lennartsson, A., Li, K., Lilje, B., Lipovich, L., Mackay-sim, A., Manabe, R.-I., Mar, J.C., Marchand, B., Mathelier, A., Mejhert, N., Meynert, A., Mizuno, Y., De Morais, D.A.L., Morikawa, H., Morimoto, M., Moro, K., Motakis, E., Motohashi, H., Mummery, C.L., Murata, M., Nagao-Sato, S., Nakachi, Y., Nakahara, F., Nakamura, T., Nakamura, Y., Nakazato, K., Van Nimwegen, E., Ninomiya, N., Nishiyori, H., Noma, S., Nozaki, T., Ogishima, S., Ohkura, N., Ohmiya, H., Ohno, H., Ohshima, M., Okada-Hatakeyama, M., Okazaki, Y., Orlando, V., Ovchinnikov, D.A., Pain, A., Passier, R., Patrikakis, M., Persson, R., Piazza, S., Prendergast, J.G.D., Rackham, O.J.L., Ramilowski, J.A., Rashid, M., Ravasi, T., Rizzu, P., Roncador, M., Roy, S., Rye, M.B., Saijo, E., Sajantila, A., Saka, A., Sakaguchi, S., Sakai, M., Sato, H., Satoh, H., Savvi, S., Saxena, A., Schneider, C., Schultes, E.A., Schulze-Tanzil, G.G., Schwegmann, A., Sengstag, T., Sheng, G., Shimoji, H., Shimoni, Y., Shin, J.W., Simon, C., Sugiyama, D., Sugiyama, T., Suzuki, M., Suzuki, N., Swoboda, R.K., T Hoen, P.A.C., Tagami, M., Tagami, N.T., Takai, J., Tanaka, H., Tatsukawa, H., Tatum, Z., Thompson, M., Toyoda, H., Toyoda, T., Valen, E., Van De Wetering, M., Van Den Berg, L.M., Verardo, R., Vijayan, D., Vorontsov, I.E., Wasserman, W.W., Watanabe, S., Wells, C.A., Winteringham, L.N., Wolvetang, E., Wood, E.J., Yamaguchi, Y., Yamamoto, M., Yoneda, M., Yonekura, Y., Yoshida, S., Zabierowski, S.E., Zhang, P.G., Zhao, X., Zucchelli, S., Summers, K.M., Suzuki, H., Daub, C.O., Kawai, J., Heutink, P., Hide, W., Freeman, T.C., Lenhard, B., Bajic, L.V.B., Taylor, M.S., Makeev, V.J., Sandelin, A., Hume, D.A., Carninci, P., Hayashizaki, Y., Ayoub, M.A., Trebaux, J., Vallaghe, J., Charrier-Savournin, F., Al-Hosaini, K., Moya, A.G., Pin, J.-P., Pfeleger, K.D.G., Trinquet, E.
Geldenhuys, S., Hart, P.H., Endersby, R., Jacoby, P., Feelisch, M., Weller, R.B., Matthews, V., Gorman, S.
Stone, S.F., Phillips, E.J., Wiese, M.D., Heddle, R.J., Brown, S.G.A.
McGuire, A.L., Urosevic, N., Chan, D.T., Dogra, G., Inglis, T.J.J., Chakera, A.
Nelson, D., Fisher, S., Robinson, B.
Jaeger, W.C., Armstrong, S.P., Hill, S.J., Pfeleger, K.D.G.
Finsterner, J., Brandau, O., Stöhlberger, C., Wallefeld, W., Laing, N.G., Laccone, F.
Hankey, G.J.
Chakravarty D, Sboner A, Nair SS, Giannopolou E, Li R, Hennig S, Mosquera JM, Pauwels J, Park K, Kossai M, Macdonald TY, Fortugne J, Erho N, Vergara IA, Ghadessi M, Davicioni E, Jenkins RB, Palanisamy N, Chen Z, Nakagawa S, Hirose T, Bander NH, Beltran H, Fox AH, Elemento O, Rubin MA
Hirose T#, Virnicchi G, Tanigawa A, Naganuma T, Li R, Kimura H, Yokoi T, Nakagawa S, Bénard M, Fox AH#, Pierron G#.
Coquille, S., Filipovska, A., Chia, T., Rajappa, L., Lingford, J.P., Razif, M.F., Thore, S., Rackham, O.
Rackham, O., Filipovska, A.
Filipovska, A., Rackham, O.
Arendts G, et al.
Arendts G,
Barker A, Cameron P, Hill K, Flicker L, Haines T, Lowthian J, Waldron N, Arendts G, Redfern J, Forbes A, Brand C, Etherton-Beer C, Hill A, Hunter P, Nyman S, Smit D.
Brown S.
Brown S, Ball E, Macdonald S, Wright C, McD Taylor D.
Brown S, Isbister G.
Cassidy T, Phillips M, Fatovich D, Duke J, Edgar D, Wood F.
Cheng A, Dwyer D, Holmes M, Irving L, Brown S, Waterer G, et al.
Egerton-Warburton D, Gosbell AD, Wadsworth A, Fatovich D, Richardson D.
Ellis B, Brown S.
Fatovich D, Brown S.
Gillman L, Jacobs I, Fatovich D.
Hare M, Arendts G, Wynaden D, Leslie G.
Isbister G, Bawaskar H, Brown S.
Isbister G, Page C, Buckley N, Fatovich D, Pascu O, Macdonald S, Calver L, Brown S.
Macdonald S, Arendts G, Fatovich D, Brown S.
Macdonald S, Nagree Y, Fatovich D, Brown S.
Macdonald S, Stone S, Neil C, van Eeden P, Fatovich D, Arendts G, Brown S.
Mitra B, Jones P, Fatovich D, Thom O.
McLay S, Macdonald S.
Mullins R, Brown S.
Nagree Y, Camarda V, Fatovich D, Cameron P, Dey I, Gosbell A, McCarthy S, Mountain D.
Nagree Y, Gosbell A, McCarthy S, Moore K, Mountain D.
Stone S, Bosco A, Jones A, Cotterell C, van Eeden P, Arendts G, Fatovich DM, Brown SGA.
Stone S, Phillips E, Wiese M, Heddle R, Brown S.
Jaeger, W.C., Seeber, R.M., Eidne, K.A. and Pfeleger, K.D.G.

Title	Publication
Optimum blood pressure target after lacunar stroke: Pro side of the argument	Hypertension
Founder p.Arg 446* mutation in the PDHX gene explains over half of cases with congenital lactic acidosis in Roma children	Molecular Genetics and Metabolism
A promoter-level mammalian expression atlas	Nature
Homogeneous time-resolved fluorescence-based assay to monitor extracellular signal-regulated kinase signaling in a high-throughput format	Frontiers in Endocrinology
Ultraviolet radiation suppresses obesity and symptoms of metabolic syndrome independently of vitamin D in mice fed a high-fat diet	Diabetes
Immediate-type hypersensitivity drug reactions	British Journal of Clinical Pharmacology
The impact of chronic kidney disease and short-term treatment with rosiglitazone on plasma cell-free DNA levels	PPAR Research
The "trojan Horse" approach to tumor immunotherapy: Targeting the tumor microenvironment	Journal of Immunology Research
Biophysical detection of diversity and bias in GPCR function	Frontiers in Endocrinology
Distal myosin heavy chain-7 myopathy due to the novel transition c.5566G>A (p.E1856K) with high interfamilial cardiac variability and putative anticipation	Neuromuscular Disorders
Selective serotonin reuptake inhibitors and risk of cerebral bleeding	Stroke
The oestrogen receptor alpha-regulated lncRNA NEAT1 is a critical modulator of prostate cancer	Nature Communications
NEAT1 long noncoding RNA regulates transcription via protein sequestration within subnuclear bodies	Molecular Biology of the Cell
An artificial PPR scaffold for programmable RNA recognition.	Molecular Biology of the Cell
Analysis of the human mitochondrial transcriptome using directional deep sequencing and parallel analysis of RNA ends.	Methods in Molecular Biology
Synthetic biology with RNA.	Synthetic Biology
Nurse led care coordination: trial protocol and development of a best practice resource guide for a cluster controlled clinical trial in Australian aged care facilities.	Archives of gerontology and geriatrics 2014; 58(1):15-19
Response to McElwaine and Robinson.	International journal of clinical practice 2014; 68(3):406
RESPOND – A patient-centred program to prevent secondary falls in older people presenting to the emergency department with a fall: Protocol for a multi-centre randomised controlled trial.	Injury Prevention 2014; DOI: 10.1136/injuryprev-2014-041271
Fluid resuscitation for people with sepsis.	BMJ. 2014; 349:g4611
Spontaneous pneumothorax: a multicentre retrospective analysis of emergency treatment, complications and outcomes.	Intern Med J. 2014; 44(5):450-7
Clinical research is a priority for emergency medicine but how do we make it happen, and do it well?	Emerg Med Australas 2014; 26(1):14-18
Developing a Burn Injury Severity Score (BISS): adding age and total body surface area burned to the Injury Severity Score (ISS) improves mortality concordance.	Burns 2014;40:805-813
Influenza epidemiology, vaccine coverage and vaccine effectiveness in sentinel Australian hospitals in 2013: the Influenza Complications Alert Network.	Commun Dis Intell Q Rep. 2014; 38(2):E143-9.
Survey of alcohol-related presentations to Australasian Emergency Departments.	Med J Aust 2014;201: 584-587
Management of anaphylaxis in an austere or operational environment.	J Spec Oper Med. 2014; 14(4):1-5.
Stroke thrombolysis remains unproven: per ardua, ad astra...	Intern Med J 2014;44:1261-1262
Challenges in arranging interhospital transfer from a non-tertiary hospital Emergency Department in the Perth metropolitan area.	Emerg Med Australas 2014;26:567-572
Nurse Screening for Delirium in Older Patients Attending the Emergency Department.	Psychosomatics 2014;55:235-42
Scorpion envenomation.	N Engl J Med. 2014; 16;371(16):1559-60
Randomized controlled trial of intravenous antivenom versus placebo for Latrodectism: the second Redback antivenom evaluation (RAVE-II) study.	Ann Emerg Med 2014;64:620-628.e2
Comparison of PIR0, SOFA and MEDS scores for predicting mortality in Emergency Department patients with severe sepsis and septic shock.	Acad Emerg Med 2014;21:1257-1263
Modified TIMI risk score cannot be used to identify low-risk chest pain in the emergency department: a multicentre validation study.	Emerg Med J. 2014; 31(4):281-5
Sustained elevation of Resistin, NGAL and IL-8 are associated with severe sepsis/septic shock in the Emergency Department.	PLoS ONE 2014 9(10): e110678
Trainee perspectives on usefulness of the Trainee Research Requirement.	Emerg Med Australas 2014;26:392-397
Hyper-dopaminergic ballismus and respiratory dyskinesia treated with intravenous haloperidol.	Emerg Med Australas. 2014; 26(6):647-8
Ant venom immunotherapy in Australia: the unmet need.	Med J Aust. 2014; 201(1):33-4.
Quantifying the proportion of general practice and low-acuity patients in the emergency department.	Med J Aust. 2013; 198(11):612-5.
Determining the true burden of general practice patients in the emergency department: getting closer.	Emerg Med Australas. 2013 Dec;25(6):487-90. doi: 10.1111/1742-6723.12163.
Genomic responses during acute human anaphylaxis are characterized by upregulation of innate inflammatory gene networks.	PLoS One 2014;9(7):e101409
Immediate-type hypersensitivity drug reactions.	Br J Clin Pharmacol. 2014;78(1):1-13
Molecular determinants of orexin receptor-arrestin-ubiquitin complex formation.	British Journal of Pharmacology (171: 364-374)

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 Sara Stockdale
 Support Vehicles Australia
 SVA
 Swagelok WA
 Debbie Tawton
 Adam Taylor
 Tomcat Hardchrome Engineering Pty Ltd
 Debbi Tomilson
 Transfield Worley
 Craig Trestrail
 Jules Tripodi
 Glen Trouchet
 Rob Tyson
 Daniel Ungvari
 Yvonne Valentine
 Bradley Van Luxemborg
 Coleen van Til
 Vero Vero Insurance
 Victa Golf Club
 Ivan Vodanovich
 Yunlai Wang
 Brian Ward
 Laura Ward
 Craig Watts
 Craig Wells
 Wentworth Plaza Hotel
 Elisha White
 Glenda Wilson
 Janice Wilson
 Chris Woolley
 Colin Wright
 James Yewers
 Tully Young

Financial Reports

2014 - The Year in Brief

Income	2013	%	2012	%
National competitive grants	\$6,262,963	18.1%	\$5,357,942	16.9%
International grants	\$207,726	0.6%	\$174,990	0.6%
Other grants	\$2,972,782	8.6%	\$2,813,209	8.9%
Commercial contracts	\$6,465,262	18.7%	\$6,069,672	19.2%
Government contracts	\$1,703,292	4.9%	\$1,733,450	5.5%
Donations and fundraising	\$10,358,331	29.9%	\$9,849,455	31.1%
Investment income	\$746,863	2.2%	\$811,649	2.6%
Research support - UWA	\$1,816,919	5.3%	\$2,409,428	7.6%
Research support - Dept of Health WA	\$1,019,527	2.9%	\$1,038,756	3.3%
Miscellaneous income	\$729,576	2.1%	\$1,231,152	3.9%
Facility recovery income	\$2,314,323	6.7%	\$181,657	0.6%
Unexpended grant income - prior periods (b)	\$-	0.0%	\$-	0.0%
Total Income	\$34,597,564	100%	\$31,671,360	100%

Expenditure				
Research activities	\$22,287,783	55.6%	\$23,985,222	79.2%
Research support	\$5,393,813	13.4%	\$4,616,917	15.2%
Facility expenses	\$3,422,759	8.5%	\$264,626	0.9%
Depreciation and amortisation (including Facilities)	\$7,110,965	17.7%	\$1,213,912	4.0%
Unexpended grant income - current period (c)	\$1,893,008	4.7%	\$219,524	0.7%
Total Expenditure	\$40,108,328	100%	\$30,300,201	100%

Net operating Surplus/(Deficit)	-\$5,510,764		\$1,371,159	
Capital Works Grant Income	\$5,763,978		\$25,580,940	
Net Surplus	\$253,214		\$26,952,099	

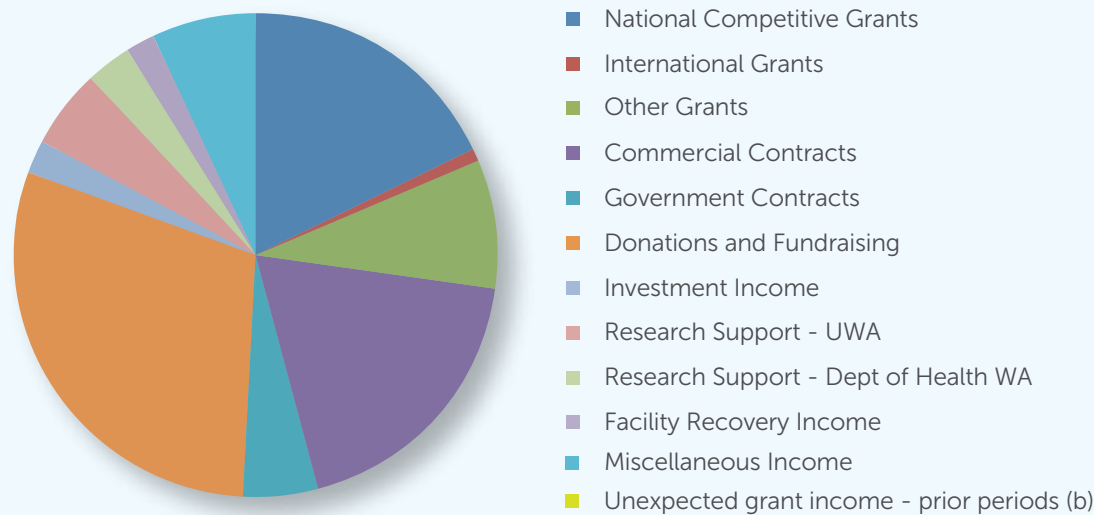
Notes

- (a) The above results incorporate the statutory financial reporting results of the Harry Perkins Institute of Medical Research Inc., and the research operations conducted by researchers through the Institute's affiliation agreement with the University of Western Australia via the Centre for Medical Research. The financial results of the Institute include the operating results of its subsidiary entity, Linear Clinical Research Ltd, and any grants administered by the Institute.
- (b) Unexpended grant income represents grant income from prior periods which has been utilised during the current year.
- (c) Unexpended grant income for current period represents grant income received but not expended at year-end.

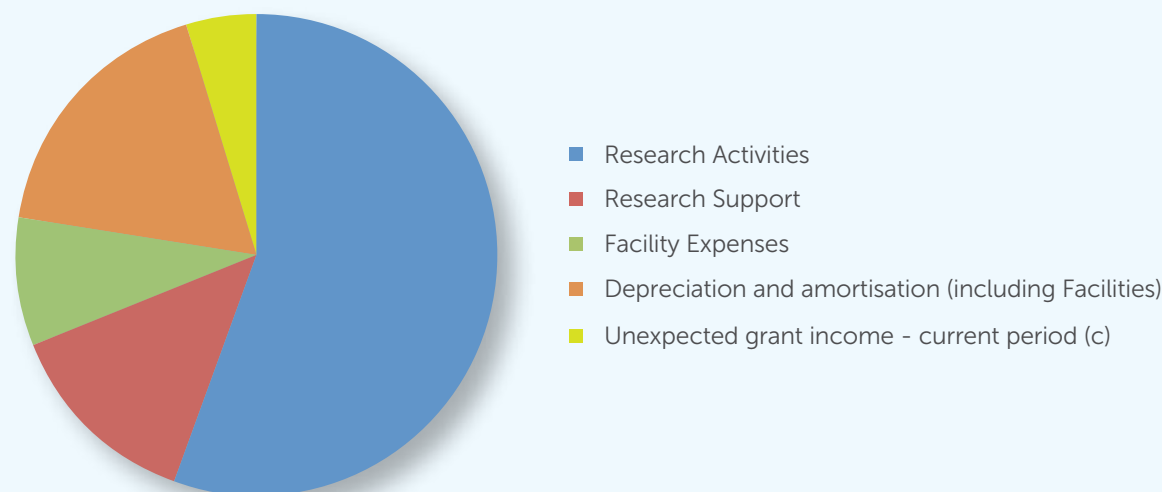
Financial Reports


2014 - The Year in Brief

Income



Expenditure



A woman with blonde hair, wearing a white lab coat, is shown in profile, looking out towards the ocean. The background is a blurred view of the sea under a bright sky. Overlaid on the image are several white-outlined hexagons of varying sizes. Two of these hexagons are filled with a solid blue color and contain white text. The overall composition is clean and professional, typical of a corporate or institutional report.

The Harry Perkins Institute of Medical Research continues to achieve scientific breakthroughs that offer real hope for the patients and their families.

Donors can support specific projects or give to the Perkins as a general donation. We will use your gift in the area of greatest need.

How you can help - Hope starts here

We are dedicated to translating our discoveries from the bench in the laboratory to the bedside, offering better treatments and hopefully cures for a range of diseases.

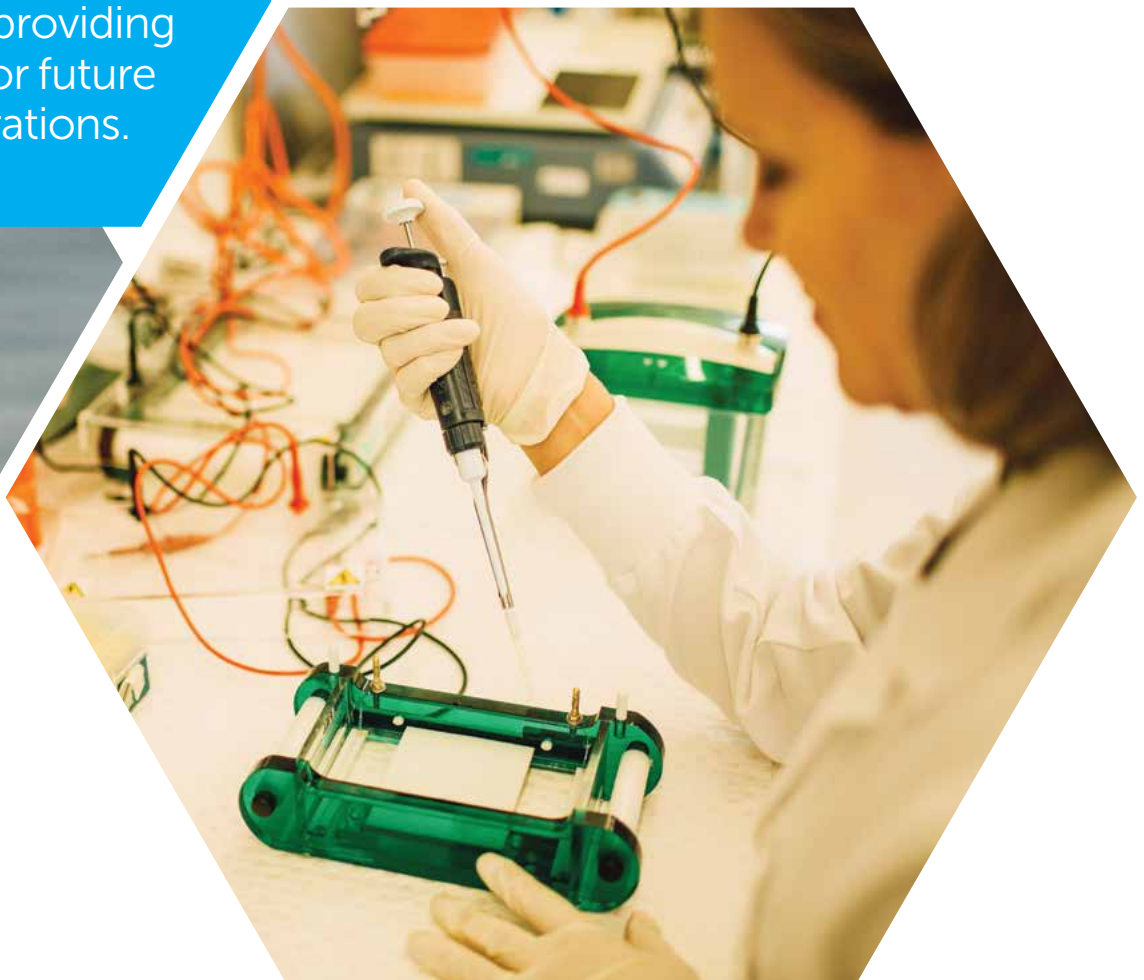
However, using the latest technologies to gain faster results and attracting top researchers is a constant challenge.

The fact is, medical research is expensive and we would not be achieving the results we are without the generous support of the community, so please donate or consider leaving a bequest to the Perkins.

We accept donations by post, phone or online. Donations over \$2 are tax deductible.

If you have any queries please contact Margaret Haydon,
Head of Marketing, on +61 8 6151 0960.

We greatly appreciate your support. Thank you for providing hope for future generations.









Perkins
HARRY PERKINS INSTITUTE
OF MEDICAL RESEARCH

QEll Medical Centre
6 Verdun St, Nedlands, WA 6009
PO Box 7214, Shenton Park
Western Australia 6008

Phone: +61 8 6151 0700
Fax: +61 8 6151 0701

www.perkins.org.au