HARRY PERKINS INSTITUTE
OF MEDICAL RESEARCH

Annual Report 2016

HARRY PERKINS INSTITUTE
OF MEDICAL RESEARCH

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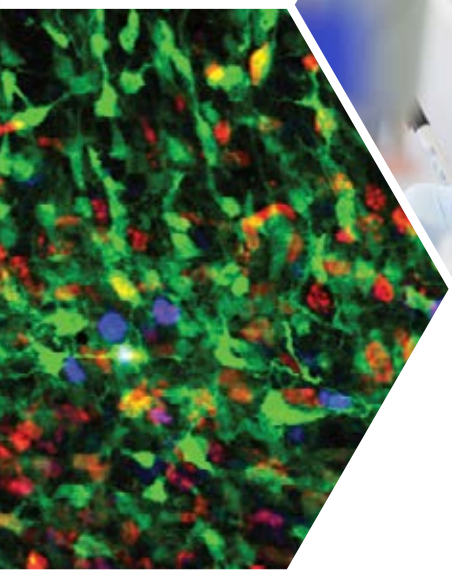

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Chairman's Report

I am privileged to again report to our community. We have had an exciting yet challenging year at the Perkins. We have celebrated many achievements but also, along with other medical research institutes in Australia, face the challenge of securing ongoing funding for critical research.

This year the Board has completed a strategic review and is working on the strategic priorities that we will pursue during the next five years. We look forward to sharing these with all our stakeholders.

I would like to thank the Board of Directors who have supported me throughout the year and who generously volunteer their time and expertise in order to achieve our mission of delivering lasting health benefits to the community.

My particular thanks go to two board members who resigned this year. Keith Kessell resigned in March after serving on the Board for five and a half years. Keith brought a wealth of corporate and government relations experience to the Board, and will be particularly remembered for the role he played in the re-branding of the Institute. In our announcements to staff Keith brought the vision of the late Harry Perkins very much to life for us all. Dr Bob Every AO, former Chairman of Wesfarmers and Boral, resigned from the Board in December after almost four very active years. Amongst his contributions, Bob chaired the fund raising committee for the whole of his directorship and very successfully led the major gifts campaign. Both made valuable contributions that will have a lasting impact.

I thank Professor Peter Leedman for his leadership and hard work, and I commend the staff of the Perkins for their passion and dedication. Their many achievements are highlighted in the body of this annual report.

Each year I am amazed and honoured by the thousands of men and women who ride, walk and fundraise for the Perkins. We enjoy significant community involvement in our major events and other fundraising and community activities. I thank each and every donor who demonstrates their commitment to making a difference to the health of the community through their generous support.

I am also grateful to the Western Australian companies and individuals who make significant contributions to the Perkins. While our donors are listed in this Report, I would like to make particular note of our founding and ongoing benefactor, Wesfarmers.

Funding provided by the WA and Federal governments is vital to sustain the quality of our work and we are very grateful for their support.

I and the Board look forward to assisting the Director and all at the Perkins in carrying out their important work for the health of the community.

Laurence Iffla
Chairman,
Harry Perkins
Institute of Medical
Research

"We have had an exciting yet challenging year at the Perkins"

LARRY IFFLA

"I thank the staff, the Board of Directors and the community for their support as together we strive to defeat disease."

PETER LEEDMAN

Director's Report

2016 was a year of many highlights. It started with a groundbreaking discovery on the process of vertebrate development by Professor Ryan Lister and Dr Ozren Bogdanovic from the Perkins Epigenetics and Genomics Laboratory. They uncovered the epigenetic instructions that provide key information required for forming a body plan of vertebrates during embryogenesis, by comparing the process in fish, frogs and mice. This finding has important implications for understanding vertebrate development.

A new approach to treating tumours, developed by Dr Juliana Hamzah, received funding to explore its commercial potential. Dr Hamzah and her team have developed a targeted drug to 'soften up' tumours, making them more vulnerable to immune cells and other anti-cancer treatments.

New research, led by Associate Professor Julian Heng, Head of the Brain Growth and Disease Laboratory at the Perkins, identified a genetic factor which could be significant for intellectual disability as well as Down Syndrome.

Early in the year, we opened a new research floor at our Nedlands facility with a capacity for 100 discovery researchers.

In May we welcomed radiologist and nuclear medicine specialist, Dr Liesl Celliers, who was appointed as the inaugural *Perth Radiological Clinic Associate in Translational Imaging*. This position was established with the generous financial support of the PerthRadClinic Foundation to help scientists optimise research conducted in the high-end cancer imaging facility located at the Perkins.

In July, the Perkins launched a new biomedical engineering program aimed at delivering revolutionary medical breakthroughs. Known as Biomedical Engineering@Perkins the program comprises two laboratories, a Vascular Engineering Laboratory headed by Dr Barry Doyle and a Cancer Imaging Laboratory headed by Dr Brendan Kennedy.

Clinical trials critical

Critical for the community is the ability of the Perkins to translate its discoveries into new treatments. In 2016 we welcomed Dr Michael Winlo as the new head of Linear Clinical Research Ltd, the clinical trials arm of the Perkins. Linear undertook a range of early phase clinical trials aimed at fast tracking research outcomes for the community. Linear is literally bringing new medicines to the community faster so that the benefits can be experienced first in WA. Led by its clinical investigators across its three sites at Sir Charles Gairdner Hospital, Royal Perth Hospital and Fiona Stanley Hospital, Perkins also does a range of other clinical trials, which include testing of colchicine, a drug used for gout, to prevent heart disease, a new treatment that may improve the outcome for patients with chronic kidney disease, determining the optimal approach to patients with acute shock and ways to improve the health outcomes of elderly patients. Our researchers and doctors are working to save more lives and to bring tomorrow's health closer to today for people in Western Australia and throughout the world. Every day, they are making progress towards preventing disease, diagnosing disease earlier, and developing new treatments.

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 May 2009. He is a partner in the legal firm, Iffla Wade and practices primarily in the area of commercial property law, State taxes and trusts and joint ventures.

Professor John Challis

Professor 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. In 2015, John took up the inaugural Director of the Western Australian Health Translation Network (WAHTN).

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.

Dr Bob Every AO

(resigned December 2016)

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. He is former Chairman of Wesfarmers Limited and Boral Limited.

Mr Keith Kessell

(resigned March 2016)

Mr Kessell joined the Board in August 2010. He was Executive General Manager, Corporate Affairs at Wesfarmers Limited for 12 years, retiring in 2008.

Mr Roger Port

Mr Port joined the Board in April 2015. He is a chartered accountant and is a former partner in PricewaterhouseCoopers. He has 30 years' experience in financial analysis, company and business valuations, transaction due diligence and mergers and acquisitions and led the PwC Perth Deals team for seven years. He is a graduate of the Australian Institute of Company Directors.

Mrs Jan Stewart PSM

Mrs Stewart joined the Board in February 2015. She held the position of CEO of Lotterywest from 1992 until December 2014. Mrs Stewart is a social worker by profession, having graduated from UWA with a Bachelor of Arts and Master's Degree in Social Work. She is a graduate of the Australian Institute of Company Directors.

Government House Function

At a special function at Government House Ballroom on 1 June, the Patron of the Perkins, Her Excellency the Honourable Kerry Sanderson AC, presented citations to MACA and the Prendiville Family.

MACA was awarded the Perkins Corporate Partner Award for 2016. MACA is not only the title sponsor of the MACA Ride to Conquer Cancer but has a team of up to 300 riders in this event which raises critical funding for cancer research at the Perkins. The award was accepted by MACA's Director of Operations, Geoff Baker.

The Prendiville Family received the Community Partner Award for their outstanding contributions to the Kirkbride Melanoma Centre, established at the Perkins in memory of young professional golfer, Scott Kirkbride who lost his battle with melanoma at just 27 years of age. The award was accepted by Garry Prendiville on behalf of Dr Jamie Prendiville and the family.

Perkins divisions, laboratories and centres

CANCER AND CELL BIOLOGY DIVISION

The Cancer and Cell Biology Division is co-led by Professor Ruth Ganss and Associate Professor Andrew Redfern.

Cancer Epigenetics Laboratory

Associate Professor Pilar Blancafort and her team joined the Harry Perkins Institute of Medical Research in 2014. Their disease focus is triple negative breast cancer, for which there are no current effective treatments. 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. 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.

Laboratory for Cancer Medicine

Professor Peter Leedman leads the Laboratory for Cancer Medicine. The research focuses on the mechanisms that regulate hormone action in various cancers (e.g. breast and prostate cancer) as well as identifying and utilising small RNAs, called microRNAs as therapeutics in cancer. MiRNAs are small pieces of RNA that can regulate gene expression by degrading the gene message before it can be translated into a protein. In the hormone action group, the focus has been on breast, prostate and colon cancer, whilst in the microRNA group the focus has been on microRNA-7 (miR-7) in melanoma, liver and head and neck cancer. The team have discovered new ways to tackle these cancers, and are working towards bringing some of these findings into the clinic. The two arms of the laboratory are linked by their common interest in RNA biology and the strong desire to translate some of these findings into clinical trials and subsequently into novel therapies.

Cell Signalling Group

Cancer cells have overactive enzymes of the type called protein tyrosine kinases (PTK) that function as on/off switches to control cancer cell growth and malignancy. Associate Professor Evan Ingley and his team investigate the functions of a subtype of PTK, known as Src Family kinases (SFK). They have discovered new interactions and pathways that SFK enzymes regulate in leukaemia and bone cancer (sarcoma) cells that influence their ability to survive and become invasive.

Iron Metabolism Laboratory

The Iron Metabolism Laboratory, headed by Associate Professor Debbie Trinder, investigates the molecular mechanisms in normal iron metabolism and in the development of the iron overload disorder hereditary haemochromatosis.

The team has expertise in the area of molecular and cellular biology of iron including cell isolation and culture, iron transport, gene and protein expression and gene knockdown technologies.

Leukaemia Research Laboratory

The Laboratory, led by Dr Louise Winteringham, is studying new ways in which leukaemia genes are regulated. In particular the work focuses on the role of gene enhancers and microRNAs (miRNA) and how these molecules can be harnessed for cancer therapies. The Laboratory has identified a number of key miRNAs that regulate blood cell development, and they appear to be deregulated in leukaemia. Importantly, miRNAs are now being trialled as a new form of treatment for some cancers.

Liver Disease and Carcinogenesis Laboratory

Liver cancer has a very poor outlook and new therapies are desperately needed. The objective of the Laboratory, headed by Professor George Yeoh, is to realise the use of a liver progenitor cell (LPC) for cell therapy to treat liver disease, including liver cancer. Currently organ transplantation is the only successful solution to cure end-stage liver disease. However, Professor Yeoh and his team have been able to generate large numbers of LPCs in preclinical models and they readily differentiate into functional hepatocytes (liver cells) in culture - ie. he can transform the early stage liver cells into more mature liver cells. These findings suggest new ways to treat liver disease based on an understanding of basic biology of the liver cells themselves.

Systems Biology and Genomics Laboratory

Headed by Professor Alistair Forrest the Systems Biology and Genomics Laboratory was established in 2015. The Laboratory's research focuses on using cutting-edge genomic techniques, in particular next generation DNA sequencing and computational approaches (bioinformatics), to understand how cells work at a system level. Professor Forrest has extensive experience in next generation sequencing (NGS) and has published using a variety of sequencing platforms (Roche, SOLiD, Illumina and Helicos) and protocols (RNA-seq, CAGE, small RNA, ChIP-seq). The move to Perkins in 2015 has enabled him to translate his basic research on mammalian systems into clinically relevant questions such as the identification of novel cancer biomarkers and drug targets.

Targeted Drug Delivery, Imaging and Therapy Laboratory

The Laboratory, led by Assistant Professor Juliana Hamzah, focuses on developing strategies to specifically target diseases such as cancer and atherosclerosis using advanced diagnostic imaging and nano-particle based therapeutic interventions. A major challenge to detect and treat chronic inflammatory diseases such as cancer and atherosclerosis is to effectively deliver contrast agents and therapeutics into the pathological tissues whilst avoiding off-target binding and consequent cytotoxic effects. The team focuses on developing tools and strategies to specifically target the microenvironment of cancers and atherosclerotic plaques to better image diseased organs and tissues and improve therapeutic outcomes.

Vascular Biology and Stromal Targeting Laboratory

Woodside Professor Ruth Ganss heads the Vascular Biology and Stromal Targeting Laboratory which focuses on blood vessels as a crucial component of normal tissue function and in disease. The Laboratory studies the role of blood vessels in cancer, and importantly, designs new treatments to manipulate blood vessels within the cancerous tissue for improved anti-cancer drug delivery. This treatment also enables better access of immune cells into malignant tissue which is particularly interesting with the arrival of immunotherapy in the clinic.

Kirkbride Melanoma Centre

The Kirkbride Melanoma Centre, led by Perkins Director, Professor Peter Leedman, is dedicated to finding improved treatments for melanoma skin cancer. Current research projects undertaken within the Harry Perkins Institute of Medical Research include the use of microRNAs to slow down and destroy melanomas, the examination of genes that can prevent UV-induced melanoma and screening drug combinations (compounds) to find a new compound with the ability to destroy melanoma cells.

CLINICAL SCIENCE DIVISION

The Clinical Science Division is co-led by Professor Grant Morahan and Professor Peter Thompson AM

Bioimaging Research and Innovation for Translational Engineering Laboratory (BRITElab)

Bioimaging Research and Innovation for Translational Engineering Laboratory (BRITElab) is led by Dr Brendan Kennedy and focuses on the development and translation of new imaging techniques to a range of clinical and biological applications, in particular breast cancer. A particular technique being developed in BRITElab is optical elastography: an imaging technique that provides a map of the mechanical properties of tissue. As the mechanical properties of tissue are invariably altered by disease, optical elastography has broad applications in areas such as vascular biology, tumour biology, physiology and cancer imaging. The group is working on better defining the surgical margin of breast cancers, in order to reduce the number of women (25%) who have to have a second operation to ensure all of the cancer tissue is removed.

Centre for Clinical Research in Emergency Medicine

The Centre for Clinical Research in Emergency Medicine (CCREM), led by Professor Daniel Fatovich, is a unique unit established at Royal Perth Hospital 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 by EDs including, sepsis, trauma, anaphylaxis, chest pain and drug overdose.

Centre for Diabetes Research

At the Centre for Diabetes Research, led by Professor Grant Morahan, the research is aimed at understanding and preventing diabetes and its complications. Diabetes is recognised as a major public health problem and is Australia's fifth "national health priority area". Diabetes is characterised by increased blood sugar levels, and has two major forms: Type 1 diabetes, which results from the person's own immune system destroying the insulinproducing 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. Grant's particular focus is on the genetics of Type 1 diabetes.

Translational Renal Research Laboratory

The Translational Renal Research group, led by Dr Aron Chakera, aims to improve outcomes for patients with renal diseases, by translating advances in basic science from the bench to the bedside. Research is focused on the immune system and how it is affected by immunosuppression, particularly in the setting of transplantation. Infectious diseases are a common problem in immunosuppressed patients. By studying host responses to pathogens, levels of immune function can be defined that may predict the likelihood of disease and help better understand the factors that influence disease development.

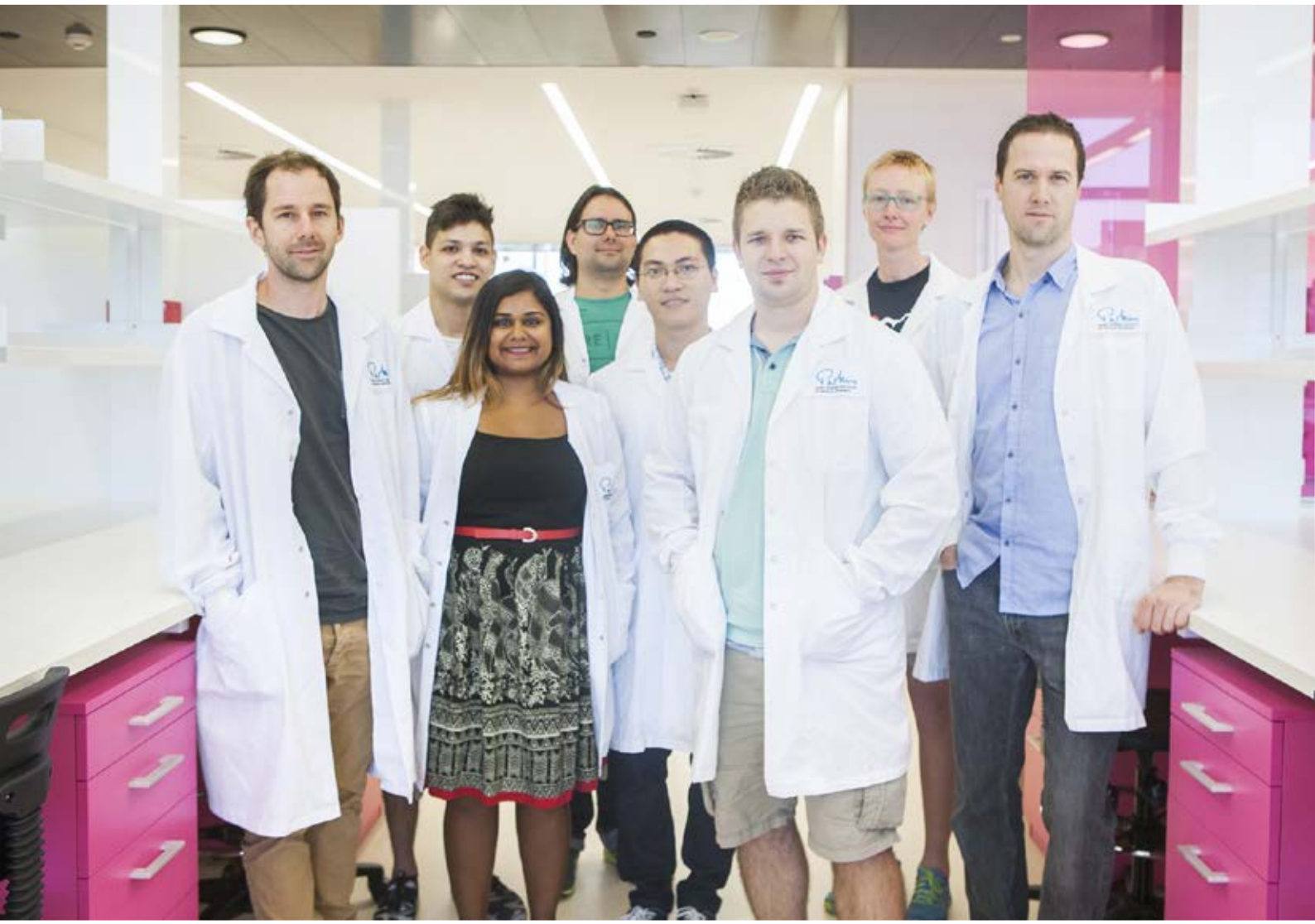
Western Australian Centre for Health and Ageing

Ageing research is conducted through the Perkins affiliate centre the Western Australian Centre for Health and Ageing (WACHA) which is led by Professor Leon Flicker and Professor Osvaldo Almeida. WACHA's research aims to extend healthy lives, prevent the onset of disabling illnesses, find better ways to treat diseases common amongst older people, and to improve the way health services are delivered. Researchers, clinicians, and students collaborate to identify and overcome the most critical obstacles to healthy ageing, including dementia, depression and frailty.

Vascular Engineering Laboratory

Cardiovascular disease is the biggest killer in the developed world and one of the biggest health problems facing the developing world. Here, in Australia, the disease kills one person every 12 minutes and in the USA the number is much higher. In the Vascular Engineering Laboratory, led by Dr Barry Doyle, we use both computational and experimental techniques to further our understanding of vascular physiology and disease, with an overall aim of helping tackle this global problem. That means trying to better understand how our arteries get blocked in the heart or rupture in the abdomen (the aorta). Our research can be broadly divided into the following themes: computational biomechanics; experimental biomechanics; multimodality imaging; and 3D bioprinting and tissue engineering.

Perkins expands into new laboratories



Early in 2016, the Perkins opened a new research floor at its Nedlands facility.

When the Perkins moved into its headquarters in Nedlands in 2014 it allowed room for growth. Now, just over two years since the opening of the state-of-the-art facility, a new floor has been opened which will house up to 100 Perkins researchers.

In April, more than 50 researchers from five laboratories moved into new facilities. Three of the laboratories are new to the Perkins: the Epigenetics and Genomics Laboratory, headed by Professor Ryan Lister; the Cancer Imaging Laboratory, headed by Dr Brendan Kennedy; and, the Vascular Engineering Laboratory headed by Dr Barry Doyle.

The opening of level 6 has enabled the Perkins to bring both the new epigenetics and biomedical engineering teams into the Perkins and to increase the critical mass of its medical research.

MOLECULAR MEDICINE DIVISION

The molecular medicine division at the Perkins is co-led by Professor Nigel Laing AO and Professor Phillipa Lamont.

Brain Growth and Disease Laboratory

Established in late 2014, the Brain Growth and Disease Laboratory is led by Associate Professor Julian Heng. The goal of the 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.

Epigenetics and Genomics Laboratory

Established in early 2015, the Epigenetics and Genomics Laboratory is led by Professor Ryan Lister. Almost every cell in the body contains essentially the same genome sequence, however differential usage of the genetic information enables cells with vastly different features and functions to be formed. The epigenome is a molecular code superimposed upon the genome that can control how genes are turned on and off, without altering the underlying DNA sequence. The Laboratory's research uses advanced genomic, molecular, genetic and computational techniques to study the epigenome, including using next-generation sequencing technologies to generate whole-genome high-resolution maps of the epigenome and associated molecular processes. The research aims to elucidate the mechanistic underpinnings of how the epigenome is established and dynamically modified, how it affects the cellular readout of the underlying genetic information, and to develop molecular tools for editing the epigenome.

Mitochondrial Medicine and Biology Laboratory

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. Led by Professor Alexandra Filipovska, the team has 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. They have developed several different preclinical models of mitochondrial disease so that we can translate our advances at the bench into new diagnostics and treatments.

Molecular Endocrinology and Pharmacology Laboratory

The Molecular Endocrinology and Pharmacology Laboratory, led by Associate Professor Kevin Pfleger, investigates 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. This laboratory is developing and successfully applying our world-leading patented technologies, including the Receptor-Heteromer Investigation Technology (Receptor-HIT). This research is being translated directly into a current clinical trial in patients with chronic kidney disease through the Perkins spinout company Dimerix Bioscience Ltd, of which Associate Professor Kevin Pfleger is Chief Scientific Advisor.

Molecular Endocrinology – Cellular Regulation Laboratory

Led by Professor Tom Ratajczak, the Laboratory investigates 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.

Neurogenetic Diseases Laboratory

Professor Nigel Laing AO, heads the Neurogenetic Diseases Laboratory which is one of the world's foremost research groups in the investigation of the genetic causes of muscle diseases. The Laing team identifies new genes that cause muscle and nerve diseases, and then establish molecular testing for the State. Thus, they directly translate their bench findings to the bedside. The Laboratory 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 and preconception carrier screening.

Synthetic Biology and Drug Discovery Laboratory

The Synthetic Biology and Drug Discovery Laboratory, led by Associate Professor Oliver Rackham, focuses on re-engineering bacteria and yeast for use as microscopic drug factories, and in the manipulation of mammalian gene expression. 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.

FACILITIES

Monoclonal Antibody Facility

The Monoclonal Antibody Facility, led by Kathy Davern 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 facility continues to generate multiple antibodies to a range of target antigens including human Hepatitis C virus, mesothelioma, human carcinomas, and molecules involved in muscular dystrophies, cancers, diabetes and lung disease.

Australian Cancer Research Foundation Cancer Imaging Facility

Officially opened in 2015, the Perkins established a high end preclinical imaging facility (the ACRF Cancer Imaging Facility) at its main headquarters. 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 preclinical models of cancer and determine effective forms of treatment. The ACRF Cancer Imaging Facility offers unparalleled access to an imaging platform unsurpassed in Australia.

Linear Clinical Research Ltd

Founded by the Perkins, Linear is a purpose built 24-bed facility that supports first in human through to phase II clinical trials and is co-located within a major research precinct and on the QEIIMC campus. It is headed Dr Michael Winlo. Linear has the Australian advantage of fast regulatory approval time to achieve first-in-human clinical data and extensive experience in healthy volunteer/ patient protocol designs. Linear is Western Australia's only dedicated early phase clinical trials facility and the most advanced of its kind in Australia.

Since opening Linear has performed over 140 clinical trials, and in 2016 had major growth in its capacity to perform cancer clinical trials. Linear now has a whole team dedicated to cancer clinical trials, with over 20 cancer trials open at any time.

In 2016 Linear won the Business Services Export Award in the Western Australian Industry and Export Awards.

Perkins recruits engineers in a first for WA

In July, the Perkins officially launched a new engineering program aimed at delivering revolutionary medical breakthroughs including transplantable 3D printed organs.

The program known as Biomedical Engineering@Perkins was launched on Thursday July 28 at the Perkins headquarters in Nedlands. It is a joint program between the Perkins and the UWA Faculty of Engineering, Computing and Mathematics.

The first of its kind in the State, it has brought together engineers, doctors and scientists to create innovative technology solutions.

The program consists of two laboratories, the Vascular Engineering Laboratory headed by Dr Barry Doyle, and a Bioimaging Research and Innovation for Translational Engineering Laboratory headed by Dr Brendan Kennedy.

Dr Barry Doyle, who heads the Vascular Engineering Laboratory, said doctors and medical researchers have the problems and the engineers can develop the solutions.

The 16 new staff members have all graduated with mechanical or electrical engineering degrees which they are now applying to medicine and medical research.

Dr Doyle said his team's grand vision is to 3D bioprint the world's first implantable heart. He said that the State is ready for a new industry employing engineers in research institutes and hospitals to improve the health of Western Australians.

RESEARCH HIGHLIGHTS

Ground breaking discovery on the process of vertebrate development

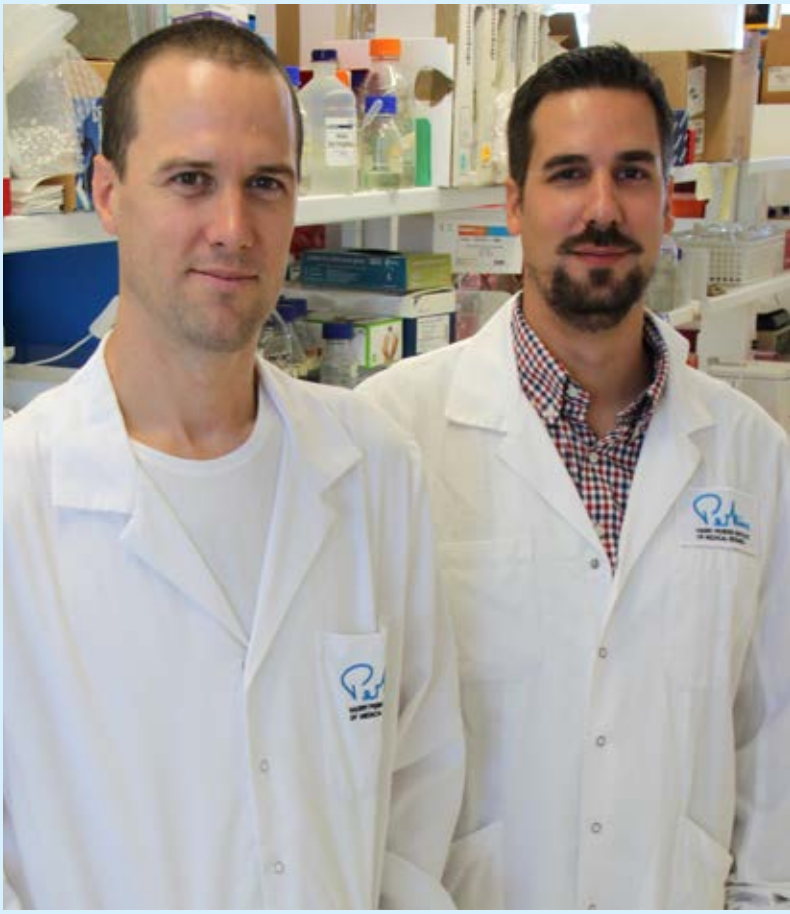
In February 2016, researchers from the Perkins announced that they had uncovered the epigenetic instructions that provide key information required for forming a body plan of vertebrates during embryogenesis, by comparing the process in fish, frogs and mice,

Professor Ryan Lister and Dr Ozren Bogdanovic from the Perkins Epigenetics and Genomics Laboratory led the study, which was published in in the prestigious journal Nature Genetics.

Their work is focused on the epigenome, an extra layer of information present in cells that is made up of millions of miniscule chemical tags attached to the DNA, and that can switch genes on or off and instruct a cell on how to develop into different tissue, such as skin or heart.

Laboratory Head Professor Lister said there was a phase during embryonic development when very different animal groups look remarkably similar. During this phase, these pre-programmed epigenetic signposts switch genes on or off to trigger the correct development of early embryonic structures.

The researchers use powerful genome analysis technologies to precisely map the location of these chemical signposts, in order to better understand the epigenetic process of development, which could be used in the future to show how these processes may go awry and cause disease or disability.



New trial to help stroke rehabilitation

Early in 2016, the WA Centre for Health and Ageing (WACHA) received a grant from the National Stroke Foundation to fund new rehabilitation therapy for stroke survivors. The study explored the effectiveness of non-invasive brain stimulation techniques such as transcranial direct current stimulation to help improve attention and reduce fatigue.

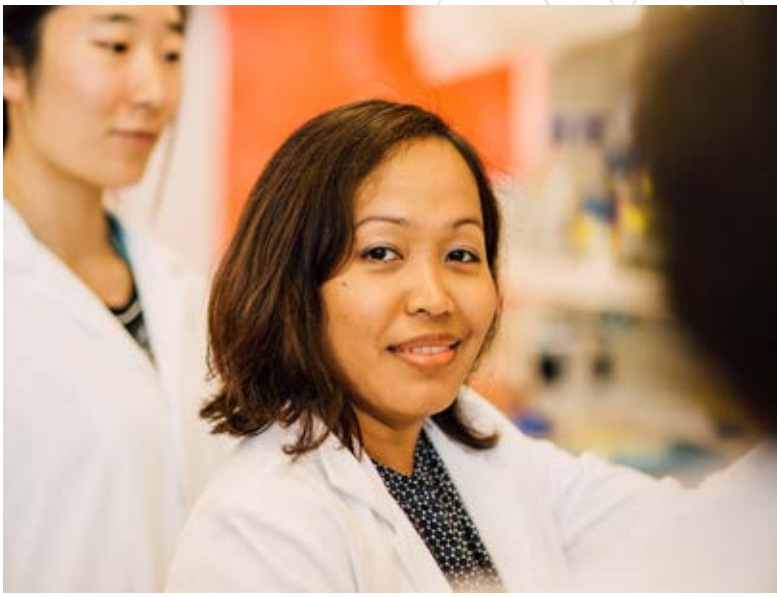
WACHA Associate Professor Christopher Etherton-Beer, who led the study, said the work is a vital part of recovery.

Associate Professor Etherton-Beer worked with colleagues from the Royal Perth Hospital Group's Bentley Health Service, UWA and Monash University with the aim of improving participation in rehabilitation among stroke survivors.

Stroke is one of Australia's biggest killers with more than 11,000 lives lost to stroke every year. Many more people are left with a lifelong disability with 65 per cent of people living with stroke also suffering a disability that impedes their ability to live their lives unassisted. Often patients are not able to take part in therapy sessions due to fatigue and attentional decline, with these factors limiting their engagement in rehabilitation post stroke.

Stroke rehabilitation is an important part of recovery after stroke and is where people can relearn skills they lost when the stroke affected part of their brain.

Funding for potential new cancer treatment



In March, a new approach to treating tumours, which was developed at the Perkins, received funding to explore its commercial potential.

Dr Juliana Hamzah and her team developed a targeted drug to soften up tumours, making them more vulnerable to immune cells and other anti-cancer treatments.

A major hurdle for many cancer treatments is that cancerous tissue is stiffer than normal tissue, making it difficult for drugs to infiltrate tumours.

Dr Hamzah said solid tumours are known to be firm and rigid, which can present a significant barrier for drug delivery. In the case of breast cancer, for example, diseased tissue can be 10 times stiffer than normal breast, this makes it difficult to give an effective dose precisely where it is needed. The new approach is significant because by softening the stiffened tumour tissue, it is possible to deliver anti-cancer drugs more effectively inside the tumour to kill cancer cells.

New drug to break down tumour defences

The prestigious publication, Cell Reports, published the results of research undertaken by Woodside Professor Ruth Ganss and her team at the Perkins in March. They have developed a new drug that could be used to repair blood vessel defects and allow for more targeted and effective drug delivery.

Current anti-cancer treatments like chemotherapy and immunotherapy, which harness a person's own killer immune cells, can struggle to enter a tumour because the blood vessels that fuel it become malformed. Tumours require a lot of nutrients, so surrounding blood vessels are redirected towards the cancer and ultimately develop abnormalities.

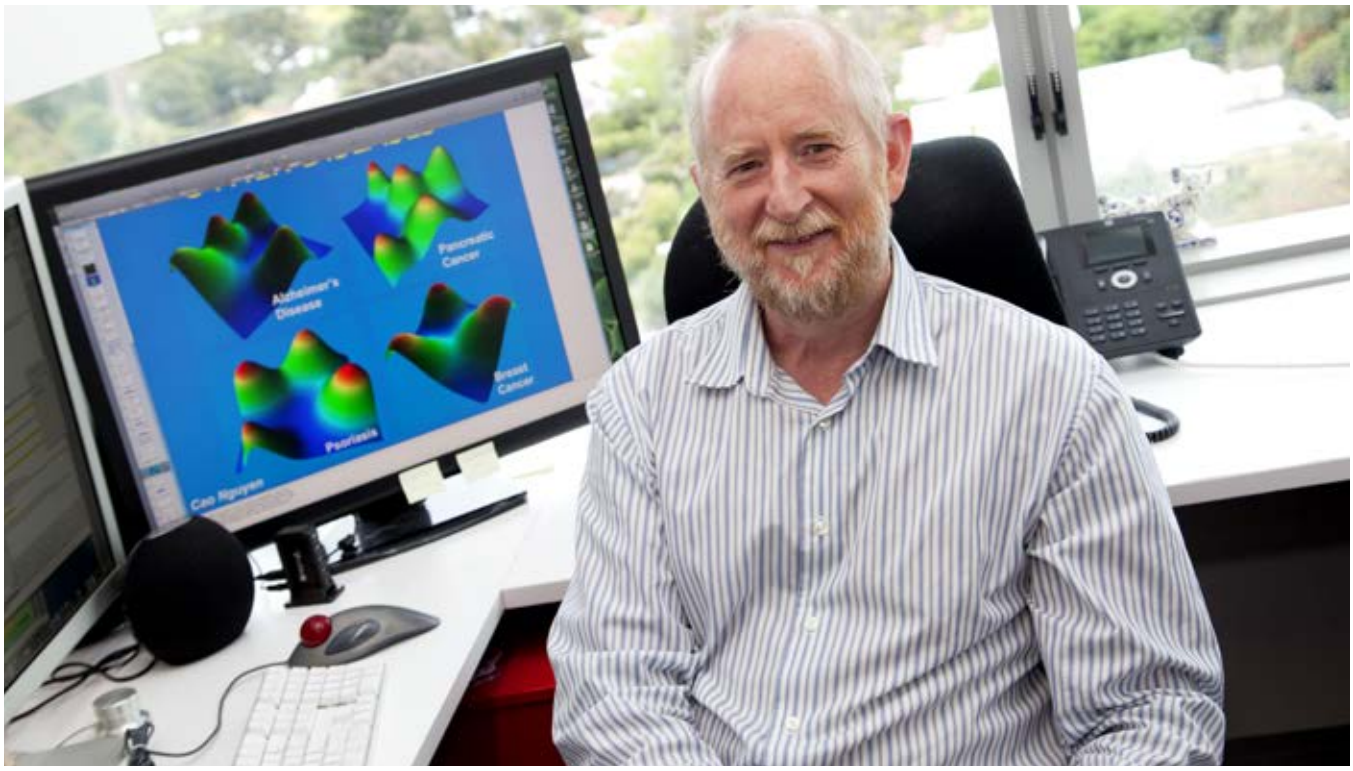
While investigating this problem Professor Ganss and her team in the Perkins Vascular Biology and Stromal Targeting Laboratory found that smooth muscle cells that line blood vessels to give them shape and help them pump blood, often break down in tumours. Once the smooth muscle cells break down, the blood vessel becomes leaky, reducing blood flow and preventing chemotherapy and immune cells travelling into the tumour.

Professor Ganss said the new drug developed in her laboratory worked by repairing the smooth muscle cells and returning normal blood flow to the vessels, allowing other anti-cancer drugs to reach the tumour core. The team is investigating whether the new drug could help stem the spread of cancer in a patient by repairing the leaky blood vessels.

Funding for promising breast cancer research

Dr Andrew Woo, a research fellow in the Perkins Laboratory for Cancer Medicine received a $100,000 project grant from Cancer Council WA to investigate a method for reprogramming metastatic tumour cells in breast cancer patients to make the tumours more susceptible to anti-cancer drugs.

Dr Woo said he is exploring how any given cell can be transformed into a stem cell (with the addition of different proteins), because this process is quite similar to how cancers develop and it may give us clues about how we can find a way to reprogram the cells. He said that currently there is no effective therapy to treat breast cancers with stem cell like features which are linked to rapid tumour growth and metastatic progression.



Study improves understanding of Type 1 Diabetes risk

A study led by Professor Grant Morahan, uncovered a complex web of factors that impact a person's risk of developing Type 1 Diabetes. It was part of a worldwide study involving over 4,000 families.

Previous investigations had identified 60 disease genes that affect a person's risk of developing Type 1 Diabetes.

Professor Grant Morahan, Director of the Perkins Centre for Diabetes Research, said the purpose of this investigation was to uncover how these disease genes caused diabetes.

He said that some genetic diseases like cystic fibrosis, are simple genetic diseases that are caused by a mutation in one gene and that mutation makes a faulty protein. Professor Morahan said it was thought complex diseases, like diabetes, would also be due to variants that changed proteins but his study found that was not the case.

The study tested 30,000 different genes in four cell types provided by people from some of the 4,000 families. Previously it was thought that if you wanted to prevent someone getting Type 1 Diabetes, scientists would need to develop a drug that would counter faulty proteins but this study suggests we need a different approach.

Professor Morahan said that a treatment needs to be found that will control the way the disease genes affect the immune system.

The results were published in the April edition of the leading *Journal of Immunology*.

Breakthrough discovery in childhood disability

A research team, including researchers from the Perkins, has uncovered the cause of microcephaly and intellectual disability in a young West Australian. Microcephaly is abnormal smallness of the head, a congenital condition associated with incomplete brain development. Microcephaly was linked with the Zika virus outbreak sweeping South America.

The team included a neurologist, radiologist, geneticist and bioinformatician. First author on the paper, Perkins researcher Isabel Hemming, said the team had uncovered a strong link between a specific chromosome mutation and intellectual disability, which helped them to establish the cause of this child's condition.

The study was significant because it concluded that the genetic mutation was almost certainly responsible for the child's symptoms. The mutation was found in the child, but not his parents. The team also found evidence to suggest that individuals with this sort of genetic mutation displayed a progressive decline in brain growth as they aged."

Head of the Perkins Brain Growth and Disease Laboratory, Associate Professor Julian Heng, said the study opened

the door to important new research into chromosomal triggers of brain growth defects, and possible methods of treatment.

The findings were published in the *American Journal of Medical Genetics* in May.

Perkins researchers decipher world-first muscle disorder case

Researchers from the Perkins Neurogenetic Diseases Laboratory discovered crucial information that could lead to new treatments for young patients with a devastating muscular disorder.

The team was asked to help solve the case of two unrelated patients, a one year old and four year old experiencing severe muscle stiffness and limited movement. During their investigation they joined with a multi-national team of researchers and studied a muscle protein that is strongly influenced by calcium.

The protein, known as tropomyosin-3 (TPM3), is vital for skeletal muscle development and plays a crucial role in healthy movement. When defective, this protein was known to cause a range of muscle disorders.
The researchers examined how the defective TPM3 in these patients might impact physical movement and focussed on determining whether the role of calcium in muscle contraction was disrupted. Dr Kristen Nowak from the Neurogenetic Diseases Laboratory said this was a world-first case where a TPM3 defect has produced these symptoms.

Previous cases with this genetic defect have generally had minimal sensitivity to calcium, but these patients are very sensitive. This information is really important for devising possible treatments for these patients or others with similar symptoms. Clinicians treating patients with similar symptoms will be able to provide targeted gene screening as a result of this study.

A new genetic player in autism

A study aimed at detecting the genetic triggers of autism spectrum disorder uncovered a new gene mutation, which could lead to better diagnosis and treatment outcomes.

The investigation was led by Associate Professor Julian Heng, Head of the Perkins Brain Growth and Disease Laboratory and revealed a connection between autism spectrum disorder and mutations to a gene known as DENR.

Associate Professor Heng said the research involved two unrelated patients with autism spectrum disorder, each had different genetic mutations that changed the way the DENR gene functioned.

The study found that foetal brain development seems to be disrupted by the DENR gene malfunction, which appears to affect the assembly of neural circuits in the brain. Associate Professor Heng said that by uncovering the ways genes such as DENR shape brain development, it is hoped that scientists might be able to recognise how the autistic brain is unique.

The recognition of what is unique amongst children with an autism spectrum disorder will lead to earlier diagnosis of autism and earlier intervention which are critically important to the management of mental health conditions such as autism.

This study involved research teams from Germany, Austria and the United Kingdom and was published in the prestigious journal *Cell Reports* in May.

Cause of mitochondrial dysfunction discovered by Perkins researchers

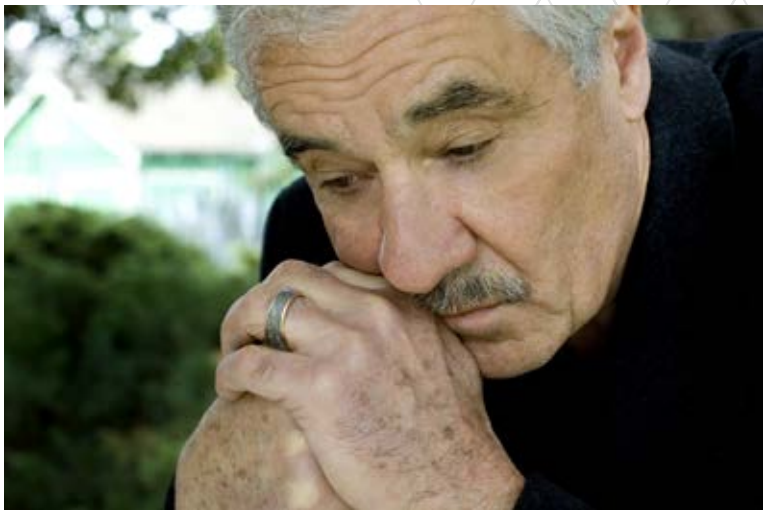
In June, the journal *Nature Communications* published an important discovery made by Perkins researchers on the cause of mitochondrial dysfunction.

The team from the Perkins Mitochondrial Medicine and Biology Laboratory, Led by Professor Alexandra Filipovska, found a connection between a mutation in the power source of our cells and a devastating disease that causes vision loss, heart disease and muscle defects in patients. The disease, known as Leigh Syndrome, has previously been linked to a genetic mutation, but Perkins researchers were able to determine how the mutation led to mitochondrial dysfunction.

Mitochondria are responsible for converting energy from food into a power source for our body and are essential for the normal function and survival of our cells. The researchers discovered that this mutation stopped production of a particular protein, which helps our cells generate energy. Lead researcher on the project, Dr Tara Richman, said without this protein the energy production system falls apart, which leads to symptoms similar to those seen in patients with Leigh Syndrome. In patients with Leigh Syndrome, symptoms often show up later in life as the function of mitochondria diminishes over time.

The research was a critical step in understanding more about the disease and how our mitochondria function.

Dementia projects established



Two important research programs were established at the Western Australian Centre for Health and Ageing (WACHA) as a result of $250,000 in funding in June. Of the funding awarded nationally though the Dementia Collaborative Research Centres, WACHA received the only two grants that were awarded to Western Australian researchers.

Director and geriatrician Professor Leon Flicker said the two projects were designed to deliver results and improve the quality of life for people living with dementia, as well as for their carers and extended family and friends.

One of the projects will look at medications for people with dementia and the other will look at how to improve low mood in people with dementia and the effect on their primary carer.

New technology to reduce secondary breast cancer surgeries

Thousands of breast cancer patients might be spared a second surgery thanks to ground breaking new technology developed by a team of engineers at the Perkins. Up to one in four women undergoing surgery to remove breast cancers will have to return to the operating theatre within weeks to remove further tissue, as small traces of tumour can be left behind.

Currently, surgeons use their finger to distinguish the edge of the tumour because cancerous tissue is much harder and stiffer than normal tissue, but this method doesn't detect tiny cancerous cells which could allow the tumour to regrow.

To solve this problem Perkins biomedical engineer, Dr Brendan Kennedy and his team of researchers from the Perkins and the University of Western Australia, have developed the world's first 3D printed finger-mounted optical imaging probe – a 'smart surgical glove'.

Dr Kennedy said the probe measures tissue stiffness at a microscopic level using high resolution imaging, allowing surgeons to detect cancer cells that are too small to see or feel but can continue to grow if left in the breast.

The finger can only identify large tumours so the ability to detect cancer at a cellular level is key to ensuring effective removal of the tumour.

The surgeon will be able to run their gloved finger around the edge of the tumour and the super sensitive probe will project an image of what they're touching on to a high resolution screen for far better visibility.

Dr Kennedy is working with surgeons and pathologists in Perth to test the first generation prototype on tissue taken from mastectomies.

He said the ability to translate research outcomes into patient benefits was fundamental, and he hoped consultations between surgeons and scientists would allow patient outcomes to continuously improve at a faster rate. Dr Kennedy is developing the glove in association with leading breast surgeon Professor Christobel Saunders and UWA's Professor David Sampson.

Intellectual disability and Down Syndrome

An investigation which aimed to understand the genetic basis for Down Syndrome has led to the identification of a gene which controls the formation of neural circuits in the brain.

New research led by Associate Professor Julian Heng, Head of the Brain Growth and Disease Laboratory identified a genetic factor which could be significant for intellectual disability as well as Down Syndrome.

Down Syndrome is recognised as the most prevalent form of intellectual disability and results from an extra copy of all or parts of chromosome 21. Notably, Associate Professor Heng discovered that there were rare cases of children with abnormalities in chromosome 21 who were intellectually disabled, but did not display clinical features consistent with a positive diagnosis for Down Syndrome.

Associate Professor Heng predicted that genetic factors specifically for intellectual disability might be present on chromosome 21. Guided by this notion, the team focussed its attention on a gene on chromosome 21 and went on to discover that EURL was critical for the production of appropriate numbers of neurons in the developing mammalian brain, as well as their ability to develop into functional brain circuits.

The data raises the possibility that treatments which correct the imbalance of gene products in brain cells, such as EURL, could lead to improvements in mental health and a better quality of life for individuals with certain forms of intellectual disability.

These findings were published in the Nature press journal, *Scientific Reports* in July.

Essential gene for healthy hearts discovered

Perkins researchers have improved the scientific understanding of how to build healthy hearts, after finding a gene that is essential for heart function.

Professor Aleksandra Filipovska and her team from the Perkins Mitochondrial Medicine and Biology Laboratory in collaboration with Professor Oliver Rackham and Professor Nils Göran Larsson and his team from the Max Planck Institute for Biology of Ageing in Germany, developed a model for cardiovascular disease by removing the gene, known as MRPP3, to examine its impact on heart function.

Professor Filipovska said the team found that without this gene, the heart becomes floppy, very soft and enlarged and ultimately can't support life. She said they knew this particular gene was involved in mitochondrial function but wanted to define its molecular role and how its loss affected heart function specifically.

The research showed that the gene is critical for life and without it the heart can't develop or work properly. Its loss causes profound enlargement of the heart, known as cardiomyopathy, that leads to death very early in life. The study showed that the MRPP3 protein teams up with two other proteins to enable the genes to work within the energy producing powerplants that exist in all of our cells and are essential for life. The heart is particularly sensitive to errors in these genes because it uses a lot more energy than other organs.

The research was published in the high impact journal *Cell Reports* in August.

Perkins researchers turn on cancer killing genes

Researchers from the Perkins used an exciting new technology to successfully switch on dormant tumour suppressor genes in multiple cancer types.

Dr Benjamin Garcia-Bloj, along with his colleagues from the Perkins Cancer Epigenetics Laboratory headed by Associate Professor Pilar Blancafort, used a gene-editing technology called CRISPR to 'wake up' key tumour suppressors to destroy the cancer from within.

In everyday life people often develop potentially cancerous cells, but there are systems that very efficiently recognise DNA damage and either repair it or self-destroy the problematic cell.

If the cell becomes badly damaged, the tumour suppressor gene will trigger a process to destroy the cell. Dr Garcia-Bloj said when these processes fail and a cancer takes hold, certain anti-cancer genes can be switched off but they are still present inside the cell. We call the genes in 'off mode' silent or dormant genes.

Dr Garcia-Bloj said that scientists have used CRISPR technology to activate dormant genes before, but his team was able to boost the genes 22,000-fold and stop the cancer growing in vitro. They tested the system on breast cancer, lung cancer and gastric cancer cells.

He said that now they know they can strongly activate the genes and have a big impact in cancer cells.

The research was published in the high quality journal *Oncotarget*.

Sudden infant cardiac death explained by gene mutation

A team of researchers, including scientists from the Perkins, has linked a faulty gene to the deaths of seemingly healthy children whose hearts suddenly stopped.

Last year the Perkins Neurogenetic Diseases Laboratory received DNA from a family in Scotland whose four-month-old baby had tragically suffered a cardiac arrest and died. With the family's permission, their doctor sent the baby's DNA to the Perkins and noted that the family were expecting a second child.

Perkins researcher, Dr Gina Ravenscroft, said the team analysed the child's DNA to find possible disease-causing genes.

While the team found two genetic variants in a gene called PPA2 that could be the cause of this disease they didn't have any other patients with variants in that gene. Months later the Perkins team was contacted by genetics researchers at the French Institute of Health and Medical Research who knew of two families with similar cardiac death and mutations in PPA2.

As a result the collaborators were able to quickly translate their findings into a genetic screening test for future babies who might face this silent disease risk.

The research was published in the high impact journal The *American Journal of Human Genetics* in September.

New method to fight hard to treat breast cancers

Dr Anabel Sorolla, from the Cancer Epigenetics laboratory, developed a new method to tackle aggressive breast cancers which is more effective than current treatments. It involves the use of nanoparticles to deliver a series of anti-cancer agents directly to the tumour. Her research focused on triple negative breast cancer, an aggressive cancer with few treatment options that becomes highly resistant to chemotherapy and often relapses after remission.

The investigation found that chemotherapy resistance in this type of breast cancer is linked to a DNA-altering protein.

The protein is found in two places in the body, in the brain and in the breast. In the brain the protein works to protect neurons from damage, warding off brain cell death that could lead to Parkinson's Disease. In breast tissue, the protein triggers cancer cell growth, spread and chemotherapy resistance. The new nanoparticles work by blocking the DNA-altering protein and delivering chemotherapy drugs directly to the tumour, while also making the cancer cells more susceptible to chemotherapy.

Dr Sorolla said her teams nanoparticles have been shown to be more effective than those currently used to treat patients. The team is currently testing a targeting molecule that functions like a GPS navigator and sends the nanoparticles straight to the tumour site. She said that their method works better than nanoparticles currently used in the clinic, partly because existing nanoparticles don't have targeting molecules.

The study was published in the high impact, international journal *Nanoscale* in September.

Genes provide clue to frog's origin

An international team, which included two Perkins researchers, has decoded the genetic sequence of the African clawed frog, an important model system for cell and developmental biology, and immunology.

Dr Ozren Bogdanovic and Professor Ryan Lister from the Perkins Epigenetics and Genomics Laboratory collaborated on the project which included researchers from the United States, Japan, Korea, the Netherlands, Australia, and Switzerland, and was led by Daniel Rokhsar and Richard Harland of the University of California, Berkeley.

The study, published in the high impact journal *Nature*, showed that this peculiar animal arose from an ancient combination of genes from two different frog species 18 million years. It revealed that the frog arose from the mating of two species, resulting in a "duplicated" genome, whereby the frog carries genetic material from two species. Interestingly, certain portions of the "duplicated" genome appear to be evolving at different rates.

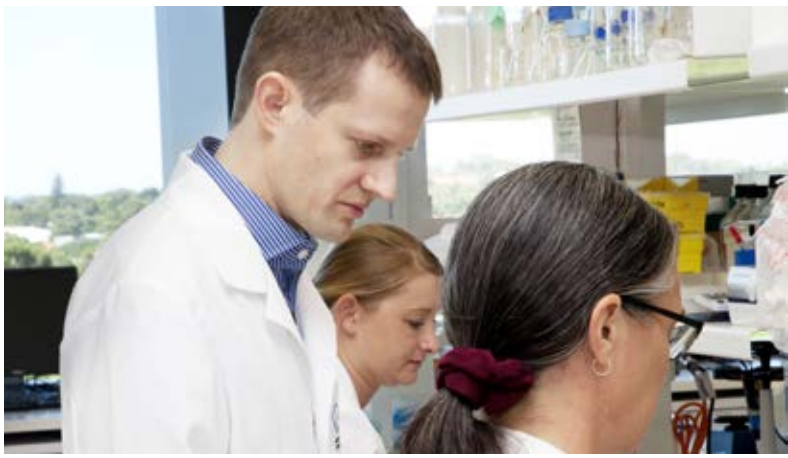
The two Perkins researchers contributed to the project by mapping the frog's epigenome. They mapped the precise genomic locations of an important biochemical signal, called DNA methylation, in the frog genome which is a very important step towards understanding of how genomes evolve and how genetics and epigenetics shape life on earth.

New treatment targeting chronic kidney disease

A new breakthrough treatment, based on technology developed by Associate Professor Kevin Pfleger, the Perkins Head of Molecular Endocrinology and Pharmacology, could potentially control a major symptom of chronic kidney disease.

Chronic kidney disease is an illness that affects one in three Australians and can lead to kidney failure, cardiovascular disease and premature death. The treatment aims to control protein leakage (proteinuria) from the kidneys - a common symptom of chronic kidney disease.

Associate Professor Pfleger says the drug therapy has the potential to treat other conditions such as non-alcoholic steatohepatitis (NASH), a form of non-alcoholic liver disease, which affects an estimated 6 million people in the US and currently has no established treatment.



AWARDS and HONOURS

Perkins researcher wins Millennium Science Award

Professor Alistair Forrest, Head of the Systems Biology and Genomics Laboratory at the Perkins, won the prestigious Millennium Science Award in February. Professor Forrest is the first West Australian based researcher to win the award since its inception. It was presented at the 37th Annual Lorne Genome Conference in Victoria.

The Millennium Science Award is granted to a young researcher who has made outstanding contributions to Australian scientific research.

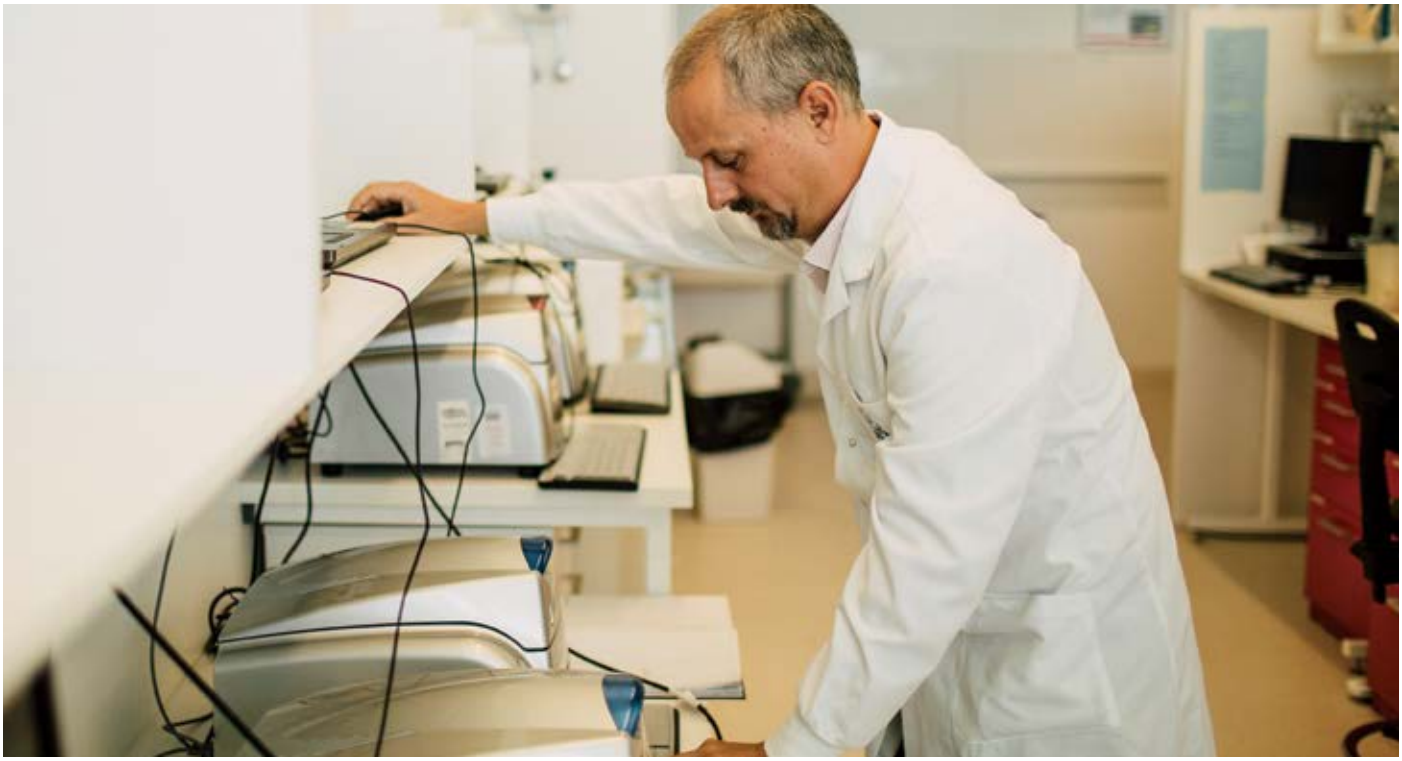
Eureka Prize for Professor Forrest

A major international project, led by Professor Alistair Forrest from Perkins, won a 2016 Australian Museum Eureka Prize. The 2016 Scopus Eureka Prize for Excellence in International Scientific Collaboration was awarded at a gala dinner in Sydney in September in recognition of the FANTOM5 project.

The project, which started in RIKEN Japan, involves researchers systematically examining the sets of genes used in most cell types of the human body. Professor Forrest, who returned from Japan to head the Systems Biology and Genomics Laboratory at the Perkins, said the work being undertaken through FANTOM5 had extensive implications for medicine.

Rather than traditional biology which focuses on one or two genes at a time, the ethos behind systems biology is to study all elements simultaneously to see how they work together.

Humans have evolved into complex multicellular organisms made of hundreds of different specialised cell types. Division of labour between these specialised cell types allows us to have more complex functions than simple single cell organisms, like being able to see, think, hear, fight infections and many other things we take for granted.



Dr Ravenscroft wins Young Tall Poppy Science Award

Dr Gina Ravenscroft has been recognised as one of Western Australia's best young scientists at the State ceremony of the prestigious Young Tall Poppy Science Awards. Dr Ravenscroft is a senior member in the Neurogenetic Diseases Laboratory, where she investigates the genetic causes of severe neuromuscular conditions.

Despite being early in her research career, Dr Ravenscroft is considered a leader in the field of disease gene discovery, for a group of neuromuscular conditions that present in utero and are often fatal. She has built a unique patient cohort through valuable collaborations with clinicians across Australia and overseas, and her work has already had a positive impact on families affected by these diseases.

The awards are run by the Australian Institute of Policy and Science (AIPS) to honour up-and-coming scientists who combine world-class research with a passionate commitment to communicating science.

Career Development Fellowship

In November, Dr Gina Ravenscroft was awarded a Career Development Fellowship by the National Health and Medical Research Council (NHMRC). Dr Ravenscroft's Fellowship was recognised for her remarkable work in the field of disease gene discovery for a group of muscle diseases that affect babies and are lethal or severely debilitating. Dr Ravenscroft has been able to help provide answers to families with children affected by these diseases.

World Muscle Society top honour

Dr Gina Ravenscroft was named World Muscle Society Young Myologist of the Year 2016, in Granada at the close of the Society's Annual Scientific Meeting.

Dr Ravenscroft's work involves finding and describing new human disease genes to develop screening tests for early diagnosis. Dr Ravenscroft and her team, collaborate regularly with Professor Forrest and together have re-examined existing patient data to find previously undiscovered disease genes.

Top British award

One of the Perkins brightest medical researchers was recognised with a prestigious award by the British Pharmacological Society. Associate Professor Kevin Pfleger won the Novartis Prize in recognition of his published work, which focuses on receptors throughout the body that are the target of many commonly used medicines.

While many current treatments result in unexplained effects due to a lack of understanding of their mechanism of action at the molecular level, Associate Professor Pfleger's research generates new knowledge about these mechanisms with a view to improving the effectiveness of current and future medicines, and reducing their side effects.

The Novartis Prize follows a recent Australian Research Council Linkage Grant of $499,000 over three years to Associate Professor Pfleger and Dr Karl Rosengren from the University of Queensland. They are chief investigators of a project to investigate the "Development of technologies to monitor multi-molecular complexes" in partnership with The University of Nottingham, BMG Labtech, Promega and Dimerix.

Associate Professor Pfleger was presented with the Novartis Prize in December at the British Pharmacological Society's Annual Dinner and Prize Giving.

Linear wins Export Award

Linear Clinical Research Ltd, the clinical trials arm of the Perkins won a WA industry export award for the fourth consecutive year.

Linear was established six years ago, and since 2012 has consistently won government awards in the Business Services or Health and Biotechnology categories. Linear CEO, Dr Michael Winlo, said he was delighted that Linear had been recognised with a Business Services Export Award but noted that Linear was more than a commercial venture. Linear works closely with local physicians to run clinical trials for therapies developed around the world. The main focus of Linear is to ensure that local patients can get access to new and innovative treatments that wouldn't otherwise be available.

The Western Australian Export Awards is part of a national program that recognises and honours Australian companies engaged in international business who have achieved sustainable growth through innovation and commitment.

COMMUNITY ENGAGEMENT

Weekend to End Women's Cancers raises $2.3M for the Perkins

The Weekend to End Women's Cancers presented by Hawaiian raised $2.3 million for women's cancer research projects at the Perkins.

Held in early April, the two-day, 60 km walk through Perth and overnight camp at McCallum Park, involved hundreds of walkers and volunteers, brought together communities of cancer survivors, patients, supporters and walkers who hadtrained and fundraised for months in order to participate.

Professor Peter Leedman thanked the 752 walkers and the sponsors, volunteers and donors who made the Weekend to End Women's Cancers presented by Hawaiian, a great success. He said the Perkins is very grateful to everyone supporting its mission to be a world leader in medical research.

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

MACA Ride to Conquer Cancer raises $4 million to conquer cancer

In October, the Perkins announced it has raised $4 million to support its ground breaking cancer research through the MACA Ride to Conquer Cancer, held over the weekend of 15 – 16 October.

At the opening ceremony, Professor Leedman particularly thanked title sponsor, MACA, for their extraordinary commitment to the Perkins. In 2016, Team MACA raised $1.2 million, bringing the total raised during their five year partnership with the Perkins to $6 million.

Professor Leedman also thanked Team Woodside, whose fundraising through the Ride over the past five years has totalled $1 million. He emphasised that it wasn't only the big companies that made the Ride such a success. He said it was the hundreds of individual participants whose lives have been touched by cancer who are the backbone of the Ride.

Each year the two-day, 200 km Ride brings together communities of survivors, cyclists and supporters with one common goal to make a difference.

Lotterywest BioDiscovery Centre

The Lotterywest BioDiscovery Centre was established by the Perkins to increased community awareness about the importance of medical research in 2014. Led by Pauline Charman and her enthusiastic and innovative team, 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 Centre employs a team of talented medical researchers, including Honours and PhD students from within the Perkins to help visitors with activities that are run in both a "wet lab" laboratory environment and a "dry lab" Community Resources Room. 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. Customised programs have been developed for the school students and community and corporate groups.

Lotterywest
BioDiscovery
Centre

Open Day Success

In August the Perkins welcomed almost 700 visitors to its Nedlands facility for its second annual Open Day. Community members were invited to visit the Perkins state-of-the-art building housed at the QEII Medical Centre and were treated to an exclusive look inside Perth's leading adult medical research institute.

The program included guided tours of the building by medical researchers, hands-on activities in the Lotterywest BioDiscovery Centre and presentations from some of WA's leading doctors and researchers, on the latest research and treatments for the most challenging human diseases.

Wesfarmers Oration featured CEO of Texas Medical Centre

The Wesfarmers Harry Perkins Oration is held annually in November in memory of a remarkable man, Harry Perkins. It was Harry's vision and commitment that led to the establishment of the Perkins. He served as the inaugural Chairman from 1998 to just before his death in 2002. Harry was a farmer from Bruce Rock who went on to enjoy a distinguished business career, culminating in 16 years as Chairman of Wesfarmers.

The 2016 Orator was Dr Robert Robbins. A cardiothoracic surgeon, he joined the Texas Medical Center (TMC) as president and CEO in 2012. Since then, he has significantly enhanced the institution's commitment to collaboration, introducing five cross-institutional research initiatives centered on innovation, genomics, regenerative medicine, health policy and clinical research. Professor Robbins topic was "21st century medicine: insights from the world's largest medical center". His talk was superb and provided an overview of TMC and some perspective of its future plans.

Professor Peter Leedman, Hon Kerry Sanderson AC, Dr Robert Robbins, Mr Laurence Iffla

Financial Report

STATEMENT OF COMPREHENSIVE INCOME FOR THE YEAR ENDED 31 DECEMBER 2016

REVENUE	2016 $	2015 $
Funding and grants – operating	3,374,393	3,796,181
Grants – capital works	21,124	385,303
Rendering of services - clinical billings	7,945,427	7,663,592
Donations	1,584,921	1,913,094
Event income	5,626,063	6,476,241
Facility income	6,007,014	8,061,010
Other income	1,032,562	992,061
Interest income	529,982	542,246
	26,121,486	**29,829,728**

EXPENSES	2016 $	2015 $
Employee costs	(6,977,889)	(6,371,300)
Laboratory and clinical expenditure	(5,175,988)	(4,952,084)
Cost of sales – clinical billings	(3,571,806)	(3,196,299)
Depreciation and impairment	(7,850,883)	(7,527,234)
Administration, office, event and utilities expenditure	(9,410,708)	(10,216,892)
Net deficit from continuing operations	**(6,865,788)**	**(2,434,081)**
Other comprehensive income / (loss)	**(32,291)**	**13,613**
TOTAL COMPREHENSIVE LOSS	(6,898,079)	(2,420,468)

Financial Report

STATEMENT OF THE FINANCIAL POSITION FOR THE YEAR ENDED 31 DECEMBER 2016

ASSETS	2016 $	2015 $
CURRENT ASSETS		
Cash and cash equivalents	29,154,750	30,967,441
Cash held in trust	3,948	417,303
Trade and other receivables	3,629,474	10,424,247
Inventory	7,425	10,725
Prepayments	240,183	181,606
TOTAL CURRENT ASSETS	**33,035,780**	**42,001,322**
NON-CURRENT ASSETS		
Investments	1,144,060	264,893
Property, plant and equipment	131,042,644	139,541,402
TOTAL NON-CURRENT ASSETS	**132,186,704**	**139,806,295**
TOTAL ASSETS	**165,222,484**	**181,807,617**

LIABILITIES	2016 $	2015 $
CURRENT LIABILITIES		
Trade and other payables	5,090,907	11,860,141
Grants held in trust	12,557,168	12,295,058
Lease liabilities	-	1,991,783
Non interest-bearing liabilities	225,000	2,000,000
Employee entitlements	697,162	627,360
TOTAL CURRENT LIABILITIES	**18,570,237**	**28,774,342**
NON-CURRENT LIABILITIES		
Non interest-bearing liabilities	505,397	-
Employee entitlements	123,607	111,953
TOTAL NON-CURRENT LIABILITIES	**629,004**	**111,953**
TOTAL LIABILITIES	**19,199,241**	**28,886,295**
NET ASSETS	**146,023,243**	**152,921,322**
Accumulated surplus	145,950,078	152,815,866
Available for sale revaluation reserve	73,165	105,456
TOTAL SURPLUS	**146,023,243**	**152,921,322**

The Statement of Financial Position provided above, together with the attached Statement of Comprehensive Income, have been extracted from the audited special purpose financial statements of the Harry Perkins Institute of Medical Research and its controlled entities. The summary financial information does not include all the information and notes normally included in an audited financial report. The audited special purpose financial report can be obtained upon request to the Chief Financial Officer.

The audited financial report (from which the summary financial information has been extracted) has been prepared in accordance with the requirements of the Associations Incorporation Act 2015, Australian Charities and Not-for-profits Commission Act 2012 and Regulations 2013, Australian Accounting Standards and other authoritative pronouncements of the Australian Accounting Standards Board.

Perkins

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