Auckland Medical Research Foundation

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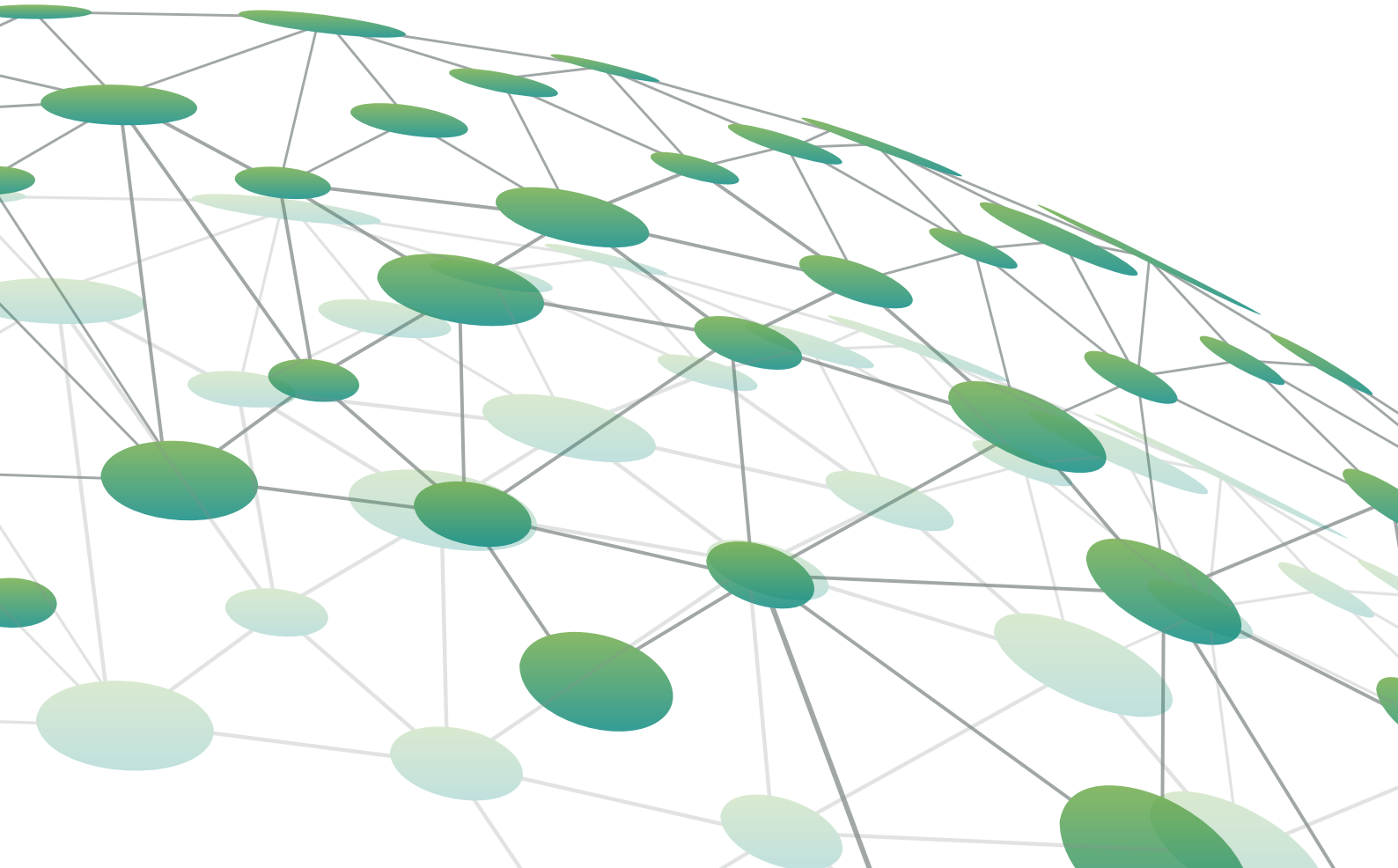
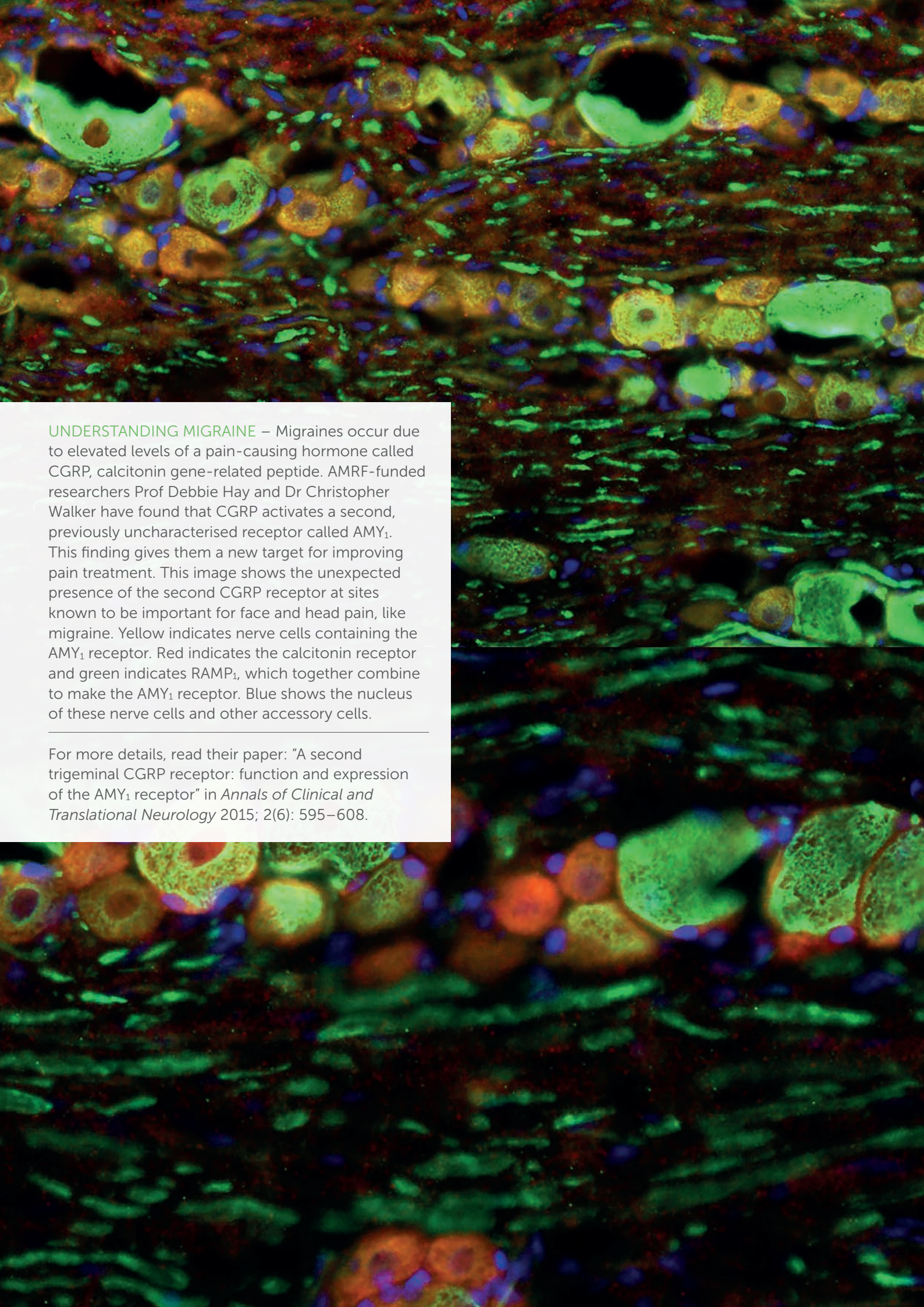
SUPPORTING MEDICAL RESEARCH FOR *60 years*

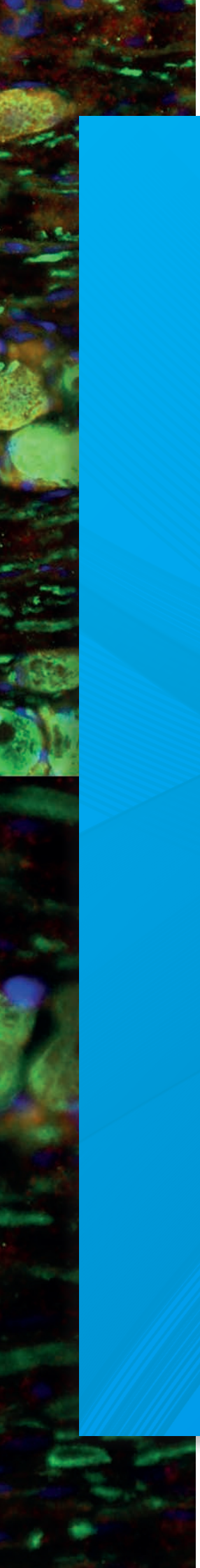
ANNUAL REPORT 2015





UNDERSTANDING MIGRAINE – Migraines occur due to elevated levels of a pain-causing hormone called CGRP, calcitonin gene-related peptide. AMRF-funded researchers Prof Debbie Hay and Dr Christopher Walker have found that CGRP activates a second, previously uncharacterised receptor called AMY_1. This finding gives them a new target for improving pain treatment. This image shows the unexpected presence of the second CGRP receptor at sites known to be important for face and head pain, like migraine. Yellow indicates nerve cells containing the AMY_1 receptor. Red indicates the calcitonin receptor and green indicates $RAMP_1$, which together combine to make the AMY_1 receptor. Blue shows the nucleus of these nerve cells and other accessory cells.

For more details, read their paper: "A second trigeminal CGRP receptor: function and expression of the AMY_1 receptor" in *Annals of Clinical and Translational Neurology* 2015; 2(6): 595–608.



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REGISTERED OFFICE

PO Box 110139, Symonds Street, Auckland 1150
Ph: 09 923 1701 | Fax: 09 362 0458 | Web: www.medicalresearch.org.nz
Charity Commission Registration Number: CC22674

President's Report & Medical Committee Report

YEAR ENDED 31 DECEMBER 2015

Jeff Todd

President's Report

2015 was a very special 60th anniversary year for the Auckland Medical Research Foundation. September saw the Foundation inducted as the first member into the University of Auckland's Chancellor's Circle - a special recognition for our lifetime contributions surpassing $50 million.

In November around 300 friends of the AMRF were guests at the Auckland Medical School to mark the occasion at an event sponsored by our bank BNZ and our key business partner BlueStar Group. Many of our guests represented generations of families who have supported us financially since our formation in 1955. With this valuable ongoing support from our founders, their descendants and the many others who have joined us on our journey, we celebrated medical research distributions totalling over $67 million in the 60 years to 2015.

Professor Sir Peter Gluckman, the Prime Minister's Chief Science Advisor and a recipient of AMRF funding early in his career (a summer studentship and the prestigious Ruth Spencer Fellowship in 1975), gave a talk on his career and research challenges and successes in New Zealand. He acknowledged the Foundation's unique and critical role in the sector particularly in funding early-career research talent. He reinforced AMRF's belief that significant advances in medicine can only come about through quality research.

The Foundation strives to improve the health of New Zealanders through funding the highest quality medical research of all kinds. In 2015 $4.34 million was awarded in research grants – a record and a significant lift from previous years, largely due to additional income from external funding partners including our key partner Perpetual Guardian and others including the Public Trust, Kelliher Charitable Trust and the Paul Stevenson Memorial Trust. However, only 20 per cent of research applications received by the Foundation were funded, reflecting both our stringent quality tests and our inability to fund all of those applications which meet our criteria.

The Foundation is most grateful for all donations and contributions received in 2015 and in particular for the generous annual endowment which covers our operating expenses.

Our Executive Director, Kim McWilliams, and her small team have ensured the Foundation's operations have been conducted with professionalism and efficiency. The team has been tireless in its efforts and innovative in its approach to growing our capital base and available research funding in a very competitive philanthropic environment.

My personal thanks are extended to trustees, board committee chairs and members who all contribute generously with their time, experience and expertise. In particular, I pay tribute to the Medical Committee, under the chairmanship of Professor Peter Browett, whose demanding but essential work in reviewing applications for grants absorbs many hours in evaluation and assessment.

With the continuing commitment of trustees, staff, members, grant holders, funding partners and donors we look forward to the next 60 years with enthusiasm and optimism.

Jeff Todd
President

Prof Peter Browett

Medical Committee Report

The Auckland Medical Research Foundation is one of the leading supporters of medical and health research in New Zealand. Our funding supports top-quality innovative and on-going research initiatives undertaken in the Auckland/Northland region for the benefit of all New Zealanders.

The awarding of these funds would not be possible without the dedication of the AMRF Medical Committee who provide their time and expertise free of charge to assess all the applications and make recommendations for funding to the Board of Trustees. In 2015 we welcomed Dr Evelyn Sattlegger, Senior Lecturer in Molecular Biology at Massey University, Auckland who offers her expertise in the areas of molecular and cellular biology, genetics and microbiology. We also fare-welled Dr Bruce Russell who has taken up a position as Associate Professor in Pharmacy at the University of Otago after serving for 2 years on the AMRF Medical Committee.

The Medical Committee have been busy this year, assessing 236 grant applications over the course of the year split between 6 grant rounds. We successfully funded 70 grants at a total cost of over $4.34 million – a success rate of 29.7% – which although is high in the arena of medical and health research funding, still means that many worthy applications are unable to be supported. Within our funded grants we have continued to support researchers and clinicians in all stages of their careers, and can proudly say that through the awarding of 3 Doctoral Scholarships, 2 Postdoctoral Fellowships, a Ruth Spencer Medical Research Fellowship, 2 Kelliher Charitable Trust Emerging Researcher Start-up Awards, and for 6 of the 23 awarded project grants, we have continued to support young and emerging researchers at the early stages of their careers.

I would like to thank the AMRF office staff for their support of the Medical Committee throughout the year. In particular my thanks go to Dr Hannah Gibbons (Research Programme Manager) and Dr Jessica Costa, (pro tem Research Programme Manager/ Research Development Manager) for their stewardship of the Grants Portfolio, and to Leigh Harrison of ElseApps Ltd for the maintenance and further development of the AMRF portal (our fully web-based electronic application and assessment system).

Peter Browett
Chair, Medical Committee
Professor of Pathology,
Department of Molecular Medicine and Pathology,
University of Auckland

Some members of the 2015 Medical Committee at the AMRF 60th Anniversary Event.

KNOWLEDGE GAINED THROUGH RESEARCH MEANS BETTER PATIENT CARE AND IMPROVED MEDICAL TREATMENTS

AMRF EXISTS FOR ONE PURPOSE: to improve the health of New Zealanders through funding the highest quality medical research. We believe that such research is vital to making genuine advances in patient care and medical treatments. But that research comes at a cost...

GROWING A SUSTAINABLE FUND

Funding for medical research in New Zealand is critical for our future health. In 1955 a group of Auckland medical and business leaders, united in their concerns about serious shortfalls in funding for medical research, came together to form the AMRF. From small beginnings, they grew a sustainable and enduring investment fund to provide research grants every year.

OUR COMMITMENT TO FUNDING EXCELLENCE

Our Medical Committee (comprised of clinical and biomedical scientists) appraises every request for funding and will consider applications from every field of modern medicine. Only the best applications meet our rigorous standards when assessing the medical and scientific importance of new research proposals.

SUPPORTING THE BEST NEW ZEALAND RESEARCH TALENT

AMRF have supported many successful scientists in New Zealand including Prof Sir Peter Gluckman, Sir Brian Barratt-Boyes and Prof Sir Graham Liggins.

Through our funding, we help to establish and retain our best emerging talent, repatriate key researchers and build capability in the New Zealand research community.

YOUR DONATION IS APPLIED ONLY TO MEDICAL RESEARCH

We apply 100% of donations, bequests, legacies and income from investments to medical research. Our operating expenses are met by a separate charitable fund. So if you donate to the AMRF, you can be assured that every cent of your donation is applied to advancing the highest quality medical research.

A SELECTION OF FIELDS SUPPORTED BY YOUR DONATIONS

Arthritis | Asthma | Biomedical Imaging | Bones & Muscles | Cancer | Cardiovascular | Cellular & Molecular Biology | Diabetes | Gastrointestinal | Endocrinology | Hearing | Immunology | Infectious Disease & Vaccine Development | Kidney | Liver | Lungs | Maternal & Newborn Health | Mental Health | Neuroscience & Neurological Disease | Nutrition | Pancreatitis | Population Health | Reproduction | Skin Biology & Wound Healing | Stem Cell Biology | Surgery | Vision

AUCKLAND MEDICAL RESEARCH FOUNDATION MARKS ITS 60TH ANNIVERSARY AND OVER $60 MILLION GRANTED TO MEDICAL RESEARCH

Generously supported by BNZ and BlueStar Group

In 1955 an extraordinary group of 77 foundation members each donated £50 to a capital fund for Auckland led medical research. They recognised that Government research funding would never be adequate to provide all that was required for a sound and stable research base in Auckland and started a drive for life members, annual members and donors to sustain the Foundation.

An endowment was set up in perpetuity for administration costs, enabling 100% of donations to go directly to research, which constituted a strong offering to potential donors. From small beginnings, with many notable New Zealanders contributing on the way, they grew a sustainable and enduring investment fund to provide research grants every year.

On the evening of Monday 23 November 2015, around 300 Foundation members, descendants of early foundation members, donors and supporters, and recipients of grant funding met at a special event hosted by BNZ Partners to celebrate this milestone. After the opening words from the Minister of Health, Hon Dr Jonathan Coleman, Prof Sir Peter Gluckman, Chief Scientific Advisor to the Prime Minister presented an address on the challenges and opportunities in this changing research environment and the many spillover benefits of New Zealand's contribution globally.

Thank you, everyone, for your generosity over 60 years.

Highlights from AMRF's 60th Anniversary Event

Cliff Hart, Barbara & Keith Ewen


Carey Pearce, A/Prof Graeme Woodfield & Jean Lawry


Judi Byrne (left), Pat Watkins & Peter Byrne


Murray & Sue Lee, Rosalie Settle, Dennis Edel & Jamie Pickford


Donald MacCulloch, Anna Yates, John Griffiths & Christine Horton


Chris Blincoe, Andrew Barnes & Prof Peter Thorne


Sir Don McKinnon & Hon David Cunliffe


Clare de Lore, Mark Bentley & Donna Nicolof


Bruce and Mary Ann Goodfellow, Dr Anna King & Paul Keeling

Hart Family

Peter Goodfellow, Sir Peter Gluckman, Anne Gaze & A/Prof Mervyn Merrilees

John Robb & Andrew Horton

David Todd, Gretchen Hawkesby & Matthew Malaghan

Alison Roe, Gary Browne, Kim McWilliams, Murray Polson & Stephanie Sidoruk

Prof Richard Fisher, Dr Susan Macken & Grant Kenyon

Distinguished Prof Jane Harding, Prof Andrew Shelling & Prof Linda Bryder

TB & Marion Goodfellow, Graham & Sarah Coxhead & John Griffiths

Lady Gluckman & Desley Goodfellow

Geoff Baxter, Anne Batley-Burton, Peter Goodfellow & Richard Burton

Distinguished Prof Ian Reid & Prof Rod Dunbar

Jill Cowling & Jeff Todd

Ian & Tove Stevenson & Kim McWilliams

Vice-Chancellor Stuart McCutcheon, Hon Jonathan Coleman, Shelley Ruha & Prof John Fraser

James Mutch & Kim McWilliams

Highlights from AMRF's 60 years continued

2015

*AMRF has committed over **$60 million** to medical research in 60 years!*

2013

AMRF partners with Perpetual Guardian

2012

The **AMRF Auditorium** opens in the University of Auckland's Faculty of Medical & Health Sciences, attended by the Rt Hon John Key (centre), Dean Ian Fraser (left), and AMRF Board President Jeff Todd (right)

2011 Mr Jeff Todd becomes AMRF President

2005

The **AMRF Medical Sciences Learning Centre** is opened by The Rt Hon Helen Clark to mark AMRF's *50th anniversary!*

2002 Mr Bruce Cole becomes AMRF President

Research funding totals over $23.9 million

1990 Mr George Blanshard becomes AMRF President

Research funding totals over $8.1 million

1984 Sir Henry Cooper KBE becomes AMRF President

Research funding totals over $3.1 million

1983

AMRF begins funding research that leads to development of a **cooling cap** that saves babies around the world from brain damage

Photo: Oakland Hospital, USA

1980

AMRF celebrates 25 years – its ***Silver Jubilee***

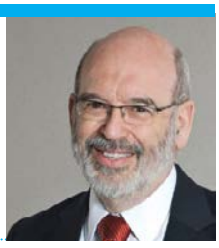
Research funding reaches over ***$1 million***

1978 Sir Harcourt Caughey KBE JP becomes AMRF President

Research funding totals over $663,000

1975

Prof Sir Peter Gluckman is awarded the prestigious Ruth Spencer Medical Research Fellowship



1972

AMRF begins funding summer student research projects

1965 Sir Kenneth Myers KBE becomes AMRF President

Research funding totals £38,000

1955

AMRF is established with £50 contributions from 80 prominent Auckland leaders including:

- Sir Douglas Robb
- Dr W E Henley
- Sir Harcourt Caughey
- Sir Kenneth Myers

First President, John Grierson CBE, also Chair of ADHB

"I have every confidence that the Foundation will strengthen Auckland's resolve to help itself in the vital sphere of medical research"

Annual Report 1957/58

George Grey Special Collections, Auckland Libraries, 34-G358, 1947

AMRF Presidents

First President, John Grierson CBE, also Chair of ADHB

"I have every confidence that the Foundation will strengthen Auckland's resolve to help itself in the vital sphere of medical research."

By the end of his tenure in 1964, research funding totals over £38,000

1965 Sir Kenneth Myers KBE becomes AMRF President

"This Foundation has acted as a catalyst for the increase in activity in the area of medical research."

"This is more than just another appeal... Medical research is an investment for the community."

By the end of his tenure in 1978, esearch funding totals over $663,000

1978 Sir Harcourt Caughey KBE JP becomes AMRF President

"The public is requiring maximum efforts to improve and conserve its greatest asset, the health of the people.

This can be aided and achieved to a considerable extent by sound and practical research in all forms."

"I suggest that it is important that privately financed Foundations such as the AMRF which encourages research right across the spectrum of medical interest should continue to be able to offer support."

By the end of his tenure in 1984, research funding totals over $3.1million

1984 Sir Henry Cooper KBE becomes AMRF President

"Medical research... must be regarded as essential to the welfare of the nation."

"The extension of knowledge is an unending process and knowledge may be pushed forward only slightly by even the best efforts... The Foundation will be fulfilling its main purpose if it makes wise provision for able men and women to continue to add to the fund of knowledge collected by their predecessors."

By the end of his tenure in 1990, research funding totals over $8.1million

1990 Mr George "Snow" Blanshard becomes AMRF President

"Our Foundation is certainly committed to maintaining its independent role and support of medical research in Auckland. Without continuing research the practice of medicine must be affected."

"I must express our sincere appreciation for the support given by way of donation, subscription, legacy and bequest. These funds make up a large part of the money available for research, and without this generosity the ability to assist in so many research projects would be severely curtailed."

By the end of his tenure in 2001, research funding totals over $23.9million

2002 Mr Bruce Cole FCA FNZIM becomes AMRF President

"Demands for medical research and education in New Zealand are, all too often, frustrated by a lack of funding... The work of the Foundation and the contributions of its benefactors play an important, even vital, part."

By the end of his tenure in 2011, research funding totals over $45million

2011 Mr Jeff Todd CBE becomes AMRF President

"Building capacity and capability for a world-class research community in New Zealand is at the heart of our philosophy and vision...With the continuing commitment of Trustees, staff, members, grant holders, funding partners and donors the future success of the Foundation is assured."

In 2015 AMRF funding totals over $60million

An AMRF Success Story

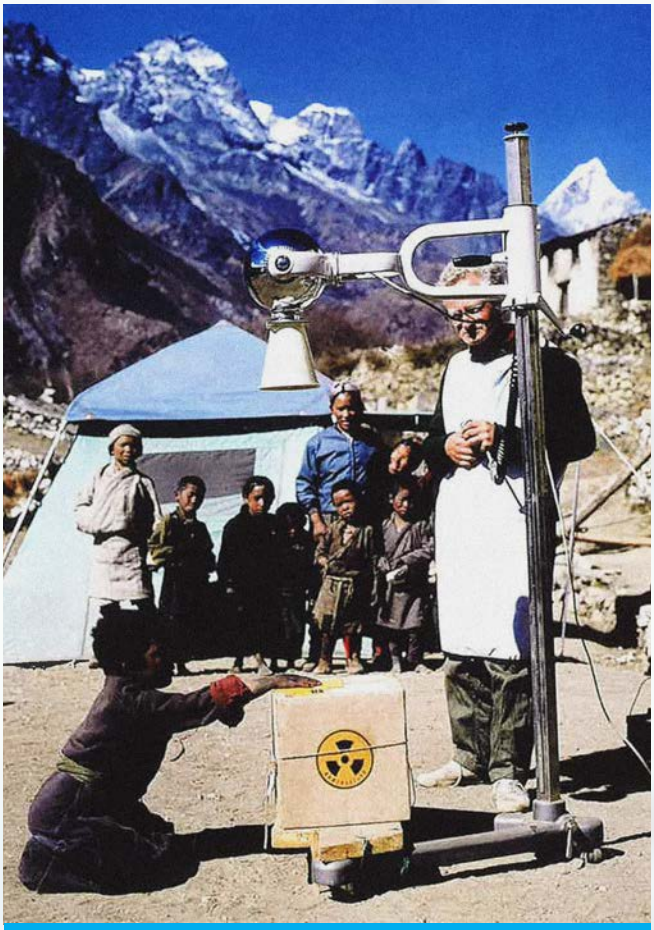
CLIFF HART, MOBILE RADIOGRAPHY PIONEER

Cliff Hart trained in Auckland and Greenlane Hospitals, graduating in 1947. He was Charge Radiographer at both Greenlane and Princess Mary Hospitals.

In the 1950s, he established a successful portable X-ray service.

In 1966 he advised Kaye Ibbertson and Ed Hillary on the first X-ray machine to be carried to and installed in Hillary Hospital, Nepal. In 1969 he established another independent, self-contained mobile radiography unit for Auckland in a VW Kombi van with a radio telephone. Cliff provided the service to small hospitals, surgeries, rest homes and domiciles until 1990. With the support of the Auckland radiologists, he received a practising licence from the National Radiation Laboratory – the only non-medically trained recipient.

Cliff is an Honorary Fellow and was President (1957-58) of the NZ Branch of the Society of Radiographers, and was President of the NZ Society of Radiographers (1962-63).



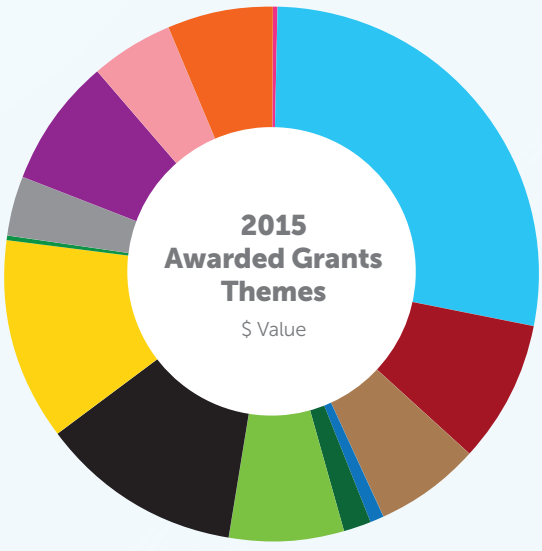
Radiographer Jack Tait with the X-ray machine in Nepal.

Cliff (centre) with colleagues Peter Nicholson (left) and Russell Wade (right), who are both still with the service.

Cliff Hart's self-contained mobile radiography unit in a VW Kombi van with a radio telephone.

GRANTS AWARDED

70 Grants Awarded Totalling $4,336,122



- Biomedical Imaging (2) | $5,048 0.12%
- Cancer (9) | $1,203,977 27.77%
- Cardiovascular Science (7) | $370,517 8.54%
- Cellular and Molecular Biology (5) | $279,713 6.45%
- Endocrinology, Metabolism and Nutrition (3) | $35,614 0.82%
- Infection and Immunity (2) | $70,179 1.62%
- Musculo-skeletal Science (2) | $308,677 7.12%
- Neuroscience (10) | $520,906 12.01%
- Other (8) | $532,124 12.27%
- Population Health (4) | $10,557 0.24%
- Pulmonary, Renal, Nephrology and Gastrointestinal Sciences (3) | $165,063 3.81%
- Reproduction, Development, Maternal and Newborn Health (9) | $335,447 7.74%
- Sensory Sciences (4) | $212,800 4.91%
- Surgery (2) | $285,500 6.58%

$ Value each theme
% Total expenditure
(n) Number of grants

Grants Awarded

PROJECT GRANTS

HBeAg SEROCONVERSION ($123,428 – 2 years) 2115001

Dr William Abbott
New Zealand Liver Transport Unit,
Auckland District Health Board

A chronic hepatitis B virus (HBV) infection carries a high risk of developing liver cancer. This risk is particularly high in patients who have a viral protein in their blood called the hepatitis B virus 'e' antigen (HBeAg). One of the primary goals of current HBV treatment is to stop production of HBeAg in the liver, as this reduces the risk of liver cancer. Unfortunately, most patients do not permanently clear the HBeAg on treatment, and new therapeutic strategies to suppress HBeAg production are needed. There is a natural mechanism by which some patients abrogate HBeAg production known as HBeAg seroconversion. It results from the accumulation of mutations in the viral DNA that stop HBeAg production. The mechanisms that drive accumulation of these mutant viruses are unknown. One possibility is that the intracellular innate immune system, which exists within all cells, recognises the HBeAg and suppresses its production. The purpose of this project is to find evidence that the intracellular innate immune system interacts with the HBeAg. This will give clues to the mechanisms that naturally suppress HBeAg production and provide targets for development of new treatments.

FUNDED BY: John and Poppy Stilson Endowment Trust

EPISTASIS IN CVID ($67,415 – 1 year) 2115002

A/Prof Rohan Ameratunga, A/Prof Klaus Lehnert, Dr Euphemia Leung, Dr See-Tarn Woon
Virology and Immunology,
Auckland District Health Board

Common Variable Immunodeficiency disorder (CVID) is the most prevalent symptomatic primary immunodeficiency that requires medical intervention. Up to 20% of non-consanguineous families have two or more affected first degree relatives. In spite of this, the causative genetic defects have not been identified in the majority of patients with CVID. With the assistance of our previous AMRF grant, we have applied modern genome-wide approaches to unravel the genetic basis of CVID in a family. Our hypothesis was that another gene was involved in the pathogenesis of CVID in this family. We have identified a second nonsense mutation in the TCF3 transcription factor (T168fsX191), which is likely to contribute to the phenotypic presentation in this family. This is potentially one of the best examples of digenic inheritance in humans and may be proof of concept that epistasis could play an important role in the pathogenesis of CVID. We requested funding to identify the pathological mechanisms responsible for the CVID-like phenotype in this family.

FUNDED BY: AC Horton Estate

TRANSLATIONAL REGULATION IN BREAST CANCER ($109,007 – 1.5 years) 1115003

Dr Marjan Askarian-Amiri, Dist. Prof Bruce Baguley, Dr Graeme Finlay
Auckland Cancer Society Research Centre,
University of Auckland

Breast cancer is the third most common cancer in New Zealand and its treatment is still a major challenge. There is a great need to better understand the molecular mechanisms underlying its pathogenesis, so as to allow the development of improved therapies. Many genetic factors are known to be involved in breast cancer progression, and in the last decade, the role of epigenetic factors have been implicated. Epigenetic changes do not involve DNA sequences but arise when chemical tags in the DNA environment affect gene expression and cause cellular and physiological variations. We are studying one epigenetic mechanism that may regulate the ability of ribosomes to select particular messenger RNA molecules for use in protein synthesis in breast cancer cells. We anticipate that these findings will shed light on novel mechanisms that regulate the production of proteins at ribosomes, will reveal mechanisms of cancer development, and will provide us with potential targets for new therapies in breast cancer.

FUNDED BY: Anonymous Donor

BIOAVAILABLE ANALOGUES OF THIENO[2,3-B]PYRIDINES ($143,432 – 2 years) 1115004

Dr David Barker, Dist. Prof Bill Denny, Dr Johannes Reynisson
School of Chemical Sciences,
University of Auckland

Recently it has been discovered that thieno[2,3-3]pyridines have high efficacy against a range of human tumour cell lines in particular triple negative breast cancer cells, which are particularly difficult to treat in the clinic. These compounds were found to target phospholipase C (PLC) a protein involved in crucial cellular processes namely, growth factor induced cell motility and cell adhesion. The compounds also sensitise cancer cells and improve the activity of other clinically used cancer treatments. Previous thieno[2,3-b] pyridines were however poorly soluble and this limited their therapeutic use. The aim of this project is to prepare new compounds similar to the thieno[2,3-b] pyridines which have increased solubility under physiological conditions. The new compounds will be prepared using a combination of molecular modelling, advanced synthesis and then tested using an array of sophisticated biological assays. We believe it is possible to introduce a whole new therapeutic dimension to cancer treatment based on the inhibition of PLC.

FUNDED BY: Anonymous Donor

PREVALENCE OF ORAL HPV INFECTION
($151,243 – 2 years) 1115005

Dr Carol Chelimo, A/Prof Merilyn Hibma, Prof Suzanne Garland, Prof Thomas Lumley
Dept of Obstetrics & Gynaecology, University of Auckland

Squamous cell oropharyngeal cancers (OPCs) have been linked to human papillomavirus (HPV) infection. Oropharyngeal cancers affect the oropharynx, tonsil and base of the tongue. A rapid rise in squamous cell OPCs has been observed, mainly among males, in New Zealand (NZ) and several high-income countries. However, there is lack of data on the prevalence of oral HPV infection in NZ, and conclusive evidence is lacking on determinants of oral HPV infection. To address this, we will undertake a population-based study to provide NZ-specific estimates of oral HPV prevalence in males and females aged 18-64 years residing in the Auckland Region. We will also determine which factors are associated with oral HPV infection, and whether females who have been vaccinated against HPV have a lower oral HPV prevalence. Findings from this study will likely have clinical and public health implications. It will provide a better understanding of the rising incidence of OPC in NZ males and information that would be useful in implementing strategies to prevent HPV-related oral cancers (such as, extending HPV vaccination to males).

FUNDED BY: Anonymous Donor

MELATONIN AND PREECLAMPSIA
($53,274 – 1.5 years) 1115006

Dr Qi Chen, Dr Katie Groom, Prof Larry Chamley, Prof Peter Stone
Dept of Obstetrics & Gynaecology
University of Auckland

Preeclampsia is a human pregnancy specific disorder which affects 3-5% of pregnancies. There is no effective treatment except delivery of the placenta/foetus. While the pathogenesis of preeclampsia is unclear, it is known that this disease is triggered by a toxic factor(s) released from the placenta. Trophoblastic debris may be one such factor. Trophoblast debris is shed from the placenta into the maternal blood in all pregnancies but there is increased trophoblastic debris shed from the placenta in preeclampsia and this debris is toxic, causing endothelial cell activation. We reported that antiphospholipid antibodies, a strong risk maternal factor of preeclampsia, increased the amount of toxic trophoblastic debris shed by disrupting mitochondria. We believe this results in increased oxidative damage with disruption of cell death pathways leading to increased shedding of trophoblast debris. We recently also reported that the trophoblast debris produced by normal placentae treated with preeclamptic sera becomes toxic and activates endothelial cells. Melatonin is a lipid soluble molecule produced by the ovary and placenta that has antioxidant effects and which may have beneficial effects in preeclampsia. In this proposal, we will investigate whether melatonin can reverse the effects of preeclamptic sera or antiphospholipid antibodies on placental oxidative damage and the production of toxic trophoblastic debris.

FIBROSIS OF THE TRANSVERSE TUBULAR SYSTEM IN HUMAN HEART FAILURE
($156,863 – 2 years) 1115014

Dr David Crossman, Prof Peter Ruygrok, Mr Maximilian Pinkham, Dr Mia Jullig, Dr Christian Soeller, Dr Carolyn Barrett
Dept of Physiology, University of Auckland

Human heart failure is the inability of the heart to pump enough blood to meet the energetic demands of the body. This condition results from cardiac muscle cells losing their ability to contract. This is a serious health condition and a major cause of death of New Zealanders. Through previous research support from Auckland Medical Research Foundation we have identified that an unusual collagen is responsible for damaging the electrical connections in charge of signalling muscle cell contraction. In this project we will test if an anti-fibrotic drug therapy can be used to prevent damage to these electrical connections and improve function in ischemic heart failure. This will be done by using our state-of-the-art super resolution microscope to image, at the nano-scale, the structure of these critical electrical connections. The potential is to confirm a previously unrecognised mechanism of heart failure and identify a new target for future treatments.

FUNDED BY: T. M. Hosking Charitable Trust

perpetual guardian

URATE CRYSTAL-INDUCED INFLAMMATION IN BONE EROSION DUE TO GOUT
($159,162 – 2 years) 1115015

Prof Nicola Dalbeth, Prof Jillian Cornish, Dr Ashika Chhana
Dept of Medicine, University of Auckland

Gout is the most common inflammatory arthritis affecting men, with high rates of early onset, severe and destructive disease in Māori and Pacific people. Joint damage frequently occurs in people with severe gout, leading to joint deformity and disability. In this laboratory study, we will examine the effects of gouty inflammation on cells in the joint that cause bone damage. We will also examine the relationship between inflammation and joint damage in people with gout. This project aims to identify new treatment approaches to treat joint damage from this disorder.

FUNDED BY: The Richardson No. 2 Trust

CALCIUM SCORES AND MICRORNAS
($47,112 – 2 years) 1115017

Ms Nikki Earle, Prof Vicky Cameron, Prof Rob Doughty, Dr Anna Pilbrow, A/Prof Malcolm Legget
Dept of Medicine, University of Auckland

Coronary artery disease is one of the leading causes of hospitalisation and death in New Zealand causing around 12,000 deaths per year, and much of this burden is avoidable through better prevention and treatment. The aim of cardiovascular

Grants Awarded continued

risk assessments is to identify people at high risk so they can be targeted with appropriate preventative treatments, but this is not always accurate. Identifying new risk markers for the early stages of coronary artery disease before symptoms occur could improve the accuracy and allow for better targeted early intervention, for example medications or behavioural change towards healthier lifestyles. We will measure a panel of circulating biomarkers called microRNAs to see if they are associated with coronary artery disease at an early stage where plaques have built up in the arteries, but before symptoms such as chest pain or a heart attack have occurred. These will be measured in blood samples from people who have had the amount of plaque in their arteries estimated using specialised imaging techniques. Long-term, we hope these studies will also further our understanding of the mechanisms of coronary artery disease and lead to the development of new treatments.

FUNDED BY: Bruce Cole Fund

GENDER INFLUENCES ON SOCIAL MODELLING OF MEDICATION EFFECTS ($19,900 – 6 months) 1115020

Dr Kate Faasse
Dept of Psychological Medicine, University of Auckland

Medication use in daily life occurs within a social context that is often disregarded or deliberately eliminated in randomised controlled trials. In everyday interactions, people talk with others about how effective (or not) their treatment is, and what side effects they are experiencing. Social modelling has an important influence on drug effectiveness and side effects, but it is frequently overlooked in research. In recent studies, we found that the social modelling of medication benefits can increase treatment effectiveness, and the social modelling of side effects can reduce effectiveness. Importantly, these effects were not limited to self-reported outcomes, and were seen in blood pressure and heart rate. We also found strong gender effects on the reporting of side effects. Following modelling of both medication benefits and side effects by a female model, female participants reported significantly more side effects than male participants. The proposed study will further investigate the influence of gender on the social modelling of treatment outcomes to assess how gender match or mismatch between the participant and the model influences these effects, as well as how participant empathy influences outcomes. This has broad implications for treatment outcomes in patients starting a new drug or those switching medications.

FUNDED BY: Donation from Sanford Limited

NEW MEDIATORS OF ACUTE DISEASE ($159,663 – 2 years) 1115007

Dr Anthony Hickey, Dr Anthony Phillips, A/Prof Adam Patterson, Dr Jiwon Hong
School of Biological Sciences, University of Auckland

A range of conditions (sepsis, heavy blood loss, inflammation) can cause acute disease. Many acute disease patients die of a similar pattern of multiple organ failure (heart and lungs, then kidneys and liver). This suggests a common factor or factors, against which there are no effective treatments. We found evidence that lipid particles, which are made in the small intestine and usually distribute energy rich fats around the body, are altered in a rat model of sepsis. We propose that in acute disease, these particles carry unusual toxic components to the key organs, and promote organ failure by damaging mitochondria, the cell's powerhouses. In this project, we will study other types of acute disease and find the common toxic components in these lipid particles that contribute to the multiple organ failure. This will provide a new method to prevent and treat multiple organ failure.

CRISPR/CAS9 SCREENING IN HUMAN TUMOUR XENOGRAFTS ($147,536 – 2 years) 1115022

Dr Stephen Jamieson, Prof William Wilson, Prof Cristin Print, Dr Francis Hunter
Auckland Cancer Society Research Centre, University of Auckland

The genomic analysis of human tumours is developing rapidly and offers unprecedented opportunities to match anticancer drugs to individual patients. This aspect of personalised cancer medicine is already contributing to improved cancer care through the use of drugs that directly target the mutated gene products that drive cancer cell growth and through the identification of genetic biomarkers that predict patient populations most likely to benefit from targeted drug therapies. However for the most widely used anticancer agents, and for many new drugs in development, the genes that determine response to therapy are unknown. We will use a powerful new technology, called CRISPR/Cas9, to knock out essentially all genes (individually, one gene per cell) in human head and neck cancer tumour xenografts grown in immune deficient mice. This study will provide new insight into the evolution of specific clones within tumours, and will enable us to develop an experimental model that is optimised for discovery of genes that determine sensitivity to anticancer agents.

PARKINSON'S DISEASE IN A DISH ($87,750 – 18 months) 1115023

Dr Kathryn Jones, A/Prof Bronwen Connor
Dept of Pharmacology, Centre for Brain Research, University of Auckland

Parkinson's disease (PD) is a neurological disorder resulting in severe motor deficits due to the loss of dopamine neurons in the brain. Lack of access to live, disease affected, human neurons is a barrier to understanding and treating PD. To overcome this, the proposed project will use a novel mRNA reprogramming

technology to generate live human dopamine precursor cells and mature neurons from skin cells donated from patients with PD. We will use gene expression technology to examine changes between PD-derived dopamine neurons and normal dopamine neurons to better understand changes that PD-related genes cause that drive the disease. Overall, the outcomes of the project will advance our current knowledge regarding how PD genes cause dopamine cell death, and provide the basis for further research eventually leading to the establishment of early warning biomarkers and the identification of new drug targets for the treatment of this debilitating disorder.

FUNDED BY: William Douglas Goodfellow Charitable Trust

CALCIUM BALANCE IN MKS ($144,945 – 2 years) 1115012

Dr Maggie Kalev-Zylinska, Prof Stefan Bohlander, Dr Lochie Teague, Dr George Chan, Dr Cherie Blenkiron
Dept of Molecular Medicine and Pathology, University of Auckland

This project will improve our understanding of blood cancers that affect megakaryocytes (platelet precursors). No specific treatments are available for patients with these disorders, and outcomes are unsatisfactory. Most frequently affected are children with Down syndrome and older people, whose tolerance of chemotherapy is particularly poor. While new therapies are needed for all patients, these two patient groups are especially vulnerable. Our work will interrogate calcium pathways in megakaryocytic cancers using modern methods. We will examine mechanisms that lead to disease development and aim to identify new therapy targets. Our results will help characterise patient cancers and guide development of novel, targeted drugs that are safer and better tolerated by patients.

MAINTAINING REDOX BALANCE IN THE AGEING EYE ($58,357 – 1 year) 11150008

Dr Julie Lim, Dr Joanna Black, Prof Paul Donaldson
Optometry & Vision Science, University of Auckland,

As we age, our bodies are exposed to a greater degree of oxidative damage. In the eye, this manifests itself through the development of cataract, glaucoma and corneal opacities; eye diseases that collectively account for more than half of the blindness in the world. Previous work has revealed that the cysteine glutamate antiporter (CGAP) in the lens may play a key role in maintaining redox balance within the eye and minimising oxidative stress to surrounding tissues. To test this hypothesis, redox balance will be genetically modified in mice by deletion of the CGAP gene either in all tissues or specifically within the lens. Through biochemical and clinical assessments of these mouse models, we will determine the effects of global and local redox imbalance on oxidative stress pathways and ocular function. Collectively, our findings will aid in our understanding of redox signalling systems in the eye and validate the utility of our knockout mice as a potential model for identifying new strategies for delaying the onset of age related eye diseases and maintaining long term ocular health.

PREVENTING THE DEVELOPMENT OF IMPAIRED GAIT PATTERNS AFTER STROKE ($159,046 – 2 years) 1115016

Dr Andrew McDaid, Ms Anna McRae, Dr James Stinear, A/Prof Cathy Stinear
Dept of Mechanical Engineering, University of Auckland

Over 7,000 New Zealanders suffer a stroke every year. The rehabilitation and hospitalisation costs for stroke are amongst the highest for all injuries, estimated at NZ$450 million per year. To recover control of movement, the brain of a stroke patient reorganises its connections with other parts of the body. Part of this process involves neighbouring brain cells or a healthy part of the brain 'taking over' from a region of the brain that was damaged by the stroke. Much of this reorganisation happens in the early (acute) stages of recovery. The highly novel hypothesis of this project is that, by constraining the paretic leg of a stroke patient in a 'normal' trajectory at the acute stage of recovery, a more normal gait pattern will result than when the constraint is not imposed; in effect the patient will never be allowed to learn an impaired gait pattern. Our long-term aim is to change clinical practice by demonstrating that a simple mechanical device can prevent stroke patients from developing the inefficient and unstable gait pattern that typically afflicts chronic stroke survivors. The project is therefore focused on developing a novel acute stage stroke rehabilitation device and taking it through a pilot study.

FUNDED BY: W & WAR Fraser Charitable Trust

BABYGEMS: GESTATIONAL DIABETES DETECTION THRESHOLDS ($140,091 – 2 years) 1115018

Dr Christopher McKinlay, Prof Caroline Crowther, Emeritus Prof Elaine Rush, Dr Mike Meyer, Dist. Prof Jane Harding
Liggins Institute, University of Auckland

Gestational Diabetes (GDM), defined as glucose intolerance (high blood glucose) first appearing in pregnancy, is an increasing health problem worldwide. Not only does it affect maternal health, but it also carries risks for the baby including being born too large, birth complications and greater likelihood of diabetes and obesity in adulthood. The rate at which a baby grows in the first 6 months influences growth patterns throughout life and this period may be particularly important for babies exposed to GDM as gaining too much fat in the months after birth is another risk factor for later obesity. Recent expert international guidelines have recommended that the threshold for diagnosing GDM should be lower than is currently used in New Zealand, but this could see rates of GDM increase substantially, up to ~18%. While treating women with mild glucose

Grants Awarded continued

intolerance may reduce the number of large babies, it is unclear if this will translate into better health outcomes overall. In this study we will investigate if treating women with mild GDM, as diagnosed under the new criteria, will optimise infant growth and feeding patterns and prevent excessive early fat accumulation. This will assist in deciding whether New Zealand should adopt the new criteria and may help to explain why babies exposed to GDM are at increased risk of diabetes themselves.

FUNDED BY: Marion Ross Memorial Fund

MUSCLE AS A SOURCE OF BONE ANABOLIC FACTORS ($149,515 – 2 years) 1115009

Dr Dorit Naot, Dr David Musson, Dr James Markworth, Dr Justin Fernandez, Prof Jillian Cornish
Dept of Medicine, University of Auckland

Each year, over 80,000 older people in New Zealand sustain a fracture, suffering acute pain and disability and in some cases long-term loss of independence. The estimated yearly cost involved is $1.15 billion. Thus, development of novel strategies for fracture prevention and the improvement of fracture healing is a major public health priority. Our study focuses on the muscle as a source of cells and factors for the improvement of bone health, as it has long been recognised that muscle loading is coupled to increases in bone mass and strength. We will study muscle and bone cell lines in an in vitro model system that enables the application of mechanical loading. We will characterise the factors secreted from muscle cells in response to loading, and study the changes these factors induce in bone cells. In addition, we will investigate the effect of bone cells on muscle cells in early developmental stages, as there is evidence suggesting young muscle cells can differentiate into bone cells and be recruited into fracture sites to support the healing process. The muscle derived factors identified here and the understanding of muscle cell recruitment to bone will contribute to development of strategies for improving bone health.

RETINAL DYSTROPHY AND TITIN ($146,413 – 2 years) 1115010

Dr Verity Oliver, Dr Andrea Vincent, Prof Fulton Wong
Dept of Ophthalmology, University of Auckland

Inherited retinal dystrophies are collectively a leading cause of retinal blindness, affecting 1/2000 people. Progressive degeneration of the retina results from an underlying genetic error. Replacement gene therapy has been successfully used in inherited blindness, but for this to be a potential treatment option the disease causing gene must first be identified. We have identified a New Zealand family with an early-onset retinal dystrophy. Using DNA sequencing technology we have located a unique disease-causing variant in the TITIN gene. We hypothesise that TITIN plays an important role in the retina and that the identified genetic variation changes normal protein function, resulting in retinal degeneration. By using zebrafish, we propose to characterise the role of TITIN in the retina. The function of TITIN will be examined by both turning off TITIN during development and introducing the TITIN DNA variant present in our New Zealand family (CRISPR/Cas9 genome engineering). The zebrafish retina will be imaged using diagnostic tools identical to those used in human eye clinics. Establishing zebrafish with aspects of the human disease facilitates future drug screening and gene therapy treatments for retinal dystrophies. Understanding inherited blindness can also help our knowledge of common blinding diseases, including age-related macular degeneration.

KNOWLEDGE-BASED RADIOTHERAPY TREATMENT PLANNING ($134,391 – 2 years) 1115021

Dr Andrea Raith, Prof Paul Rouse, Prof Matthias Ehrgott, Dr Juliane Manitz, Dr John Simpson, Dr Giuseppe Sasso, Dr Andrew Macann
Dept of Engineering Science, University of Auckland

Radiotherapy treatment is used to treat cancer in about 50% of all New Zealand cases. During treatment a patient's tumour volume is irradiated while avoiding damage to surrounding healthy tissue. Treatment plans are developed by a planner using commercial software, in an often time-consuming iterative process, which aims to achieve a range of plan quality parameters. The oncologist reviews the plan and decides to go ahead, or that re-planning is required (which may or may not lead to actual improvement of a plan). It is impossible to tell if a plan is truly optimal; plan acceptance and quality are based on experience and intuition. We propose to develop a knowledge-based benchmarking approach to assess plan quality by on-the-fly comparison of a new plan to a library consisting of previous clinically approved plans. The proposed integration of this approach in current planning systems gives planners and oncologists feedback on plan quality avoiding unnecessary iterations, thus improving the efficiency of the planning process. Patients will benefit from receiving better quality treatments. Our goal is to help treatment planners generate better treatments for patients in a more efficient planning process thus shortening the time from diagnosis to beginning of cancer treatment.

FUNCTIONAL OUTCOMES AFTER FONTAN SURGERY ($32,224 – 18 months) 1115019

Dr Kathryn Rice, Dr Tom Gentles, Dr Tim Hornung
Dept of Paediatrics, University of Auckland

Some children are born with one heart pump chamber instead of two. This is the most serious type of congenital heart defect. Children with this condition require a series of operations in the first years of life, the last of which is the "Fontan" operation. Unfortunately this is not a cure. People with a Fontan circulation have reduced life expectancy, ongoing medical problems, and reduced quality of life; highlighted by their reduced ability to undertake physical activity which worsens over time. There are around 1350 people living with this circulation in Australasia. A Registry has been set up between New Zealand and Australia for people with a Fontan circulation.

The Registry aims to undertake research to improve their quality, and quantity of life. This project focuses on better understanding how the Fontan circulation works. We assess both the quality of life and functional capacity of people with a Fontan circulation using sophisticated MRI and heart ultrasound imaging at rest and during exercise. Achieving a greater understanding of the Fontan circulation will allow us to develop new approaches to improve heart function, reduce medical issues, with positive impact on the quality of life for people with a Fontan circulation.

CYTISINE PHARMACOKINETICS AND DOSE RESPONSE ($130,256 – 2 years) 1115011

A/Prof Janie Sheridan, A/Prof Malcolm Tingle, Dr David Newcombe, Dr Natalie Walker
School of Pharmacy, University of Auckland

The use of tobacco products and exposure to tobacco smoke is recognised as the leading preventable cause of death worldwide, with an estimated 15,000 people dying of tobacco-related diseases every day. There are a number of pharmacotherapies which support smoking cessation, of which varenicline is the most effective, but also the most expensive. Cytisine, a plant-based alkaloid, is a similar type of pharmacotherapy to varenicline, but is significantly cheaper, and has been shown to be more effective than placebo. However, the product has a complex dosing regimen that has no clear basis in empirical research, and research indicates that adherence to dosing may be poor potentially reducing effectiveness. A less complex regimen is therefore likely to improve smoking cessation outcomes. We therefore propose to undertake two studies to investigate the influence of dose, dosing frequency and dosing duration and the relationship with cytisine's effect on craving for tobacco. We hypothesise that an improved dosing regimen underpinned by scientific evidence may increase the effectiveness of the drug in the wider population. The outcomes of these studies will contribute to the design of a larger community-based trial to assess whether an improved dosing regimen can increase the effectiveness of the drug.

TREATMENTS FOR COCHLEAR NEUROPATHY ($146,463 – 2 years) 1115013

A/Prof Srdjan Vlajkovic, Prof Peter Thorne
Dept of Physiology, University of Auckland

Hearing loss affects 10-13% of New Zealanders and this prevalence will increase with the aging population. The most common causes of acquired hearing loss in humans are aging and noise exposure. These are associated with the loss of sensory cells and auditory neurons in the cochlea of the inner ear. Prosthetic rehabilitation via hearing aids and cochlear implants cannot repair cochlear injury, hence it is essential to develop therapies that can protect the delicate structures of the inner ear and thus preserve hearing. In this proposal we will examine how the blocking of two proteins that bind together and function as a molecular switch for adenosine receptors in the cochlea can improve the survival of cochlear tissues after exposure to noise and rescue hearing. This is potentially critical translational research for prevention and therapeutic management of acquired hearing loss.

NAMED FELLOWSHIPS

RUTH SPENCER MEDICAL RESEARCH FELLOWSHIP

ANTERIOR RESECTION SYNDROME: A PATHOPHYSIOLOGICAL DEFINITION ($282,500 – 2 years) 1415003

Dr Celia Keane
Dept of Surgery, University of Auckland

The overall aim of this research is to critically advance the clinical understanding and therapy of Anterior Resection Syndrome (ARS). ARS is a poorly understood, though common, consequence of colorectal cancer surgery, and is associated with significantly compromised long-term quality of life in affected patients. This aim will be achieved by undertaking a literature review, achieving a consensus definition of ARS, investigating pathophysiological mechanisms in a prospective cohort, and studying neuromodulation therapies. This work will add to both patient and clinician understanding of ARS and will have implications for pre-operative patient counselling and patient selection. With a pathophysiological definition of ARS, work can be focused on targeted therapies to ultimately improve individual patient outcomes and quality of life.

FUNDED BY: The Ruth Spencer Estate

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JEAN CATHIE RESEARCH FUND FELLOWSHIPS

CHANGES IN BRAIN NETWORKS UNDERLYING TINNITUS DUE TO BRAIN STIMULATION AND HEARING AIDS ($163,686 – 2 years) 1415001

Dr Giriraj Shekhawat
Section of Audiology, University of Auckland

Tinnitus ("ear and head noise") affects approximately 15% of the population. Severe tinnitus can negatively impact the quality of life. There is a pressing need for greater understanding of how tinnitus arises, and evolves over time, in order to develop effective therapies to address this problem. Traditional research in the area of tinnitus has used quantitative group designs, measuring limited variables across a group of tinnitus patients, sometimes before and after a single intervention. However, considering the heterogeneous nature of tinnitus, it is likely that individual differences are not properly accounted for or result in misinterpretation of results in large group trials. A solution, which we propose here, is to make use of multiple case studies investigated in depth over an extended period of time. This prospective research will explore the theoretical basis of network

Grants Awarded continued

models of tinnitus through a mixed model design consisting of multiple behavioural (psychoacoustical, psychometric, and qualitative) and objective (fMRI) measures. Tinnitus in patients will be perturbed by short-term (brain stimulation) and long-term (hearing aid) stimulation. This novel study is likely to reveal potential prognostic factors for tinnitus management and the longitudinal changes in pathological brain networks associated with brain stimulation and hearing aid use.

FUNDED BY: Jean Cathie Research Fund

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SELECTIVE ACTIVATION OF GABAERGIC NEURONS TO TREAT TINNITUS ($199,987 – 2 years) 7415002

Dr Yiwen Zheng
Dept of Pharmacology and Toxicology, University of Otago

Chronic tinnitus is a debilitating condition that significantly reduces the quality of life in individuals affected and presents a considerable socioeconomic impact to society. Its prevalence is expected to increase in the future due to increased risky music-listening behaviours in the younger generation. Dysfunction of a specific type of neuron in the brain, shown to be responsible for neuronal inhibition, has been linked to tinnitus generation. I will selectively stimulate these neurons using a novel optogenetic technique. This technology allows specific types of neurons to be labelled with light-sensitive proteins. These light-sensitive proteins are able to turn these neurons "on" when exposed to light at a specific wavelength and turn them "off" when the light is off, so that "specific" neurons at "specific" locations can be manipulated at "specific" times. I will then measure neurotransmitter release in different areas of the brain, before and after optogenetic stimulation of the GABAergic neurons located in different areas of the brain to determine their time- and location-specific role in tinnitus prevention and treatment using a rat model of acoustic trauma-induced tinnitus. The results will significantly improve the current understanding of the neurological basis of tinnitus and highlight optimal therapeutic targets for tinnitus treatment.

FUNDED BY: Jean Cathie Research Fund

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DOCTORAL SCHOLARSHIPS

BARBARA BASHAM DOCTORAL SCHOLARSHIP

MODULATION OF CALCITONIN RECEPTORS BY RAMPS ($126,500 – 2 years) 1215001

Ms Erica Burns
School of Biological Sciences, University of Auckland

As the levels of obesity in our population continue to increase, there is a resulting rise in the prevalence of diabetes. Therefore, treatments are desperately needed to help individuals with diabetes control their blood sugar fluctuations and prevent life-threatening complications such as stroke and heart failure. A natural hormone called amylin stabilizes blood sugar levels after eating as well as inducing a feeling of fullness, reducing meal size and ultimately helping patients to lose weight. Mimicking amylin's effects is a successful strategy for treating diabetes as well as for treating obese individuals at risk of developing diabetes. This project will investigate the ability of amylin to produce a sustained response at its site of action. This will help to evaluate its potential as a long-term treatment option.

FUNDED BY: Barbara Basham Medical Charitable Trust

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HENRY COTTON DOCTORAL SCHOLARSHIP

CARDIOVASCULAR CONTROL IN FEMALES WITH HEART FAILURE ($126,500 – 2 years) 1215002

Mr Terence Loftus
Dept of Physiology, University of Auckland

Each year similar numbers of males and females die of heart failure. However, current treatment strategies for heart failure have been developed based on evidence obtained primarily from males. This bias in research towards the use of male subjects may have led to treatment strategies for heart failure that are not optimal for females, with evidence suggesting that they are less effective in women than men. In women, ovarian hormones appear to be somewhat cardioprotective as the precipitous fall in sex hormones during menopause coincides with a significant increase in the occurrence of cardiovascular disease. But what happens after these sex hormones are no longer there? Presently, the evidence simply does not exist to answer this question as the fundamental mechanisms underlying any sex based differences in cardiovascular control are unknown. Using highly specialised techniques this project aims to help uncover the mechanisms that drive heart failure development and progression in women. In particular, the project aims to determine the role of both the nerves and the angiotensin system in mediating heart failure development and progression in females. Ultimately, the research will provide fundamental evidence on which to base sex-specific treatments of heart failure.

FUNDED BY: Henry Cotton Charitable Trust

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POSTDOCTORAL FELLOWSHIPS

EDITH C COAN RESEARCH FELLOWSHIP

IMPACT IN CANCER
($182,861 – 2 years) 1315001

Dr Petr Tomek
Auckland Cancer Society Research Centre, University of Auckland

Our immune system can seek out and destroy cancer cells. However, tumours have evolved a number of mechanisms to escape destruction by the immune cells. These mechanisms need to be blocked in order to restore the ability of the immune cells to fight the cancer. We have developed novel agents that inactivate an enzyme called IDO1 used by cancers to disable the patient's immune cells. IDO1 depletes the essential amino acid tryptophan required for all cells to grow. The immune cells cannot function properly at low tryptophan levels and become inactivated and die. The question being asked in this research is how do the cancer cells themselves overcome the tryptophan deprivation? We hypothesise that a protein called IMPACT plays a critical role in differentially regulating the responses of cancer cells and immune cells to the tryptophan deprivation. Our research aims to find the role of IMPACT on the survival of cancer cells during tryptophan deprivation induced by IDO1. This study will advance our understanding of the self-protective mechanisms used by cancer cells. This information will help us to develop novel approaches for treatment of cancer; our current number one cause of death in New Zealand.

FUNDED BY: Edith C Coan Trust

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DAVID AND CASSIE ANDERSON RESEARCH FELLOWSHIP

GENE MUTATION, GENETIC TESTING AND TARGETED THERAPY IN LUNG CANCER
($193,377 – 2 years) 1315002

Dr Sandar Tin Tin
Section of Epidemiology and Biostatistics, University of Auckland

Lung cancer remains a leading cause of cancer mortality in New Zealand and worldwide. New models of cancer care using genotype-directed targeted therapies have strong potential to improve survival outcomes but have received little attention in the New Zealand health care system. The proposed research aims to investigate the prevalence, demographic profiles and clinical outcomes of genetically-defined subtypes of lung cancer and accessibility of genetic testing and targeted therapy in a large nationwide cohort of lung cancer patients, using a number of data sources including New Zealand Cancer Registry, individual patient medical records, laboratory reports, drug dispensing records, PHARMAC records of Special Authority approval, hospital discharge data and mortality records. The findings will then be compared with those from other population-based studies worldwide. This will facilitate policy development regarding nationally standardised strategies for genotype-directed targeted therapy in lung cancer patients in New Zealand.

FUNDED BY: David and Cassie Anderson Medical Trust

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OTHER GRANTS AWARDED

GAVIN AND ANN KELLAWAY MEDICAL RESEARCH FELLOWSHIPS

$10,000 1515001

A/Prof Johanna Montgomery
Dept of Physiology, University of Auckland

To access new autism mouse models and world-class imaging facilities and to begin a new collaboration examining the neural basis of cardiac arrhythmias.

$65,000 7515002

Dr Lisa Pilkington
Chemical Sciences, University of Auckland

To undertake a Masters of Applied Statistics at the University of Oxford. To learn and develop skills in applied statistics so they can be utilised, in conjunction with my knowledge in the field of medicinal chemistry, to direct research in the field of drug discovery. Also, to further learn about the application of statistics in the field of genetics and disease.

SIR HARCOURT CAUGHEY AWARD

$25,000 2715001

Dr Michelle Wilson
Medical Oncology Department, Auckland District Health Board

Challenges facing clinical trial design in medical oncology.

Grants Awarded continued

SIR DOUGLAS ROBB MEMORIAL FUND

$800 1715003

Dr Hillary Sheppard
School of Biological Sciences,
University of Auckland

Request for funds to cover publication of a research paper in the journal "Melanoma Research".

KELLIHER CHARITABLE TRUST EMERGING RESEARCHER START-UP AWARDS

$30,000 1715001

Dr Sarah Bristow
Dept of Medicine,
University of Auckland

Research support for her Edith C Coan Research Fellowship "Calcium, bone and cardiovascular health".

$30,000 1715002

Dr Chris Walker
School of Biological Sciences,
University of Auckland

Research support for his David and Cassie Anderson Research Fellowship "Neuropeptide receptors and pain".

HEALTHEX EMERGING RESEARCHER AWARD

$5,000 Travel Award 6715001

Miss Lily Chang
Dept of Optometry & Vision Science,
University of Auckland

To attend Universitas 21 Health Sciences Forum, Pontificia Universidad Catolica, Santiago, Chile – 21-25 September 2015, and to meet and perform experiments with her collaborator at the Neurosciences Centre.

FUNDED BY: Wellington Sisters Charitable Trust

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TRAVEL GRANTS AWARDED

Dr Monica Acosta
Optometry and Vision Science,
University of Auckland

To attend the European Retina Meeting, Brighton, UK, 1–3 October 2015.

Dr Jane Alsweiler
Dept of Paediatrics; Child and Youth Health, University of Auckland

To attend the World Congress of Perinatal Medicine, Madrid, Spain, 3–6 November, 2015.

Dr Anneka Anderson
Te Kupenga Hauora Maori,
University of Auckland

To attend the 9th Health Services and Policy Research Conference, Melbourne, Australia, 5–9 December 2015.

Dr Kristi Biswas
Dept of Surgery, University of Auckland

To visit a lab at the University of California (San Francisco) and to attend American Academy of Allergy, Asthma and Immunology (AAAAI) Annual Meeting, San Francisco and Los Angeles, USA, 2 March – 5 April, 2015.

A/Prof Nathan Consedine
Psychological Medicine,
University of Auckland

To attend the 74th Annual Meeting of the American Psychosomatic Society (Denver, CO) and the Society for Affective Science Annual Conference (Chicago, IL), and visit collaborators at the University of California, 14 Feb – 20 March 2016.

Dr Louise Curley
School of Pharmacy, University of Auckland

Melbourne university laboratory visit to learn new techniques, Melbourne, Australia, 13 April – 3 May 2015.

A/Prof Maurice Curtis
Dept of Anatomy with Radiology, University of Auckland

To attend the 12th International Conference on Alzheimer's and Parkinson's disease, Nice, France, 13–22 March 2015.

Dr Peng Du
Auckland Bioengineering Institute,
University of Auckland

To attend Digestive Diseases Week 2015, Washington DC, USA, 16–19 May 2015.

Dr Daniel Exeter
Dept of Epidemiology & Biostatistics,
University of Auckland

To attend the 15th International Medical Geography Symposium (IMGS), Vancouver, Canada, 5–10 July 2015.

Dr Chantelle Fourie
Dept of Physiology, University of Auckland

To attend ISN/ANS (International Society for Neurochemistry, combined with ANS) 2015 and "From Synapses to Circuits and Behaviour" (Satellite), Cairns, Australia, 20–27 August 2015.

Dr Renee Handley
School of Biological Sciences,
University of Auckland

To attend the CAG Triplet Repeat Disorders Seminar and Conference (Gordon Research Conferences), Lucca, Italy, 30 May – 5 June 2015.

Dr Jennifer Kruger
School of Engineering, University of Auckland

To attend the International Continence Society, 45th Annual meeting, Montreal, Canada, 6–9 October 2015.

A/Prof Denis Loiselle
Dept of Physiology, University of Auckland

To attend the 44th Annual European Muscle Conference, Warsaw, Poland, 21–25 September 2015.

Dr Anna Miles
Speech Science, University of Auckland

To attend the Laryngology Society of Australasia Symposium, Cairns, Australia, 25–30 July 2015.

Dr Pritika Narayan
Dept of Anatomy with Radiology, University of Auckland

To attend the 2015 High Content Screening and RNAi Meeting, Melbourne, Australia, 16–17 July 2015.

Dr Niranchan Paskaranandavadivel
Auckland Bioengineering Institute, University of Auckland

To attend the IEEE Engineering in Medicine and Biology Conference 2015, Milan, Italy, 25 August – 7 September 2015.

Dr Max Petrov
Dept of Surgery, University of Auckland

To attend the 5th Biennial Congress of the Asian-Pacific Hepato-Pancreato-Biliary Association (A-PHPBA), Singapore, 18–21 March 2015.

Dr Anna Ponnampalam
Liggins Institute, University of Auckland

To attend the Society for Reproductive Investigation's 62nd Annual Meeting, San Francisco, USA, 25–29 March 2015.

Dr Rohit Ramchandra
Dept of Physiology, University of Auckland

To attend the Experimental Biology meeting, Boston, USA, 28 March – 1 April 2015.

Dr Manisha Sharma
School of Pharmacy, University of Auckland

Visit to research laboratory and presentation at international controlled release society (CRS) conference, Belfast and Edinburgh, UK, 6–30 July 2015.

Dr Hilary Sheppard
School of Biological Sciences, University of Auckland

To attend MicroRNAs and Noncoding RNAs in Cancer, Keystone, Colorado, USA, 7–12 June 2015.

Mrs Marian Showell
Dept of Obstetrics & Gynaecology, University of Auckland

To attend the Cochrane Gynaecology and Fertility Group meeting/symposium "Advancing reproductive health though evidence: Cochrane's contribution" in Oxford, UK, and the Cochrane mid-year meeting in London, UK, 30 March – 8 April 2016.

Dr Avan Suinesiaputra
Dept of Anatomy with Radiology, University of Auckland

To attend the 19th Annual Scientific Sessions of Society for Cardiovascular Magnetic Resonance (SCMR) 2016, Los Angeles, USA, 26 January – 4 February, 2016.

Dr Jason Turuwhenua
Auckland Bioengineering Institute, University of Auckland

To attend the Association for Research in Vision and Ophthalmology meeting, Denver, Colorado, USA, 3–15 May 2015.

Dr Stefanie Vandevijvere
Dept of Epidemiology and Biostatistics, University of Auckland

To attend the annual conference of the International Society for Behavioral Nutrition and Physical Activity (ISBNPA), Edinburgh, UK, 3–6 June 2015.

A/Prof Mark Vickers
Liggins Institute, University of Auckland

To attend the Federation of American Societies for Experimental Biology (FASEB) - The Growth Hormone/Prolactin Family in Biology and Disease, Steamboat Springs, Colorado, USA, 12–17 July 2015.

Dr Vicky Wang
Auckland Bioengineering Institute, University of Auckland

To attend the 8th International Conference on Functional Imaging and Modelling of the Heart, Maastricht, Netherlands, 25–27 June 2015.

Dr Trecia Wouldes
Psychological Medicine, University of Auckland

To attend the 17th Biennial ISRCAP Scientific Meeting, Portland, Oregon, USA, 8–11 July 2015.

Dr Jie Zhang
Ophthalmology and Vision Science, University of Auckland

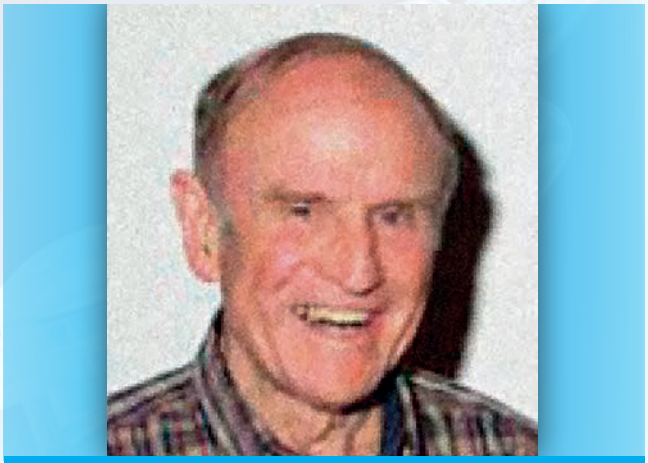
To attend the 31st Asia-Pacific Academy of Ophthalmology Congress, Taipei, Taiwan, 24–27 March 2016.

An AMRF Success Story

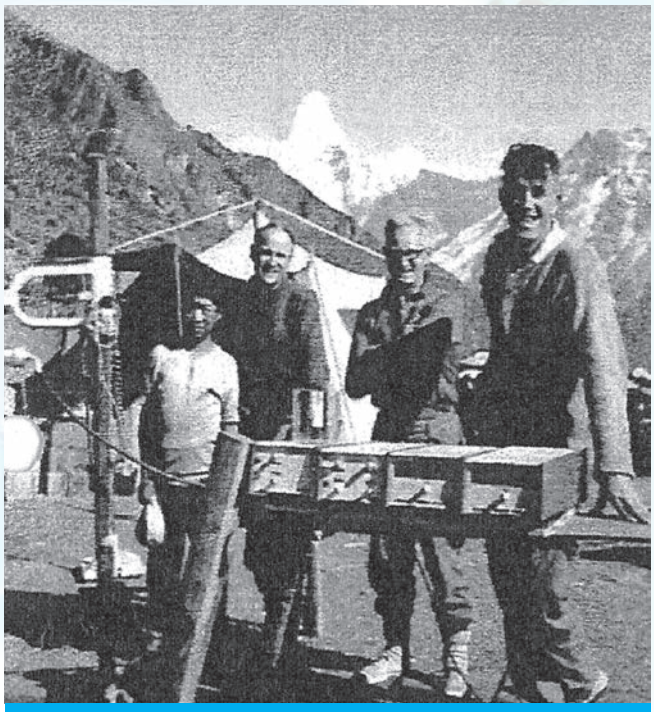
EMERITUS PROFESSOR KAYE IBBERTSON

Kaye graduated from Otago Medical School in 1950, then came to Auckland where he worked with the notable physician Wilton Henley, who was instrumental in setting up the University of Auckland Medical School in 1964.

After time overseas, Kaye returned to New Zealand and was in charge of the Radioisotope Unit. He received his first AMRF funding in 1963 and researched thyroid and growth hormones.



Emeritus Professor Kaye Ibbertson



Emeritus Professor Kaye Ibbertson (second from left) in the Nepalese Himalayas with Sir Edmund Hillary (right).

As the first specialist endocrinologist in Auckland and later as the inaugural Professor of Endocrinology at the School of Medicine, Professor Ibbertson had a major influence on the growth of endocrinology and the shaping of careers for junior staff who later became leaders in the field.

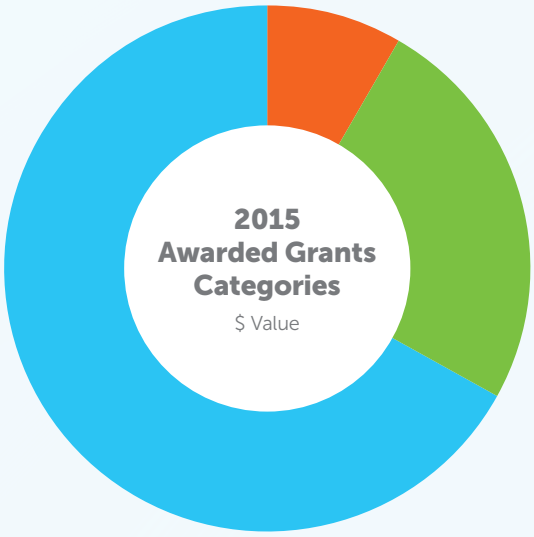
These studies brought international recognition to Kaye and to Auckland as a leading centre in studies on hormones and the endocrine system.

In 1966, at the invitation of the Himalayan Trust, established by Sir Edmund Hillary and supporters, Kaye travelled to Khumbu in the Nepalese Himalayas to tackle the huge problem of iodine deficiency and goitres caused by lack of iodine. It was impractical to import iodised salt, so Kaye tried an innovative approach. He gave the Nepalese injections of lipiodol, a compound which proved to be a very effective source of slow release iodine. One injection was sufficient to yield significant results, and the use of composting toilets led to the perhaps more astounding finding: several years later the benefits were still apparent, and in those who had not been injected! The compost fertilised crops with iodine excreted by those who had been injected.

Kaye served on the AMRF's Board of Trustees as the representative of the Fellows of the Royal Australasian College of Physicians from 1969-1975.

GRANTS COMPLETED

70 Grants Awarded Totalling $4,336,122



Population Health and Community Total (8)	$360,441	8.31%
Clinical Total (19)	$1,074,727	24.79%
Biomedical Total (43)	$2,900,954	66.90%

$ Value each category % Total expenditure (n) Number of grants

Grants Completed

PROJECTS

ORAL DEXTROSE GEL FOR PREVENTION OF HYPOGLYCAEMIA IN AT RISK NEWBORN INFANTS (1113012)

Dr Jane Alsweiler, Prof Jane Harding, Dr Jo Hegarty
Paediatrics: Child and Youth Health, University of Auckland

Dr Jane Alsweiler

Hypoglycaemia (low blood sugar) is the commonest metabolic condition in newborn babies, affecting up to 30% of babies born in Auckland hospitals. It frequently leads to neonatal intensive care unit admission and may cause long-term brain damage. In this trial, we investigated the effectiveness of dextrose gel for *prevention* of hypoglycaemia, and its consequences in at-risk babies. We compared two different doses of dextrose gel, given on one or more occasions at feed times to those newborn babies at increased risk of having hypoglycaemia to determine a dose that will best prevent neonatal hypoglycaemia. Our study showed that dextrose gel given to at-risk babies can prevent neonatal hypoglycaemia, and identified the most effective dose regimen. We are currently undertaking a large multi-centre trial comparing the identified dose regime with a placebo gel. We aim to investigate if prophylactic oral dextrose gel is more effective than a placebo gel in reducing NICU admission rates and in improving later neurodevelopmental outcomes. Should it be found that dextrose gel can be used effectively to prevent this common newborn condition with potential long-term health consequences, such an intervention would revolutionise the management of neonatal hypoglycaemia around the world.

MOLECULAR DEFECTS IN COMMON VARIABLE IMMUNODEFICIENCY (2112017)

A/Prof Rohan Ameratunga, Dr Klaus Lehnert, Dr See-Tarn Woon, Ms Wikke Koopmans, Dr Anthony Jordan
LabPLUS, Auckland City Hospital

We have discovered two new genetic causes of a condition called Common Variable Immunodeficiency Disorder (CVID). CVID can result in recurrent and severe infections in adults and children. The first gene NFKB1, affects a New Zealand family. Mutations of this gene have not been previously described. We have collaborated with a leading group in Germany and will publish our findings jointly. The second gene, TCF3 appears to interact with another gene TACI to produce a severe version of a CVID-like disorder in another New Zealand family. We are fortunate to have received another grant from the AMRF to explore this further. This may be one of the best examples of a process called epistasis, where two or more genes interact. We have shown that identifying the genetic basis of a condition has many advantages including accurate diagnosis, identification of milder cases, family studies as well as being able to offer prenatal diagnosis. Furthermore, identification of the genetic defect may result in better treatment options including treatment with intravenous immunoglobulin. This project has been of great value to the families involved as well as increasing scientific knowledge.

GLYCOSYLATED PROTEINS IN HUMAN HEART FAILURE (1111009)

Dr David Crossman, Dr Mia Jullig, Dr Peter Ruygrok, A/Prof Christian Soeller, Prof Mark Cannell
Dept of Physiology, University of Auckland

Dr David Crossman

Human heart failure is the inability of the heart to pump enough blood to meet the energetic demands of the body. This is a serious health condition and a major cause of death of New Zealanders. We have identified electrical connections, responsible for signalling muscle cell function, are broken in human heart failure. Through the use of mass spectrometry and super resolution imaging on the nano-scale we have identified, for the first time, that changes in a glycosylated or sugar modified collagen is responsible for these broken electrical connections. This discovery represents a previously unrecognised mechanism that could lead to new drug treatments for heart failure.

THE PEOPLE STUDY (1112010)

Prof Rob Doughty, Dr Mayanna Lund
Cardiovascular Research Group,
University of Auckland

Prof Rob Doughty

Heart failure is a common condition with high rates of hospitalisation and death. This multicentre cohort study aims to determine the clinical outcomes for patients with heart failure who have normal heart pump function. The objectives of this study are to determine which of these patients will be at risk of dying or being readmitted to hospital. The study has recruited a total of 941 patients at 4 centres in New Zealand. Completion of long-term follow- up to 2 years will provide detailed outcome data for this important group of patients and will impact on the clinical management of patients with heart failure in New Zealand. The goal is to lead to the development of clinical trials to test newer treatments for patients with heart failure.

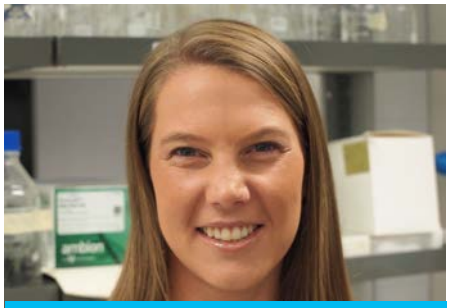
BIOMECHANICAL MODELLING TO EXPLAIN TOPHUS FORMATION AND BONE EROSION IN GOUT (1112008)

Dr Justin Fernandez, A/Prof Nicola Dalbeth, Dr Kumar Mithraratne
Auckland Bioengineering Institute,
University of Auckland

Gout is the most common inflammatory arthritis, causing severe joint pain and damage. It occurs primarily in the foot and is strongly associated with obesity and features of wear-and-tear arthritis, suggesting that loading on certain joints may play a role in the presentation of this disease. Using a number of emerging technologies including dual energy computed tomography, motion capture and highly detailed 3D computational models, this study aimed to answer the question, "is biomechanical loading or tissue stress within the foot linked to sites affected by gout?" We could not demonstrate a relationship between patterns of urate deposition and bone erosion in gout and patterns of tissue stress during gait in volunteers of normal and high body mass index (BMI). Although ground reaction forces were higher in those with high BMI, von Mises stress during gait did not differ between BMI groups, suggesting that alterations in internal tissue stress due to overweight/ obesity do not explain the preferential involvement of certain sites in gout.

DEVELOPING TROPHOBLAST STEM CELLS: A STEP TOWARDS HEALTHIER PREGNANCIES (1113005)

Dr Jo James, A/Prof Larry Chamley
Dept of Obstetrics & Gynaecology,
University of Auckland



Dr Jo James

The placenta is the baby's life-support system in utero, and its formation and function in early pregnancy is crucial for pregnancy success. Inadequate placental development results in pregnancy disorders from conception to birth including miscarriage, pre-eclampsia (high blood pressure in pregnancy) and intrauterine growth restriction (small babies), which together affect around 15,000 pregnancies in NZ each year. Despite its importance, we understand very little about how the human placenta develops. This research aimed to address this problem by studying the stem cells from which the placenta is formed. The placenta is composed of specialised cells called trophoblasts, which form different populations each critical for pregnancy success, but we do not understand how these populations arise. We previously isolated a candidate trophoblast stem cell population from early placental samples. In this research we have developed ways of maintain these cells in culture by employing matrices, oxygen levels and cytokines similar to those they are exposed to in their in vivo environment. Furthermore, we showed that these cells reside in the placenta throughout pregnancy, and that pure populations can be isolated from term placentae, making them enticing future targets to understand how pregnancy pathologies develop.

STRUCTURE AND FUNCTION OF THE BACTERIAL DRUG EFFLUX PUMP ACRB IN THE LIPID BILAYER MEMBRANE (1109009)

A/Prof Alok Mitra
School of Biological Sciences,
University of Auckland

The renewal of outbreaks of tuberculosis and cholera and resistance of other common pathogenic bacteria towards most antibiotics due to the bacterial drug efflux has posed a serious threat. We have chosen the plasma membrane AcrA/ AcrB/TolC complex in Escherichia coli as a model system to understand at the molecular level the process of drug efflux

Grants Completed continued

directly in the lipid membrane. Towards this end, we have over-expressed, purified and characterised AcrA, AcrB and TolC in detergent and have generated lipid-reconstituted 2D crystals of AcrB for high-resolution electron crystallography. We have explored conditions for forming the tripartite complex in order to generate 3D structure of the full ternary and binary complexes by single particle image analysis as well as by 2D crystallisation in the lipid bilayer membrane. We have also attempted to produce in cellulo the tripartite complex by molecular biology approaches.

THE SYNAPTIC BASIS OF HUNTINGTON'S DISEASE (1112018)

A/Prof Johanna Montgomery, Dr Ailsa McGregor
Dept of Physiology & Centre for Brain Research, University of Auckland

A/Prof Johanna Montgomery

In this project we examined how Huntington's Disease (HD) affects brain cell communication at synapses. We focused on changes that occur in the hippocampus, as this is where early brain changes occur in HD. Using our new cellular model of HD, our data show that the mutant huntingtin protein selectively decreases the amount of NMDA-type receptors located at synapses. As NMDA-type receptors are critical for learning and memory, this change in receptor localisation could underlie the cognitive deficits observed in early HD. Interestingly, these changes in the hippocampus were different from those observed in the striatum. Moreover, we have also identified that different isoforms of the synaptic protein SAP97 appear to play different roles in regulating NMDA receptors and could be a tool to return NMDA receptor distribution to normal.

TARGETING THE HUMAN GROWTH HORMONE RECEPTOR IN ER+ BREAST CANCER (1112019)

Dr Jo Perry, Dr Dong-Xu Liu, Dr Stephen Jamieson, Prof William R Wilson
Liggins Institute, University of Auckland

Dr Jo Perry

Growth hormone has a vital action in cancer growth, including breast cancer. Humans and animals born with a deficiency in the cell surface receptor for human growth hormone (hGH) have a dramatically reduced, almost absent, risk of developing cancer. Conversely, increased levels of hGH and the hGH receptor are detectable in a variety of different human cancers, including breast cancer, and this is associated with reduced survival for breast cancer patients. The aim of the current study was to use models of human breast cancer to test the hypothesis that hGH receptor inhibition will restrict the growth of tumours, and improve response to the anti-cancer drug, tamoxifen. Establishing suitable experimental models was more technically challenging than anticipated, and this delayed commencement of the main experimental component. However, we have overcome all major technical difficulties and have successfully established the experimental models and expertise required to complete the study.

DO MAGGOT SECRETIONS PROMOTE WOUND HEALING? (1113023)

Dr Anthony Phillips, Dr Cherie Blenkiron
School of Biological Sciences, University of Auckland

Dr Lisa Brown, one of the key investigators on the grant, captured in action working on the project in the lab. Lisa is an Advanced General Surgery Trainee who is undertaking research on this project aimed to develop better ways to drain dead tissue from deep in the body and avoid open surgery in very sick people. Anthony Phillips grantholder.

The medicinal maggot, Lucilia sericata, is used to treat chronic skin ulcers and is reported to secrete bioactive compounds that act to kill infecting bacteria and promote wound healing. We are investigating the effects of these secretions on the characteristics of cultured wound cells and have found that various cell types are affected to differing degrees. This suggests that one cell type may be the major responder to treatment, which then propagates the wound healing response. The greater understanding of the actions of these secretions will allow us to exploit them for new treatment approaches to combat non-healing wounds.

THE NEUROPHYSIOLOGICAL BASIS OF THE ADAPTATION LEVEL THEORY OF TINNITUS (1113028)

Dr Grant Searchfield, Prof Dirk De Ridder, Dr Cathy Stinear, Prof Ian Kirk, Mr Giriraj Singh Shekhawat
School of Population Health,
University of Auckland

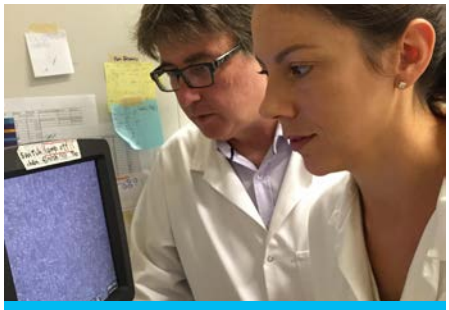
Tinnitus (ringing in the ears) can be modified by application of low-level current to the scalp. This low current non-invasive form of brain stimulation is called Transcranial Direct Current Stimulation. This research grant has funded studies investigating, for the first time, the effects of an improved method of electrical brain stimulation called High Definition – Transcranial Direct Current Stimulation (HD-tDCS) on tinnitus. This novel method allows more specific stimulation of brain regions thought to generate tinnitus. Our results show that HD-tDCS has positive short-term effects on tinnitus. We are currently using mathematical models of the brain's response to stimulation to tell us which regions of the brain are responsible for tinnitus. This work is assisting in the development of new treatments.

Funded by: Perpetual Guardian

perpetual guardian

WNT SIGNALLING AS A LINK BETWEEN DIABETES AND ATHEROSCLEROSIS (1112015)

Dr Peter Shepherd, Dr Brie Sorrenson
Dept of Molecular Medicine & Pathology,
University of Auckland



Left to Right: Professor Peter Shepherd and Dr Brie Sorrenson.

The high glucose levels that occur in type-2 diabetics increase the risk of developing atherosclerotic cardiovascular disease. The focus of this research was to determine whether glucose regulation of the Wnt signalling pathway is a mechanism by which cells respond to high glucose levels to explain the link between type-2 diabetes and atherosclerosis. This work has shown that glucose regulates the Wnt signalling factors catenin and LRP6 in macrophage and pancreatic cell lines and this regulation is required for a) glucose-induced cell migration and adhesion, which are processes involved in atherosclerosis, and b) insulin secretion from pancreatic cells, which is aberrant in type-2 diabetes and is a major risk factor for cardiovascular disease. The data support that catenin may be involved in insulin secretion through regulating the movement of insulin granules to be released from the cell. This is a novel role for catenin in the cytoplasm and interestingly, this is at least partially independent from its most well-known role, which is activating gene expression in the nucleus. Given the importance of Wnt signalling factors to processes of both cardiovascular disease and type-2 diabetes it provides a common mechanism linking these disease states.

CANNABINOID DRUGS FOR THE TREATMENT OF TINNITUS (7113027)

Prof Paul Smith, Dr Yiwen Zheng
Dept of Pharmacology & Toxicology,
University of Otago

Professor Paul Smith and Dr Yiwen Zheng in the laboratory.

The aim of the project was to investigate the potential of two drugs derived from Cannabis, which are already used in the treatment of pain and spasticity in multiple sclerosis, for the treatment of tinnitus. These drugs are delta-9-tetrahydrocannabinol and cannabidiol. We have found that a 1:1 combination of these drugs appears to exacerbate, rather than relieve, tinnitus. While this is not the result we expected, it is consistent with some recent neurophysiological evidence on the role of cannabinoid receptors in the brainstem cochlear nucleus, and provides new insights into how cannabinoid drugs may affect the auditory system.

Funded by: Perpetual Guardian

perpetual guardian

ELUCIDATING THE EXPRESSION OF CHROMOSOME 10 MUTATIONS IN ANTERIOR CORNEAL DYSTROPHY, AND DEVELOPMENT OF A ZEBRAFISH MODEL OF DISEASE (1113001)

Dr Andrea Vincent, A/Prof Trevor Sherwin, Prof Phil Crosier
Dept of Ophthalmology,
University of Auckland

Left to Right: A/Prof Trevor Sherwin, Dr Andrea Vincent and Prof Phil Crosier.

Inherited recurrent corneal erosion dystrophy in a unique New Zealand family causes significant episodes of eye pain from childhood, as the corneal surface falls off. The cause of this dystrophy was unknown. We have successfully identified mutations in two genes, both of which are important in the cornea. We identified 3 other families with the same disease, and have shown that the collagen gene COL17A1 carries a mutation in all affected people. This gene is important in the

Grants Completed continued

cornea. In zebrafish we have shown that the gene is also present in the cornea. As similar recurrent corneal erosions can arise after injury, our findings have the potential to aid in the treatment of more common eye injuries.

OTOPROTECTION BY ADENOSINE RECEPTORS (1112009)

Dr Srdjan Vlajkovic, Prof Peter Thorne, Dr Detlev Boison, Prof Gary Housely
Dept of Physiology, University of Auckland

Dr Srdjan Vlajkovic

Exposure to noise and drugs toxic to the inner ear are major contributing factors to acquired hearing loss at any age. We have previously shown that acquired hearing loss can be reduced in experimental animals by administration of drugs acting on adenosine receptors. In this study we examined the protective roles of the two main types of adenosine receptors found in the inner ear using genetically modified mice that lack genes for each of these receptors. Our studies show that the gene knock-out mice have normal hearing at ambient sound levels, but showed increased vulnerability to acoustic injury compared to wild-type mice. Better understanding of the role of adenosine receptors in cochlear response to stress and injury is potentially a critical translational research leading to prevention and therapeutic management of noise-induced hearing loss.

DOCTORAL SCHOLARSHIPS

USING FUNCTIONAL AND STRUCTURAL MRI TO EXPLORE PLASTICITY IN THE HUMAN VISUAL CORTEX (1211004)

Mr Victor Borges
Dept of Optometry & Vision Science, University of Auckland

The goal of this research project was to investigate the impact of vision loss on the brain using functional MRI. We found that diseases such as glaucoma, which affect the nerves that connect the eye to the brain, caused decreased activation within visual brain areas. Taking the unique approach of comparing how each eye (diseased eye versus fellow eye) activated the visual cortex, we found no evidence for re-organisation or plasticity within the affected brain areas. This apparent stability of the human visual cortex has significant implications of the future development of devices designed to restore vision, which require the brain to retain the ability to process visual information from the affected eye.

GENETIC VARIANTS AND SUDDEN CARDIAC DEATH SYNDROMES (1211002)

Miss Nicola Earle
Dept of Medicine, University of Auckland

Left to Right: Dr Don Love, Nikki Earle and Prof Jon Skinner

Sudden unexpected cardiac death can have a devastating effect on families and communities, particularly when it occurs in the young. For people with both inherited and acquired heart disease, the risk of sudden cardiac death can be modified by relatively common genetic variants, or polymorphisms, particularly within genes that regulate the heart rhythm. During this project we investigated the role of such polymorphisms in the risk of sudden death or cardiac arrest in New Zealand patients with a broad range of cardiovascular disease, including long QT syndrome, hypertrophic cardiomyopathy, and patients hospitalised for heart attacks. We identified certain polymorphisms that modify the risk of sudden death, over and above the clinical information that is currently used to predict risk. We also found that by thoroughly investigating family members of those affected by inherited heart disease, we were able to identify large numbers of people at risk in the New Zealand community and offer protective therapies to them. This area of research can help identify those at most risk from sudden cardiac death to allow early treatment and intervention, and ultimately help reduce the number of deaths.

MECHANOBIOLOGY OF THE NUCLEUS PULPOSUS: THE ROLE OF NOTOCHORDAL CELLS IN INTERVERTEBRAL DISC DEGENERATION (1210002)

Miss Taryn Saggese
Dept of Anatomy with Radiology, University of Auckland

Miss Taryn Saggese

This study investigated the role of two different cell types found within the intervertebral disc in response to both mechanical stress (to mimic poor

posture and/or heavy lifting) and nutrient deprivation (a process that occurs as we age). We found that mature disc cells are negatively affected by pressure, and this response is exacerbated with nutrient deprivation. In contrast, the second cell type, notochordal cells, do not respond to pressure and nutrient deprivation does not alter this behaviour. These results highlight notochordal cells as candidates for cell replacement therapies.

CHARACTERISATION OF LIVER ANTIGEN PRESENTING CELLS (1212003)

Dr Otto Leopold Strauss
Dept of Surgery, University of Auckland

Dr Otto Leopold Strauss

The healthy human liver is bathed in inflammatory substances but maintains an anti-inflammatory state. This may be partly due to antigen presenting cells (APC) that are an essential component of the immune system but have been poorly described in the human liver. I described the framework of the liver lobule's blood vessels, then used this to identify how liver APCs are distributed. I also characterised the liver APC populations using flow cytometry and assessed their ability to recognise, remove and respond to bacteria. I identified a population of cells particularly responsive to bacteria. Despite not observing a difference in APC populations we used immunofluorescence microscopy to describe differences between organ rejection in liver transplantation and the recurrence of hepatitis C. These findings contribute to our understanding of the immunological response in the normal and will be useful in the development of therapies and monitoring techniques for diseases of the liver.

PRETERM STEM CELL THERAPY (1211003)

Miss Lotte van den Heuij
Dept of Physiology, University of Auckland

Miss Lotte van den Heuij

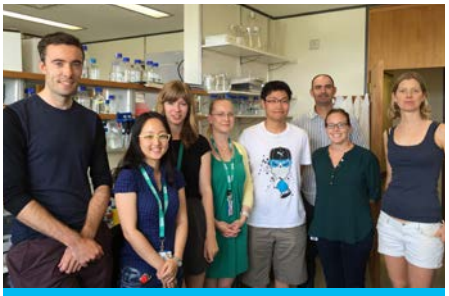
Despite advances in obstetrics, many preterm and term babies are born brain injured after oxygen deprivation before or during birth. Currently we have only one therapy to help; brain cooling. This treatment is not effective for many infants and not suitable for preterm babies. Thus there is a need to develop new therapies. The purpose of the studies undertaken in this PhD thesis was to evaluate the potential of stem cells derived from amniotic membranes that are normally discarded at birth. This project examined the effects of stem cells on brain injury when given at different times early in recovery (2 hours and 24 hours), and when treatment was delayed and given repeatedly over many days. The project has demonstrated that these amnion stem cells are very protective of the preterm brain when given treatment is delayed and cells are given repeatedly. Our project shows that the cells work to reduce the inflammation which causes ongoing injury and stops new cells from developing properly. Further work is needed to characterise optimal early and delayed treatment protocols, but the results to date are very exciting. We believe that this treatment could be translated to clinic in the future for both preterm and term babies.

OTHER GRANTS

GAVIN AND ANN KELLAWAY MEDICAL RESEARCH FELLOWSHIP

TO SPEND THREE WEEKS AT THE UNIVERSITY OF SOUTHERN CALIFORNIA IN THE LABORATORY OF PROFESSOR ANDREW MCMAHON IN ORDER TO BE TRAINED IN STATE-OF-THE ART CRISPR GENOME EDITING TECHNOLOGIES (1514005)

A/Prof Alan Davidson
Dept of Molecular Medicine & Pathology, University of Auckland



A/Prof Alan Davidson (third from right) with his laboratory members.

Funds provided by the Gavin and Ann Kellaway Medical Research Fellowship enabled me to spend a week in the laboratory of Professor Andrew McMahon at the University of Southern California, Los Angeles, USA where I was taught state-of-the-art techniques in mouse embryo microinjection. This skill has been transferred to the University of Auckland and a mouse microinjection facility has been established with strategic funding by the University. This facility will enable the cutting-edge technique of gene editing to be performed in mouse embryos, allowing genes to be rapidly 'knocked out'. This technology provides a major advance in the University's research capabilities and will lead to enhanced productivity, higher impact discoveries, and increased international competitiveness.

Grants Completed continued

DEVELOPING A COMPUTATIONAL MICROSCOPE FOR INVESTIGATION CELL MATRIX INTERACTION IN THE ACHILLES TENDON FOR TISSUE ENGINEERING APPLICATIONS (1514002)

Dr Vickie Shim
Auckland Bioengineering Institute,
University of Auckland

The aim of the my Gavin and Ann Kellaway Medical Research Fellowship to UC Berkeley was to build a virtual human computational model to design and develop a functional tissue engineering construct for tendon. I visited Berkeley for four months in 2015. During this period, I successfully implemented nanoscale contact mechanics algorithm developed by Professor Shaofan Li and his group at the Department of Civil and Environmental Engineering at UC Berkeley, thereby achieving the object described above. This new algorithm is being used to model the interaction between tendon cells and their environment, especially collagen fibres. This fellowship benefited me greatly as it has opened a door for me to explore nanoscale events between cells and their surroundings using advanced computational techniques. Furthermore, a strong collaborative link formed with one of the leading groups in this field will be instrumental in conducting an impactful and truly interdisciplinary study that can make significant contribution to tissue engineering and regenerative medicine.

HEALTHEX EMERGING RESEARCHER AWARD

$5,000 Travel Award (6715001)

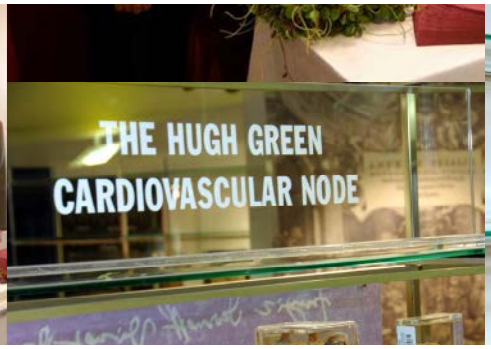
Miss Lily Chang
Dept of Optometry & Vision Science,
University of Auckland

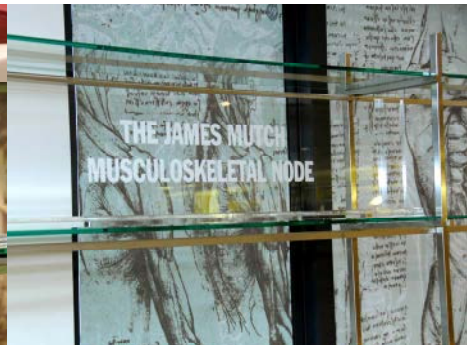
Miss Lily Chang

I would like to thank AMRF for awarding me The AMRF Emerging Researcher Award in 2015. Subsequently, I was able to travel to Chile in September 2015 to present my research at the Universitas 21 (U21) Annual Meeting in Santiago, and to conduct experiments for my PhD project in Valparaiso, Chile. The title of my PhD project is "Molecular and Functional Evidence of Alzheimer's disease (AD) in the Eye: Clinical and Experimental Application", and a natural animal model for AD – the Octondon degus (endemic to Chile) was used for immunohistochemistry of the retina, and in vivo non-invasive examination of their eyes. The clinical ocular assessment of the Octondon degus colony was completed during my time in Valparaiso, Chile, and I was able to proceed with completing my thesis in December 2015. Furthermore, I had the opportunity of presenting my research, exchanging ideas and networking with other researchers from around the world at the U21 Annual Meeting in Santiago. This wonderful experience would not have been possible without the support of AMRF.

Funded by: Wellington Sisters Charitable Trust

AMRF Medical Sciences Learning Centre





Opened in 2005 by Prime Minister Helen Clark, the AMRF Medical Sciences Learning Centre was funded by the AMRF to celebrate the Foundation's 50th Anniversary.

The AMRF Medical Sciences Learning Centre is a purpose-built and architecturally-designed facility for undergraduate, graduate and postgraduate education in anatomy, radiology and pathology.

The Centre combines the Medical School's anatomy and pathology museums and contains a wide range of anatomical models and specimens covering all body systems, over 1100 pathology specimens, and an extensive on-line radiology and pathology image database.

Construction of the Centre was made possible through a generous gift of $500,000 from a benefactor to the Auckland Medical Research Foundation to mark their 50th anniversary.

- Designed by notable architect Rick Pearson
- Winner of the New Zealand Institute of Architects "New Zealand" and "Colours" Award 2006
- Finalist in the New Zealand Institute of Architects Supreme Award 2006

Catriona and Holly from the CatWalk Trust, the Hon Jonathan Coleman, the Hon Nikki Kaye and Zara Phillips in her role as Patron of the Trust, visited the AMRF Medical Sciences Learning Centre and were welcomed with a presentation. Zara visited New Zealand to celebrate 10 years of Spinal Cord Injury advocacy and research with scientists from the University of Auckland, friends and ambassadors. The Centre for Brain Research's Prof Louise Nicholson and Dr Simon O'Carroll delivered an update of their promising new findings in their quest to find a cure for spinal cord injuries. (Photo courtesy of Andrew Lau)

An AMRF Success Story

EMERITUS PROFESSOR SIR JOHN SCOTT KBE FRSNZ
26 JUNE 1931 – 20 OCTOBER 2015

John graduated from the University of Otago in 1955 with a MBChB.

Over several decades John and his team worked on ground breaking research into lipids, coronary artery disease and heart attacks. His group was the first in the world to show that cholesterol is transported through the body on lipoproteins.

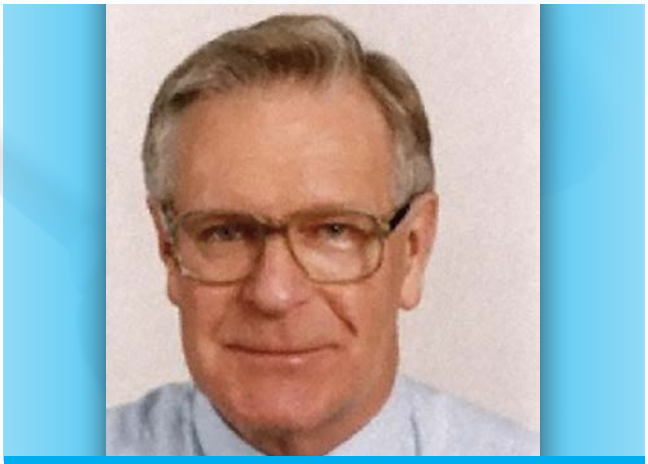
He was a young medical graduate during rapidly changing times for medical and health research. He recalled the founding of the Auckland Medical Research Foundation (AMRF) and commented that "Generations of young emerging medical graduates and scientists have benefited enormously ever since."

John obtained his Membership of the Royal College of Physicians (MRCP) whilst working at the Postgraduate Medical School of London at Hammersmith Hospital, UK, and went on to complete his doctorate in medicine at the University of Birmingham, UK.

Sir Douglas Robb then invited John to return to Auckland to help establish a medical school in Auckland.

Later in 1962 the AMRF awarded John the prestigious AMRF Isaacs Medical Research Fellowship for his project titled 'Studies of lipoprotein turnover in normal patients and in certain diseases'.

John was passionate about teaching, mentorship and creating an ideal academic environment in which to undertake world class research.



Emeritus Professor Sir John Scott KBE FRSNZ

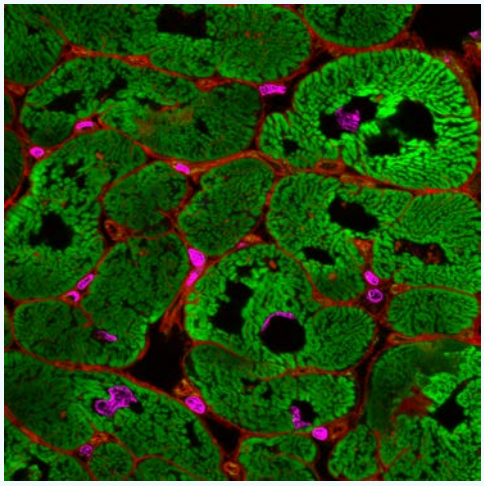
He was the Head of the Department of Medicine at the University of Auckland from 1979–1987, and was a founding member of the Auckland Medical History Society, serving as President in 1976. He was elected a Fellow of the Royal Society of New Zealand in 1987 and was President of from 1997 to 2000. He was appointed a Knight Commander of the Order of the British Empire for services to medicine in 1988 and retired from the University of Auckland in 1996.

"Organisations such as the AMRF have been advocating patiently the prospective benefits of medical research undertaken within New Zealand for the population. I and my generation are intensely grateful for the support they have provided for us, our junior colleagues, and our successors."

Special thanks to Perpetual Guardian who administer the Edith Rose Isaacs Estate and are a strategic partner of the AMRF.

perpetual guardian

PUBLICATIONS



Confocal imaging of normal human cardiac tissue. Structures labelled include nuclei (magenta), extracellular matrix and transverse tubules (red), and myofibrillar actin (green). Note the high contrast of nuclei labelling and the detailed myofibrillar organisation within the myocyte.

In publication:
Crossman D, Hou Y, Ruygrok P, Soeller C (2014). Next Generation Endomyocardial Biopsy: The Potential of Confocal and Super Resolution Microscopy. Heart Failure Reviews 20(2):203-214.

Publications

Ameratunga R, Brewerton M, Slade C, Jordan A, Gillis D, Steele R, Koopmans, W, Woon S.-T (2014). Comparison of diagnostic criteria for common variable immunodeficiency disorder. *Frontiers in Immunology* 15(5):415.

Ameratunga R, Woon S-T, Gillis D, Koopmans W, Steele R (2013). New diagnostic criteria for common variable immune deficiency (CVID), which may assist with decisions to treat with intravenous or subcutaneous immunoglobulin. *Clinical and Experimental Immunology* 174(2):203-211.

Borges V, Danesh-Meyer H, Black J, Thompson B (2015). The functional effects of unilateral open-angle glaucoma on the primary and extrastriate visual cortex. *Journal of Vision* 15(15):9, 1–14.

Crossman D, Hou Y, Jayasinghe I, Baddeley D, and Soeller C (2015). Combining confocal and single molecule localisation microscopy: a correlative approach to multi-scale tissue imaging. *Methods* 88:98-108.

Crossman D, Hou Y, Ruygrok P, Soeller C (2014). Next Generation Endomyocardial Biopsy: The Potential of Confocal and Super Resolution Microscopy. *Heart Failure Reviews* 20(2):203-214.

Crossman D, Young A, Ruygrok P, Nason G, Baddelely D, Soeller C, Cannell M (2015). t-tubule disease: Relationship between t-tubule organization and regional contractile performance in human dilated cardiomyopathy. *Journal of Molecular and Cellular Cardiology* 84:170–178.

Dalbeth N, Deacon M, Gamble G, Mithraratne K, **Fernandez J** (2015). Relationship between tissue stress during gait in healthy volunteers and patterns of urate deposition and bone erosion in gout: a biomechanical computational modelling study. *RMD Open* (1):e000101.

DaSilva-Arnold S*, **James J***, Al-Khan A, Zamudio S, Illsley N (2015). Differentiation of first trimester cytotrophoblast to extravillous trophoblast involves an epithelial-mesenchymal transition. *Placenta* 36(12):1412-1418.

* denotes joint first author.

Earle N, Crawford J, Smith W, Hayes I, Shelling A, Hood M, Stiles M, Maxwell F, Heaven D, Love D, Skinner J (2013). Community detection of long QT syndrome with a clinical registry: An alternative to ECG screening programs? *Heart Rhythm* 10:233-238.

Earle N, Ingle, J, Bagnall R, Gray B, Crawford J, Smith W, Shelling A, Love D, Semsarian C, Skinner J (2015). NOS1AP polymorphisms modify QTc interval duration but not cardiac arrest risk in hypertrophic cardiomyopathy. *Journal of Cardiovascular Electrophysiology* 26(12):1346-1351.

Earle N, Poppe K, Pilbrow A, Cameron V, Troughton R, Skinner J, Love D, Shelling A, Whalley G, Ellis C, Richards A, Doughty R (2015). Genetic markers of repolarization and arrhythmic events after acute coronary syndromes. *American Heart Journal* 169(4):579-586.

Earle N, Yeo Han D, Pilbrow A, Crawford J, Smith W, Shelling A, Cameron V, Love D, Skinner J (2014). Single nucleotide polymorphisms in arrhythmia genes modify the risk of cardiac events and sudden death in long QT syndrome. *Heart Rhythm* 11:76-82.

Fourie C, Kim E, Waldvogel H, Wong J, McGregor A, Faull R, **Montgomery J** (2014). Differential Changes in Postsynaptic Density Proteins in Postmortem Huntington's Disease and Parkinson's Disease Human Brains. *Journal of Neurodegenerative Disease* 2014:938530. doi: 10.1155/2014/938530.

Grant C, Crane J, Mitchell E, Sinclair J, Stewart A, Milne T, Knight J Gilchrist C, Camargo C (2016). Vitamin D supplementation during pregnancy and infancy reduces aeroallergen sensitisation: a randomised controlled trial. *Allergy* DOI:10.1111/all.12909.

Hansen B, **Zhao J**, Csepe T, Moore B, Li N, Jayne L, Kalyanasundaram A, Lim P, Bratasz A, Powell A, Simonetti O, Higgins R, Kilic A, Mohler P, Janssen P, Weiss R, Hummel J, Fedorov V (2015). Atrial fibrillation driven by micro-anatomic intramural re-entry revealed by simultaneous sub-epicardial and sub-endocardial optical mapping in explanted human hearts. *European Heart Journal* 36(35):2390-2401.

Harding J, Hegarty J, Crowther C, Edlin R, Gamble G, **Alsweiler J** (2015). Randomised trial of neonatal hypoglycaemia prevention with oral dextrose gel (hPOD): study protocol. *BMC Pediatrics* 15:120.

Hoare D, **Searchfield G**, El Refaie A, Henry J (2014). Sound therapy for tinnitus management: practicable options. J*ournal of the American Academy of Audiology* 25(1):62-75.

James J (2016). Stem cells and pregnancy disorders: From pathological mechanisms to therapeutic horizons. S*eminars in Reproductive Medicine* 34(1):17-26.

James J, Chamley L (2016). Structure and development of the human placenta. In: Placenta: The tree of life. Edited by Ornella Parolini. CRC Press; 1 edition (February 17, 2016), ISBN 9781498700269.

James J, Hurley D, Gamage T, Zhang T, Vather R, Pantham P, Murthi P, Chamley L (2015). Isolation and characterisation of a novel trophoblast side-population from first trimester placentae. *Reproduction* 150(5):449-462.

James J, Srinivasan S, Alexander M, Chamley L. (2014). Can we fix it? Evaluating the potential of placental stem cells for the treatment of pregnancy disorders. *Placenta* 35(2):77-84.

Lee T, Yang A, Brittain T, Birch N (2015). An analysis approach to identify specific functional sites in orthologous proteins using sequence and structural information: application to neuroserpin reveals regions that differentially regulate inhibitory activity. *Proteins* 83(1):135-152.

Ly K, Bartho J, Eicher T, Pos K, **Mitra A** (2014). A novel packing arrangement of AcrB in the lipid bilayer membrane. *FEBS Letters* 588(24):4776-4783.

McKinlay C, Alsweiler J, Ansell J, Anstice N, Chase J, Gamble G, Harris D, Jacobs R, Jiang Y, Paudel N, Signal M, Thompson B, Wouldes T, Yu T, **Harding J**; CHYLD Study Group (2015). Neonatal Glycemia and Neurodevelopmental Outcomes at 2 Years. *New England Journal of Medicine* 373(16):1507-1518.

Oliver V, van Bysterveldt K, Cadzow M, Steger B, Romano V, Markie D, Hewitt A, Mackey D, Willoughby C, Sherwin T, Crosier P, McGhee C, **Vincent A** (2016). A COL17A1 Splice-Altering Mutation is Prevalent in Inherited Recurrent Corneal Erosions. *Ophthalmology* doi: 10.1016/j.ophtha.2015.12.008.

Saggese T, Redey P, McGlashan S (2014). Same-species phenotypic comparison of notochordal and mature nucleus pulposus cells. *European Spine Journal* 24(9):1976-1985.

Sarkar D, Leung E, Baguley B, Finlay G, **Askarian-Amiri M** (2015). Epigenetic regulation in human melanoma: past and future. *Epigenetics* 10, 103-121.

Searchfield G (2014). Tinnitus what and where: an ecological framework. *Frontiers in Neurology* 5:271.

Shekhawat G, Kobayashi K, **Searchfield G** (2015). Methodology for studying the transient effects of transcranial direct current stimulation combined with auditory residual inhibition on tinnitus. *Journal of Neuroscience Methods* 239:28-33.

Shekhawat G, Stinear C, **Searchfield G** (2015). Modulation of Perception or Emotion? A Scoping Review of Tinnitus Neuromodulation Using Transcranial Direct Current Stimulation. *Neurorehabilitation and Neural Repair* 29(9):837-846.

Strauss O, Bartlett A (2014). Dendritic cell subset composition in the human liver is more complex than it seems. *Journal of Hepatology* 60(5):1097-1098.

Strauss O, Dunbar P, Bartlett A, Phillips A (2015). The immunophenotype of antigen presenting cells of the mononuclear phagocyte system in normal human liver - a systematic review. *Journal of Hepatology* 62(2):458-468.

van den Heuij L, Mathai S, Davidson J, Lear C, Booth L, Fraser M, Gunn A, Bennet L (2014). Synergistic white matter protection with acute-on-chronic endotoxin and subsequent asphyxia in preterm fetal sheep. *Journal of Neuroinflammation* 11:89.

van den Heuij L, Wassink G, Gunn A, Bennet L (2015). Using Pregnant sheep to Model Developmental Brain Damage. Book chapter, David Walker (ed), Prenatal and Postnatal Determinants of Development: Neuromethods 109:327-341.

Vather R, Josephson R, Jaung R, Kahokehr A, Sammour T, **Bisset I (2015)**. Gastrografin in Prolonged Postoperative Ileus-: A Double-Blinded Randomized Controlled Trial. *Annals of Surgery* 262(1):23-30.

Waddell-Smith K, **Earle N**, Skinner J (2015). Must every child with long QT syndrome take a beta blocker? *Archives of Disease in Childhood* 100(3):279-282.

Wharewera-Mika J, Cooper E, **Kool B**, Pereira S, Kelly P (2015). Caregivers' voices: The experiences of caregivers of children who sustained serious accidental and non-accidental head injury in early childhood. *Clinical Child Psychology and Psychiatry* doi: 10.1177/1359104515589636.

Zhao J, Yao Y, Shi R, Huang W, Smaill B, Lever N (2015). Progressive modification of rotors in persistent atrial fibrillation by stepwise linear ablation. *Heart Rhythm Case Reports* 1(1):22-26.

Zheng Y, McPherson K, Reid P, **Smith P** (2015). The anti-inflammatory selective melanocortin receptor subtype 4 agonist, RO27-3225, fails to prevent acoustic trauma-induced tinnitus in rats. *European Journal of Pharmacology* 761:206-210.

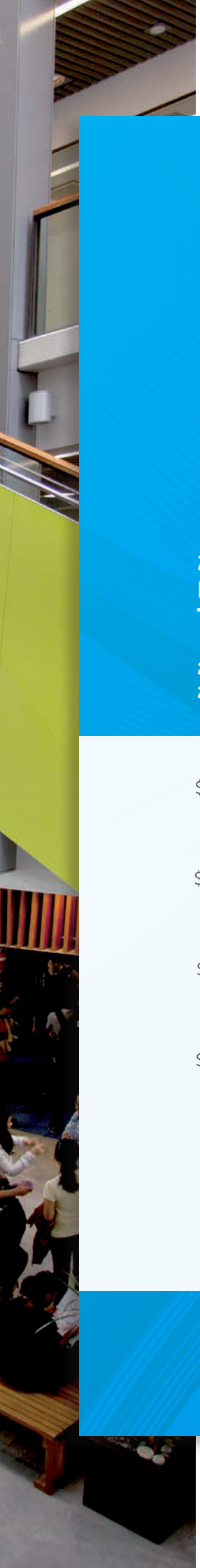
Zheng Y, Reid P, **Smith P** (2015). Cannabinoid CB1 receptor agonists do not decrease, but may increase, acoustic trauma-induced tinnitus in rats. *Frontiers in Neurology* 6:60.

AMRF AUDITORIUM

University of Auckland
Faculty of Medical and Health Sciences

The AMRF Auditorium was made possible through a generous donation from an AMRF benefactor.

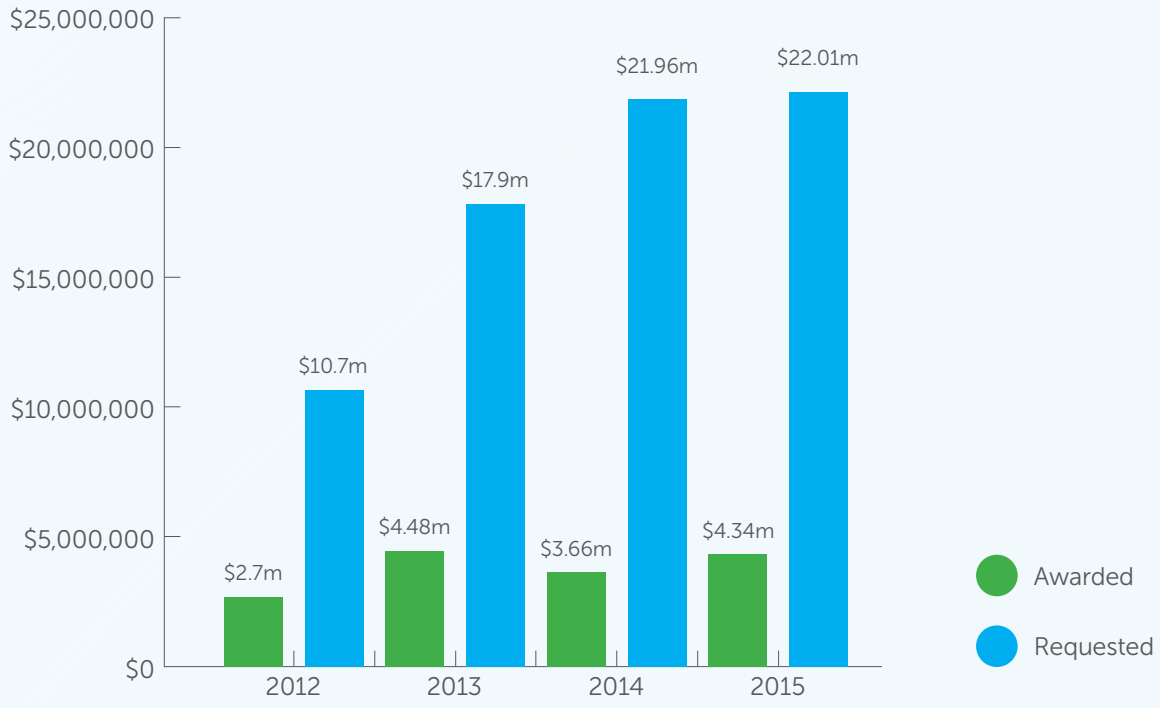
AMRF holds two free public lectures each year on topics of interest. See www.medicalresearch.org.nz for past and current lectures.



FINANCIALS 2015

2015 SAW AN 18.5% INCREASE IN GRANTS AWARDED HOWEVER, THERE ARE MANY WORTHY REQUESTS FOR FUNDING THAT WE CANNOT SUPPORT.

2014 – $21.96 million requested, $3.66 million awarded
2015 – $22.01 million requested, $4.34 million awarded



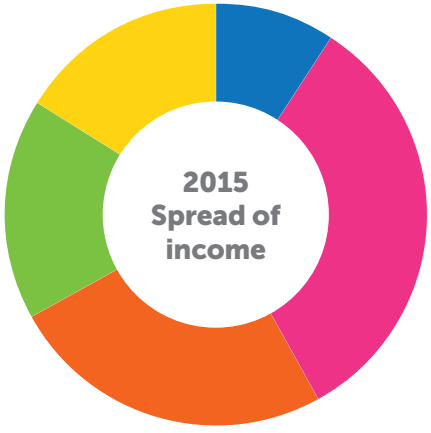
Financial Highlights 2015

RESEARCH FUNDING 2015 $4.34M **TOTAL RESEARCH FUNDING SINCE 1955 $60.1M**

FINANCIAL PERFORMANCE

	Note	2015 $	2014 $
Income			
Donations / Subscriptions	1	647,154	402,712
Investment Income		2,238,363	2,100,067
Trust Income and External Funding	1	1,723,452	769,765
Legacies/Bequests/Specific Donations	2	1,152,929	153,818
Net Gain on realisation of investments		1,098,027	600,119
Net Loss on currency fluctuations		(2,838)	(2,097)
Total		6,857,087	4,024,384
Expenditure			
Operational expenses		321,005	354,437
(Less Donation)	3	(321,005) Nil.	(354,437) Nil.
Research Grants 2015	4	4,080,406	3,425,927
Depreciation on Grant Funded Assets		4,832	5,231
Reduction in value of investments		419,644	335,599
Total		4,504,882	3,766,757
Net (Deficit) / Surplus		2,352,205	257,627

The summary financial report above has been extracted from the full Audited Financial Statements which can be obtained by contacting the Foundation's office. Tel: 09 923 1701 or Email: admin@medicalresearch.org.nz



	2015	2014
Donations / Subscriptions	$647,154	$402,712
Investment Income	$2,238,363	$2,100,067
Trust Income and External Funding	$1,723,452	$769,765
Legacies / Bequests / Specific Donations	$1,152,929	$153,818
Net Gain on realisation of investments	$1,098,027	$600,119

NOTES TO THE 2015 FINANCIAL REPORT

1. Donation & Trust Income includes medical research and capital grants, donations and external funding received from the following organisations:

Perpetual Guardian Administered Funds	
David & Cassie Anderson Medical Trust	193,377
Barbara Basham Medical Trust	126,500
Ruth Spencer Estate	282,500
NH Taylor Charitable	363,673
Ethel Reed Hitchen Estate	126,500
J&P Stilson Endowment Trust	105,000
Richardson Trust	3,644
Rose Richardson Estate	40,000
Edith C Coan Trust	246,942
John A Jarrett Trust	40,000
T.M. Hosking Charitable Trust	20,000
C.E. Lawford Estate	4,000
Public Trust Administered Funds	
Acorn Charitable Trust	10,000
Tennyson Charitable Trust	5,000
Pritchard Coutts Charitable Trust	62,000
Audrey Simpson Trust	5,650
Ralph Dingle Trust	2,000
Wellington Sisters Charitable Trust	5,000
Other Trusts/Funds	
Douglas Goodfellow Charitable Trust	87,750
The Kelliher Charitable Trust	60,000
Paul Stevenson Memorial Trust	25,000
Marion Ross Fund	127,666
Anonymous	428,404

2. Legacies, Bequests and Specified Donations 1,152,929

Estate of Brian De Luen
Estate of EM Robinson
Estate of G.M. Chapman
Estate of Nora Hamblin

3. Operational Expenses

The Foundation is very grateful for the Harry Goodfellow Fund, Hector Goodfellow Fund and TB & WD Goodfellow Fund for the external funding of operational expenses.

4. Research Funding Approved During Year

PROJECT GRANTS GENERAL (23)	
AMRF General Purpose & Named Funds Supporting Research Projects	2,667,486
POSTDOCTORAL FELLOWSHIPS (2)	
David and Cassie Anderson Research Fellowship	193,377
Edith C Coan Research Fellowship	182,861
DOCTORAL SCHOLARSHIPS (3)	
AMRF Doctoral Scholarship	126,500
AMRF Brian De Luen Doctoral Scholarship	126,500
Barbara Basham Doctoral Scholarship	126,500
AMRF TRAVEL GRANTS (32)	83,908
NAMED FELLOWSHIPS (3)	
Jean Cathie Research Fellowship (2)	380,690
Ruth Spencer Medical Research Fellowship	282,500
OTHER GRANTS (7)	
Kelliher Charitable Trust Emerging Researcher Start-up Grant (2)	60,000
Gavin and Ann Kellaway Medical Research Fellowship (2)	75,000
HealtheX Emerging Research Award	5,000
Sir Harcourt Caughey Fund	25,000
Sir Douglas Robb Memorial Fund	800
Total Grants Committed 2015	**4,336,122**
Less amounts allocated but not required	(255,716)
TOTAL GRANT FUNDING 2015	**4,080,406**

Members, Sponsors & Supporters 2015

WE ARE MOST GRATEFUL TO ALL THE INDIVIDUALS, TRUSTS AND ORGANISATIONS LISTED BELOW WHO HAVE GIVEN GENEROUS SUPPORT TO THE FOUNDATION DURING THE YEAR.

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ACKNOWLEDGEMENTS, LEGACIES, BEQUESTS, PARTNERS & SUPPORTERS 2015

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Estate of Brian De Leun

Estate of Elaine M Robinson

Estate of GM Chapman

Estate of Nora Hamblin

Special Acknowledgements

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AMRF have a proven track record of growing world class medical research, and it is our belief that research is the only way we can ensure genuine advances in medicine and outcomes for patients. To this end, we rely on the generosity and support of our donors to help us grow a sustainable fund for the future.

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A recent quote from Elspeth Mount QSM, about becoming an AMRF member:

"I am absolutely in awe of the work of AMRF to date and would certainly encourage every member to help spread the word and seek to grow the membership among their family, friends and colleagues".

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You may consider a Remembrance Donation in lieu of flowers or may wish to honour a special occasion such as the birthday of a friend or family member. The Foundation will send a personalised letter advising that you have made this type of donation. Such donations are appreciated by the individuals or families as this is a dignified and practical way of expressing your condolences or celebrating a special occasion.

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A bequest is a gift of cash or assets (shares, property, or other assets) made through your Will. A bequest or major gift to the AMRF is an investment in the health of future generations. You can choose to leave your gift for a specific area of research or for general purposes, allowing the Foundation to determine the greatest area of need. If you are considering this option please contact us, as we are happy to assist.

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