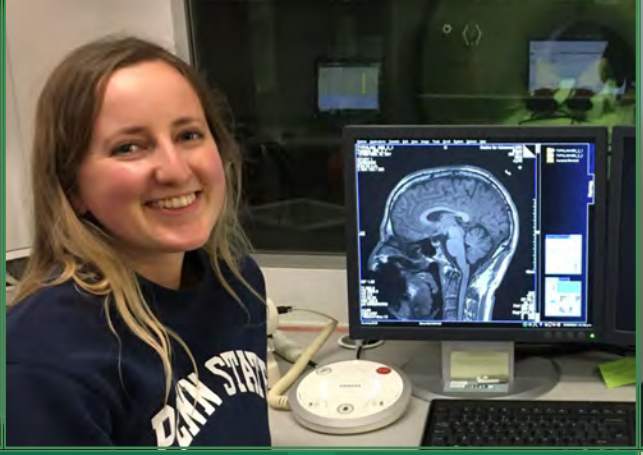
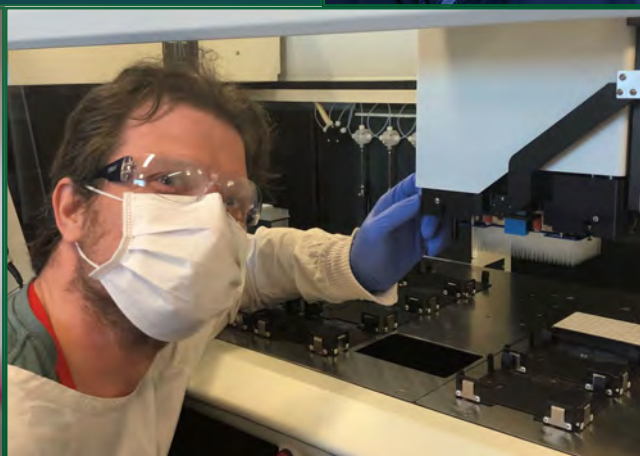










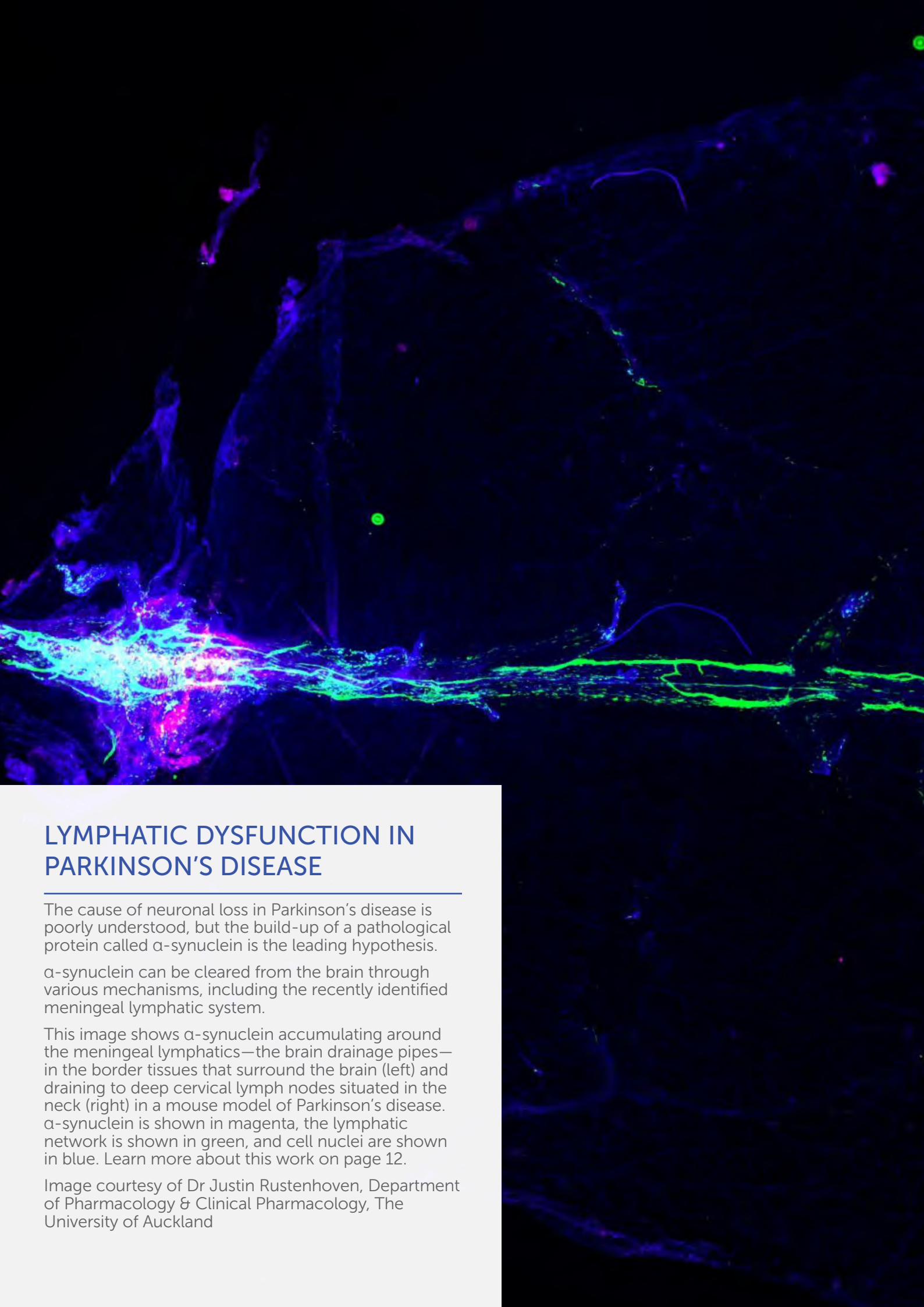



ANNUAL REPORT 2023

Auckland Medical Research Foundation

est. 1955

SUPPORTING MEDICAL RESEARCH FOR OVER *65 years*



LYMPHATIC DYSFUNCTION IN PARKINSON'S DISEASE

The cause of neuronal loss in Parkinson's disease is poorly understood, but the build-up of a pathological protein called α-synuclein is the leading hypothesis.

α-synuclein can be cleared from the brain through various mechanisms, including the recently identified meningeal lymphatic system.

This image shows α-synuclein accumulating around the meningeal lymphatics—the brain drainage pipes—in the border tissues that surround the brain (left) and draining to deep cervical lymph nodes situated in the neck (right) in a mouse model of Parkinson's disease. α-synuclein is shown in magenta, the lymphatic network is shown in green, and cell nuclei are shown in blue. Learn more about this work on page 12.

Image courtesy of Dr Justin Rustenhoven, Department of Pharmacology & Clinical Pharmacology, The University of Auckland

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Web: www.medicalresearch.org.nz
Charity Services Registration Number: CC22674

PRESIDENT'S REPORT 2023

In 2023, Auckland Medical Research Foundation (AMRF) turned 68 and our mission to fund world-class medical research continues to stand the test of time.

In the landscape of 2023, we continued to navigate unprecedented challenges. As we collectively emerged from the tumultuous years shaped by Covid-19, the start of the year brought extreme weather events resulting in the loss of life, displaced communities, destruction of homes and businesses and widespread devastation across various regions of New Zealand. It is only fitting to acknowledge all those profoundly affected by the storms and floods and recognise the long road ahead as these communities rebuild and recover.

The New Zealand economy also presented its own challenges, characterised by inflation, high interest rates and for many, a cost-of-living crisis. Given this ongoing financial turbulence, we are extremely proud to highlight we were able to award funding of almost $4,000,000, similar to 2022 levels.

You, our loyal donors, have been instrumental in making this possible. Your commitment to sustaining our researchers in their vital work reflects the value you place on the future health of us all and we are so thankful for your belief in providing a lasting legacy that will benefit generations to come.

On pages 6 and 7, you can read about our doctoral scholarships awarded in 2023. This year marked a significant milestone, not only for introducing scholarship interviews for the first time but also for the inclusion of Helen Goodwin, founder of the Gooduck Charitable Trust, onto our scholarship interview panel.

It became clear this year we were experiencing a distinct departure from the Covid-19 era, defined by closed borders and restricted travel. There was a very noticeable shift in the allocation of our travel grants with over $100,000 more awarded than in 2022. This increase not only signals the growing optimism within our research communities but also a renewed commitment to fostering collaborations essential to drive meaningful impact on a global scale.

In this age of health challenges, cancer continues to stand out as one of the more prevalent diseases, impacting countless lives. You will note on page 5 that 16.5% of our funding was allocated to cancer research projects and this is testimony to the amount of world-class research being undertaken here in New Zealand. This quantum of cancer research is also made possible by one donor who gifted $600,000 for work in this field and we offer our deepest gratitude to this anonymous benefactor for the significant advancements they are helping to drive.

Auckland Medical Research Foundation wouldn't be New Zealand's largest independent funder of research across the spectrum of all disorders and diseases, without the foresight and extraordinary generosity of the Goodfellow family and associated charitable trusts. Their visionary philanthropy has been fundamental in our success over the years and words cannot convey the depth of our gratitude for the annual donation which covers all of our operating expenses, allowing every dollar donated by you to go directly into critical medical research.

In my summary of the 2023 year, I would like to extend my sincerest thanks to the AMRF team for their steadfast dedication to achieving our mission of funding world-class medical research; our volunteer Board of Trustees who guide our strategic direction and help shape the initiatives that define our organisation; and our Medical Committee members for the time, expertise and passion they gift to ensure we uphold the highest standards in our pursuit of ground-breaking research.

To you, our donors and supporters, a heartfelt thank you for being such a vital part of our collective force, joined in purpose and for the difference you are helping to make in the health and quality of life for so many.

Richard Taylor

President

MEDICAL COMMITTEE REPORT 2023

In another busy year, our dedicated volunteer Medical Committee assessed 184 applications and awarded 102 grants across six grant rounds totaling $3.93 million, across a multitude of research themes.

This year saw generous AMRF donors fund projects such as designing new drug delivery conjugates to improve anticancer drugs; understanding the effects of skin pretension and deformation on needle-free drug delivery; and a clinical trial to test a pain relief implant for abdominal surgery.

With the country now out of the grasp of the COVID-19 pandemic, one highlight was seeing the research community re-igniting their travel plans to disseminate their research at national and international conferences, with 40 travel grants awarded in 2023 compared to nine awarded the previous year.

Another highlight for this year was the awarding of three doctoral scholarships and one Douglas Goodfellow Medical Research Fellowship. This year we introduced an interview stage for our doctoral scholarship and Douglas Goodfellow Medical Research Fellowship applicants. We were thrilled to invite Helen Goodwin of the Gooduck Charitable Trust to sit on the panel along with selected members of the Medical Committee. Helen was so impressed with the quality of the applicants interviewed that she committed to providing two doctoral scholarships this year, allowing for the AMRF to fund a third doctoral scholarship recipient, in addition to providing one Douglas Goodfellow Medical Research Fellowship. Thank you, Helen.

Year after year the awarding of these grants would not be possible without the generous gifting of time and expertise of our Medical Committee members and co-opted members who work had to ensure a contestable and robust assessment process is applied to all grant rounds.

In 2023 we welcomed two clinicians onto our Medical Committee. Dr Doug Campbell, a specialist anaesthetist at Te Whatu Ora Te Toka Tumai with his specialty being in neuroanaesthesia, and Dr Gergely Toldi, a consultant neonatologist at Starship Neonatal Intensive Care Unit and lecturer at the Liggins Institute researching early life development of the immune response. We also welcomed two biomedical researchers. Dr Hilary Sheppard is a stem cell biologist whose research focuses on using targeted genome engineering technologies to engineer cells for use in the clinic, and Dr Moana Tercel, a medicinal chemist focusing on developing better anticancer drugs, both from the University of Auckland, Waipapa Taumata Rau. To date we have relished in the knowledge and enthusiasm they have brought to the Medical Committee and look forward to their input for several more years. I also want to extend a farewell and my sincere gratitude to Prof Anthony Phillips for his input into the Committee since he joined us back in 2017. We wish him well for what comes next.

On behalf of the Medical Committee, I would like to thank the AMRF Board and team for all their work to achieve our timeless mission of funding world-class medical research and, in particular, Dr Hannah Gibbons (Research Programme Manager) for her stewardship of the Grants Portfolio and management of the Medical Committee.

Professor Peter Browett
Chair, Medical Committee
Professor of Pathology, Department of Molecular Medicine and Pathology, The University of Auckland Waipapa Taumata Rau; and Haematologist, Te Whatu Ora Te Toka Tumai

A PROMISING COMBINATION THERAPY FOR ALZHEIMER'S DISEASE

Dr Lola Mugisho

Department of Ophthalmology,
The University of Auckland

Being awarded an AMRF Postdoctoral Fellowship will bring Dr Lola Mugisho, an accomplished molecular biologist, one step closer to realising her goal of becoming a world-class independent researcher in neurotherapeutics, developing novel treatments for neurodegenerative diseases affecting the retina and brain.

"This funding is invaluable in furthering my research team's work with the retina as a window into the brain, an extension of the brain if you like, an extension where the vascular pathology and inflammatory responses can be easily imaged, presenting a unique opportunity to develop non-invasive retinal biomarkers for neurodegenerative brain diseases and potential treatments," says Lola.

Alzheimer's disease (AD) is the most common form of dementia, characterised by amyloid-beta accumulation in the brain and despite two FDA-approved treatments targeting amyloid-beta, their limited effectiveness and severe side effects highlight the need for alternative approaches.

Recent interest has focused on "inflammaging" which is age-related inflammation, and research has shown that the inflammasome pathway controls inflammaging and is implicated in age-related diseases such as AD, making it a potential target for innovative treatment strategies for neurodegenerative diseases.

"For eight years, my research team, currently comprising of two research technicians, one research assistant, three PhD candidates, one MSc student and four Bachelor of Optometry (honours) students, has studied the inflammasome pathway in age-related neurodegenerative diseases.

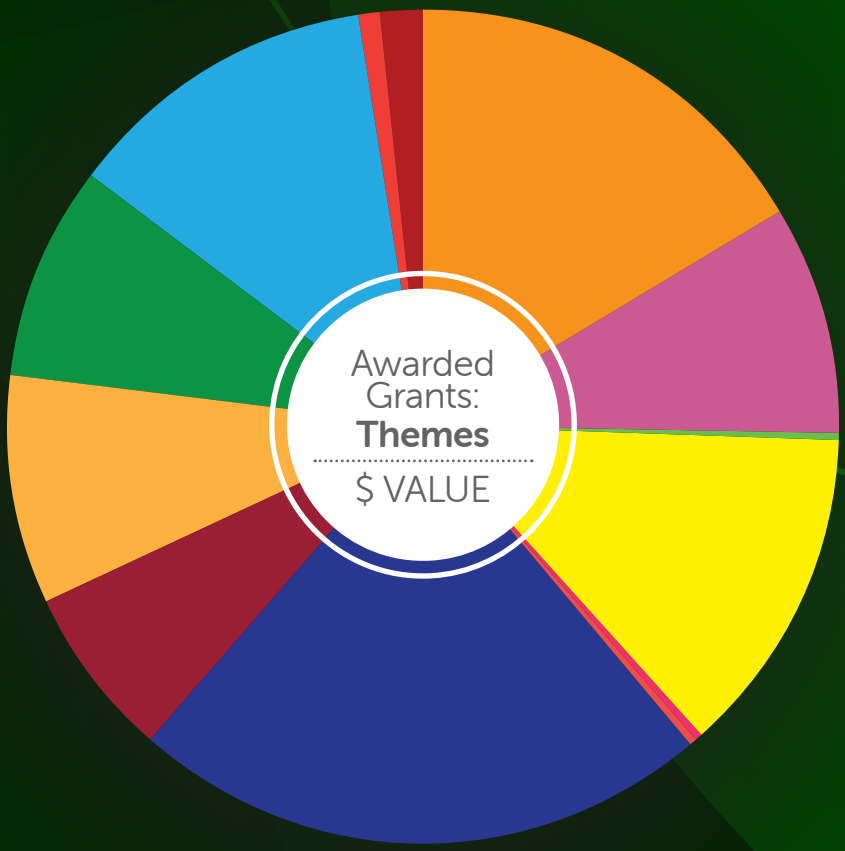
"It is really exciting that we discovered anti-inflammasome drugs such as Peptide5 and Tonabersat to protect against age-related eye and brain pathologies by reducing inflammation.

"This funding is invaluable in furthering my research team's work with the retina as a window into the brain."

"However, in this instance, my new hypothesis is that using a combination of Tonabersat and Lecanemab will be the most effective approach, as Lecanemab reduces amyloid-beta levels, but cannot halt the activated inflammasome pathway during inflammaging, necessitating the addition of Tonabersat to reduce inflammation and halt the progression of AD.

"In short, this research project aims to assess the safety and efficacy of a combination therapy for AD treatment and builds on my aspiration to lead drug discovery, translational research, and the development of new drugs targeting neurodegenerative disease pathways to enhance overall quality of life," summarised Lola.

GRANTS AWARDED



2023 AWARDED GRANTS — THEMES
74 GRANTS AWARDED TOTALLING $3,934,109*

- Biomedical Imaging (2) | **$3,000** | 0.08%
- Cancer (9) | **$651,451** | 16.56%
- Cardiovascular Science (9) | **$345,154** | 8.77%
- Cellular & Molecular Biology (2) | **$15,644** | 0.40%
- Endocrinology, Metabolism and Nutrition (3) | **$495,854** | 12.6%
- Infection and Immunity (4) | **$10,600** | 0.27%
- Musculo-skeletal Science (3) | **$11,022** | 0.28%
- Neuroscience (14) | **$892,912** | 22.7%
- Other (7) | **$258,701** | 6.58%
- Population Health (6) | **$344,758** | 8.76%
- Pulmonary, Renal, Nephrology & Gastrointestinal Sciences (3) | **$332,927** | 8.46%
- Reproduction, Development, Maternal & Newborn Health (7) | **$478,199** | 12.16%
- Sensory Sciences (3) | **$38,000** | 0.97%
- Surgery (2) | **$55,000** | 1.40%

(n) Number of grants
$ Value each theme
% Total expenditure
*Includes AMRF Researcher Network Fund

DOCTORAL SCHOLARSHIP

DEVELOPING A DIGITAL MENTAL HEALTH INTERVENTION FOR YOUNG PEOPLE ON AWAITING PSYCHOLOGICAL TREATMENt ($149,000 - 3 years) 1232003

Miss Melody Kim

Dept. of Psychological Medicine,
The University of Auckland

New Zealand is facing a wait-list crisis. Accessing mental health care has never been more challenging. This research proposal aims to develop scalable and effective interventions that can offer timely support to children, youth, and young adults (herein, young people) during their journey to receive psychological treatment. Recent studies have shown a significant increase in mental health distress among young individuals, particularly in the context of extended wait times for professional support. The challenges of accessing timely and appropriate mental health care have resulted in a perceived 'crisis' in the field, with young people facing the most extended wait times among all age groups. These prolonged waits have been linked to exacerbating distress levels, dissatisfaction, and lowered treatment efficacy. However, interventions and support have received limited attention during this specific waiting period. The proposed research comprises interlinked studies that will shed light on the experiences of mental health clinicians and young people during this critical waiting period which will then inform the development and adaptation of a wait-list-specific intervention. Armed with qualitative insights, a scalable, tailored digital intervention prototype will be carefully co-designed with key stakeholders. The research aims to bridge the existing gap in research and interventions, paving the way for more accessible and impactful mental health care for young people facing prolonged wait times.

MEDICAL RESEARCH FELLOWSHIP

DOUGLAS GOODFELLOW MEDICAL RESEARCH FELLOWSHIP GESTATIONAL DIABETES MELLITUS IN NEW ZEALAND ($314,000 - 3 years) 1423001

Dr Lisa Douglas

Liggins Institute, The University of Auckland

Gestational diabetes mellitus (GDM) is a condition of high blood sugar levels first detected during pregnancy, affecting one in every eight pregnancies. In Auckland, rates have tripled over the past 15 years. GDM increases the risk of health problems in both mother and baby, both during pregnancy and in the years following, and contributes to health inequality over generations. I am an advanced trainee in Endocrinology with a special interest in GDM. I plan a series of studies examining how blood sugar control during a GDM pregnancy impacts outcomes 4.5 years later for both mother and child. For the mother I will investigate her sugar control, body size, diet and physical activity and overall wellbeing, and for her child I will investigate body size and behavioural and developmental outcomes using specialised questionnaires. I will also examine the effects of adherence to the recommended targets for blood sugar control, and to recommended diabetes screening follow-up after GDM, and which women are most at risk of not achieving these. This work will help to identify where interventions might be directed and guide the best use of limited health resource to improve outcomes and reduce inequalities after GDM in the future.

HELEN GOODWIN DOCTORAL SCHOLARSHIPS

HARNESSING SODIUM NITRITE TO ENHANCE COLLATERAL PERFUSION DURING ISCHEMIC STROKE ($149,000 – 3 years) 1223002

Miss Sryana Sukhdev

Dept. of Physiology, The University of Auckland

Stroke is a serious health concern in New Zealand, particularly among Māori and Pacific populations. Current treatment aims to restore blood flow to the brain, but this requires specialist care which takes longer to access from rural regions. Given the higher number of Māori living in rural areas, inequitable access to treatment is likely to contribute to poorer outcomes seen in Māori stroke patients. Nitric oxide (NO) is commonly known for its vasodilatory effects, with previous animal studies having shown its promise in restoring blood flow and improving outcomes following stroke, but its cost and specialised requirements limit its widespread use. As an alternative, we propose using nebulised sodium nitrite as a cost-effective means of delivering NO, which has been shown to be safe and well-tolerated by clinical populations, which we hypothesise will selectively improve collateral blood flow to stroke-affected areas. We propose preclinical studies to determine mechanism of benefit, and refine optimal timing and dosage and human studies of the cerebrovascular effects of sodium nitrite treatment in a 'stroke risk' cohort. We aim that our study will build evidence to support future clinical trials.

FUNDED BY: Gooduck Charitable Trust

T CELL ACCUMULATION AND NEURONAL DYSFUNCTION IN PARKINSON'S DISEASE ($149,000 – 3 years) 1223001

Mr Luca Vinnell

Dept. of Pharmacology & Clinical Pharmacology, The University of Auckland

Parkinson's disease (PD) is a neurodegenerative disorder characterised by the loss of dopamine-producing neurons in the brain, leading to motor impairments and cognitive decline. While traditionally considered a disease affecting neurons, emerging evidence suggests that immune cells, particularly T cells, infiltrate the brain of individuals with PD. The proposed project will explore the involvement of T cells in PD, with a focus on their detrimental impact on neuronal function. Under healthy conditions, neurons can use cytokines—molecules produced predominantly by immune cells— to talk to one another, and this communication is essential for survival. This project hypothesises that the infiltration of T cells into the brain creates a communication barrier between neurons. In this context, T cells interfere with the intricate language of neuronal signalling, disrupting normal cytokine mechanisms, by introducing their own cytokines into the neuronal dialogue. This disruption is believed to contribute to the progression of PD. Through a combination of disease models, and analysis of patient samples, I aim to elucidate the mechanisms by which T cells impact neuronal communication in PD. Understanding this holds significant promise for advancing our knowledge of the immune-neuronal interplay in PD, shedding light on the potential role of T cells in disease progression and offering new avenues for therapeutic intervention.

FUNDED BY: Gooduck Charitable Trust

POSTDOCTORAL FELLOWSHIPS

A PROMISING COMBINATION THERAPY FOR ALZHEIMER'S DISEASE ($282,195 - 2 years) 1323001

Dr Odunayo (Lola) Mugisho

Dept. of Ophthalmology, The University of Auckland

Dementia is a pressing issue among the elderly, expected to double from 2015 to 2050, affecting approximately 10% of those aged 65 and over. Alzheimer's disease (AD) is a common form of dementia characterised by amyloid-beta accumulation in the brain. Despite two FDA-approved treatments targeting amyloid-beta, their limited effectiveness and severe side effects highlight the need for alternative approaches. Recent interest has focused on "inflammaging," age-related inflammation. Research has shown that the inflammasome pathway controls inflammaging and is implicated in age-related diseases like AD, making it a potential target for innovative treatment strategies for neurodegenerative diseases. Previous work undertaken by my group has studied the inflammasome pathway in age-related neurodegenerative diseases. We found that anti-inflammasome drugs like Peptide5 and Tonabersat, protect against age-related eye and brain pathologies by reducing inflammation. Here I hypothesise that a combination of Tonabersat and Lecanemab will be the most effective drug-based approach for AD, as

Lecanemab reduces amyloid-beta levels, but cannot halt the activated inflammasome pathway during inflammaging, necessitating additional Tonabersat to reduce inflammation. This drug combination may provide a holistic approach to drug development with the hope of halting disease progression and preserving cognitive function.

FUNDED BY: W & WAR Fraser Bequest

INVESTIGATING THE CAUSE OF CATAMENIAL EPILEPSY ($264,233 - 2 years) 1323002

Dr Rachael Sumner

School of Pharmacy, The University of Auckland

Epilepsy is one of the most common and debilitating neurological conditions in the world, affecting 1-2% of the population. For 40% of women with epilepsy, their menstrual cycle will worsen their seizures; they will experience at least twice as many seizures as they ordinarily would, and the seizures may be more severe than usual. This worsening occurs at specific phases of their menstrual cycle and is called catamenial epilepsy. Catamenial epilepsy seizures frequently cannot be treated with available medicines. The exact mechanism is unknown but it is likely to involve how the brain responds to hormones and changes its sensitivity. Finding mechanisms that explain catamenial seizures and are potential targets for new treatments is essential. This fellowship is focused on finding the mechanism. We are running a study recruiting females with epilepsy who have catamenial seizures. We are comparing the findings with females who do not have seizure changes. We are testing how their brain changed over the menstrual cycle. We will also give common hormone medications to volunteer females to test changes to

hormone sensitivity at different points of their menstrual cycle. For all participants we will record their brain waves (using electroencephalography) and take blood samples to test hormone levels.

FUNDED BY: Edith C. Coan

perpetual guardian

Grants Awarded

PROJECTS

Dr Ben Albert

PARENTAL DIET AND THE OFFSPRING ($179,182 – 2 years) 1123001

Dr Benjamin Albert, Prof Wayne Cutfield, Dr José Derraik, Dr Anna Ponnampalam, Dr David Musson, Prof Mark Vickers

Liggins Institute, The University of Auckland

Children who are born to mothers with overweight or obesity are more likely to develop problems with their weight, and metabolic diseases such as diabetes and cardiovascular disease as they grow up. This is because they are born with alterations to how their body's metabolism works. As over half of the children born in New Zealand, will have a mother with greater weight, this is important. Unfortunately, we don't have any effective treatments to reduce the risk for these children once they are born. We also don't know if Dad's health is as important as Mum's. This study will use a high-fat high-sugar, Western junk food diet, in rats, to find out the relative importance of the mother and the father's diet and body fatness, and also find out whether a fish oil treatment given to the offspring during childhood can prevent weight and metabolic problems from developing as they grow up. This could lead to better health advice for both men and women who wish to become parents, and to a rescue treatment, to protect children born at risk of weight problems.

Front: Roimata Tipene, Dr. Karen Bartholomew, Dr. Olivia Perelini, Kaz Bautista. Back: Phillip Manako, Anastacia Oloapu, Lucy Brown

P. SOMERAE DETECTION IN ENDOMETRIAL CANCER IN AOTEAROA ($174,834 – 2 years) 8123010

Dr Karen Bartholomew, Dr Marina Walther-Antonio, Dr Georgina McPherson, Dr Silipa Naiqiso, Dr Lois Eva, Dr Michelle Wilson, Dr Sarah Corbett, Dr Suneela Mehta, Dr Collette Bromhead, Dr Joanne Moses, Dr Sathana Ponnampalam, Dr Jye Lu, Ms Puawai Enoka, Ms Pauline Fakalata, Dr Claire Henry, Dr Cherie Blenkiron, Dr Bryony Simcock, Mrs Roimata Tipene

Planning Funding and Outcomes, Te Whatu Ora Waitematā

Endometrial Cancer (EC; cancer of the uterus or womb) is a significant health and equity issue in Aotearoa. Pacific women have one of the highest incidence rates in the world, and it is rising extremely rapidly, with EC now being the biggest contributor to the life expectancy gap for Pacific women. There are also inequities for Māori women in both EC incidence and mortality. Potential drivers of EC include obesity, diabetes and menopausal status. More recently, studies have indicated links between vaginal and endometrial microbial communities (microbiome) and EC. In the US an anaerobic bacteria (bacteria which grows without oxygen), *Porphyromonas somerae* has been found to be associated with EC. The US lead author is collaborating with us to examine whether this bacteria can be detected, alongside changes in pH, on vaginal swabs and endometrial samples in a large and diverse population in Aotearoa; Māori, Pacific and non-Māori non-Pacific women. We will also examine the broader microbiome to see if there are differences for Aotearoa or between groups. Confirming a microbiome biomarker for EC raises the possibility of a minimally invasive screening test (vaginal self-test) in the future, with the ultimate aim of addressing EC inequities.

FUNDED BY: Anonymous donor

Dr Kathryn Burns

PERSONALISED MEDICINE IN LUPUS NEPHRITIS ($179,997– 2 years) 1123002

Dr Kathryn Burns, A/Prof Nuala Helsby, Dr Tze Goh, Prof Peter Gow, Dr Janak de Zoysa

Dept. of Pharmacology & Clinical Pharmacology, The University of Auckland

Mycophenolate mofetil (MMF) is an immunosuppressant drug which targets an enzyme in white blood cells, inosine-5'-monophosphate dehydrogenase (IMPDH). It can be used to treat patients with the autoimmune disease systemic lupus erythematosus (SLE) who develop potentially life-threatening kidney damage (lupus nephritis). This study aims to understand how differences in IMPDH between SLE patients affect how well MMF suppresses its activity, and how this changes over time. We will also investigate the way MMF enters each person's immune cells, as well as inherited differences between patients that might affect outcomes both for MMF and for an alternative drug used to treat lupus nephritis (cyclophosphamide). Understanding these factors could help doctors to predict which patients are likely to benefit from MMF therapy, and which ones are more likely to benefit from cyclophosphamide instead.

Grants Awarded continued

Prof Katie Groom

NATURE'S ONLY ORGAN TRANSPLANT ($179,187 – 2 years) 1123003

Prof Larry Chamley, A/Prof Qi Chen, Dr Charlotte Oyston, Prof Katie Groom

Dept. of Obstetrics & Gynaecology, The University of Auckland

Our immune system must be able to distinguish between components of our own bodies (self) which it must ignore and bacteria or viruses (non-self) which it is designed to destroy. Organ transplants are rejected because the recipient's immune system recognises the transplant as non-self and attacks it. Because it is derived half from dad, the placenta/fetus are nature's only transplant. We don't understand how nature tricks the maternal immune system into allowing the fetal transplant to survive during pregnancy but this process goes wrong in a life-threatening disease called preeclampsia, which is found only in pregnant women. We believe that tiny packages called extracellular vesicles, which are pushed out of the placenta into mum's blood are the key to how the fetus controls its mother's immune system. We are investigating which immune cells interact with placental extracellular vesicles and how that interaction alters the maternal immune system in normal and preeclamptic pregnancies. We expect pregnancies to be safe but approximately 5% of pregnant women develop preeclampsia which has both immediate and long-term consequences for mother and babe. This research will give us a better understanding of how the immune system is controlled in pregnancy and what goes wrong in preeclampsia. These are the first steps towards developing new treatments for preeclampsia.

Prof Stuart Dalziel, Cure Kids Chair of Child Health Research and STAR Study Senior Investigator

STEROIDS IN PRESCHOOL ASTHMA REDUCTION (STAR) STUDY ($52, 930 – 2 years) 2123004

Prof Stuart Dalziel, Dr Alexandra Wallace, A/Prof John Thompson, Adj Prof Simon Craig, Prof Franz Babl, Prof Meredith Borland, Dr Libby Haskell, Dr David McNamara, Dr Eunicia Tan, Dr Christine Brabyn, Dr Te Aro Moxon

Children's Emergency Deptartment, Te Whatu Ora Te Toka Tumai

Asthma is the most common illness of childhood, and the leading cause of emergency department (ED) visits. Māori and Pacific children are more frequently affected, and three times more likely to require hospitalisation. Preschool wheeze is treated similarly to asthma in older children, including 3-days of oral steroid medication for moderate or severe episodes. However, recent evidence suggests that wheeze in preschoolers is a short-lived illness, meaning these children may require only 1-day of oral steroid. Thus, in the STeroids in preschool Asthma Reduction (STAR) Study, we will compare respiratory outcomes in wheezy preschoolers treated with 1- versus 3-days of oral steroid. If this study shows that outcomes are the same for children who receive the shorter course, their treatment will be simplified, and their risk of steroid-related side-effects greatly reduced. This will be especially relevant for preschoolers who suffer recurrent wheezy episodes and receive several courses of steroids each year. Furthermore, this study has potential to improve equity of care.

FUNDED BY: Estate of Mrs J. Goodfellow

Dr Simerdeep Dhillon

EXENATIDE NEUROPROTECTION ($178, 913 – 2 years) 1123012

Dr Simerdeep Dhillon, Prof Alistair Gunn, Prof Laura Bennet, Dr Joanne Davidson

Dept. of Physiology, The University of Auckland

Each year around 8% of all Kiwi babies are born preterm. These vulnerable infants are at significant risk of life-long disabilities such as learning problems, reduced IQ, and behavioural difficulties, due to brain injury and impaired development. Exposure of the baby to oxygen deprivation in the womb or during birth is a major cause of brain injury. Currently, there are no brain protection treatments available for these infants. Preterm babies only show subtle clinical signs and brain injury can take days to diagnose. To realistically reduce brain damage in preterm infants, we need treatments that can be given even after a very long delay after birth. This preclinical study will examine if treatment with a clinically available drug (Exenatide) starting with a delay of multiple days after a period of oxygen deprivation can treat ongoing inflammation and promote the repair of the preterm brain. The findings from this study will provide crucial evidence for future clinical studies with the potential to reduce disabilities and improve outcomes of preterm infants.

FUNDED BY: Curtis-Tonkin Paediatric Fund

Dr Sara Hanning (left) and Dr Derryn Gargiulo (right)

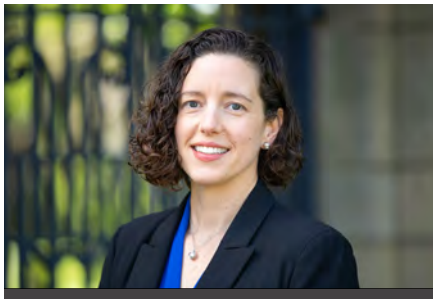
THE STABILITY OF 'AS REQUIRED' SYRINGES COMPOUNDED IN COMMUNITY PHARMACIES IN AOTEAROA, NEW ZEALAND ($63,029 – 1 year) 1123008

Dr Derryn Gargiulo, Dr Sara Hanning, A/Prof Jeff Harrison, Dr Sachin Thakur

School of Pharmacy, The University of Auckland

Everyone with a life-limiting condition, their family and whānau, should have access to the best possible palliative care. For clients under palliative care, if medicines can no longer be taken orally, they are injected via a syringe in a portable pump over 24 hours. For every medicine contained within the 24-hour syringe, a corresponding 'as required' syringe is prepared for breakthrough pain or worsening symptoms. These syringes may be needed in a hurry at any time, and a ready supply of syringes has the potential to reduce admissions to hospital for symptom management. The syringes are often compounded using aseptic techniques in community pharmacies, but due to a lack of sterility and stability data, are assigned a conservative three-day expiry. This means the family must return to the pharmacy every three days to collect a new supply of medication, and any unused syringes are disposed of as pharmaceutical waste. This study will determine the stability of the most commonly used medicines in these 'as required' syringes, with a view to extend the expiry date where possible. A parallel study will determine the sterility of these syringes. In addition to reducing waste, extending the expiry date of these medicines will reduce the burden on families, giving them more time to spend with their loved ones.

FUNDED BY: Douglas Goodfellow Primary Healthcare Research Fund



Dr Meghan Hill
Photo credit: Elise Manahan/University of Auckland

Mi-LABOUR TRIAL ($112,492 – 2 years) 1123013

Dr Meghan Hill, Dr Moerangi Tamati, Dr Michelle Wise, Mrs Robin Cronin, Dr Charlotte Oyston, Dr Lynn Sadler

Dept. of Obstetrics & Gynaecology, The University of Auckland

We are studying the efficacy and safety of Mifepristone to increase the rate of spontaneous labour in people who have undergone a prior caesarean birth. People who plan a Vaginal Birth After Caesarean (VBAC) ideally await spontaneous labour. Induction of labour increases the risk of repeat caesarean birth and the chance of complications. We have limited options to offer people wishing for VBAC. Prostaglandins, the most commonly used cervical preparation agents, are contraindicated in women with a prior caesarean. Oxytocin is an alternative. However, it requires an intravenous infusion, causes contractions and continuous cardiotocograph (CTG) monitoring is required when patients are receiving this medication. Oxytocin use is associated with a higher rate of unplanned repeat caesarean birth and labour complications including uterine rupture. Mifepristone blocks progesterone receptors causing cervical softening without significant uterine contractions. This mimics the process people undergo prior to labour. We will assess the use of Mifepristone to increase the rate of spontaneous labour in people with a prior caesarean birth by performing a double blinded randomised controlled trial. Participants are allocated to receive either a single dose of mifepristone or a placebo. The trial is patient-centred, with study visits occurring at the site of their choice, including their home. This approach is aimed at reducing barriers to access healthcare and trial participation.

Dr James McKeage

JET INJECTION: SKIN TENSION AND DEFORMATION ($180,000 – 2 years) 1123005

Dr James McKeage, Prof Andrew Taberner, Dr Alexander Dixon, Prof Poul Nielsen

Auckland Bioengineering Institute, The University of Auckland

Liquid drugs, such as vaccines or insulin, can be delivered through the skin without a needle using 'needle-free jet injection'. In this approach, the drug itself is formed into a hair-thin, high-speed jet that can break through the skin and into the underlying tissue. Removing the needle avoids the burden of infectious sharps waste and needle-phobia - which affects over 50% of children. Despite the benefits, needle-free jet injection has yet to be broadly successful in replacing needles. A significant barrier to uptake is that jet injection studies continue to report failed injections, inconsistent delivery volumes, and/or variable pain or comfort scores from patients. How the injector is pressed against the skin determines how successful and comfortable the injection will be, however, we still do not understand the best way to stretch or contact the skin before an injection. By building a new system to control skin tension and the jet-induced movement of the skin we will investigate how these affect jet penetration and fluid delivery. This will inform the design of injectors, or could lead to new techniques, that improve the ease and consistency of jet injection - allowing us to realise the broad benefits of avoiding needles.

FUNDING CONTRIBUTION BY: NH Taylor Charitable Trust

Grants Awarded continued

Dr Guiseppe Sasso

PACE-NODES ($62,342 – 2 years) 2123006

Dr Jerusha Padayachee, Dr Guiseppe Sasso

Radiation Oncology, Te Whatu Ora Te Toka Tumai

Prostate cancer is the most common cancer to affect men in Aotearoa New Zealand, with an estimated 4,000 new cases a year. Men with high risk localised prostate cancer, are at greater risk of the cancer returning after their initial treatment, and we are continuing to explore ways to improve their outcomes. One area of interest is the use of radiotherapy targeting both the prostate and pelvic nodes at the initial treatment. Lymph node spread is common in men with high-risk prostate cancer, but it is often difficult to detect on scans. Recent studies have shown that by treating both the prostate and pelvic lymph nodes, we can reduce the risk of the cancer returning. In addition, with improvements in radiotherapy technology, we can now deliver this treatment safely. Prostate radiotherapy is typically delivered over 4 weeks (20 treatments). More recently, there has been a shift to deliver radiotherapy over 5 treatments using an approach of stereotactic body radiotherapy (SBRT). Here, by applying extreme precision, a highly ablative dose per treatment is delivered to the prostate, and early data shows this approach to be safe. It is unclear whether SBRT can be delivered safely and more effectively when treating both the prostate and pelvic nodes, and this PACE-NODES randomised study will provide further insight.

FUNDED BY: Anonymous donor

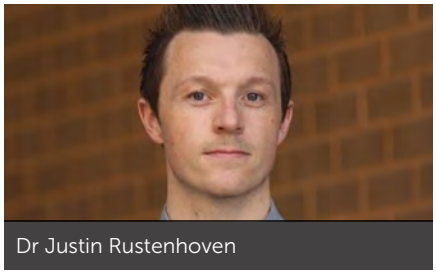
Dr Claudia Paterson

LIGNOCAINE IMPLANT FOR PAIN RELIEF IN COLON SURGERY ($25,000 – 6 months) 1123015

Dr Claudia Paterson, Prof Andrew Hill, A/Prof Darren Svirskis, Dr Parry Singh

Dept. of Surgery, The University of Auckland

Current approaches to managing postoperative pain after abdominal surgery rely on opioids. Opioids provide strong pain relief but have negative side effects. Local anaesthetic agents, such as lignocaine, work by "numbing" the nerves, and are being increasingly used worldwide instead of opioids. We have been studying the benefits of administering local anaesthetic into the abdominal cavity after surgery in patients for over ten years. We have developed an implantable device which is placed into the abdominal cavity at the time of surgery and immediately provides continuous delivery of lignocaine. This device has been designed with the specific goal of improving pain control following abdominal surgery. The device can be easily removed at any time. The device has been developed with DEC Pharmaceuticals, a Hamilton-based MedTech company. We have demonstrated the safety of this device in a sheep model. We are planning to conduct a Phase 1 study of our implant with ten participants who are undergoing colon surgery. The aim of this Phase 1 study is to demonstrate that this device is safe in humans. After this, we aim to demonstrate that the device is effective in reducing pain, by conducting further studies.



Dr Justin Rustenhoven

MENINGEAL LYMPHATIC DYSFUNCTION IN PARKINSON'S DISEASE ($168,926 – 2 years) 1123011

Dr Justin Rustenhoven, Prof Maurice Curtis, A/Prof Deborah Young, Prof Mike Dragunow, Mr Sam McCullough, Dr Taylor Stevenson

Dept. of Pharmacology & Clinical Pharmacology, The University of Auckland

Parkinson's disease is a progressive neurological disorder affecting cognition and movement. It occurs when neurons in the brain that control these functions die or become damaged. The cause of neuronal loss is poorly understood, but the build-up of a pathological protein called α-synuclein is the leading hypothesis. α-synuclein can be cleared from the brain through various mechanisms, including the recently identified meningeal lymphatic system. This system sits in the borders surrounding the brain and functions as a drainage pipe to remove waste matter arising from the brain. In Parkinson's disease, this system becomes dysfunctional, or "clogged", which contributes to the build-up of harmful proteins. The cause(s) of lymphatic dysfunction in Parkinson's disease are unknown. We will investigate the mechanisms underlying the "clogging" of these brain drains by studying the effects of α-synuclein—the major pathological protein in Parkinson's disease—on the lymphatic system using mouse models, human cell cultures, and brain border tissues donated by individuals with Parkinson's disease. Understanding how the lymphatic system is affected in Parkinson's disease could lead to new treatments targeting this system. Similar to clearing a blocked drain, restoration of lymphatic function could have significant benefits in promoting waste removal and associated cognitive benefits for Parkinson's disease.

FUNDED BY: Anonymous donor

Dr Eunicia Tan

THE PARACETAMOL AND IBUPROFEN IN KIDS INTERVENTION (PIKI) STUDY ($179,847 – 2 years)

1123009

Dr Eunicia Tan, Dr Trevor Kuang, Dr Laura Joyce, Dr Alexandra Wallace, Dr Joanne Cole, Dr Alastair MacLean, Dr Kim Yates, A/Prof John Thompson, Dr Martin Than, Dr Libby Haskell, A/Prof Christopher McKinlay, Prof Stuart Dalziel

Dept. of Surgery, The University of Auckland

Fever is the most common reason children < 2 years of age are taken to emergency departments. International guidelines recommend that fever-reducing medications should only be used for relief of discomfort, rather than solely for lowering temperature. Paracetamol and ibuprofen are the two most widely prescribed and used over-the-counter medications for fever and pain in children, but the extent to which these medications improve discomfort in febrile children is unknown. It is unthinkable that there remains a knowledge gap regarding the appropriate use of paracetamol and ibuprofen for treatment of fever-related discomfort, given their universal use for fever and pain in young children. The Paracetamol and Ibuprofen in Kids Intervention (PIKI) Study ('Piki' is Te Reo Māori for 'to climb', 'to support'), will compare the efficacy and safety of paracetamol vs ibuprofen for relief of discomfort in febrile children < 2 years of age in the emergency department.

Dr Moana Tercel

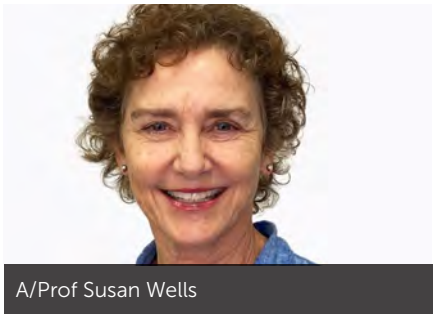
MASKED CAMPTOTHECINS FOR ADCs ($175,847 – 2 years) 1123014

Dr Moana Tercel, Dr Frederik Pruijn

Auckland Cancer Society Research Centre, The University of Auckland

Antibody-drug conjugates (ADCs) are a new and rapidly growing type of cancer treatment. ADCs use the selectivity of an antibody to deliver a drug directly to cancer cells, with the goal of avoiding the normal tissue toxicity which is often caused by chemotherapy. In this project we will prepare new versions of a type of drug that has been the focus of some recent ADCs developed for treating breast cancer. These new versions of the drugs have the right chemical properties to address current limitations and so make even better and more effective ADCs.

FUNDED BY: Anonymous donor



A/Prof Susan Wells

UNLOCKING PRIMARY CARE DATA ON MULTIMORBIDITY TO IMPROVE THE PREDICTION AND MANAGEMENT OF CARDIOVASCULAR RISK ($172,757 – 2 years) 1123007

A/Prof Susan Wells, Ms Yeunhyang Catherine Choi, Dr Katrina Poppe

School of Population Health, The University of Auckland

Multimorbidity (MM), having two or more long term conditions, affects one in four New Zealanders. The prevalence is highest for Māori, Pacific and older people, contributing to reduced quality-of-life and life expectancy. MM co-occurs in those at high CVD risk, yet NZ CVD risk management guidelines provide negligible advice about MM to guide GP-patient decision making. An existing research collaboration has curated a large de-identified data set of adult patients enrolled in ProCare PHO, linked with national hospitalisation, pharmaceutical dispensing and regional laboratory data, and are investigating how well current NZ risk algorithms perform in the presence of MM. However, several conditions (gout, bundle branch block, polycystic ovarian syndrome, endometriosis, chronic migraine, hypertensive disorders of pregnancy, and gestational diabetes), which are strongly associated with increased CVD risk, are not captured by the NZ MM index, M3. We plan to replicate our M3-associated long term condition methodology to describe the prevalence of these conditions in GP records, investigate their impact on 5-year CVD hospitalisations and deaths, whether these conditions influence GP management of CVD risk and whether there are equity gaps by age, gender, ethnicity and deprivation.

FUNDING CONTRIBUTION BY: Edith Rose Isaacs Estate

Grants Awarded continued

SUMMIT POSTDOCTORAL RESEARCH PRESENTATION AWARD

Dr Sien Yee (Sandy) Lau
Dept. of Obstetrics & Gynaecology,
The University of Auckland

$3,000 - 6723001
AMRF Best Research Presentation Award: Placental extracellular vesicles provide transient protection against cardiovascular disease development in rodents.

AMRF SUPPORT OF THE 2023 TE WHATU ORA ATĀ COLLABORATIVE RESEARCH SYMPOSIUM

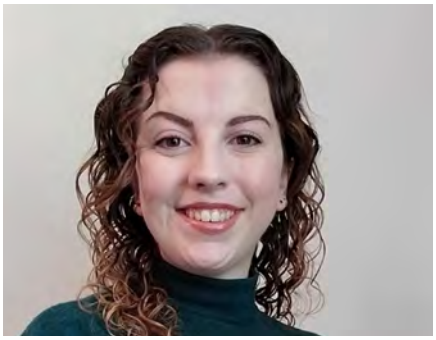
Prof Rita Krishnamurthi
National Institute for Stroke and Applied Neurosciences, Auckland University of Technology

$500 – 6723002
AMRF Best Senior Researcher: Changes in hospital admission for stroke: Findings from the ARCOS studies (1981-2022).

Dr Zhenqiang Wu
Dept. of Geriatric Medicine,
The University of Auckland

$1,000 - 6722006
AMRF Best Emerging Researcher: A Decision Support System at Adult ED Triage for predicting health outcomes.

HEALTHEX EMERGING RESEARCHER AWARDS



Jess Kelly
Dept. of Pharmacology & Clinical Pharmacology,
The University of Auckland

$3,000 - 6723004
2023 AMRF Outstanding Emerging Researcher Award: Novel Generation of Three-Dimensional Brain Spheroids Using Direct Cell Reprogramming

Dr Sarah Primak
Dept. of Paediatrics: Child and Youth Health,
The University of Auckland

$2,000 - 6723005
2023 AMRF Doctoral Oral Presentation Runner Up Award: Treating Impetigo with Antiseptics, Replacing Antibiotics (TIARA): a randomised controlled trial comparing topical impetigo treatments.

Ederlyn Perolina
School of Pharmacy
The University of Auckland

$2,000 - 6723006
2023 AMRF Best Poster Presentation Award: A cell-based platform for studying the effects of ultrasound on neurons following stretch injury.

ALL HEALTHEX AWARDS FUNDED BY: Wellington Sisters

with you for generations to come Public Trust

SIR HARCOURT CAUGHEY AWARD

A/Prof Joanna James
Dept. of Obstetrics & Gynaecology,
The University of Auckland

$11,664 1723001
Visit by A/Prof Christopher Moraes from the Dept. of Chemical Engineering, McGill University, Canada, to the University of Auckland for collaborative research.

KELLIHER CHARITABLE TRUST EMERGING RESEARCHER START-UP AWARDS

Dr Renita Martis
Dept. of Physiology,
The University of Auckland

$30,000 1723002
Research support for her AMRF Postdoctoral Fellowship 'Inter-tissue antioxidant exchange in the eye'.

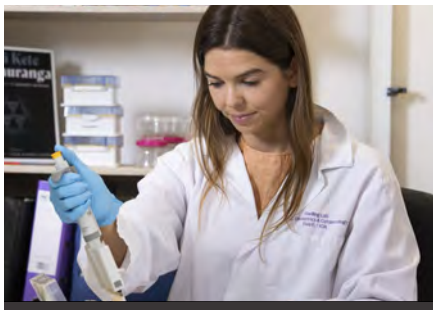
Dr Brittany Park
Dept. of Surgery,
The University of Auckland

$30,000 1723003
Research support for her Douglas Goodfellow Medical Research Fellowship titled 'Physiologic Reserve and Emergency Laparotomy'.

FUNDED BY: Kelliher Charitable Trust

Kelliher Charitable Trust

DOUGLAS GOODFELLOW REPATRIATION FELLOWSHIP EXTENSION


Dr Emma Nolan

OBESITY AND BREAST CANCER: A NOVEL 3D ORGANOID MODEL TO STUDY CANCER-ADIPOCYTE CROSSTALK ($221,946 – 1 year) 1421001-1

Dr Emma Nolan

Auckland Cancer Society Research Centre, The University of Auckland

Obesity is a growing global crisis and has been linked to significantly worse outcomes for patients diagnosed with cancer. Breast tumours grow in an environment enriched in fat (adipose) cells, which have been recently shown to communicate with cancer cells and boost their growth. However, due to a lack of laboratory models that accurately mimic the interaction between cancer cells and fat cells in the breast, the specific role that obesity plays in this relationship remains unclear. To address this question, this study will utilise a new model of breast cancer which is generated using cancer and adipose cells donated by NZ breast cancer patients. In this model, cancer cells are grown in the lab as three-dimensional 'mini tumours' called tumour organoids, which are then surrounded by human breast adipose cells to mimic the breast environment. Using this exciting new model, we can uncover how breast cancer cells are fuelled by neighbouring adipose cells, and how this crosstalk drives cancer progression. Ultimately, this work could reveal new biomarkers or drug targets to combat obesity-associated cancer growth.

FUNDED BY: Douglas Goodfellow Charitable Trust

SIR DOUGLAS ROBB MEMORIAL FUND

Dr Kelly Zhou

Dept. of Physiology, The University of Auckland

$2,907 - 1723004

Travel and accommodation costs for the 49th Annual Fetal and Neonatal Physiological Society Meeting's plenary lecture speaker, Prof Frances Northington from Johns Hopkins University.

Pictured: Members of the organising committee for the 49th Annual Fetal and Neonatal Physiological Society Meeting. From left to right, Prof Alistair Gunn, Dr Simerdeep Dhillon, Dr Kelly Zhou and A/Prof Joanne Davidson.

Grants Awarded continued

TRAVEL GRANTS

Dr Anna Boss
Dept. of Obstetrics & Gynaecology, The University of Auckland
$2,145 - 6623022

Attendance and invited workshop presentation at the International Federation of Placenta Associations meeting
Rotorua, New Zealand 5 - 8 September 2023.

Dr Melissa Cadelis
Dept. of Molecular Medicine & Pathology,
The University of Auckland
$2,600 - 6623023

Attendance and presentation at the European Conference on Marine Natural Products
Granada, Spain, 3 - 8 September 2023.

Dr Rebecca Evans
Liggins Institute, The University of Auckland
$4,000 - 6623027

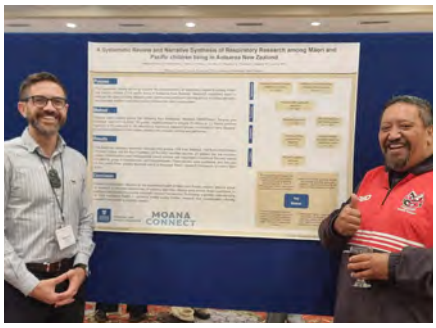
Meeting with collaborators at the French Longitudinal Study of Children (ELFE), Paris, France, and attendance and presentation at the SLLS conference
Munich, Germany, 25 September - 12 October 2023
Pictured (l-r): Dr Ben Fletcher, Molly Grant, Dr Rebecca Evans, Josie Tait, Dr Esther Yao, Karl Crosby

Dr Joanna Hikaka
School of Pharmacy, The University of Auckland
$3,718 - 6623030

Attendance and invited presentation at the International Society of Pharmacovigilance Conference
Bali, Indonesia, 6 - 9 November 2023.

Dr Annette Lasham
Dept. of Molecular Medicine & Pathology,
The University of Auckland
$3,290 - 6623016

Attendance and presentation at the 5th International Caparica Conference in SPLICING 2023
Caparica, Portugal, 16 - 19 July 2023
Pictured (l-r): Dr Annette Lasham, Dr Valer Gotea, Professor Ruth Sperling



Dr Mataroria Lyndon
Centre for Medical and Health Sciences Education,
The University of Auckland
$4,200 - 6623012

Attendance and presentation at the 10th International Meeting on Indigenous Child Health
Tulsa, OK, USA, 24 - 26 March 2023.

Dr Aleksandra Milosavljevic
School of Pharmacy, The University of Auckland
$3993 - 6623033

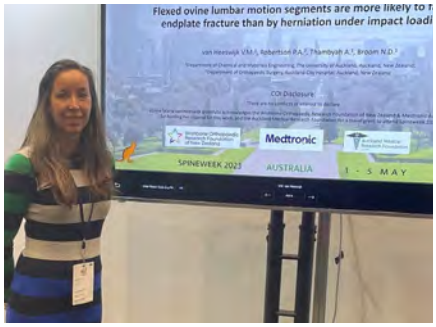
Attendance and invited presentation at the International Society of Pharmacovigilance Conference
Bali, Indonesia, 6 - 9 November 2023.

Dr Ana Luiza Sayegh
Dept. of Physiology, The University of Auckland
$4,000 - 6623001

Attendance and presentation at the American Physiology Summit 2023
Long Beach California, USA, 20 - 23 April 2023.

Dr Winston Tan
Dept. of Physiology, The University of Auckland
$4,000 - 6623038

Attendance and presentation at the 58th Inner Ear Biology Workshop
London, UK, 3 - 5 September 2023.
Pictured (l-r): Prof. Joseph Santos-Sacchi and Dr. Winston Tan



Dr Vonne van Heeswijk
Dept. of Chemical and Materials Engineering,
The University of Auckland
$4,000 - 6623015

Attendance and presentation at Spineweek 2023
Melbourne, Australia, 1 - 5 May 2023.

Grants Awarded continued

TRAVEL GRANTS CONTINUED

Dr Ghader Bashiri
$4000 – 6623021
School of Biological Sciences, The University of Auckland
Attendance and role of co-Chair at the Gordon Research meetings on Enzymes, Coenzymes and Metabolic Pathways, Waterville Valley, USA, 15 - 21 July 2023.

Dr Carol Bussey
$4000 – 6623014
Dept. of Physiology, The University of Auckland
Attendance and Presentation at the American Physiology Summit 2023, Long Beach California, USA, 20-23 April 2023.

Dr Maize Cao
$4000 – 6623024
School of Biological Sciences, The University of Auckland
Attendance and presentation at the 34th International Symposium on ALS/MND, Basel, Switzerland, 6 - 8th December 2023.

A/Prof Qi Chen
$1544 – 6623019
Dept. of Obstetrics & Gynaecology, The University of Auckland
Attendance and presentation at the annual meeting of the International Society of Extracellular vesicles, Seattle, USA, 18 - 21 May 2023.

Dr Yan Chen
$3172 – 6623018
Centre for Medical and Health Sciences Education, The University of Auckland
Attendance and presentation at the Australian and New Zealand Association for Health Professional Educators (ANZAPHE) Conference, Gold Coast, Australia, 26 - 19 June 2023.

Dr David Crossman
$4000 – 6623025
Dept. of Physiology, The University of Auckland
Attendance and presentation at the Biophysical Society Meeting 2024, Philadelphia, USA, 10 - 15 February 2024.

Dr Rhea Himanshu Desai
$4000 – 6623023
Dept. of Molecular Medicine & Pathology, The University of Auckland
Attendance and presentation at the 65th Annual Meeting of the American Society of Hematology, San Diego, USA, 9 - 12 December 2023.

Dr Victor Dieriks
$4000 – 6623007
Dept. of Anatomy & Medical Imaging, and Centre for Brain Research, The University of Auckland
Attendance and presentation at the Neurodegeneration: New Biology Guiding the Next Generation of Therapeutic Development Conference Whistler, Canada, 15 - 19 May 2023.

Dr Alexander Dixon
$2300 – 6623005
Auckland Bioengineering Institute, The University of Auckland
Research Visit to Institute for Experimental Cardiovascular Medicine (IEKM), Freiburg, Germany, 17-30 April 2023.

Dr Sophie Farrow
$2866 – 6623002
Liggins Institute, The University of Auckland
Attendance and presentation at the Genomics of Brain Disorders Welcome Trust Conference, Cambridge, UK, 17 - 23 May 2023, and multiple laboratory visits.

Dr Igor Felippe
$4000 – 6623004
Dept. of Physiology, The University of Auckland
Attendance and presentation at the American Physiology Summit 2023, Long Beach California, USA, 20 - 23 April 2023, and visit a laboratory in Iowa.

Dr Peter Freestone
$3443 – 6623009
Dept. of Physiology, The University of Auckland
Attendance and presentation at the International Basal Ganglia Society (IBAGS) triennial meeting, Stockholm, Sweden, 13 - 16 June 2023.

Dr Chiara Gasteiger
$4000 – 6623028
Dept. of Medicine, The University of Auckland
Attendance and presentation at the American College of Rheumatology (ACR) Convergence, San Diego, USA, 10 - 15 November 2023.

Dr Angus Grey
$3000 – 6623029
Dept. of Physiology, The University of Auckland
Attendance and presentation at the 1st International Mass Spectrometry Imaging Society Meeting, IMSIS 2023, Montreal, Canada. 23 - 25 October 2023.

A/Prof Nuala Helsby
$4000 – 6623006
Dept. of Molecular Medicine & Pathology, The University of Auckland
Attendance, presentation and committee activity at 19th World Congress of Basic & Clinical Pharmacology (WCP2023), Glasgow, Scotland, 2 - 7 July 2023.

Dr Anna Howe
$3000 – 6623020
Dept. of Paediatrics: Child & Youth Health, The University of Auckland
Attendance and presentation at the Communicable Diseases & Immunisation Conference 2023, Perth, Australia, 19 - 21 June 2023.

Dr Sien Yee (Sandy) Lau
$4000 – 6623031
Dept. of Obstetrics & Gynaecology, The University of Auckland
Laboratory visit and presentation Columbus, USA, and attendance and presentation at the Society of Reproductive Investigations Conference, Vancouver, Canada, 7 - 16 March 2024.

Dr Mia Mclean
$3967 – 6623032
Psychology & Neuroscience, Auckland University of Technology
Fostering and establishing research collaborations at Tilburg University, Netherlands and University of Pavia, Italy, and attendance and presentation at the 2nd Centre for Brain and Cognitive Development International Workshop on Naturalistic Experimentation of Child Development, University of London, London, UK, 2 - 25 September 2023.

Dr Simon O'Carroll
$782 – 6623034
Dept. of Anatomy and Medical Imaging, The University of Auckland
Collaborator visit at University of Queensland, Australia and attendance and presentation at the Australasian Neurotrauma Workshop, University of Queensland, Australia, 28 November - 3 December 2023.

Dr Rhys Ponton
$4000 – 6623017
School of Pharmacy, The University of Auckland
Attendance and presentation at the Harm Reduction International (HRI) 2023 conference, Melbourne, Australia, 16 - 19 April 2023.

Dr Raewyn Poulsen
$4000 – 6623035
Dept. of Pharmacology & Clinical Pharmacology, The University of Auckland
Attendance and invited presentation at the Gout, Hyperuricemia and Crystal-Associated Disease Network (GCAN) conference, laboratory visit to establish collaboration, and attendance and presentation at the American College of Rheumatology (ACR) Convergence, San Diego, USA, 7 - 15 November 2023.

Dr Amelia Power
$1097 – 6623036
Dept. of Physiology, The University of Auckland
Attendance and presentation at Queenstown Research Week MedSci Congress 2023, Queenstown, New Zealand, 29 - 30 August 2023.

Dr Farha Ramzan
$2672 – 6623037
Liggins Institute, The University of Auckland
Attendance and presentation at the Australia and New Zealand Society for Extracellular Vesicles (ANZSEV 2023), Adelaide, Australia, 7 - 11 November 2023.

Dr Julia Shanks
$4000 – 6623008
Dept. of Physiology, The University of Auckland
Attendance and presentation at the American Physiology Summit 2023, Long Beach California, USA, 20 - 23 April 2023.

A/Prof Simon Swift
$3000 – 6623010
Dept. of Molecular Medicine & Pathology, The University of Auckland
Attending multiple conferences on pathogens and the microbiome, and new concepts and approaches in microbiology, France, Scotland and Germany, 3 - 31 June 2023.

Dr Sarah Ward
$4000 – 6623011
Dept. of Exercise Science, The University of Auckland
Attendance and presentation at the Osteoarthritis Research Society International (OARSI) World Congress on Osteoarthritis, Denver, USA, 16 - 20 March 2023.

Dr Craig Webster
$4000 – 6623039
Centre for Medical and Health Sciences Education, The University of Auckland
Accommodation costs to attend and present at the Pediatric Sedation Outside of the Operating Room, and to meet with co-authors regarding major new Textbook, New York, USA, 7 - 13 September 2023.

Dr Zoe Woolf
$3630 – 6623040
Dept. of Pharmacology & Clinical Pharmacology, The University of Auckland
Attendance and presentation at the Society of NeuroOncology Annual Conference, Vancouver, Canada, 15 - 19 November 2023.

Dr Jie Zhang
$4000 – 6623013
Dept. of Ophthalmology, The University of Auckland
Attendance and presentation at the 2023 European Society of Ophthalmology meeting, Prague, Czech Republic, 15 - 17 June 2023.

Dr Debbie Zhao
$4000 – 6623003
Auckland Bioengineering Institute, The University of Auckland
Attendance and presentation at the 12th International Conference on Functional Imaging and Modelling of the Heart (FIMH), Lyon, France and a laboratory visit to King's College London/Barts Health NHS, London, UK, 19 June - 14 July 2023.

FELLOWSHIP STRENGTHENS GROUND-BREAKING EPILEPSY RESEARCH & ACADEMIC CAREER

Dr Rachael Sumner

School of Pharmacy,
The University of Auckland

Why does the menstrual cycle cause seizures to worsen in many females with epilepsy?

Back in 2016 Dr Rachael Sumner was awarded an AMRF Doctoral Scholarship and describes receiving an AMRF Postdoctoral Fellowship seven years later as "coming at a perfect time in my journey - I can continue developing my own research identity and programme investigating women's health, specifically, the myriad of neurological and psychiatric disorders caused by, or made worse by, major changes in hormones around the menstrual cycle, pregnancy, and menopause."

With epilepsy being one of the most common neurological conditions in the world, affecting 1-2% of the population, Rachael's most recent research has focused on the increased frequency and severity of epileptic seizures in women during their menstrual cycle.

Rachael has spent the last two years planning a catamenial epilepsy study to help the estimated 25,000 New Zealand women, many of whom experience double the number of seizures at specific phases of their menstrual cycle. The seizures are often resistant to treatment and result in women not being allowed to drive, work or take part in their daily routines. The exact cause is not known but through sampling, it has been established females with catamenial epilepsy do not have different levels of hormones in their blood so Rachael's research lab will concentrate on looking at how the brain responds to changes in the women's hormones who experience catamenial seizures versus women who don't have seizures.

This will be the first human clinical research programme focused on finding an objective mechanism of catamenial seizures, recording the participants brain waves along with taking blood samples to test hormone levels and Rachael is equally excited by the prospect that knowledge gained may benefit other disorders.

Alongside her research, Rachael strives to be a well-rounded academic, balancing her work with a strong commitment to service, teaching and mentoring postgraduate students. Since 2019, Rachael has managed to juggle her research work, along with lecturing at the University of Auckland in the subjects of human neuroscience and neuropharmacology and supervising 10 postgraduates which she sites as a highlight in her role.

"I am extremely grateful to AMRF for supporting my research and career. I aim to demonstrate my gratitude by working hard to do great science, mentor students (our future scientists), develop my career momentum, and ultimately produce real improvements in seizures for women with catamenial epilepsy," said Rachael.

Grants Completed

PROJECTS

Dr Cherie Blenkiron

MELANOMA EV-CHIP

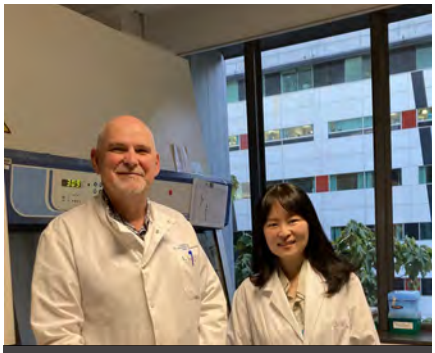
($159,937 - 2 years) 1120005, **($8,400)** CRF-1120005

Dr Cherie Blenkiron, Dr Colin Hisey, Prof Cristin Print, Ms Sandra Fitzgerald

Dept. of Molecular Medicine & Pathology, The University of Auckland

Immunotherapies are used to re-awaken the immune system as a treatment for metastatic melanoma. Better tests, or biomarkers, are however needed to select patients who will, or will not, respond to these treatments. Recently, a promising blood-based biomarker was reported in multiple international studies and our goal was to develop methods to test it on a group of New Zealand patients. Many technical hurdles were overcome to establish the assay in our laboratory. We confirmed that the pre-treatment levels of this biomarker were able to indicate outcomes however, in contrast to other studies, the biomarker was not able to predict whether a patient would respond to immunotherapy. This highlights the challenges of reproducing studies and implementing 'research-grade' assays into hospital care. Further assay development, and confirmation that levels of the biomarker can indicate outcomes are now needed to move from the research laboratory into the clinic.

FUNDED BY: JI Sutherland Fund for Melanoma Research



Prof Larry Chamley (team leader) and Song Paek

PLACENTAL TOXIN IN PREECLAMPSIA

($159,998 – 2 years) 1119010, **($16,908)** CRF-1119010

Prof Larry Chamley, Dr Torsten Kleffmann, Dr Carolyn Barrett, A/Prof Katie Groom, Dr Charlotte Oyston

Dept. of Obstetrics & Gynaecology, The University of Auckland

Preeclampsia is a disease in which pregnant women develop dangerously high blood pressure which damages many organs and can potentially cause death. The only way to prevent this, is to deliver the baby, often prematurely with long-term consequences for the baby. Mothers who have preeclamptic pregnancies also have long-term risk of heart disease and stroke. We do not know what causes preeclampsia, but we do know that toxins released from the placenta cause damage to mum's blood vessels triggering preeclampsia. We have been investigating one possible placental toxin called extracellular vesicles that are tiny packages released from the placenta. We have found differences in the proteins contained in these vesicles from preeclamptic placentas compared to normal placentas and are continuing to work to understand if the changes in the vesicles might cause preeclampsia and the long-term risk of heart disease and stroke. We have also given preeclamptic or normal vesicles to mice. We found that the arteries that control blood pressure are more likely to contract leading to high blood pressure when the mice were given preeclamptic vesicles. Our research suggests that placental vesicles are one of the factors that trigger preeclampsia and the long-term consequences of this disease.

FUNDED BY: Curtis-Tonkin Paediatric Fund

(l-r) Mr Ali Zahraei (PhD Student), Ms Melody Tang (Research Technician), Dr Nicholas Demarais, Dr Gus Grey, Ms Emily MacFarlane (PhD Student), Dr Kyriakos Varnava, Dr George Guo

INVESTIGATION OF LENS PROTEIN FLEXIBILITY

($117,192 – 2 years) 1119018, **($12,338)** CRF-1119018

Dr Nicholas Demarais, Prof Paul Donaldson, Dr Angus Grey, Dr George Guo

School of Biological Sciences, The University of Auckland

This project aimed to investigate the central hypothesis that presbyopia and age-related nuclear (ARN) cataract are linked by age related damage to lens proteins that alters their structure and elasticity and inhibits their ability to bind water. We trialled a novel technological approach, Raman Confocal Microscopy, to map the spatial distributions of free and protein-bound water in bovine lenses. Initial experiments optimised the main tissue preparation steps required to detect high quality Raman spectra directly from lens tissue. Next, we trialled the developed protocol on aging and cataract lens models to determine whether differences in protein:water interactions could be detected. Finally, by incubating lenses in heavy water, we were able to spatially map heavy water distributions in the lens. Our next steps are to combine heavy water incubations with our lens aging and cataract models to further understand the changes that take place in protein:water interactions in the development of presbyopia and cataract.

Grants Completed continued

A/Prof Christopher Hall (l) and A/Prof Guy Warman

THE MOLECULAR CLOCK REGULATES ANTIBACTERIAL RESPONSES ($156,598 - 2 years) 1120004, ($7,938) CRF-1120004

A/Prof Christopher Hall, A/Prof Guy Warman

Dept. of Molecular Medicine & Pathology, The University of Auckland

Infectious diseases remain one of the most common reasons for hospital admission in New Zealand, especially for Māori and Pacific peoples. The innate immune system, which provides the all-important first line of defence against infections, has been shown to fight infections more strongly when animals are active, and the threat of some infections is greatest. This time-of-day variation is believed to be controlled by molecular clocks that operate within cells of the immune system. Targeting this clock machinery is emerging as an exciting new strategy to treat infections. A large gap in our knowledge relates to how these molecular clocks operate in different components of the immune system to fight infection. The primary aim of this research was to understand if a molecular clock functions within the liver, an important innate immune tissue, to regulate antibacterial function. Using a larval zebrafish infection model, we have shown that genetic disruption of the liver molecular clock results in reduced host survival during the active phase due to reduced production of an ancient antibacterial weapon called C3. This new knowledge helps explain how the immune system synchronises elevated antibacterial activity with the active phase, when encounters with pathogens are most likely.

FUNDING CONTRIBUTION BY: Reed Charitable Trust

A/Prof Nuala Helsby and Dr Soo Hee Jeong

DO PPI DRUGS ADVERSELY INTERACT WITH CAPECITABINE? ($81,174 - 2 years) 1120011, ($3,267) CRF-1120011

A/Prof Nuala Helsby, Dr Edmond Ang, Dr Sanjeev Deva, Dr Soo Hee Jeong

Dept. of Molecular Medicine & Pathology, The University of Auckland

Many anticancer drugs cause heartburn and patients are often given proton pump inhibitor (PPI) drugs to help with these symptoms. Capecitabine is a tablet form of 5-fluorouracil (5-FU), which is given intravenously. Capecitabine is converted in the body by a multi-step process (via a metabolite called doxifluridine) to ultimately produce 5-FU. There are growing concerns that when PPI drugs are given with capecitabine, patients have worse treatment outcomes. We have investigated whether this is due to an alteration in how capecitabine is absorbed, processed and eliminated in the body. Our initial results suggest that there are probably only minor changes in how the drug is handled by the body (pharmacokinetics). However, we have discovered that PPI drugs can inhibit the conversion of doxifluridine into 5-FU by cancer cells. Moreover, when colorectal cancer cells are treated with doxifluridine and PPI at the same time there was a strong antagonistic effect on cell viability. This antagonism could be an overlooked mechanism underlying poorer outcomes in patients receiving PPI and capecitabine and requires further investigation.

CO-FUNDED BY: Cancer Research Trust NZ

Dr Laird Cameron

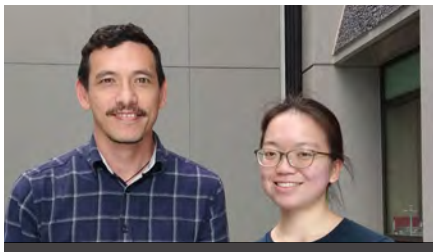
NIVORAD - A RANDOMISED PHASE 2 TRIAL OF NIVOLUMAB AND STEREOTACTIC ABLATIVE BODY RADIOTHERAPY IN ADVANCED NON-SMALL CELL LUNG CANCER, PROGRESSING AFTER FIRST OR SECOND LINE CHEMOTHERAPY ($104,454 – 2 years) 2116019

Dr Louis Lao, Dr George Laking, Dr Laird Cameron

Radiation Oncology, Te Whatu Ora Te Toka Tumai

The primary objective of the study was to evaluate whether the addition of stereotactic radiotherapy provides additional benefit in patients who are treated with immunotherapy (nivolumab) for advanced lung cancer. Recruitment for the NIVORAD trial officially closed by August 2019. This NZ arm of the study recruited more than double our proposed number of patients and our Australian counterparts recruited broadly from the whole country and received corporate sponsorship from Bristol-Myers Squibb. Despite this, and AMRF's generous support, the trial was stopped early with 50 of 120 total patients recruited. Due to lack of further funding, staff and facilities the findings remain unpublished, although the data analysis is reported as complete to the Australian and New Zealand Clinical Trials Registry.

FUNDED BY: Anonymous donor



Dr Tet-Woo Lee and Ms Hanting Yong

MOLECULAR DETERMINANTS OF MICROENVIRONMENT STRESS TOLERANCE IN HEAD AND NECK CANCER ($151,615 – 2 years) 1119012, ($13,432) CRF-1119012

Dr Tet-Woo Lee, A/Prof Stephen Jamieson, Dr Dean Singleton

Auckland Cancer Society Research Centre, The University of Auckland

Due to poor blood supply, the microenvironment in which tumours grow is low in oxygen, acidic and deficient in nutrients. Tumours must adapt to these stressful conditions to survive and do so through changes in gene regulation. In this research, we have successfully validated the importance of several candidate genes and molecular signalling pathways that enable cancer cells to tolerate these stressful conditions, as a follow-up to our earlier research using a method called functional genomics that enabled systematic identification of these candidates across the genome. Among these genes and signalling pathways was a novel gene for survival of cancer cells specifically under low oxygen. This result is significant not only because it is an entirely new finding, but also its potential application - an inhibitor against the product of this gene may provide a novel approach for selective targeting of hypoxic tumour cells. This research also led to the development of an efficient pipeline for validating candidate genes that can be used in other functional genomics projects in our laboratory, and this grant provided funding for two postgraduate research projects. Our results have been presented at several national and international conferences, and manuscripts for publication in peer-reviewed scientific journals are under preparation.

FUNDED BY: Anonymous donor

Robert Atiola (MSc student), Christopher Puliuvea (PhD student), Tumanu Futi, Hannah Burden (PhD student) and A/Prof Troy Merry

CREBRF VARIANT IN BETA-CELL FUNCTION ($159,324 – 2 years) 1119019, ($16,732) CRF-1119019

A/Prof Troy Merry, Dr Paul Docherty, Dist Prof Geoffrey Chase, Dr Rinki Murphy, Prof Peter Shepherd

Discipline of Nutrition, The University of Auckland

New Zealand's largest and fastest growing health problem is type 2 diabetes (T2D). Recently a small change in a gene called CREBRF has been shown to be protective against the development of T2D and this genetic variation is present in 20-30% of people of Polynesian ancestry living in New Zealand. We currently do not know how this variant protects from T2D, but we do know that the β-cells of the pancreas produces a hormone called insulin, and insulin is responsible for lower blood sugar levels after a meal. When T2D develops the pancreas's ability to produce insulin is reduced, causing a rise in blood sugar levels. To test whether the CREBRF genetic variant may be protecting the pancreas β-cells from damage we recruited 48 participants and tested their pancreatic β-cell function. Our results, using a test called the hyperglycaemic clamp+arginine stimulation test, supported our initial observation using a different technique – the oral meal test – that the CREBRF variant increases the ability to release insulin in response to glucose. This may underpin why this variant protects from T2D. We also showed that the reason for the increase in insulin secretion is not due to a greater beta-cell mass but may suggest greater sensitivity to glucose by the pancreatic β-cells in Māori and Pacific people with the gene variant.

FUNDED BY: Marion Ross Memorial Fund

CCLS Conference Auckland 2023. Invited speakers on stage for 'Question Time' Prof Trevor Sherwin (second from right)

AS OLD AS YOUR STEM CELLS ($159,975 - 2 years) 1120007, ($8,653) CRF-1120007

Prof Trevor Sherwin, A/Prof Julie Lim

Dept. of Ophthalmology, The University of Auckland

We proposed that the cornea is an ideal model in which to study the declining potency of male stem cells and enable us to determine the mechanisms as to why women live longer than men. Stem cell homeostasis of tissue and thus stem cell aging is most pronounced in tissues with a high turnover, such as epithelia. The corneal epithelium is the essential front surface of the window to the eye that is maintained by the limbal stem cells located at the periphery. Any defects in stem cell function are quickly transmitted onto the corneal surface and are observable through clinical examination. To test this, we used specialised mouse cornea models to demonstrate that DNA damage in the cornea was related to age and sex, and that the expression of the gene thioredoxin reductase 1 (TXNRD1), a key enzyme for protection against oxidative stress was significantly downregulated with respect to age and sex. We also demonstrated, using a knockout mouse model of advanced aging that DNA damage and the decreased expression of TXNRD1 in males was exacerbated reinforcing the idea that the mechanism of advanced aging in the male cornea is through oxidative pathways. Our data supports TXNRD1 as a major factor in advanced aging in male cells and potentially an important role in why women live longer and healthier than men.

Grants Completed continued

Dist Prof Dame Margaret Brimble, Dr Iain Hay, A/Prof Christopher Squire, Dr Paul Young, Dr Iman Kavianinia, Johanes (Kevin) Kasim.

MEMBRANE DISRUPTION BY CYTOTOXIN AN-58 ($43,526 – 1 year) 1119016

A/Prof Christopher Squire, Dist Prof Dame Margaret Brimble, A/Prof Adam Patterson, Dr Jeff Smaill, Dr Paul Young, Dr Iman Kavianinia, Dr Iain Hay

School of Biological Sciences, The University of Auckland

We studied the mechanism by which the synthetic peptide AN-58, an analogue of natural peptide Culicinin D produced in the Brimble peptide laboratory, effectively destroys biological membranes. AN-58 has been proposed as a cancer cell killing reagent when paired with tumour targeting antibodies. We showed using both liposomal leakage assays and cryoelectron microscopy imaging, that AN-58 effectively "punches" holes into artificial membranes that mimic the composition of mitochondrial membranes. AN-58 forms pores at lower concentrations that the known pore-forming peptides melittin and alamethicin but does so with slower kinetics. Our imaging of AN-58 and the control peptides shows obvious liposomal pores of different morphology. The unique, irregular appearance of the AN-58 pores produced and its ability to link adjacent membranes in multilayer vesicles, suggests a different pore forming mechanism to that of the control peptides..

FUNDED BY: Hugh Green Income Fund

Dr Suzuki-Kerr (PI) and her academic mentor Prof Peter Thorne at the Te Reo Language Week

ATP SIGNALLING AND COCHLEAR SYNAPTOPATHY ($108,968 – 2 years) 1119014, ($13,432) CRF-1119014

Dr Haruna Suzuki-Kerr, Prof Peter Thorne, A/Prof Srdjan Vlajkovic, Dr Shelly Lin

Dept. of Physiology, The University of Auckland

Many anticancer drugs cause heartburn and patients are often given proton pump inhibitor (PPI) drugs to help with these symptoms. Capecitabine is a tablet form of 5-fluorouracil (5-FU), which is given intravenously. Capecitabine is converted in the body by a multi-step process (via a metabolite called doxifluridine) to ultimately produce 5-FU. There are growing concerns that when PPI drugs are given with capecitabine, patients have worse treatment outcomes. We have investigated whether this is due to an alteration in how capecitabine is absorbed, processed and eliminated in the body. Our initial results suggest that there are probably only minor changes in how the drug is handled by the body (pharmacokinetics). However, we have discovered that PPI drugs can inhibit the conversion of doxifluridine into 5-FU by cancer cells. Moreover, when colorectal cancer cells are treated with doxifluridine and PPI at the same time there was a strong antagonistic effect on cell viability. This antagonism could be an overlooked mechanism underlying poorer outcomes in patients receiving PPI and capecitabine and requires further investigation.

CO-FUNDED BY: Eisdell Moore Centre
FUNDING CONTRIBUTION BY: N H Taylor Charitable Trust

Dr Petr Tomek operating the liquid handling robot at Peter MacCallum Cancer Centre in Melbourne

BANISHING TRYPTOPHAN CATABOLISM ($159,056 - 2 years) 1120009, ($7,376) CRF-1120009

Dr Petr Tomek, A/Prof Brian Palmer, A/Prof Kaylene Simpson, A/Prof Ute Röhrig

Auckland Cancer Society Research Centre, The University of Auckland

Cancers hire enzymes called IDO1 and TDO to sabotage the patients' cancer-killing immune cells and undermine curative cancer immunotherapies. To sensitise more patients to immunotherapies, these enzymes need to be stopped. But no medicines to inactivate them has yet reached the market. The challenge is to inactivate both IDO1 and TDO effectively without toxicities caused by binding of drugs to a red pigment called haem that is present not only in IDO1 and TDO but also in vital proteins including haemoglobin. To overcome these limitations, we aim to develop a Trojan Horse, a drug that binds exclusively and permanently to haem-free IDO1 and TDO, rendering the enzymes incapable of acquiring haem and functioning. We have found haem-free IDO1 and TDO to be abundant in ovarian and brain cancer cells and discovered several unique molecules capable of safely inactivating both IDO1 and TDO in ovarian and brain cancer cells. We also obtained pioneering evidence that permanent inactivation of IDO1 is non-toxic to mammalian cells indicating safety of the Trojan Horse strategy. These encouraging findings provide us essential information for building the Trojan Horse molecule. Successfully developed Trojan Horse has potential to sensitise more cancer patients to life-saving cancer immunotherapies.

FUNDED BY: Anonymous donor

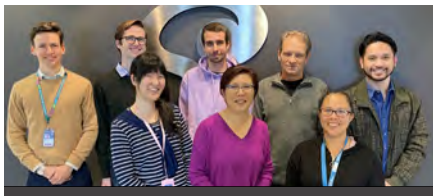
A/Prof Srdjan Vlajkovic

CISPLATIN-INDUCED COCHLEAR INFLAMMATION ($159,234 – 2 years) 1119017, ($15,482) CRF-1119017

A/Prof Srdjan Vlajkovic, Prof Paul Smith, Prof Peter Thorne

Dept. of Physiology, The University of Auckland

Cisplatin chemotherapy is considered a mainstay of cancer treatment. However, the use of cisplatin is dose-limited by considerable side effects such as nephrotoxicity, neurotoxicity, and inner ear toxicity. Inner ear toxicity is a major dose-limiting side effect of cisplatin in clinical practice. Following cisplatin chemotherapy, 40-80% of adults and at least 50% of paediatric patients are left with permanent hearing loss. Inner ear toxicity is characterised by symmetrical high frequency hearing loss, ranging from moderate to profound, often associated with tinnitus. Recent studies suggested that cochlear inflammation may contribute to cisplatin-induced hearing loss. Therefore, our preclinical study focused on the damaging effects of cisplatin-induced cochlear inflammation. We demonstrated increased expression of pro-inflammatory mediators in the cisplatin-treated rat cochlea and reduced expression of anti-inflammatory molecules. Our data suggests that unresolved inflammation in the cisplatin-treated cochlea can aggravate cochlear damage. The outcome of this study also suggests future directions for preventing cisplatin-induced cochlear injury by combining anti-inflammatory medication with standard antioxidant therapy. This is directly relevant for preventing hearing loss in cisplatin-treated cancer patients.



Dr William Cook, Mr Conor Nelson, Dr Angela Wu, Mr Bradley Hall , A/ Prof Deborah Young, Dr Alexandre Mouravlev, Dr Dahna Fong, Mr Thai Nguyen

A NOVEL GENE REGULATION SYSTEM FOR USE IN GENE THERAPY ($158,550 - 2 years) 1120003, CRF-1120003 ($11,334)

A/Prof Deborah Young, Dr Angela Wu

Dept. of Pharmacology & Clinical Pharmacology, The University of Auckland

Gene therapy is a promising approach for treating human diseases, including those affecting the brain. We have developed a novel gene switch for use in gene therapy that harnesses disease-specific signals to switch on and restrict the therapy to sick neurons only at the time of need. In this project, we have confirmed the functionality of our gene switch and the dependence on the disease-specific signal (elevated calpain activity) for turning the switch on. To develop the gene switch for therapeutic use in the context of the neurodegenerative disorder Huntington's disease, we have optimised genetic sequences capable of efficiently knocking down the production of mutant huntington protein that drives the disease process. We have developed the gene therapy tools that will allow a comparison between the regulated gene therapy strategy proposed here to a conventional one and will progress to a comparison between these two strategies in future ongoing studies. Our results to date are exciting and in line with our hypotheses and suggest that this gene tool will facilitate the advancement of gene therapy from the bench to the clinic.

CO-FUNDED BY: Neurological Foundation of New Zealand

Neurological Foundation
A pathway to hope

KELLIHER CHARITABLE TRUST EMERGING RESEARCHER START-UP AWARDS

Dr Nikki Earle

RESEARCH SUPPORT FOR POSTDOCTORAL FELLOWSHIP TITLED 'MULTI-OMICS AND BIOMARKERS TO PERSONALISE RISK PREDICTION AND THERAPY IN ACUTE CORONARY SYNDROMES' ($30,000) 1721003

Dr Nikki Earle

Dept. of Medicine, The University of Auckland

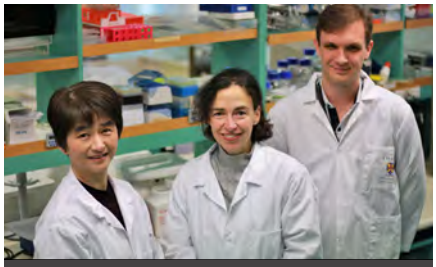
This Kelliher Charitable Trust Award provided financial support for my AMRF Postdoctoral Fellowship. Together through this combined funding we conducted the Multi Ethnic New Zealand study of Acute Coronary Syndromes (MENZACS) to more accurately predict clinical outcomes in New Zealanders with first-time heart attacks. Thanks to funding from the Kelliher Charitable Trust, we were able to measure the key cardiac biomarkers NT-proBNP (N-terminal B-type natriuretic peptide), hsTnT (high-sensitivity troponin T), and GDF-15 (growth differentiation factor-15) in plasma samples from 220 of recruited patients. Our findings highlight the significance of NT-proBNP in predicting outcomes in people with first-time heart attacks, while hsTnT remains a better diagnostic than prognostic biomarker. We are now undertaking further research into the variability in the levels of these biomarkers across New Zealand's unique population groups. I am sincerely grateful to the Kelliher Charitable Trust for the generous 'AMRF Emerging Researcher Start-up Award' which facilitated this important research during my AMRF Postdoctoral Fellowship.

FUNDED BY: Kelliher Charitable Trust

Kelliher Charitable Trust

Grants Completed continued

JEAN CATHIE PROJECTS FOR TINNITUS RESEARCH: PROJECT GRANTS



A/Prof Yiwen Zheng, Prof Michelle Glass, Dr David Finlay

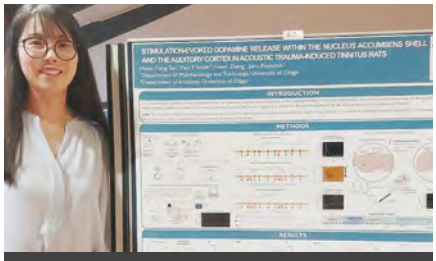
ENDOCANNABINOIDS AND TINNITUS PERCEPTION

($74,916 - 1 year) 7720015, **($15,309)** CRF-7720015

Dr Yiwen Zheng, Dr David Finlay, Prof Paul Smith, Prof Michelle Glass

Dept. of Pharmacology and Toxicology, University of Otago

This project set out to test the involvement of an auditory gating system in tinnitus perception in an animal model and the possible modulatory effects of endocannabinoid system. We induced tinnitus in animals using acoustic trauma, waited for 2 months for chronic tinnitus to develop, confirmed the perception of tinnitus in rats using a behavioural testing paradigm, measured auditory gating function using an electrophysiological method and collected brain tissues from those animals. We demonstrated, for the first time, that auditory gating is impaired only in tinnitus positive animals, but not in tinnitus negative animals. These novel findings could potentially explain why not every animal develops tinnitus after acoustic trauma. We have also explored the involvement of endocannabinoid system in tinnitus perception and auditory gating by measuring the cannabinoid receptor 1 (CB1) expression and the activity of two enzymes that are responsible for endocannabinoid degradation. We found that there was no difference in CB1 expression between control and tinnitus positive or tinnitus negative groups, which suggests that a difference in CB1 expression does not underlie the changes in auditory gating. We are in the process of analysing the results from the enzyme assay. This study advances the current knowledge in tinnitus research, provides insights into the mechanisms underlying tinnitus and may shed light on the development of target specific treatment for tinnitus.



Miss Huey Tien Tan, PhD student, presenting the results at the Biomedical Sciences Postgraduate Symposium, University of Otago

DOPAMINE AND TINNITUS ($69,680 – 1 year) 7722005

A/Prof Yiwen Zheng, Prof John Reynolds, Prof Paul Smith

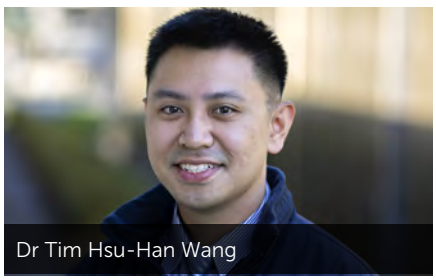
Dept. of Pharmacology and Toxicology, The University of Otago

Tinnitus is the perception of a ringing, buzzing or whistling sound in a person's ears or head in the absence of an external sound, which causes sleep disturbances, cognitive problems, work impairment and even suicide. The aim of this project was to investigate the involvement of the dopamine system in tinnitus perception in an animal model by measuring dopamine release in two different brain areas that is important for tinnitus generation and perception using an advanced technique called fast-scan cyclic voltammetry (FSCV). We found that dopamine release was significantly decreased a few months after acoustic trauma that causes tinnitus, which suggests a chronic change in dopamine neurotransmission. Further analysis into the differences in the temporal profile of the dopamine release, dopamine synthesis and dopamine receptor expression between animals that with and without acoustic trauma will provide insights into the underlying mechanisms.

BOTH GRANTS FUNDED BY: Jean Cathie Fund for Tinnitus Research

perpetual guardian

DOUGLAS GOODFELLOW MEDICAL RESEARCH FELLOWSHIP



Dr Tim Hsu-Han Wang

MECHANISMS OF POST-SURGICAL GASTRIC ARRHYTHMIAS ($104,000 - 1 year) 1421004

Dr Tim Hsu-Han Wang

Dept. of Surgery, The University of Auckland

Post-surgical complications can occur following upper gastrointestinal surgery. These symptoms include nausea, vomiting, reflux and abdominal pain are quite distressing for patients. There is now emerging evidence that these are caused by abnormal electrical activity of the stomach. This project aims to identify the changes in the electrical activity of the stomach following surgery using the novel non-invasive Body Surface Gastric Mapping device, developed by the University of Auckland. I also aim to determine the electrical activity across a gastrointestinal anastomosis in an animal model. I have now collected all the data required and am in the process of completing my final data analysis. Preliminary results have shown that there is abnormal electrical activity present in patients who have undergone an oesophagectomy, sleeve gastrectomy, gastric bypass, sleeve converted to bypass and pancreaticoduodenectomy. Abnormal electrical conduction has also been identified in animal models. Further analysis is currently being completed. Between 2022 and 2023, I have published 2 research papers and have presented my preliminary works at 5 international conferences and have received 3 awards for these. I am extremely grateful for being supported by the Douglas Goodfellow Medical Research Fellowship in 2022 to assist me in my research journey.

FUNDED BY: Douglas Goodfellow Charitable Trust

DOCTORAL SCHOLARSHIPS

Dr Bashar Matti

PROSTATE CANCER SCREENING IN NEW ZEALAND: TRENDS AND THE DEVELOPMENT OF CANCER RISK CALCULATOR ($128,000 – 3 years) 1218005, ($7,000) CRF-1218005

Dr Bashar Matti

Dept. of Surgery, The University of Auckland

This project aimed to investigate current trends in prostate cancer screening in New Zealand and develop an individualised model to improve outcomes in all kiwi men and address the known disparities in cancer outcomes affecting Māori men. We have demonstrated that prostate cancer screening in our community with PSA blood test is quite common. However, this practice being opportunistic has led to clear disparities between Māori and non-Māori men. Moreover, the current New Zealand guidelines for Prostate cancer assessment needs to be updated to account for the variabilities in PSA levels between men of different age and ethnic groups. Lastly, there needs to be a move towards an organised and systematic approach for prostate cancer screening that can well be implemented in a general "healthy-man check" where all kiwi men aged 50 – 70 years are actively invited to have PSA testing as well as other health parameters optimisations such as diabetes and cardiovascular diseases. This will not only improve prostate cancer survival but also the general wellbeing in our society.

Dr Matt Williams and Dr Sarah Kember

MATERNAL MENTAL HEALTH AND VACCINATION BEHAVIOURS IN AOTEAROA ($116,000 - 3 years) 1220004

Dr Sarah Kember

School of Psychology, Massey University

New and expectant mothers are primary decision-makers about vaccination for their babies. However, the crucial timeframe for those decisions coincides with the highest risk period for perinatal anxiety and depression. This study tested the hypothesis that perinatal anxiety and depression impact vaccination rates and explored participants' own perspectives about key influences on their decisions. 387 New Zealand mothers were surveyed about their levels of depression, anxiety, and vaccination intentions for their babies. Overall, there was evidence of a strong relationship between vaccination intentions and what mothers expected to regret most should their decision have an unintended outcome (i.e., contracting a preventable illness or an adverse vaccine reaction). In this largely pro-vaccination sample, perinatal anxiety increased intention to vaccinate. These results suggest that intention is impacted by predicted regret about the consequences of the decision to vaccinate or not. The roles of anxiety or regret were supported by analysis of self-reported key influences on their decision-making.

FUNDED BY: John Jarrett Trust

Supervisor A/Prof Jo James, Anandita Umapathy, Dr Anna Boss and Cherry Sun

TROPHOBLAST STEM CELLS AND FETAL GROWTH RESTRICTION ($128,000 - 3 years) 1219006, ($7,000) CRF-1219006

Dr Cherry Sun

Dept. of Obstetrics & Gynaecology, The University of Auckland

Fetal growth restriction (FGR) is a pregnancy disorder where babies are born dangerously small, with poor long-term health outcomes. Abnormal function of placental trophoblast cells that facilitate the exchange of nutrients and waste between mum and baby disrupts fetal growth. Our laboratory uses a novel technique to isolate trophoblast stem cells (TSC) from human term placentae, allowing us to directly compare healthy and pathological TSCs – a crucial step to understanding how FGR arises. Following the development of culture conditions to propagate TSCs from normal term placentae in the lab, subsequent 2D experiments showed that these cells can give rise to mature trophoblast lineages. Comparisons could then be made between normal and FGR placentae, showing that TSCs from FGR placentae have abnormal growth and differentiation into mature trophoblasts. This may provide a functional explanation for the impaired placental development seen in this condition. Our ability to directly isolate TSCs from placentae with known pathology holds significant promise in further unravelling how major obstetric conditions develop and inform treatment options thereafter.

Grants Completed continued

POSTDOCTORAL FELLOWSHIPS

Dr Nikki Earle

MULTI-OMICS FOR ACS ($182,948 - 2 YEARS) 1320003, ($11,825) CRF-1320003

Dr Nikki Earle

Dept. of Medicine and Toxicology, University of Otago

This fellowship focused on reducing the burden of disease in New Zealanders who experience first-time heart attacks, and on increasing equity of clinical outcomes across ethnic groups and for men and women. We have enrolled over 2300 people with first-time heart attacks into the ongoing study MENZACS (the Multi-Ethnic Study of Acute Coronary Syndromes) and investigated how clinical, genetic, epigenetic, nutrition and lipid-related factors affect the causes of ischaemic heart disease and the risk of further events. We have also developed a focus on women's heart health and will continue to investigate female-specific risk factors for heart disease such as menopausal status and pregnancy-associated disorders. This programme of research has also helped us develop a collaborative multidisciplinary team throughout New Zealand, including clinical and academic cardiologists, data and laboratory scientists, experts in Māori cardiovascular health, research nurses, and students. On an individual level, this fellowship has been crucial in developing my independence as a researcher and developing new strategic research directions.

FUNDED BY: Douglas Goodfellow Charitable Trust


Dr William Schierding

INTERPRETATION OF ENHANCER MUTATIONS DRIVING CANCER ONSET, PROGRESSION, AND TREATMENT ($212,408 - 2 years) 1320002, ($13,763) CRF-1320002

Dr William Schierding

Liggins Institute, The University of Auckland

Genome-wide association studies have associated hundreds of genetic variants with the risk of developing melanoma or lung cancer. However, understanding the molecular basis of such associations has remained a challenge because most of these loci are in non-coding regions of the genome. We have developed a new way of scrutinising gene regulation in melanoma and lung cancer (Aim 1), integrated these data with existing melanoma MPRA (enhancer) data to support those findings (Aim 2), and then testing these models in external genomic data sets to validate them in a somatic model (Aim 3). Overall, this work has begun revealing the overlap between germline gene regulation and the pathway towards impact on genes central to somatic driving of the onset of cancer. We believe this research introduces a novel pathway towards molecular cancer diagnostics and opens the move beyond just an extensive scrutiny of amino acid altering mutations. Further integration of these target genes into tissue-specific gene regulatory and protein-protein interaction networks identified genes and proteins that interact—directly or indirectly—showed significant enrichment for known cancer driver genes, connecting germline risk factors to the impact of somatic mutations (translating from a vague "risk" association to direct factors of cancer onset).

FUNDED BY: Douglas Goodfellow Charitable Trust

EDITH ROSE ISAACS DOCTORAL SCHOLARSHIP


From left to right: Elizabeth Cooper, Dr Susan Li, Dr Zoe Woolf, Carina Lee, and supervisor Thomas Park

PLATELET-DERIVED GROWTH FACTOR SIGNALLING IN PATIENT-DERIVED BRAIN CELLS ($128,000 - 3 years) 1219004

Dr Susan Li

Dept. of Pharmacology & Clinical Pharmacology, The University of Auckland

Platelet-derived growth factor (PDGF) is an important mitogen for development and homeostatic function. Its role in the adult human brain is relatively unknown, therefore, this project aimed to characterise the role played by PDGF signalling in both physiological function and in disease contexts. Using a range of in situ and in vitro techniques, we identified the expression of the PDGF ligands and their receptors in the adult human brain. Using primary human brain cells derived from epilepsy and glioblastoma tumour resection biopsy tissue, we were able to comprehensively characterise the signalling driven by these receptors in both tumour and non-tumour contexts. We found significant heterogeneity in the expression of the receptors as well as the signalling pathways in each cell type. We identified discrepancies between homeostatic and disease signalling, and we hope these findings will contribute to identification of therapeutic targets.

FUNDED BY: The Edith Rose Isaacs Estate

perpetual guardian

SIR HARCOURT CAUGHEY AWARDS

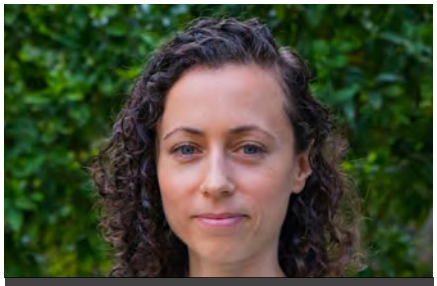
Dr Winston Tan

EFFECT OF MITOTEMPO, A MITOCHONDRIA-TARGETED ANTIOXIDANT, IN PROTECTING AGAINST AGE-RELATED SENSORY HAIR CELL DEGENERATION AND HEARING LOSS IN MICE ($25,000 – 5 months) 1722003

Dr Winston Tan

Dept. of Physiology, The University of Auckland

Extensive evidence implicates mitochondrial dysfunction and oxidative stress playing a central role in hearing loss. Due to their high metabolic demands, the sensory hair cells and other cells in the cochlea are vulnerable to the damaging effects of mitochondrial reactive oxygen species (ROS). A potential treatment strategy involves using mitochondria-targeted antioxidants, such as MitoQ (mitoquinol mesylate), a well-characterised antioxidant known for its mitochondrial accumulation and wide availability as a dietary supplement. This pilot study, conducted in partnership with MitoQ Ltd (Auckland, New Zealand), aimed to evaluate the therapeutic potential of short-term (9 weeks) MitoQ supplementation in protecting against age-related hearing loss (ARHL) in 6-month-old mice, which is the approximate age when hearing loss commences in these animals. We assessed a range of hearing loss indicators, including 4-HNE which is a selective marker of oxidative stress. Our results demonstrated that MitoQ supplementation had a modest protective effect against hearing loss. Interestingly, cochlear 4-HNE expression was not significantly affected by MitoQ, suggesting the involvement of alternative pathways. Our findings suggest that MitoQ may hold promise as a novel otoprotective strategy against ARHL, but that further research is necessary to elucidate the underlying mechanisms behind MitoQ's otoprotective effect and to explore the efficacy and feasibility of long-term MitoQ treatment for ARHL.



Dr Irene Vorontsova

UNRAVELLING MECHANISMS OF LEADING CAUSES OF BLINDNESS AND CATARACT AND MYOPIA USING THE POWER OF ZEBRAFISH ($25,000 – 6 months) 1722004

Dr Irene Vorontsova

School of Psychology, Massey University

Lens clouding (cataract) is the leading cause of blindness in the world, and uncorrected refractive error, which includes short-sightedness (myopia), is the leading cause of global visual impairment. The incidence of cataract and myopia are on the rise, leading to an impending health crisis that may overwhelm the public health system. The AMRF Sir Harcourt Caughey Award has been instrumental in my repatriation back to the University of Auckland after my postdoctoral position at the University of California, Irvine for 7 years. Here, I plan to unravel the mechanisms that lead to cataract and set up a research programme to understand mechanisms leading to myopia by using a powerful combination of genetic, molecular biology, and imaging approaches in the zebrafish, a model system that has significantly advanced our understanding of human biology. The salary support from this grant, together with the NIH subaward, has given me financial stability to establish myself administratively and get my two research projects off the ground here in Auckland. During the funding period, I have established my network of collaborators here in Auckland and am now co-supervising two PhD students who will work along-side me to pursue the goals of my research programmes. I have applied for funding to continue to support myself and my research.

SUMMIT POSTDOCTORAL RESEARCH PRESENTATION AWARD

Dr Alex Muntz

AMRF BEST RESEARCH PRESENTATION AWARD: BLINKING, CLINICAL MARKERS AND SYMPTOMS OF DRY EYE DISEASE, AND SCREEN USE HABITS OF YOUNG ATTENDEES OF A GAMING CONVENTION IN AUCKLAND, NZ ($3,000) 6720005

Dr Alex Muntz

Dept. of Ophthalmology, The University of Auckland

Screen time alters the way we blink. We blink less when focused on a screen, causing dry, gritty, watery eyes, but also head aches and blurry vision. This "digital eye syndrome" is linked to excessive screen time and affects many people. Blinking is poorly understood because it is difficult to measure. It requires cameras placed in view of the participant's eyes, restricting head and gaze movements and usually confining the assessment to controlled, unnatural laboratory settings. Participant awareness of the measurement further skews results. Therefore, we need better ways to assess how we blink during and around digital devices. Unable to use this AMRF award to attend an international conference due to COVID-19 pandemic restrictions, I used it to obtain necessary equipment to use the front-facing cameras of mobile devices to observe blinking in more natural viewing conditions. We assessed blinking using devices representing the most common viewing distances, working positions, gaze angles and tasks. This research is ongoing, with international collaborations being established during this award period. The ultimate aim is to develop policies on safe screen use, and for integrating educational and screening interventions around screen use in routine clinical practice.

FUNDED BY: Wellington Sisters Charitable Trust

Grants Completed continued

SIR DOUGLAS ROBB MEMORIAL FUND

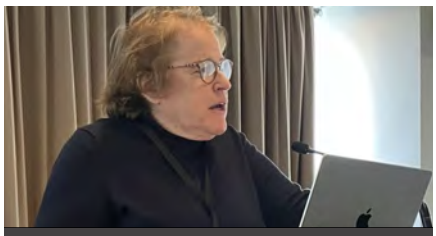
ANZPRA attendees at the 2022 IFPA-ANZPRA satellite meeting

SUPPORT FOR AUSTRALIAN AND NEW ZEALAND PLACENTAL RESEARCH ASSOCIATION SATELLITE MEETING ($1,394) 1722002

A/Prof Joanna James

Dept. of Obstetrics & Gynaecology, The University of Auckland

This Sir Douglas Robb grant was awarded as a grant-in-aid to support the hosting of a two-day Satellite Meeting of the Australian and New Zealand Placental Research Association (ANZPRA), which was successfully held on the 17th-18th November 2022 at the Hanmer Springs Hotel, Hanmer Springs, New Zealand. The location allowed ANZPRA members to retreat and reconnect as a group, meet new members and research students, foster existing collaborations, and initiate new collaborations. One of the key goals of seeking support from this meeting by the AMRF was to help heavily subsidise student and early career researcher (ECR) registration, enabling high numbers of junior researchers to attend the meeting - for many one of their first opportunities to do so post-COVID-19. This goal was successfully achieved, as of the 60 total registrants for this meeting, 32 were students (Masters/PhD), 7 were ECRs (0-5 years post-PhD), and 21 were >5 years post-PhD). Feedback from the meeting across all career levels was extremely positive. Researchers across all levels highlighted the importance of making new connections, and expanding their networks within the Australasian community, which are imperative for maximising research impact and helping aid funding success.



Professor Frances Northington

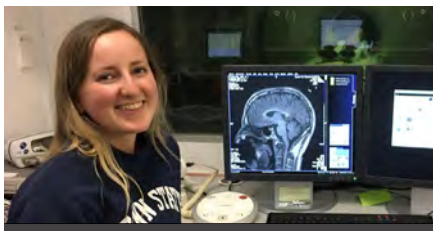
SUPPORT FOR THE 49TH ANNUAL FETAL AND NEONATAL PHYSIOLOGICAL SOCIETY MEETING'S PLENARY LECTURE SPEAKER, PROF FRANCES NORTHINGTON FROM JOHNS HOPKINS UNIVERSITY ($2,907) 1723004

Dr Kelly Zhou

Dept. of Physiology, The University of Auckland

This Award covered travel and accommodation costs for the 49th Annual Fetal and Neonatal Physiological Society Meeting's plenary lecture speaker, Prof Frances Northington, a professor of paediatrics and neurology, founder and co-director of the Neurosciences Intensive Care Nursery at Johns Hopkins University, Baltimore, USA. She is a world leading specialist in neonatal brain injury research, facilitating translation from basic sciences to clinical practice. Her plenary lecture titled "A tribute to scientists of the Fetal and Neonatal Physiological Society and a challenge to the rest of us to advance neuroprotection, neurorepair and neurorecovery after neonatal hypoxia-ischemia" was inspiring and well received by the 100 international attendees of the FNPS meeting, a leading international conference in the area of perinatal research, hosted by our laboratory this year in Queenstown. Having Professor Northington attend the meeting was invaluable for all attendees, through the sharing and discussion of new knowledge and findings, which is critical for the advancement of perinatal research. Professor Northington also visited the Faculty of Medical & Health Sciences at the University of Auckland where she gave a seminar, facilitated an early career researcher mentoring session, and toured the Fetal and Physiology Neuroscience Group laboratory, and listened to group members presenting recent findings. Overall, Professor Northington's visit had a significant benefit for perinatal research and will contribute towards our long-term goal of improving treatment strategies to care for sick and vulnerable babies in New Zealand.

HEALTHEX EMERGING RESEARCHER AWARDS



Julia Plank

VALIDATING NEUROIMAGING TO DETECT NEUROINFLAMMATION IN VIVO ($2,000) 6720002; BRAIN TEMPERATURE AS A MEASURE OF NEUROINFLAMMATION: ASSESSMENT USING WHOLE-BRAIN MAGNETIC RESONANCE SPECTROSCOPY ($3,000) 6722001

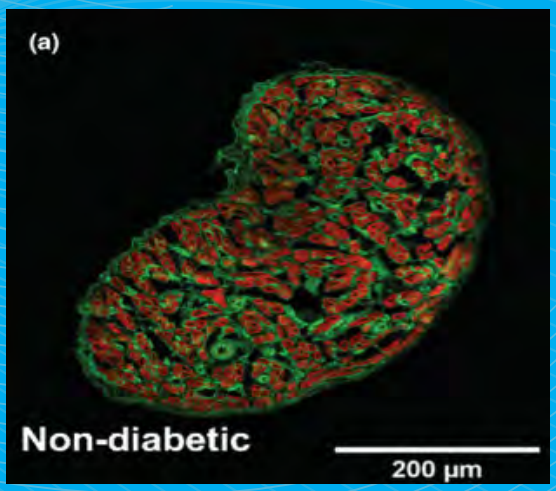
Julia Plank

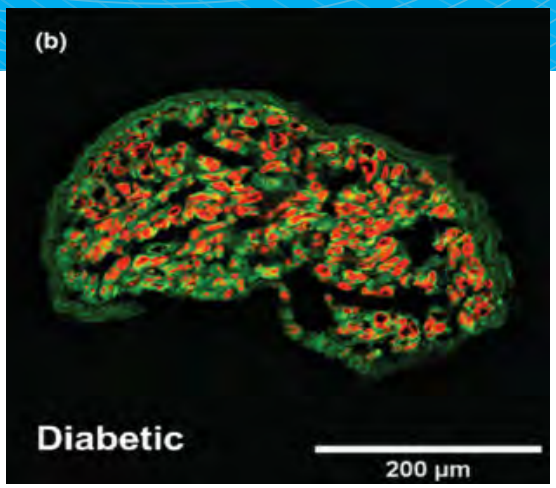
School of Pharmacy, University of Auckland

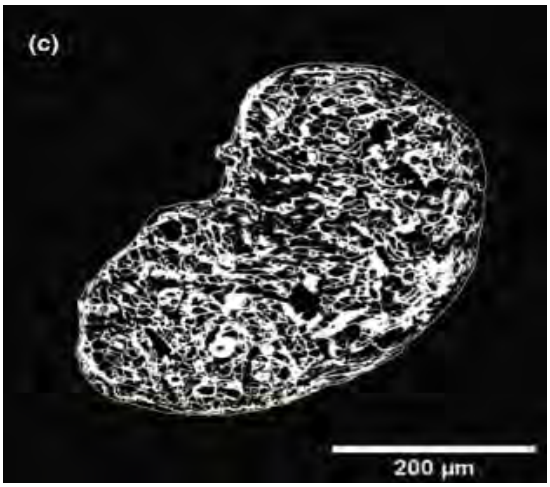
After several years of COVID-19 restrictions, in November 2022 I was finally able to use these awards to fund a lab visit and international conference both in California. At that time, the price of airfares had skyrocketed and so I was hugely grateful to AMRF for their contributions. In Los Angeles I visited the Mary and Mark Stevens Neuroimaging and Informatics Institute at the University of Southern California. I presented on my research on magnetic resonance spectroscopic imaging as a measure of brain inflammation - also the topic of my HealtheX presentations. It was brilliant practice for upcoming job talks, my PhD defence, and for networking with likeminded researchers stoking connections for future collaborations. A few days later I presented a poster at the 2022 Society for Neuroscience conference in San Diego. This conference is attended by more than 20,000 people every year including neuroimaging, psychiatry, computational, molecular, and cellular neuroscience experts. The networking and insights I gained through these experiences were enlightening and extremely helpful, especially now as I look towards next steps and postdoctoral research fellow positions. Thank you so much AMRF for your generosity and affirmation of my work.

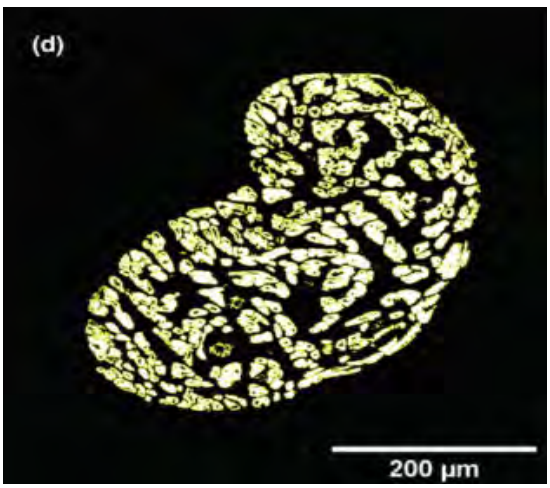
FUNDING CONTRIBUTION BY: Wellington Sisters Charitable Trust

THE IMPORTANCE OF RESEARCH PUBLICATIONS: CAREERS, COLLABORATIONS AND MORE









Research publications are crucial to advancing medical researchers careers as they are the primary means of disseminating new knowledge, sharing discoveries, and contributing to the scientific community. Publishing in reputable journals enhances a researcher's professional reputation, helps secure funding, and opens up opportunities for collaboration. The process of publishing also requires rigorous experimentation and thorough documentation, which hones a researcher's skills and ensures the quality and reliability of their work.

A key aspect of the publication process, as well as AMRF's funding approval process, is peer review, where experts in the field evaluate the research for its validity, significance, and originality. Peer review acts as a quality control mechanism, ensuring that only robust and impactful studies are published. This scrutiny not only improves the credibility of the research but also fosters a culture of continuous improvement and academic integrity within the scientific community.

These images show cardiac tissue from the hearts of consenting patients with type 2 diabetes and their non-diabetic controls in a study from researchers led by Dr Marie-Louise Ward from the University of Auckland's Department of Physiology.

Dr Ward and her team aim to understand why the heart tissue's ability to contract changes in diabetic people, and explain why patients with diabetes often suffer from heart disease, the leading cause of death for patients with type 2 diabetes. They found a disruption in calcium ion handling in cardiomyocytes, a critical cell type for normal heart function, which now gives them a target for more precise treatment strategies. If the cellular mechanisms of contractile impairment in diabetic patients can be prevented or reversed, this could lead to improved patient quality of life and reduce mortality.

Images (a) and (b) are examples of cross sections of trabeculae (muscular structures found in the atria of the heart) from non-diabetic and type 2 diabetic patients. Green immunohistochemical staining shows the outside of the cells while red shows myofilaments within the cells. Panel (c) shows how the researchers measured the cross-sectional area of the trabeculae by tracing the outline of the cells and measuring the area. Panel (d) shows a similar outline of the myofilaments alone. The force produced by each muscle was measured and expressed per myofilament area, showing that muscles from diabetic patients produced less calcium activated force per contractile protein area.

You can read more about this research, awarded an AMRF project grant in 2018 and completed in 2022, in this 2023 publication, the source of these images:

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Dr William Scheirding

2023 ANNUAL RESEARCH AWARDS

Donors, stakeholders, partners and family members joined us in recognising our scholars, fellows and special award recipients.

The 2023 Research Awards recognised our scholars, fellows and special award recipients and celebrated the breakthroughs they are making in medical and health science. It was also the opportunity to continue raising support for our initiative designed to sustain our mid-career researchers at a critical point in their career, the Futures Fellowship Fund (FFF).

The Futures Fellowship Fund was launched to help researchers like Dr Peter Freestone who has spent the last ten years researching Parkinson's disease and is pioneering a device for more effective, less invasive deep brain stimulation. In his words: "I will continue battling through this mid-career phase until I can secure an academic position to complement my research – a position that can provide some sort of security but these are far and few between."

To find out more about the Futures Fellowship Fund and how you can help, please contact Sue Brewster, Executive Director on sue.brewster@medicalresearch.org.nz or call on 09 923 1701 or 027 569 7777.

EMPOWERING TOMORROW'S RESEARCHERS: HELEN GOODWIN'S GOODUCK DOCTORAL SCHOLARSHIPS

CREATING A CAREER PATHWAY FOR ASPIRING EARLY CAREER RESEARCHERS

Helen Goodwin has always held a deep interest in education, having been a secondary school teacher and deputy principal, and supporting medical research doctoral scholarships felt like a natural extension of her passion for advancing knowledge and investigative studies.

Back in 2018, Helen, as a founder of the Gooduck Charitable Trust and along with her fellow trustees, made the decision to invest in the next generation of researchers and over the past five years the Trust has provided four doctoral scholarships.

In late 2023, Helen was invited to join some of the AMRF Medical Committee members on a panel of scientists and professors in assessing the four final applicants who had made it to interview stage. Meeting these talented young researchers in-person was invaluable for Helen, who was able to ask questions such as 'how would you describe, in two to three sentences, the impact you hope to make through your research'. After the interviews, Helen reflected how incredibly impressed she was with the quality of the candidates and could have easily chosen all four to receive scholarships.

"It was such a special experience for me to be able to engage with these incredible young students, hear them articulate their research objectives along with the outcomes they were hoping to achieve and feel the intense passion they had for their chosen fields of study," said Helen.

"All of us on the panel agreed we had four top-quality applicants but with only two scholarships available to award, I decided the Gooduck Charitable Trust should fund two of the students, meaning there was one more AMRF scholarship available to allocate.

"I was able to select the two candidates working in neuroscience, a field of research that is of particular interest to me with my husband having had a terminal brain tumour anld my sister recently having had a stroke, and I was thrilled to hear they were happy to accept the two Helen Goodwin Doctoral Scholarships (refer to page 7).

"I would encourage any donor who is able to contribute towards personal awards like scholarships or fellowships to take the opportunity to meet the recipients.

"This personal connection gave me a real sense of the value of philanthropy in a sector where the amount of funding available does not add up to the immense difference our researchers are making in shaping our future health," concluded Helen.

Helen's involvement was equally valued by the research experts on the panel. The panel recognised the merits of having a different perspective in the mix and how the incorporation of donor insights enriched the overall decision-making process, so much so that, whenever possible, a 'Helen' will be included in AMRF interview panels going forward.

Financial Highlights 2023

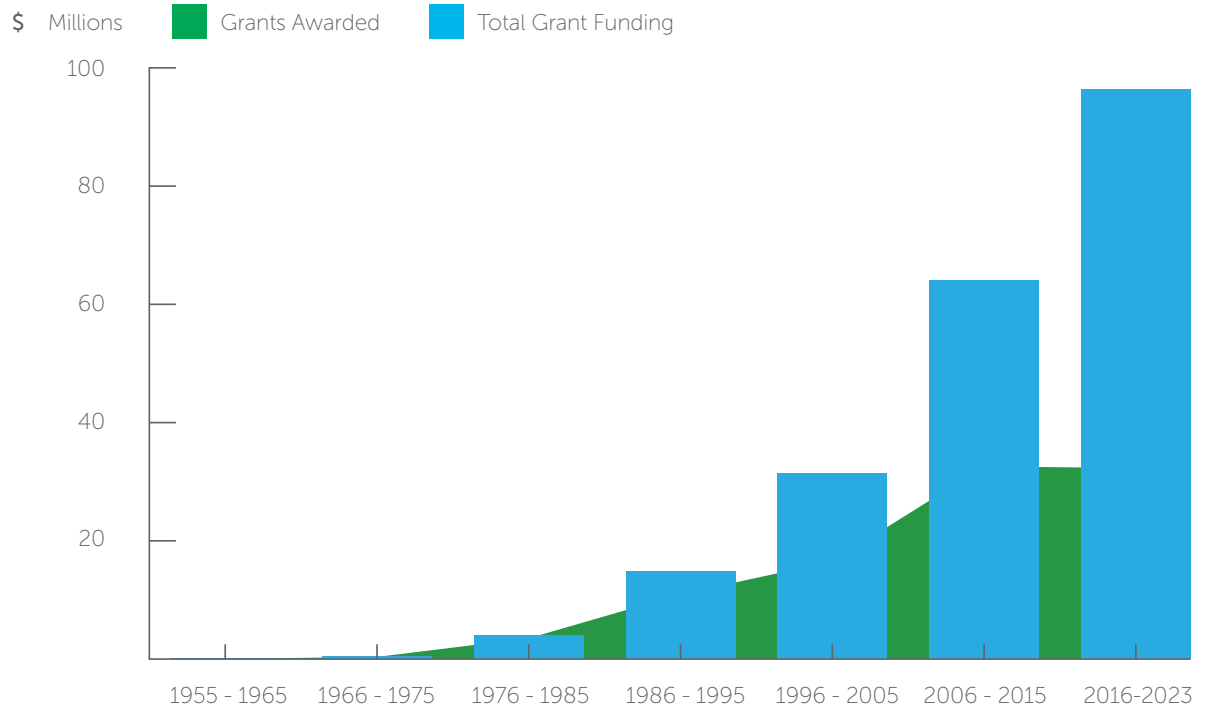
RESEARCH FUNDING 2023 $3.93 MILLION TOTAL RESEARCH FUNDING SINCE 1955 $96.2 MILLION

FINANCIAL PERFORMANCE

	Note	2023 $		2022 $	
Revenue					
Donations/Research Income	1	1,877,736		1,685,496	
Investment Income (Total Return)	2	8,365,585		(6,654,189)	
Other Comprehensive Revenue / (Expense)		3,046,014		226,715	
Total		**13,289,335**		**(4,741,978)**	
Expenditure					
Operational expenses		559,712		543,517	
(Less Donation)	3	(559,712)	-	(543,517)	-
Net Research Grant Expenditure	4	3,572,136		3,649,589	
Net Surplus / (Deficit)		**9,717,199**		**(8,391,567)**	
Trust Equity		**71,816,423**		**62,099,224**	

The summary financial highlights above have been extracted from the Audited Financial Statements which can be obtained by contacting the Foundation's office, or via Charities Services www.charities.govt.nz

AMRF GRANT FUNDING 1955 - 2023



Notes to the 2023 Financial Report

1. Donation & Research Income includes grants, donations (general and specific use), trust distributions and external funding received from the following organisations:

Perpetual Guardian Administered Funds	
The Edith C Coan Trust	120,000
Edith Rose Isaacs Estate	38,000
Rose Richardson Estate & Trust	34,792
The John & Poppy Stilson Endowment Trust	100,000
The NH Taylor Charitable Trust	14,117
The NR Thompson	15,000
The Room Simmonds Charitable Trust	10,000

Public Trust Administered Funds	
The Audrey Simpson Trust Fund	5,250
Ralph Dingle Trust	2,530
Pauline Gapper Charitable Trust	6,500
The Reed Charitable Trust	10,000
Wellington Sister Charitable Trust	13,500

Other Trusts/Funds over $10,000	
Anonymous	600,000
Douglas Goodfellow Charitable Trust	270,000
The Goodfellow Foundation	63,029
Gooduck Charitable Trust	298,000
The JI Sutherland Fund	50,000
The Kelliher Charitable Trust	60,000
Marion Ross Memorial Fund	30,947
Norah Hamblin Trust	10,000
Paul Stevenson Memorial Trust	25,000
Brain Cancer Fundraiser	16,710

Other Comprehensive Revenue including: Legacies, Bequests and Capital Gifts

Estate of Beryl Fitzwater
Estate of FP Grinter
Estate of Mrs J Goodfellow
Estate of Kenneth Holmes
Estate of AC Sinclair
Aotea Group Holdings Ltd
Noel and Heather Davies
James Mutch

2. Investment Income (Total Return)

AMRF Investments are held in a series of Custodial Managed Funds, with all investment income recorded on a Total Return basis. Portfolio Total Income includes: all direct income (interest and dividends), investment management fees and annual portfolio gains or losses which are recorded via the Statement of Financial Performance.

Following the global investment market decline of 2022, the AMRF investment portfolio recovered significantly during 2023 to report substantial capital growth, and continues to report strong performance thanks to the skill of our Investment Managers.

3. Operational Expenses

The Foundation is grateful to the Harry, Hector, Douglas, and TB Goodfellow Funds for the ongoing funding of operational expenses.

4. Research Funding Awarded 2023

PROJECT GRANTS (15)	2,080,838
POSTDOCTORAL FELLOWSHIPS (2)	546,428
DOCTORAL SCHOLARSHIPS (3)	447,000
AMRF TRAVEL GRANTS (40)	137,441
OTHER GRANTS	
UoA / AMRF Senior Research Fellowship	100,000
Douglas Goodfellow Medical Research Fellowship	314,000
Douglas Goodfellow Repatriation Fellowship	221,964
Kelliher Charitable Trust Emerging Researcher Start-up Grant (2)	60,000
Sir Harcourt Caughey Award	11,644
Sir Douglas Robb Award)	2,907
HealtheX Emerging Research Awards (3)	7,000
Summit Award	3,000
Te Whata Ora Award (2)	1,000
Researcher Network Fund	887
TOTAL GRANT FUNDING 2023	3,934,109
Less amounts allocated but not required	(371,973)
NET GRANT EXPENDITURE 2023	**3,572,236**

Special Acknowledgements

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

Honorary Life Members

Blincoe, Chris
Bowie, Jennifer
Byrne, Judi
Chan, Rebbeca and David
Davies, Heather
Hart, Cliff
Nicholson, Prof Louise
Todd, Glenys

Life Members

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Baird, Tony
Bunning, Natalie
Christie, David
Collings, Stan
Crookbain, Margaret
Davies, Amelia
Davies, Matthew
Davies, Noel
Ding, Christine
Ding, Allan
Ding, Thomas
Donne, Adrienne
Fish, Barbara
Friedlander, Sir Michael
Gibbons, Dr Hannah
Glass, Paul
Glover, Bill
Glover, Donna
Goodfellow, Peter
Goodfellow, TB
Graham, David
Green, Prof Colin
Gunman, Kirk
Gunman, Susan
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Hall, Richard and Yvette
Hall, Simon
Herle, Suryashobha
Hobbs, Emmet
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Lorimer, Michael
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MacCulloch, Robert
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Taylor Family
Todd, Jeffrey
Yates, Anna
Young, Prof Alistair

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Barber, Prof Alan
Barnett, Leanne
Blackie, Shirley
Blamey, Jan and Barry
Brewster, Sue
Clarke, Ray
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Denton, Joanne
Farzana, Syeda Sadia
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Gibson, Debbie
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Mason, Barbara
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Molloy, Thea
Muir, Mr P and Mrs S
Noble, Katie
Peace, Su
Proft, Prof Thomas
Pyne, Jenny
Sasso, Dr Giuseppe
Suzuki-Kerr, Dr Haruna
Taylor, Sue
Thorne, Prof Peter

LEGACIES, SPONSORS, CAPITAL GIFTS & FUNDING PARTNERS 2023

Funding Partners

Perpetual Guardian
Public Trust
Douglas Goodfellow Charitable Trust
Douglas Goodfellow Urology Fund
Gooduck Charitable Trust
The Kelliher Charitable Trust
The J.I. Sutherland Fund
Marion Ross Memorial Fund

Capital Partners / Funds in Perpetuity

A.C. Horton Estate Fund
Hugh Green Fund
Gavin & Ann Kellaway Fund
W. & W.A.R. Fraser Fund
Sir William Goodfellow Fund
G. S. Blanshard Fund
Doug Brown Fund
Sir Harcourt Caughey Fund
Sir Henry Cooper Fund
L.H. Corkery Fund
M.J. Merrilees Fund
Sir Douglas Robb Fund
Sir Lewis Ross Fund
Brian Jones Fund
Bruce Cole Fund
MRI ERD Trust Fund
Jennings-Cannon Fund
Douglas Goodfellow Fund
David Christie Fund
Curtis-Tonkin Paediatric Fund
Hugo Charitable Trust Fund
Jeffrey Todd Fund
Noel & Heather Davies Fund

Capital Gifts

Aotea Group Holdings Ltd
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Sponsors

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Thanks also to our benefactors who wish to remain anonymous.

Thank You!

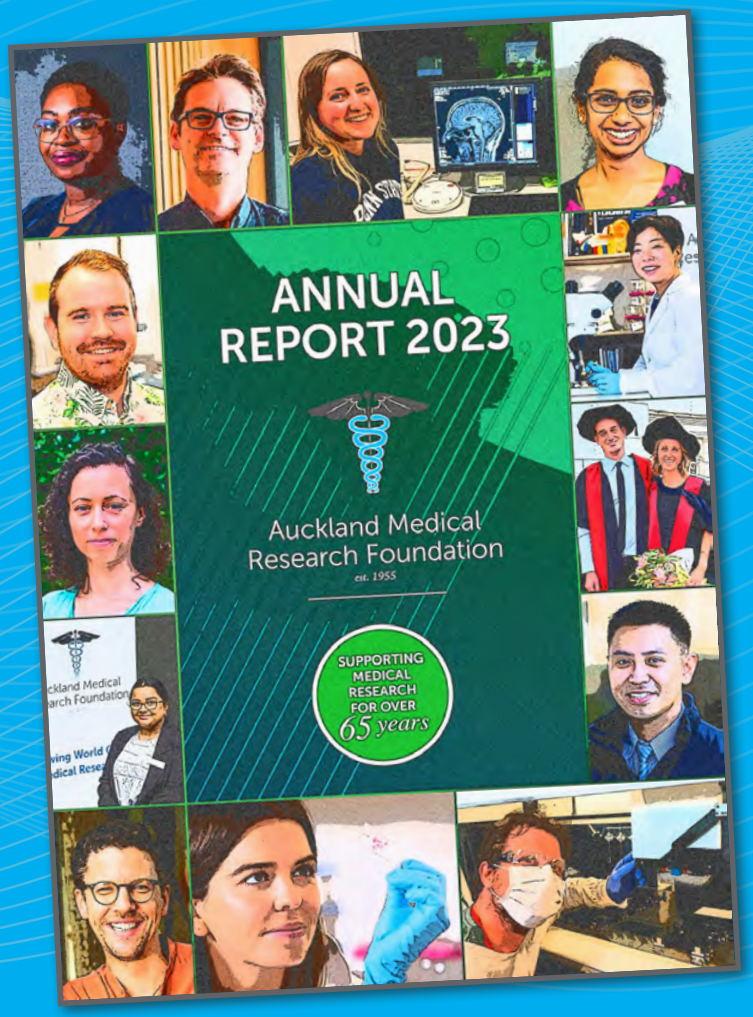
The cover photos of this annual report showcase some of the remarkable people whose work you have enabled – be it researching for more effective treatments, better understanding of how to prevent a specific disease or disorder, improved ways to reduce medical trauma or just enhancing overall health outcomes for us all.

Front cover, clockwise from top left:

- Dr Lola Mugisho, AMRF Postdoctoral Fellowship, pages 4 & 8
- Dr Benjamin Albert, Project Grant, page 9
- Dr Julia Plank, HealtheX Emerging Researcher Award, page 30
- Dr Renita Martis, Kelliher Charitable Trust Emerging Researcher Start-Up Award, page 15
- Dr Haruna Suzuki-Kerr, Project Grant, page 24
- Dr Matt Williams and Dr Sarah Kember, Doctoral Scholarship (SK), page 27
- Dr Tim Hsu-Han Wang, Douglas Goodfellow Medical Research Fellowship, page 26
- Dr Petr Tomek, Project Grant, page 24
- Dr Emma Nolan, Douglas Goodfellow Repatriation Fellowship Extension, page 15
- Dr Alex Muntz, Summit Postdoctoral Research Presentation Award, page 29
- Sryana Sukhdev, Helen Goodwin Doctoral Scholarship, page 7
- Dr Irene Vorontsova, Sir Harcourt Caughey Award, page 29
- Dr James McKeage, Project Grant, page 11

Back cover, clockwise from top left:

- Jess Kelly, HealtheX Emerging Researcher Award, page 14
- Dr Nikki Earle, Kelliher Charitable Trust Emerging Researcher Start-Up Award, page 25
- From left to right: Elizabeth Cooper, Dr Susan Li, Dr Zoe Woolf, Carina Lee, and supervisor Dr Thomas Park, Edith Rose Isaacs Doctoral Scholarship (SL), page 28
- A/Prof Susan Wells, Project Grant, page 13
- A/Prof Cherie Blenkiron, Project Grant, page 21
- Dr Kathryn Burns, Project Grant, page 9
- A/Prof Chris Hall, Project Grant, page 22
- Dr Brittany Park, Kelliher Charitable Trust Emerging Researcher Start-Up Award, page 15
- Dr Eunicia Tan, Project Grants, page 13
- Dr James McKeage, with former PhD students Jiali and Kieran, Project Grant, page 11
- Dr Luca Vinnell, Helen Goodwin Doctoral Scholarship, page 7



HOW YOU CAN HELP TO CHANGE LIVES

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Every contribution matters.

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Leave a Legacy: Include our research in your will and leave a lasting impact.

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Auckland Medical Research Foundation,
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Email us at
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☐ Please send me information on leaving a bequest through my will

AMRF thanks BlueStar Group for more than ten years of pro bono design and print of the AMRF annual report and newsletters.

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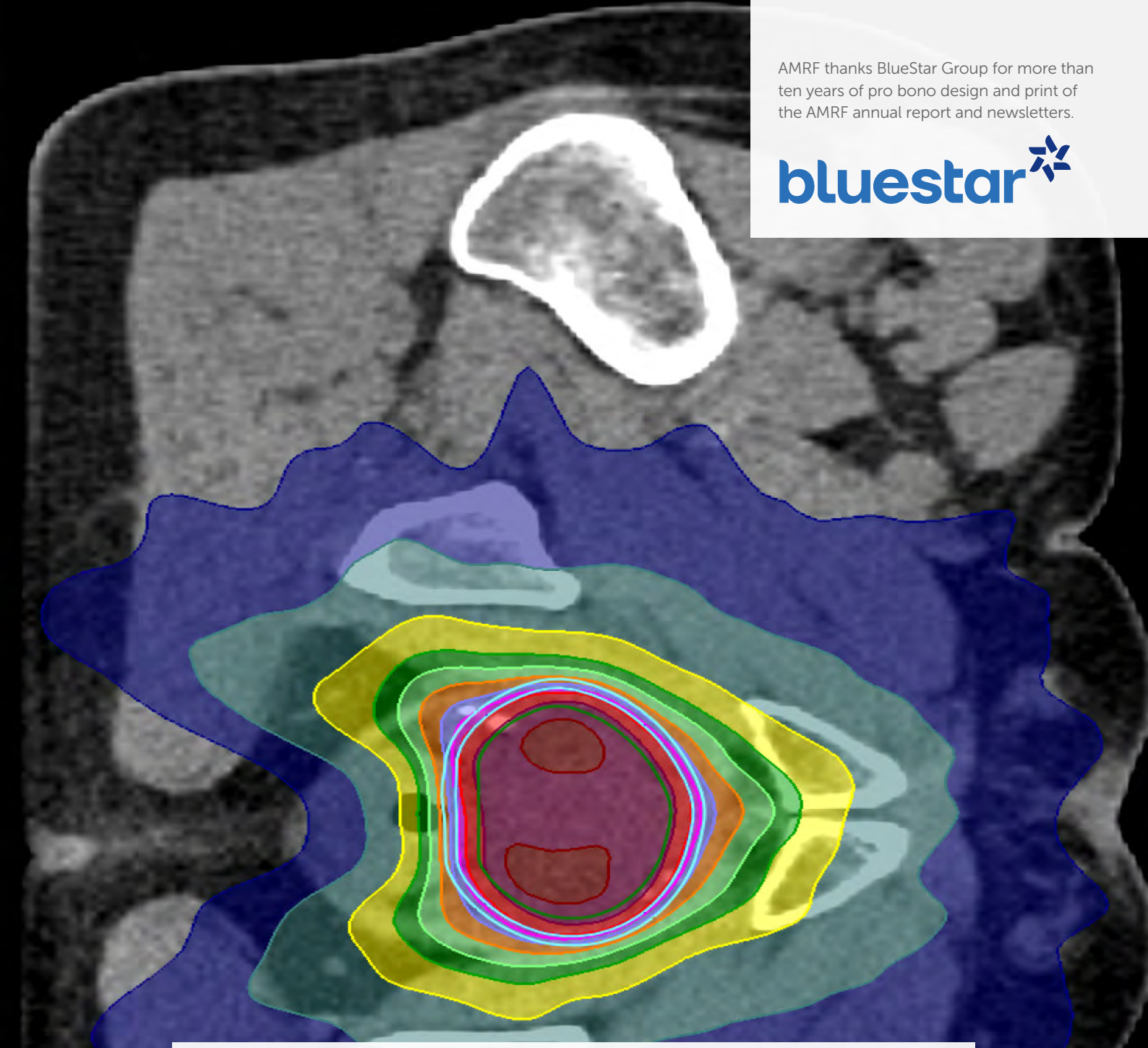

FASTER PROSTATE CANCER TREATMENTS

The landscape of radiation oncology has drastically changed in recent years. As technology has advanced, so too has our treatment delivery. The current trend is to deliver radiotherapy in fewer treatments using ablative doses, termed stereotactic body radiotherapy (SBRT).

In men with localised prostate cancer, what would have previously been up to an 8 week treatment course is now condensed down to 2 weeks.

The PACE-NODES trial is taking the next step to explore the application of an SBRT technique in men receiving radiotherapy to the prostate as well as the pelvic nodes, and the trial presents an opportunity for our patients in Aotearoa New Zealand to access a treatment approach that would not otherwise be available.

Image is a radiotherapy planning CT image for a patient treated on the international PACE-C trial at Te Toka Tumai, courtesy of Dr Jerusha Padayachee, refer to page 12.

Auckland Medical Research Foundation

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