Auckland Medical Research Foundation

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ANNUAL REPORT 2020

SUPPORTING MEDICAL RESEARCH FOR OVER *65 years*

TREACHEROUS CELLS IN CANCEROUS TISSUE

Lymph nodes are small collections of immune and scaffolding cells. They are key sites where the immune system starts to react to threats of infection and some cancers.

One puzzle is that cancer cells often invade lymph nodes, that is, they metastasise there - despite these nodes being home to the very immune cells that can kill them.

Dr Jennifer Eom was awarded an AMRF Doctoral Scholarship in 2018 and in 2020 published exciting research findings from her thesis, where it featured on the cover of the journal Cancer Immunology Research.

Dr Eom has found that scaffolding cells are likely to play a role in preventing immune attack on cancer cells. Some of these cells appear to make barriers around the cancer cells while others seem likely to provide nourishment or attract the immune cells away from the cancer cells. This is what can be seen in the image on these pages.

Instead of the green T cells, a type of immune cell, being amongst the red cancer cells and attacking them, most T cells are "trapped" on the blue scaffolding cells, in no position to fight off the cancer.

These results will enable the development of new cancer therapies that target the molecules used by different types of scaffolding cells to support and aid cancer cells.

Read more in the publication listed on Page 33.

FUNDED BY: J.I. Sutherland Fund for Melanoma Research

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Charity Services Registration Number: CC22674

PRESIDENT'S REPORT 2020

2020 will be forever etched in world history as the year of the Covid-19 pandemic. By March 2020 most countries were in partial or full lock-down in a desperate bid to eliminate the spread of the deadly virus. Globally, New Zealand was in the spotlight for our well planned and effective response to the pandemic.

In this vein, AMRF was proud to launch and fast-track a special fund that allowed our research community to contribute to vital Covid-19 pandemic research (see pages 17-19).

Despite the challenges of 2020, the ongoing strength of the Foundation's financial performance continues. Whilst the Trustees are pleased to report that the 2019 change to managed funds has been successful and that ongoing investment performance remains in good shape, the real financial impact is thanks to you, our very loyal supporters who are helping to fund transformational and life-changing research. With the contribution of external funding and significant donations during 2020, we were delighted to award funding of nearly $4.7 Million to our world-class researchers, which also included the additional funding round of $507K for Covid-19 research.

Dr David Musson specialises in tendon, joint and bone health and is one of those world-class researchers whose career has been future proofed through your generosity. In 2018, David was awarded the AMRF University of Auckland Senior Research Fellowship - a grant designed to support a researcher for a five year period and allow them to progress their career to a self-sustaining level. By late 2020, he had done exactly that and was appointed into a paid, senior lectureship position while being able to continue on with his ground-breaking research. David's story is featured on page 4 and is testimony to why we launched the Futures Fellowship Fund.

The launch of our Futures Fellowship Fund in November couldn't have come at a better time with the pandemic bringing many of our off-shore researchers home. Our mission is simple but the need is titanic - our mission is to build a $5 Million capital base over the next four years to provide annual funding to a mid-career researcher for five years. As with Dr Musson, this is time enough to allow them to find breakthroughs in medicine, develop capability as a research leader and become more competitive for academic positions. We launched with $1 Million of pledged donations and we continue on this mission to provide our mid-career researchers with a future, just like the one they are providing for us.

I extend my sincere thanks to our Executive Director, Sue Brewster, and the team at the AMRF who worked with the usual dedication and professionalism amidst the turmoil of Covid-19.

To the Trustees, Committee Chairs and Committee Members, thank you for the voluntary time and expertise you provide so generously – it is without question that AMRF would not be where we are today without your knowledge and commitment. I would like to acknowledge the passing of a treasured and long-standing trustee, Dr Bruce Goodfellow, and we pay tribute to Bruce and his incredible contribution to AMRF on page 39.

As always, my final thank you is to the Goodfellow family and their associated charitable trusts which fund all of AMRF's operational expenses. This support ensures every cent of every donation goes directly into research that will continue to change our lives forever.

Richard Taylor

President

MEDICAL COMMITTEE REPORT 2020

In a year when the Covid-19 pandemic gripped the world, bringing many facets of normality to a standstill, I am proud to say we were able to progress "business as usual" along with launching a special Covid-19 research round that had a significantly truncated funding process.

In our standard grant rounds during 2020, our highly skilled medical committee voluntarily assessed 207 applications, of which 58 were awarded totalling $4.18 million across a multitude of research themes. Due to the travel restrictions imposed by the pandemic, we were only able to award our first round of travel grants (16 grants, totalling $43,735) and we continue to work with those recipients to help them attend virtual meetings or delay their travel. At a time of such global instability, it is a credit to the AMRF that we successfully funded 28% of all applications. Particular highlights were the awarding of three Postdoctoral Fellowships, (two funded by the Douglas Goodfellow Charitable Trust), the continued relationship with the Kelliher Charitable Trust with the awarding of two Kelliher Charitable Trust Emerging Researcher Start-up Awards and an additional grant to support a one-year Postdoctoral Fellowship extension for Dr Brigid Ryan, a previous recipient of their award.

In late March, the AMRF responded to the need of our New Zealand research community to be able to contribute to Covid-19 research happening around the world. Within one week, an additional funding pool of $507,000 was established and an expedited, three week, contestable application process for the new AMRF COVID-19 Research Round was introduced. Our Medical Committee, along with co-opted members A/Prof Dan Exeter, A/Prof Judith McCool to provide additional support for the population health based applications, and Dr Isaac Warbrick (Ngāti Te Ata, Te Arawa, Ngā Puhi) to oversee Matauranga Māori, worked around the clock to assess 42 applications and make recommendations to fund seven projects at a total cost of $507,937. It is a testament to the support and structure of the AMRF that we could establish and carry out the awarding of these grants. Additionally, it is a pleasure to know that we are contributing to the global efforts to understand this devastating pandemic.

The awarding of all grants would not be possible without the generous gifting of time and expertise of our full Medical Committee members and co-opted members, who, as always, ensured a contestable and robust assessment process. At a time when they were managing their own research and clinical responsibilities during a pandemic, this is no mean feat.

As always, I would like to thank the AMRF Board and team for all of 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; and Haematologist, Auckland District Health Board

THE FUTURE OF OUR 'JOINT' HEALTH

Dr David Musson

Bone and Joint Research Group, Dept of Medicine, University of Auckland

Receiving a senior research fellowship in 2018 provided Dr David Musson with a critical pathway to becoming an established researcher.

In 2017, Dr David Musson was leading the Tendon and Orthopaedic Research Programme in the University of Auckland Bone and Joint Research Group, carving out a name for himself in the research community.

In early 2018, an impressive research portfolio combined with his leadership skills saw David awarded the inaugural AMRF-University of Auckland Senior Research Fellowship – a five year fellowship designed to sustain emerging researchers and provide them with a strong career pathway.

"The fellowship allowed me to focus solely on my research and this paid off early on in the piece with my work helping to provide clinicians with alternative, safer graft sources for knee ACL (anterior cruciate ligament) reconstructions," David reflects.

By late 2020, David's future in research was sealed. He was offered a senior lecturership – a paid academic position that allows him to continue his research and share his knowledge and experiences by taking on students.

David is 100% certain that the fellowship provided him with a necessary stepping stone on his research career pathway.

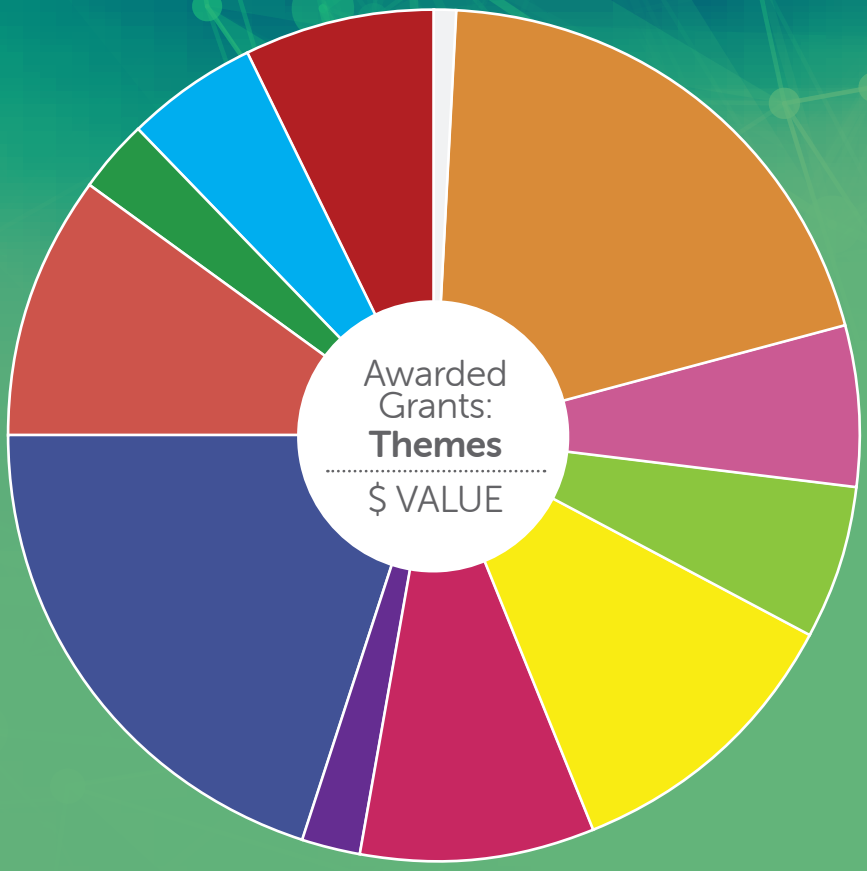
"Without a doubt, getting this lecturing position would not have been possible without the support of AMRF and its donors, first through a recent project grant but most importantly through the senior research fellowship.

"The other great news is that with securing a paid lecturing position, I no longer need the AMRF-UoA Senior Research Fellowship to sustain my research and this will become available for another person to benefit in the way I have."

"AMRF donors have helped me establish myself as a tendon researcher and pursue my work to give people back their pain-free, functional joints.

"Now this fellowship is available for another person to benefit the way I have."

GRANTS AWARDED



2020 AWARDED GRANTS — THEMES
65 GRANTS AWARDED TOTALLING $4,692,231

- Biomedical Imaging (2) | **$31,875** | 0.68%
- Cancer (9) | **$940,794** | 20.05%
- Cardiovascular Science (3) | **$291,948** | 6.22%
- Cellular & Molecular Biology (2) | **$262,034** | 5.58%
- Covid-19 Project (7) | **$507,937** | 10.83%
- Endocrinology, Metabolism and Nutrition (2) | **$5,752** | 0.12%%
- Infection and Immunity (6) | **$439,470** | 9.37%
- Musculo-skeletal Science (3) | **$104,000** | 2.22%
- Neuroscience (12) | **$929,858** | 19.82%
- Other (6) | **$471,398** | 10.05%
- Population Health (3) | **$14,622** | 0.31%
- Pulmonary, Renal, Nephrology & Gastrointestinal Sciences (2) | **$162,003** | 3.45%
- Reproduction, Development, Maternal & Newborn Health (4) | **$214,565** | 4.57%
- Sensory Sciences (1) | **$3,000** | 0.06%
- Stem Cell Biology (2) | **$309,975** | 6.61%
- Surgery (1) | **$3,000** | 0.06%

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

POSTDOCTORAL FELLOWSHIPS

AMRF POSTDOCTORAL FELLOWSHIP

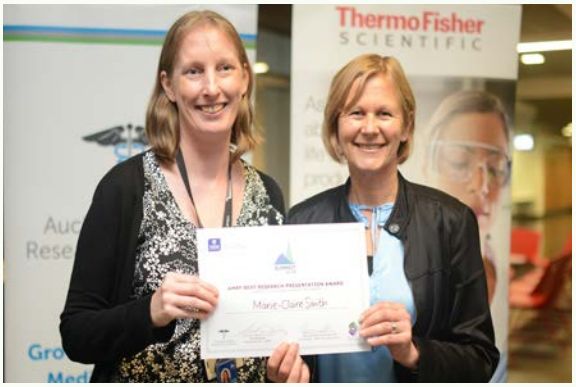
TWIST 3: VALIDATION OF THE TIME TO WALKING INDEPENDENTLY AFTER STROKE TOOL ($210,576 - 2 years) 1320001

Dr Marie-Claire Smith

Dept. of Medicine,
The University of Auckland

Around 10,000 New Zealanders experience stroke each year, and most will have difficulty walking. Regaining the ability to walk independently can make the difference between returning home, or having to move to a rest home or nursing home. Patients and whānau/family would like to know whether they will walk independently again and how long this will take. Unfortunately clinicians' predictions are accurate only about half the time.

The TWIST tool predicts both whether and when a patient will walk safely on their own again, with 90% accuracy. These predictions will enable patients, whānau and clinical teams to more confidently plan patients' care, discharge, and short and long term living arrangements. In turn, this is expected to improve rehabilitation efficiency, and reduce the emotional



and economic burden on patients and whānau as they adjust to life after stroke. This study will validate TWIST so it can be implemented in clinical care. It will also interview patients, whānau/family, and clinicians, to understand the perceived benefits and risks of giving and receiving prediction information. The results of this study will lay the groundwork for the next study that will see what happens when prediction information about walking is available in routine clinical practice.

Read more on page 22.

DOUGLAS GOODFELLOW POSTDOCTORAL FELLOWSHIP

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

Dr William Schierding

Liggins Institute,
The University of Auckland

The increasing availability of large international genetic databases and inexpensive, cloud-based computation makes now an ideal time to develop a tool which can show a comprehensive picture of mutations in the context of regulatory elements, specifically 3-D genome structure. The bioinformatics approach will be fast (minutes), inexpensive to operate (only data storage costs), provide open access to mutation annotation for all clinical and genomics experts, and attribute impact to the numerous cancer variants currently classified as having "unknown significance". The value of this approach is to improve future diagnostics with the power to understand non-coding mutations, to alleviate: 1. patient anxiety ("Is my family member hurt by these variants of unknown significance?");

2. clinician overburden (overwhelming information without clear clinical answers); and 3. diagnostic cost (expensive expertise to diagnose individuals with unknown burden). Therefore, this project could lead to a beneficial way to screen mutations and reduce the burden of having so many unknowns..

FUNDED BY: The Douglas Goodfellow Charitable Trust

DOUGLAS GOODFELLOW POSTDOCTORAL FELLOWSHIP

MULTI-OMICS AND BIOMARKERS TO PERSONALISE RISK PREDICTION AND THERAPY IN ACUTE CORONARY SYNDROMES ($182,948 - 2 years) 1320003

Dr Nikki Earle

Dept. of Medicine, The University of Auckland

Mortality rates for cardiovascular disease in New Zealand are decreasing, meaning people are more likely to survive events such as heart attacks and be living with heart disease. The rates of subsequent events in these people are high, and there are persistent ethnic inequities with worse outcomes for Māori and Pacific peoples. In this study of over 2000 New Zealanders who have survived their first heart attack, we aim to develop new ways to identify people at highest risk of death or rehospitalisation to enable targeting of preventative interventions. This will include exploring genetic markers of risk across New Zealand's unique mix of ethnic groups, and several other biomarkers, in addition to the known clinical, lifestyle and environmental cardiovascular risk factors. This research may lead to novel approaches to reduce recurrent events in patients with established heart disease, identify more personalised treatments, and help increase equity of outcomes.

I am so thrilled and grateful to be awarded this Douglas Goodfellow Postdoctoral Fellowship. It takes many years to develop the skills and collaborations needed to become an independent research leader and this fellowship makes a huge difference to the journey.

FUNDED BY: Douglas Goodfellow Charitable Trust

DOCTORAL SCHOLARSHIPS

MODELLING NEWBORN CARDIOVASCULAR DEVELOPMENT ($106,000 - 3 years) 1220006

Dr Robyn May

Dept. of Obstetrics & Gynaecology,
The University of Auckland

Preterm birth (defined as birth before 37 completed weeks of gestation) is a global burden, with over 15 million babies born prematurely each year. Babies born early are at greater risk of a range of short-term and long-term problems, including a greater risk of cardiovascular disease (CVD) in adult life. Several mechanisms linking preterm birth to the onset of CVD later in adulthood have been suggested, however, uncertainty remains about the physiological mechanism by which preterm birth is related to poor cardiovascular outcomes later in life. This project aims to address this knowledge gap using computational modelling.

Computational modelling is a type of mathematical modelling that studies the behaviour of a complex system using computer simulations. In this project, we will collect data on the heart and blood vessels of newborns and develop a computational model of the cardiovascular system for both term and preterm

babies and compare them to identify differences in cardiovascular physiology between newborns of different gestational ages that may predispose preterm babies to greater cardiovascular risk later in life. The findings of this project may contribute to future clinical studies that may be able to reduce these CVD risk factors for babies born early.

FUNDED BY: Curtis-Tonkin Paediatric Fund

DOCTORAL SCHOLARSHIPS (CONTINUED)

MATERNAL MENTAL HEALTH AND VACCINATION BEHAVIOURS IN AOTEAROA ($116,000 - 2 years) 1220004

Ms Sarah Kember

School of Psychology, Massey University

Over the past two centuries, vaccines have revolutionised human health, the ongoing COVID-19 pandemic a grim illustration of the dangers of uncontrolled disease. To achieve population immunity through vaccination, however, a large number of people must be vaccinated. In New Zealand, rates remain consistently lower than necessary for population immunity. Understanding drivers for low uptake is complex, but crucial to population health. One plausible cause is anxiety and depression in pregnant women and new mothers. Studies have found a strong link between psychological distress and decision-making challenges. Yet it is during the very period when 10-20% of pregnant women and new mothers experience anxiety or depression that 7 of the 15 childhood vaccines are due.

Despite good reason to believe that poor mental health in pregnancy and postnatally increases the risk of missed vaccines, experimental techniques manipulating distress level, are ethically impossible. Massey University researchers will therefore test the hypothesis using sophisticated statistical analytic techniques. The study will contribute important knowledge for future interventions to increase vaccination rates by improving maternal mental health. Given misinformation circulating about vaccines and disruptions to routine immunisation programmes due to COVID-19, the need for current and relevant research has never been more pressing.

FUNDED BY: The John Jarrett Trust

HELEN GOODWIN DOCTORAL SCHOLARSHIP

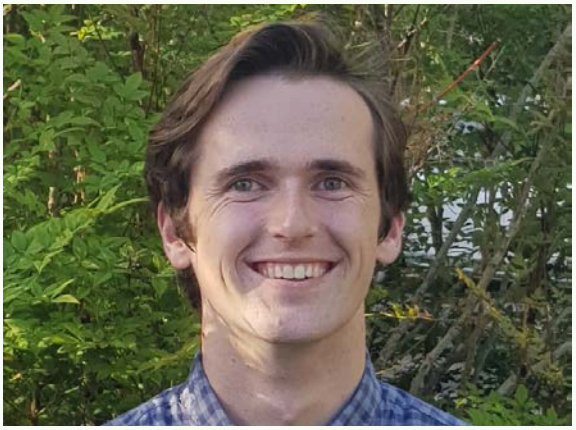
AN IMMUNOTHERAPEUTIC APPROACH TO TREATING COGNITIVE DECLINE IN AGING ($131,000 - 2 years) 1220007

Mr Conor Nelson

Dept. of Pharmacology & Clinical Pharmacology, Centre for Brain Research, The University of Auckland

As the aged population continues to grow, new therapies are needed to prevent the predicted escalation in the number of people affected by age-related neurodegenerative diseases. Our lab has developed an antibody-based immunotherapy targeting the GluN1 subunit of NMDA glutamate receptors. These receptors are believed to be essential to the process of learning and memory, and we have previously demonstrated that treatment with these antibodies has neuroprotective and cognitive-enhancing properties in rodent models. This project takes the next step towards the development of a GluN1 antibody therapy suitable for human use. We will determine whether site-specific monoclonal GluN1 antibodies are as effective at boosting learning and memory function as our current GluN1 antibody therapy, as the predictable binding behavior of monoclonal antibodies makes them safer for clinical use. Additionally, we will be investigating whether the ability of anti-GluN1 antibodies to selectively alter signalling at NMDA receptors is able to modify the progression of Alzheimer's disease in a transgenic mouse model. If these experiments prove to be successful, these results will contribute to the development of a new class of therapies for improving cognitive function and increasing the brain's resilience to neurodegenerative disease.

FUNDED BY: Gooduck Charitable Trust



SUMMIT POSTDOCTORAL RESEARCH PRESENTATION AWARD

DR ALEX MUNTZ

Dept of Ophthalmology,
The University of Auckland

$3,000 TRAVEL AWARD 6720005

This award signals that the key to successful scientific communication in a multidisciplinary environment is simplifying one's message beyond what may initially seem appropriate or even comfortable. In my work, I am dedicated to developing interdisciplinary approaches to tackle the complex issues we are facing, and so I believe in simple communication as a basis for fostering collaboration, as well as for ensuring comprehension and thus real educational value. This award reinforces my belief in this approach. The financial aid, coupled with the generous flexibility in such uncertain times, will be of great assistance towards taking the next step in my work, and is highly appreciated.

FUNDED BY: Wellington Sisters Charitable Trust

HEALTHEX EMERGING RESEARCHER AWARDS

DR SCOTT BOLAM

Dept of Medicine,
The University of Auckland

AMRF OUTSTANDING EMERGING RESEARCHER AWARD
$3,000 6720001

Understanding Obesity's Harmful Effects on Tendon Healing in a Rat Rotator Cuff Tear Model.

FUNDED BY: Wellington Sisters Charitable Trust

MS JULIA PLANK

School of Pharmacy,
The University of Auckland

AMRF DOCTORAL ORAL PRESENTATION RUNNER UP AWARD
$2,000 6720002

Validating neuro-imaging to detect neuroinflammation in vivo.

MISS ALICE MCDOUALL

Dept of Physiology,
The University of Auckland

AMRF BEST POSTER PRESENTATION AWARD
$2,000 6720003

Tonabersat is neuroprotective after hypoxia-ischaemia in neonatal rats.

Grants Awarded

GDM AND SCHOOL AGE OUTCOMES ($159,813 - 2 years) 1120019

Dr Jane Alsweiler, Prof Caroline Crowther, Prof Gavin Brown, Dr Christopher McKinlay

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

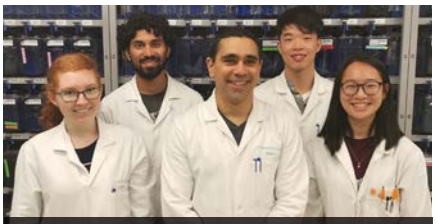
Dr Jane Alsweiler

In the last 20 years it has become very common for pregnant women in New Zealand to develop diabetes; 10% of women who didn't have diabetes before becoming pregnant will have diabetes in pregnancy. Diabetes in pregnancy increases the risk of complications during pregnancy and when the baby is born. A healthy diet and exercise and, in some cases, medicine such as insulin, reduces the risk for women with diabetes in pregnancy. However, it is unknown if there are long-term risks for the baby's brain development and risk of obesity if they are born to a mother who had diabetes in pregnancy. In this study we will compare children who were born to mothers with diabetes, with those whose mothers didn't have diabetes, at 6-7 years of age. We will assess the children's ability to do well at school and their body composition. The results of this study will give valuable information on the long-term outcomes of children who are born to mothers who develop diabetes in pregnancy.

LYMPHATIC VESSEL GROWTH ($102,034 - 2 years) 11200004

Dr Jonathan Astin

Dept. of Molecular Medicine & Pathology The University of Auckland



Left to right. Janet Reid (BSc Hons student), Wenxuan Chen (PhD student), Dr Jonathan Astin, Denver Britto (PhD student) and Annie Yang (MSc student).

The lymphatic vasculature plays an essential role in fluid homeostasis where it collects excess tissue fluid and returns it to the bloodstream. Lymphatic vessels also provide a conduit for immune cell trafficking and therefore help to regulate our immune response. Dysregulated lymphatic vessel growth underpins many health conditions, ranging from cancer metastasis, kidney transplant rejection and breast cancer-associated secondary lymphoedema. In New Zealand, over 20% of women who undergo lymph node removal and/or radiotherapy as part of treatment for breast cancer will develop lymphatic dysfunction and secondary lymphoedema - the painful and debilitating buildup of fluid in tissues. In contrast, the aberrant overgrowth of lymphatic vessels is associated with cancer metastasis and can also cause the mis-trafficking of inflammatory cells, contributing towards the rejection of transplants. Consequently, there is considerable interest in therapies that can regulate lymphatic vessel growth to help treat these lymphatic-related conditions. However, the mechanisms that control lymphatic growth remain understudied. In this project we will address this by analysing zebrafish mutants that display either excessive lymphatic growth or a lack of lymphatic vessels, allowing us to determine how lymphatic vessel growth is controlled during development. This important work will pave the way for new therapies to treat lymphatic-related disease.

MELANOMA EV-CHIP ($159,937 - 2 years) 1120005

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

Dept. of Molecular Medicine & Pathology The University of Auckland

Dr Cherie Blenkiron and Dr Colin Hisey

Immunotherapies like Keytruda offer people diagnosed with malignant melanoma an effective new choice for treatment. Identifying if a cancer is responding to these therapies is however challenging, limited to physical exam and imaging. Testing of the blood could detect people who do not respond much earlier thereby reducing the side effects and saving inconvenient travel to receive these treatments. International scientists have identified a new early detection marker of treatment response that analyses vesicle packages from the blood. Now the challenge remains to bridge the gap between research and hospital laboratories. For this purpose, our study will develop a state of the art microfluidic technology to provide a rapid, inexpensive and sensitive testing method for trial using patient blood samples. This study aims to firstly confirm in Aotearoa NZ patients that these vesicles can accurately detect whether an individual is responding to treatment. Secondly, we aim to build new expertise and offer training in bio-engineering to upskill new researchers. Finally, and most importantly, we will take steps towards the development of a clinically useful test that ultimately could improve patient outcomes and reduce inequities in testing through the provision of a portable, quick and inexpensive technology.

FUNDED BY: J.I. Sutherland Fund for Melanoma Research

HIPPOCAMPAL DEFICITS IN AUTISM SPECTRUM DISORDER ($158,373 - 2 years) 1120020

Dr Juliette Cheyne, A/Prof Johanna Montgomery, Dr Kevin Lee, Dr Yewon Jung

Dept. of Physiology,
The University of Auckland

Dr Juliette Cheyne (centre) with her staff and students

The development of head-mounted miniaturised microscopes (miniscopes) enables brain activity to be recorded in freely moving rodents. By using miniscopes we can directly decipher how brain cell activity underlies behaviour as it happens in the awake behaving animal. Furthermore, we can utilise this technology to understand the mechanisms of behavioural changes in neurological diseases. Here we will examine the cellular mechanisms that underlie behavioural deficits in Autism Spectrum Disorders (ASD). Individuals with ASD display a range of behavioural changes including learning difficulties, social deficits, and repetitive behaviours. These behaviours are well replicated in mouse models allowing their cellular underpinnings to be explored. Several of the behaviours that are affected in ASD are mediated by a brain region called the hippocampus. We will utilise miniscopes to examine cellular activity in the hippocampus during spatial and social memory tasks. We will also determine whether a dietary zinc supplement, previously shown to prevent ASD behaviours from developing, returns hippocampal activity to normal. The ability to examine brain activity and behaviour simultaneously will advance our understanding of the cellular mechanisms that cause behavioural deficits in ASD. Improved understanding of the mechanism of action of our treatment will aid its translation into clinical trials.

DEVELOPMENT OF A CULTURALLY APPROPRIATE WHĀNAU APP FOR SELF-HARM ($158,802 - 2 years) 1120001

Dr Liesje Donkin, Ms Tania Cargo, A/Prof Sarah Hetrick, Mrs Vartika Sharma

Dept. of Phsychological Medicine,
The University of Auckland

Dr Liesje Donkin

There is currently little knowledge about self-harm, and a lack of resources to support whānau that have been developed and tested in New Zealand. This lack of whānau knowledge can increase the level of distress and isolation that young people feel and may lead to worsening mental health of both the whānau and the young person. This research uses a specific bicultural approach of He Awa Whiria (the braided rivers approach) which ensures that a kaupapa Māori approach is able to sit alongside but be separate from the Pākehā approach, although they may also influence each other. By using this approach, the research will create a resource, which is both by and for Māori to support Māori whānau using their own experiences, and those of their young people. The development of co-designed resources based on current best practice will improve access to tools that can help whānau support their young person and enhance the wellbeing of the young person and the whānau alike. This improved wellbeing may reduce the severity and frequency of self-harm and potentially reduce hospital admissions for self-harm requiring medical attention.

LONGITUDINAL ANALYSIS OF AIRWAY MICROBIOTA IN CYSTIC FIBROSIS ($159,003 - 2 years) 1120008

Prof Richard Douglas, Dr Kristi Biswas, Dr Brett Wagner, Dr Mark O'Carroll

Dept. of Surgery,
The University of Auckland

Dr Kristi Biswas, Prof Richard Douglas, and Dr Brett Wagner

Cystic fibrosis (CF) is the most common life-shortening inherited disease in New Zealand. There is currently no cure for this disease and life-long treatment is required. Patients with CF produce thick mucus that they then have difficulty clearing from their airways. As a result, CF patients suffer from repeated bacterial infections and are prescribed several courses of antibiotics, which increase the risk of developing antibiotic resistance. Although the bacterial pathogens found in the lungs of CF patients have been researched extensively, it remains unclear if the same pathogens are also found in the sinuses. Our project proposes a long-term study that investigates the bacteria in the sinuses and lower airways within the same CF patient throughout acute infections and when patients are clinically stable. Specifically, we will apply sequencing techniques to evaluate the transmission of bacteria between airway sites within the same patient and assess changes in antibiotic resistance over time. This will be the first study in NZ to examine longitudinally the sinus and lung microbiomes of adult patients with CF. This project will contribute significantly new knowledge about the dynamics of the bacteria in the CF airway and help improve antibiotic treatments for this lifelong condition.

Grants Awarded continued

PREDICTION OF CARDIOVASCULAR RISKS IN CANCER PATIENTS ($159,944 - 2 YEARS) 1120015

Prof Mark Elwood, Dr Essa Tawfiq, Dr Corina Grey, Dr Matire Harwood, Prof Rod Jackson, Dr Arier Chi Lun Lee, Prof Mark McKeage, Dr Vanessa Selak, Dr Sandar Tin Tin, Dr L. Susan Wells

Section of Epidemiology & Biostatistics, The University of Auckland

Dr Essa Tawfiq

In New Zealand we can assess people's future risk of cardiovascular disease (CVD), heart attacks and related diseases, to help decisions particularly about lipid-lowering and blood pressure lowering treatments. About 500,000 patients are in this GP based system, called PREDICT. Cancer is a long-term disease. In NZ, 64% of cancer patients are alive more than five years after diagnosis, with about 15,000 in PREDICT. There are about 95,000 cancer survivors in NZ. Apart from cancer, the greatest risk to these patients is CVD. We will test whether PREDICT gives accurate results for those with cancer, and test if it can be improved for cancer patients. We will assess whether the risks of CVD are increased in cancer patients. We will give particular attention to Māori and Pacific populations, who have higher rates of CVD and higher rates of death from cancer. We will also use another less detailed system, VARIANZ, with over 70,000 cancer patients. This study uses non identified data from several sources, with strict confidentiality and data protection systems. No individual patients need to be approached. This research will give valuable new information on CVD and cancer, and improve the treatment of individual patients, and health policies and systems.

FUNDING CONTRIBUTION BY: Rose Richardson Estate

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

A/Prof Christopher Hall, A/Prof Guy Warman

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

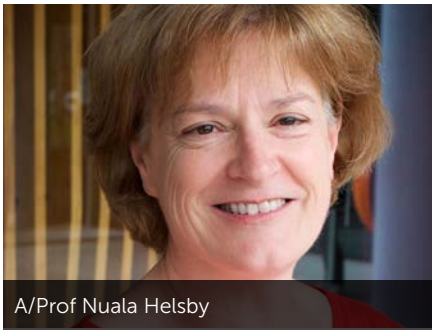
A/Prof Chris Hall and A/Prof Guy Warman

The immune system has evolved to anticipate and prepare for daily fluctuations in bacterial exposure by coordinating a heightened antibacterial response. This cunning adaptation is believed to be regulated by a molecular timer (or clock) that operates in immune cells and tissues to elevate antibacterial responses when we are active, and exposure to pathogens is greatest. Given genetic or environmental disruption of this molecular timer (e.g. from shift work or jet lag) enhances the risk of infection, pharmacologic targeting of the molecular clock, and specific timing of antimicrobial therapies, are emerging as exciting new approaches to treat infections. To realise this therapeutic potential, we need to understand how these molecular timers operate within different components of the immune system to fight infections. We have evidence that a molecular clock regulates the activity of a powerful weapon of the immune system that detects and eliminates bacterial infections, called the complement system. This project will uncover exactly how the molecular clock regulates oscillations in complement antibacterial activity and whether targeting the molecular clock can elevate this antibacterial response. We expect this knowledge will unlock new approaches to fight infections around the clock.

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

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

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



A/Prof Nuala Helsby

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, which is given intravenously. Capecitabine is converted in the body by a multi-step process prior to formation of 5-Fluorouracil. Recent studies suggest that individuals prescribed PPI drugs with capecitabine have poorer disease survival than patients treated with 5-Fluorouracil and PPI drugs. The reason for this difference is not known. One suggestion is that changes in the pH of the stomach from use of PPI affects the dissolution of the tablet and decreases how much capecitabine enters the body. However, the only published information on the effect of PPI on capecitabine blood concentrations was a flawed study. Hence it is not known if there is this type of interaction between PPI and capecitabine. We will undertake a series of studies to assess whether PPI adversely affect the absorption of capecitabine tablets in patients and to also investigate other mechanisms of how PPI may interfere with capecitabine action in cells grown in the laboratory. By understanding how PPI drugs interact with capecitabine we can help NZ oncologists decide whether it is appropriate to prescribe these drugs together.

CO-FUNDED BY: Cancer Research Trust New Zealand

END OF LIFE CARE DURING COVID-19 RESTRICTIONS ($120,079 - 18 months) 1120010

Dr Tess Moeke-Maxwell, Prof Merryn Gott, Dr Jackie Robinson, Dr Lisa Williams, Dr Rosemary Frey, A/Prof Janine Wiles, Dr Melissa Carey, Dr Natalie Anderson, Dr Jenny Parr

School of Nursing,
The University of Auckland

Dr Tess Moeke-Maxwell (Ngai Tai ki Tamaki Makaurau & Ngati Porou)

The impact of Covid-19 restrictions has been profound for people who have experienced the death of a whānau or family member since we first moved to Level 4 in March 2020. During Lockdown many people died alone due to visitor restrictions, with family/whānau grief exacerbated by an inability to hold tangihanga and funerals and even under Level 1 measures arranging visits from overseas relatives is complex. Understanding the circumstances – and experiences – of end of life care and dying from the family/whānau perspective is critical to informing national guidelines regarding optimising palliative and end of life care during pandemics. Working in partnership with Auckland and Counties DHBs, we will conduct a mixed methods study involving over 1,000 bereaved family and whānau caregivers and approximately 60 health professionals, NGO and community development workers. Findings will inform the development of evidence-based guidelines and an inter-professional education resource to support DHBs, Hospices, Primary Healthcare Organisations, Aged Residential Care Facilities and the Ministry of Health in planning how to ensure high quality and equitable palliative and end of life care during pandemics.

CNP AND FETAL GROWTH RESTRICTION ($50,680 – 2 years) 1120017

Dr Mark Oliver, A/Prof Katie Groom, Prof Frank Bloomfield, Prof Eric Espiner, Dr Timothy Prickett

Liggins Institute, The University of Auckland

Dr Mark Oliver

Small size at birth caused by fetal growth restriction (FGR) decreases a baby's chances of survival and can have negative consequences for health throughout life. Using current methods, measuring the size of the mother's tummy or ultrasound, miss at least a third of cases in New Zealand and more worldwide. These missed cases are at increased risk of stillbirth. FGR is usually accompanied by low blood oxygen content in utero because the placenta is not working properly. Measuring fetal blood oxygen content is not possible in human babies but we can do so in sheep fetuses. A hormone called C-type natriuretic peptide (CNP), found in maternal blood, may be a marker of low fetal blood oxygen and FGR. This study will investigate whether CNP could be a useful test for FGR, detecting it more reliably and with an inexpensive, noninvasive test that does not require specialist skills. We will study the detailed relationship between fetal blood oxygen and maternal CNP in sheep to inform future research in women and their babies.

CO-FUNDED BY: Cure Kids

ORGANOIDS, KIDNEY DISEASE AND DRUG DEVELOPMENT ($150,000 – 15 months) 1120002

Dr Veronika Sander, A/Prof Alan Davidson, Dr Janak de Zoysa, Dr Thitinee Vanichapoli

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

Dr Veronika Sander

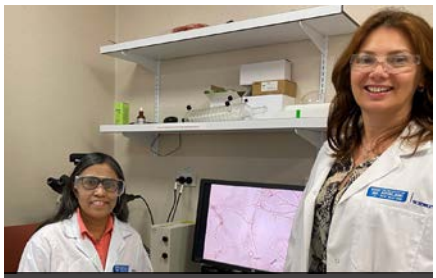
Kidney disease is a major health concern in New Zealand with 11% of the population thought to have some form of chronic kidney disease (CKD). Podocytes are specialised cells that form the kidney's blood filters, and they are the major target of injury in CKD. Currently, therapies do not target podocytes but instead act systemically and often with limiting side-effects. We have identified a NZ family with a unique inherited kidney disease that is associated with a mutation in the WT1 gene, a key regulator of podocyte function. The goal of this proposal is to use state-of-the-art human kidney organoids (mini kidneys grown in a dish) to establish a model of the patients' kidney defects. This will help us understand how the WT1 mutation leads to disease. In addition, we will use these organoids to test the therapeutic effects of a drug-like compound that we found can ameliorate the effects of the WT1 mutation, thereby helping advance the development of a new therapy for CKD in the future.

Grants Awarded continued

SELF-CLEANING ANTIMICROBIAL SURFACES ($160,000 - 2 years) 11200012

Dr Viji Sarojini, Prof Jadranka Travas-Sejdic, A/Prof Jun Lu

School of Chemical Sciences,
The University of Auckland



A/Prof Viji Sarojini and Prof Jadranka Travas-Sejdic

Catheter associated urinary tract infections (CAUTIs) are one of the most common healthcare associated infections in New Zealand. Unfortunately, all catheters eventually get colonised by bacteriuria. The colonising bacteria produce "crystalline" biofilms that are highly resistant to antibiotics and block the urine flow through the catheter. This necessitates frequent removal and re-insertion of the catheter causing significant discomfort and emotional burden on patients. Current mitigation strategies to prevent bacterial accumulation include developing antifouling and antimicrobial surfaces. Unfortunately, these modified catheters have several drawbacks such as lack of long-term efficacy due to bacterial accumulation, development of bacterial resistance and cytotoxicity. We have identified a series of novel peptide-based therapeutics with broad spectrum antibacterial and antibiofilm activity against several uropathogens. Silicon surfaces immobilised with the most potent peptide, were not colonised by biofilms. This proposal tackles one of the long-term efficacy issues associated with urinary catheters that arises from the accumulation of dead bacteria on catheter surfaces. A novel pH responsive antibiofilm self-cleaning urinary catheter coating will be developed combining the antimicrobial power of our peptide therapeutics with the pH responsiveness of natural dextran polymers.

ELECTROCHEMICAL DETECTION OF IRON ($155,032 - 2 years) 1120016

Dr Manisha Sharma, A/Prof Darren Svirskis, Prof Paul Kilmartin, Prof Anthony Phillips, Dr Claire Hemmaway

School of Pharmacy,
The University of Auckland

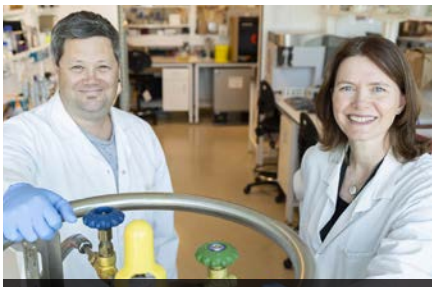
PhD student Barbara Angoro with Dr Manisha Sharma

Iron plays a significant role in various biological process such as transport of oxygen around the body. In normal physiological conditions, iron in blood, is present in a bound form to the protein transferrin and is nontoxic. However, in certain pathological conditions excess free iron is found in blood, unbound to protein transferrin. This form of iron is known as non-transferrin bound iron (NTBI). NTBI is very toxic, capable of generating highly reactive free radical species responsible for oxidative damage to various organs of the body. NTBI is a potential diagnostic indicator to assess the iron status of patients at-risk. To date there is no direct method available to measure NTBI levels and excess iron is diagnosed indirectly by determining haematological clinical tests, which often underestimate free toxic iron levels and are inaccurate. Therefore, there is an urgent need for a standardised universally accepted assay method, suitable for translation into pathology laboratories. This project aims to develop an electrochemical method for accurate and rapid detection of NTBI in human blood plasma. Electrochemical techniques are advantageous due to their low cost, high speed, simplicity and the potential to be converted into a compact biosensing kit.

GENOME-CORRECTED FIBROBLASTS FOR USE IN 3D SKIN SHEETS ($160,000 - 2 years) 1120018

Dr Hilary Sheppard, Dr Sarah Meidinger, Dr Vaughan Feisst, Dr Diana Purvis

School of Biological Sciences,
The University of Auckland



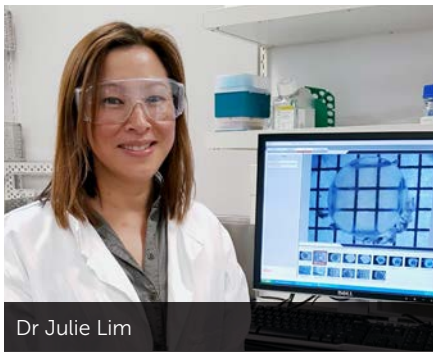
Dr Vaughan Feisst and Dr Hilary Sheppard

We aim to develop a genome-engineered, regenerative skin product for people with a fragile skin condition called epidermolysis bullosa (EB). EB is caused by a defect in one of the genes that create the 'adhesive' that glues skin cells (keratinocytes and fibroblasts) together. Although the numbers affected are not large (approximately 150 in NZ), health care costs are considerable. The impact on the individual and families is significant due to chronic wounds, pain and complications including early mortality. Currently there is no cure for this condition. Building on our expertise of editing keratinocytes, we now want to focus our attention on editing fibroblasts. Using a small sample of patient skin, we will repair the defective gene using CRISPR/Cas9 genome engineering. "Fixing" both of the skin cell types allows us to then generate full-thickness skin sheets that could be used to permanently cover/treat the chronic wounds of EB patients. This low risk, proof of principle application combines the expertise of local, national and international clinicians, molecular and cellular biologists. In this project we are using gene editing to target a skin condition, but gene editing therapy can target a range of conditions. Therefore, this research paves the way for clinical grade gene editing in NZ and will help to build a capability with numerous clinical and research uses.

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

Prof Trevor Sherwin, Dr Julie Lim

Dept. of Ophthalmology,
The University of Auckland



Dr Julie Lim

Why do women live longer than men? 95% of supercentenarians (110+ years old) are female, and unusually healthy. At the point of health decline, the resident organ stem cell function can no longer return the organ to homeostasis thereby linking sex and stem cells to the ageing process. We aim to elucidate the mechanisms that protect female stem cells from the ravages of ageing which leads to the prolonged health span. To date, two small animal studies have identified a disparity in the regenerative potential of stem cells from muscle tissue and in hematopoietic stem cells in mice. Simultaneously, in our studies using adult stem cells derived from human eyes, we have identified the first discernible difference between stem cells isolated from female and male human donors with the male derived stem cells showing alarmingly decreasing potency with age compared to the female cells. We propose that the eye is an ideal model in which to study the declining potency of male stem cells and enable us to determine the stem cell mechanisms as to why women live longer than men.

ATOVAQUONE FOR IMPROVED CANCER IMMUNOTHERAPY ($159,275 - 2 years) 1120013

Dr Dean Singleton, Dr Kimiora Henare, Dr Stephen Jamieson, Dr Tet-Woo Lee

Auckland Cancer Society
Research Centre,
The University of Auckland

Dr Dean Singleton

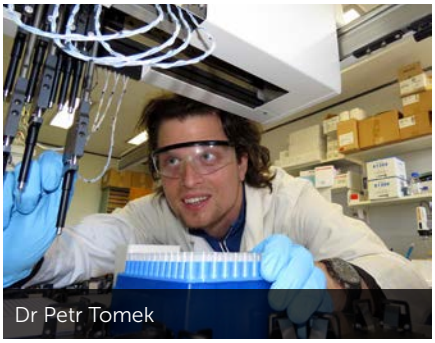
Immunotherapies that harness the power of the body's own immune system to kill cancer cells are revolutionising cancer therapy. However, most cancer patients are unlikely to benefit from current immune checkpoint inhibitors because the microenvironment within solid tumours impairs the activity of tumour killing immune cells (T cells). Interferon (IFN) signalling in tumour myeloid cells, another group of immune cells, activates the T cells and stimulates them to attack the tumour. However, the IFN response is diminished in tumour-infiltrated myeloid cells when they become oxygen-starved (hypoxic). The ensuing suppression of IFN responses impairs immune surveillance and renders immune checkpoint therapy ineffective. Atovaquone, a commonly prescribed anti-parasitic drug that decreases oxygen consumption rate, can abolish the hypoxic compartment in tumours. In this project, we will determine whether atovaquone can reoxygenate breast and head and neck tumour models. We will then use these models to investigate whether the loss of hypoxia decreases tumour recruitment of myeloid cells (specifically macrophages) and their co-optation into immunosuppressive states. This work will explore an important opportunity to advance immunotherapy use in the treatment of metastatic breast and head and neck cancer patients.

FUNDED BY: Anonymous

BANISHING TRYPTOPHAN CATABOLISM ($159,056 - 2 years) 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



Dr Petr Tomek

Cancers co-opt numerous strategies to escape elimination by the patient's immune system. Many cancers produce an enzyme called IDO1 that paralyses the cancer-killing immune cells of the patient by producing toxic chemicals. To restore the function of the cancer-killing immune cells, researchers have been developing drugs to disable IDO1. Unfortunately, one of these drugs recently produced negative results in a large clinical study. This negative outcome likely occurred because the drug could not inhibit the IDO1's evil twin called TDO2 that cancers co-opt for the same malignant purpose as IDO1. This research aims to identify a molecule capable of inactivating both IDO1 and TDO2 at the same time. In collaboration with Australian and Swiss researchers, we will use cutting-edge robotic and computational technologies to discover molecules that disable both IDO1 and TDO2 simultaneously in cancer cells. In subsequent projects, we intend to modify the most promising molecule identified so that it permanently glues itself to IDO1 and TDO2. We reason that this "sticky" molecule will disable IDO1 and TDO2 more efficiently and will enhance the ability of patient's immune cells to fight cancer.

FUNDED BY: Anonymous

Grants Awarded continued

ACCESS TO ENDOSCOPY FOR MĀORI AT CMDHB
($10,580 - 6 months) 3120006

Ms Maree Weston, Dr Andrew MacCormick, Ms Emma Espiner, A/Prof Elana Curtis

Dept. of General Surgery, Middlemore Hospital, Counties Maunkau District Health Board

Ms Maree Weston and Ms Emma Espiner

This project examines the role of health systems in perpetuating inequities. Bowel cancer is a major cause of cancer death in Aotearoa, accounting for approximately 1200 deaths each year. Māori are less likely to receive care, are more likely to receive lower quality of care, and are more likely to be diagnosed with bowel cancer at an advanced stage. Each of these factors contributes to reduced survival rates for Māori compared to non-Māori. This evidence of inequity in bowel cancer treatment highlights the need to scrutinise all pathways into health services for ā aori with an equity lens to determine if structural barriers at Counties Manukau DHB are contributing to the greater burden of harm from bowel cancer experienced by Māori. Internal audit data from the DHB suggest ethnic disparities exist within the referral system to endoscopy services - a key step in the process to diagnose bowel cancer. It appears that Māori do not successfully access endoscopy services at the same rates that non-Māori do. This project aims to examine the ethnic disparities, understand the barriers and enablers to access, and suggest a more equity-focused system for endoscopy services.

FUNDED BY: Sir Lewis Ross Fund

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

A/Prof Deborah Young, Dr Angela Wu

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

A/Prof Deborah Young

Gene therapy has begun to deliver impressive therapeutic benefits for a range of human diseases, including those affecting the brain. Current strategies use a molecular Trojan horse to deposit a therapeutic gene into sick as well as healthy neurons in the target brain region. Ideally, the therapy should be restricted to sick neurons only, to reduce the potential risk of adverse effects or toxicity. We have developed a novel gene switch for use in gene therapy that harnesses disease-specific calpain signals to restrict the production of the therapy in sick cells only at the time of need. In this project, we ask whether these same disease-specific calpain signals that kickstart mechanisms that ultimately kill neurons in Huntington's disease be used to activate our gene switch and produce a therapy to halt the inevitable destruction of these same brain cells. As part of the gene-drug development process, we will confirm our gene switch works in a mouse model of Huntington's disease before we conduct a head-to-head comparison between a conventional versus our gene switch-regulated gene therapy approach. The outcomes of this work contribute a new technology that will facilitate the broad translation of gene therapy from the bench to the clinic.

CO-FUNDED BY: Neurological Foundation of New Zealand

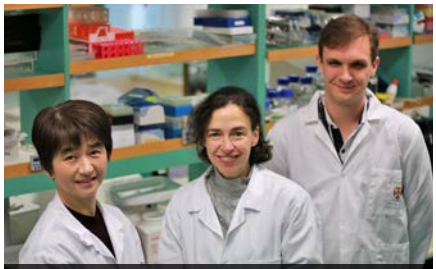
Neurological Foundation
A pathway to hope.

JEAN CATHIE PROJECTS

ENDOCANNABINOIDS AND TINNITUS PERCEPTION
($74,916 - 1 year) 7720015

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

Dept of Pharmacology & Toxicology, University of Otago



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

Chronic tinnitus is a debilitating condition affecting approximately 10% of the population and for which there are limited treatment options. It has long been known that the perception of auditory signals can be modulated by a neural network called the auditory gating system, which acts as a filter to inhibit repeated irrelevant sounds. Based on this, the perception of tinnitus has been suggested to be a result of failure in this inhibitory auditory gating system. However, it is not clear what molecular changes are driving this. This project will test the involvement of the endocannabinoid system in tinnitus perception through its possible modulatory effects on auditory gating, in an animal model. Specifically, we will induce tinnitus in rats using acoustic trauma and confirm the animal's perception of tinnitus using a well-established behavioural paradigm. We will then assess the auditory gating function using electrophysiology and measure the expression of cannabinoid CB1 receptors using radioligand autoradiography, as well as the activity of two enzymes responsible for endocannabinoid degradation, using enzyme activity assays. The results will contribute to a better understanding of tinnitus perception and lay the foundation for further studies into developing effective treatments for tinnitus, targeting the auditory gating system.

FUNDED BY: Jean Cathie Fund for Tinnitus Research

perpetual guardian

FOR TINNITUS RESEARCH

NOVEL TREATMENT FOR TINNITUS ($74,803 - 2 years) 7720016

Prof Dirk De Ridder, A/Prof Yiwen Zheng, A/Prof Grant Searchfield, A/ Prof Bruce Russell, Dr Divya Adhia, Prof Paul Glue, Prof Paul Smith

Surgical Sciences,
University of Otago

Prof Dirk De Ridder

Tinnitus, often referred to as 'ringing in the ears', is a prevalent and disabling disorder worldwide. In New Zealand, tinnitus affects approximately 6% of the total population and severely impairs quality of life in a significant proportion of individuals. Current available treatments for tinnitus have a small effect, warranting new targeted treatment approaches. Several studies demonstrate altered activity in brain regions that are involved in the hearing processes, in individuals with tinnitus. The combined treatment of MDMA (Ecstasy) and sound therapy can normalise altered brain activity through learning, thereby reducing tinnitus perception and related distress. The current study will explore the safety and the effect of combined MDMA (Ecstasy) and sound therapy on tinnitus perception and related distress, and also evaluate its effects on the brain's activity in the regions associated with tinnitus.

FUNDED BY: Jean Cathie Fund for Tinnitus Research

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COVID-19 RESEARCH PROJECTS

SARS-COV-2 VIRUS ENTRY INHIBITORS ($96,457 - 12 months) 1720007

Dist Prof Dame Margaret Brimble, Dr Alan Cameron, Prof Miguel Quinones-Mateu, Mr Dan Fellner, Dr Allan Zhang, Dr Daniel Furkert, A/Prof Paul Harris

School of Chemical Sciences,
The University of Auckland

Dr Alan Cameron and Dist Prof Dame Margaret Brimble

Given the seriousness of the COVID-19 pandemic, the rapid development of a potent anti-SARS-CoV-2 therapeutic agent is imperative. It has been determined that SARS-CoV-2 makes its entry to human host cells by binding to the angiotensin-converting enzyme 2 (ACE2) on human cell surfaces via a spike protein. We will develop agents that will prevent virus cell entry by disrupting the key binding interaction between SARS-CoV-2 and the host cell. These new modalities provide a promising opportunity for the discovery of new antiviral drugs to tackle the COVID-19 pandemic.

COVID-19 AND INTERRAI RESEARCH ($27,100 - 12 months) 1720014

Dr Gary Cheung, Dr Etuini Ma'u, Dr Claudia Rodriguez, Mr Adrian Martinez Ruiz, Prof Vanessa Burholt, Dr Brigid Ryan

Dept. of Psychological Medicine,
The University of Auckland

Dr Gary Cheung

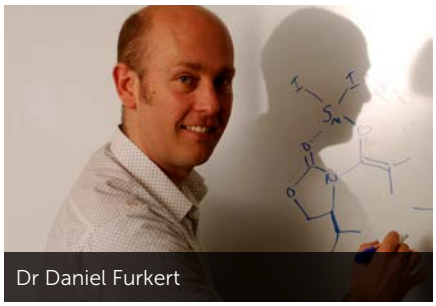
Older adults are the most at-risk group for COVID-19 infection. Self-isolation is likely to affect both formal and informal care and lead to loneliness, depression, accelerated functional and cognitive decline, and falls. Loneliness is a serious public health concern and a risk factor for premature mortality, poor physical and psychological wellbeing. interRAI Home Care is a comprehensive geriatric assessment mandated for all older New Zealanders assessed for publicly funded home support services and aged residential care. The interRAI population typically have physical illness and/or functional impairment. A NZ study found a high rate of loneliness (21%) among older adults assessed with the interRAI Home Care. It is likely that the interRAI population (~36,000 interRAI assessments per year) will experience further decline in their health and psychosocial well-being during the COVID-19 pandemic. The objectives of this study are to (i) track the impact of COVID-19 on the health and psychosocial indicators of the interRAI population quarterly in the first year of COVID-19; (ii) compare these indicators with the same indicators in the year before COVID-19; and (iii) report these indicators publicly as soon as data analysis is completed every quarter.

COVID-19 RESEARCH PROJECTS

ANTIVIRAL THERAPEUTICS AND DEVELOPMENT PLATFORM FOR COVID-19 ($74,470 - 12 months) 1720013

Dr Daniel Furkert, Prof Vernon Ward, Mr Dan Fellner, Dr Sung Yan, A/Prof Paul Harris

School of Chemical Sciences,
The University of Auckland



Dr Daniel Furkert

Antiviral drugs alongside an effective vaccine are essential for long-term clinical management of Covid-19. This project will leverage our existing antiviral drug discovery collaboration to rapidly generate and assay a set of lead compounds against SARS CoV-2 main protease. Compounds will be designed using a combination of molecular docking and state-of-the-art molecular dynamics for development of novel therapeutic agents for clinical treatment of Covid-19.

SOCIAL CONNECTEDNESS AMONG OLDER PEOPLE DURING COVID-19 ($98,257 - 12 months) 1720005

Prof Merryn Gott, Dr Tatiana Tavares, Ms Louise Rees, Dr Tess Moeke-Maxwell, A/Prof Janine Wiles, Ms Tessa Morgan, Dr Lisa Williams

School of Nursing,
The University of Auckland

Prof Merryn Gott

People over 70 have been identified as the group most vulnerable to Covid-19 with specific restrictions imposed on their activities. The media has characterised this group as passive and in need of protection. However, their diverse views and experiences of the lockdown are unknown. This information is critical to informing current – and future – public health responses to this ongoing pandemic situation. In this study we will explore the impact of the government response to Covid-19 on people aged >70 years through: 1) in-depth interviews exploring the experiences of a culturally-diverse group of the most socially isolated and lonely older New Zealanders; 2) the creation of a national archive of letters and photographs from older New Zealanders describing and illustrating their experience of the pandemic and articulating what strategies they have used, and barriers they have faced, to remaining socially connected; 3) an analysis of how the media have represented older people within the context of the pandemic; and 4) a service provider survey. Our partners in the project - Age Concern New Zealand - will use findings to inform their pandemic response and we will use creative methods to promote further impact.

FUNDED BY: A.C. Horton Estate

MENTAL HEALTH CONSEQUENCES OF THE COVID-19 LOCKDOWN ($81,878 - 12 months) 1720006

A/Prof Danny Osborne, Prof Chris Sibley, Dr Lara Greaves

School of Psychology,
The University of Auckland

A/Prof Danny Osborne

Although necessary to contain the spread of COVID-19, the mental health consequences of New Zealand's nationwide lockdown are unknown. The current proposal will address this oversight by comparing nationally representative data from the New Zealand Attitudes and Values Study collected in the months before New Zealand's first known case of COVID-19 with new data obtained in the 12 weeks during and after the initial nationwide lockdown (Study 1), as well as a year later (Study 2). Accordingly, we will examine both the short- and long-term mental health consequences of the unprecedented lockdown to contain the spread of COVID-19. Results will provide critical insights into the psychological wellbeing of New Zealanders while under lockdown, and help to identify populations at risk of developing mental health problems while the nation fights to contain the spread of COVID-19. Because New Zealand and other countries across the globe are likely to move between various degrees of lockdown until a vaccine is developed, understanding how lockdowns affect public mental health is necessary in order to effectively develop targeted interventions for those who are most psychologically vulnerable to prolonged periods of self-isolation.

COVID-19 RESEARCH PROJECTS

NURSE WELLBEING DURING COVID-19 ($31,494 - 12 months) 4720010

Dr Matthew Roskruge, Dr Margaret Brunton, Dr Catherine Cook

Massey Business School,
Massey University

Dr Matthew Roskruge

Our nurses are essential to the success of our health system and response to COVID-19. While New Zealand is not yet facing the catastrophic pressure felt overseas, nurses are working on the front lines and experiencing the risks and vulnerabilities to themselves and their whānau. This can have serious consequences such as anxiety and depression, harming nurse wellbeing and undermining our health system at a time of need. This research will directly address workforce sustainability by investigating the impact COVID-19 has on nurse wellbeing in the Auckland region and identifying resilience strategies which can be deployed by nurses, their employers and organisations which support them. To achieve this, data on wellbeing are collected through online surveying to identify patterns resulting from the pandemic. These data are then complemented with interviews exploring themes identified in the survey, focusing on sustainability strategies and opportunities to intervene to improve wellbeing. The research will have an impact not only in the science community, but also for our largest health workforce by informing the development of support strategies during this and future crises, directly contributing to a better health system and improved outcomes for both nurses and the public they work tirelessly to support.

COVID-19 WELLBEING APP ($98,281 - 12 months) 1720008

Dr Anna Serlachius, Dr Hiran Thabrew, Nic Cao, Ms Eva Morunga, Dr Alana Cavadino

Dept. of Psychological Medicine,
The University of Auckland

Dr Hiran Thabrew and Dr Anna Serlachius

Prior to the COVID-19 pandemic, young people in New Zealand experienced significant mental health issues and the worst youth suicide rate among OECD nations. Recent stresses related to rapid lockdown, physical isolation, disrupted academic routines and financial insecurity are likely to exacerbate pre-existing mental health issues and to generate new ones, especially anxiety and depression. Now, more than ever, young people need to develop skills to maintain their wellbeing and build resilience through the coming months. As young people aged 16-30 years living in New Zealand are primarily digital natives with good cell-phone access, a prototype app, called 'Whitu', or '7 ways in 7 days', has been developed for them by researchers at the University of Auckland and Auckland District Health Board. The easily disseminable app includes seven modules that can be completed within a week to learn evidence-based coping skills such as relaxation, gratitude and mindfulness. Preliminary assessment of a basic prototype is underway, including with young people of Māori and Pacific Island ethnicity, and now formal evaluation of the minimally viable app is planned via an AMRF-funded randomised controlled trial.

KELLIHER CHARITABLE TRUST AWARDS

EMERGING RESEARCHER START-UP AWARD $30,000 1720011

Dr Peter Freestone

Dept. of Physiology,
The University of Auckland

Dr Peter Freestone

This award supported Dr Freestone in his Davis & Carr Senior Research Fellowship and enabled a technical resource to assist with his research into less invasive, more effective treatments for Parkinson's disease. The additional resource meant Dr Freestone could focus on the establishment of his own research group and to further his work using a revolutionary neuroscience tool (Optogenetics) that allows the precise control of individual neurons using light.

FUNDED BY: Kelliher Charitable Trust

EMERGING RESEARCHER START-UP AWARD $30,000 1720012

Dr Hannah Holtkamp

Photon Factory,
School of Chemical Science,
The University of Auckland

Dr Hannah Holtkamp

This award provided support for Dr Holtkamp's postdoctoral fellowship focused on research into a largely unstudied skin disease, Discoid lupus erythematosus, with the aim of helping to improve the diagnosis of skin cancer in New Zealand.

FUNDED BY: Kelliher Charitable Trust

Grants Awarded continued

KELLIHER CHARITABLE TRUST AWARD FELLOWSHIP EXTENSION

$106,199 1720017

Dr Brigid Ryan

Dept. of Anatomy & Medical Imaging,
The University of Auckland

Dr Brigid Ryan

In 2020, the immense value of the research being undertaken by Dr Ryan was recognised through Kelliher Charitable Trust awarding funding to extend her postdoctoral fellowship by another year. This extension enabled the analysis of data from the first three years of this world-first, longitudinal study into frontotemporal dementia – The NZ Genetic Frontotemporal Dementia Study – comparing results between family members who carry the gene mutation, but do not yet have symptoms of dementia ('pre-symptomatic carriers') and those who do not carry the mutation ('controls').

FUNDED BY: Kelliher Charitable Trust.

Kelliher Charitable Trust

DOCTORAL SCHOLARSHIP EXTENSION

ROLE OF HYALUONAN IN HIPPOCAMPAL NEURON DEVELOPMENT ($27,000 – 8 months) 1218004

Ms Molly Abraham

Dept. of Physiology,
The University of Auckland

Ms Molly Abraham

The growth and connectivity of brain cells (neurons) is critical for normal brain development and function. Alterations to the normal development of these cells can disrupt their ability to form connections and create neural networks. Deficits in neuronal connectivity are observed in a range of neurodevelopmental disorders including autism, attention deficit hyperactivity disorder, and can induce impairments in learning and memory. However, there is limited progress in the treatment of such disorders, as the mechanisms underlying neuronal developmental and connectivity in the normal brain remain unclear. Hyaluronan is a sugar molecule expressed throughout the body and brain, which has been shown to support non-neural cell development. Evidence suggests that this sugar is expressed in the developing brain, however its specific role in brain cell development is unknown. Thus, this research will provide a novel insight into the role of hyaluronan in normal brain function, and whether disruption of hyaluronan and the extracellular matrix contributes to various neurodevelopmental disorders. Further, this study will provide information on whether targeting hyaluronan disruption is a potential therapeutic strategy to promote normal brain function.

AMRF SUPPORT OF THE COUNTIES MANUKAU DHB RESEARCH WEEK

$1,000 Award 6720004

Ms Elaine Duguid

Pysiotherapy, Tamaki Hands, Counties Manukau District Health Board

Best Overall Student/Emerging Researcher Award at the 2020 Counties Manukau DHB Research Week: Rehabilitation Following Flexor Pollicis Longus (FPL) Tendon Repair: A Pilot Srudy Comparing Earlyactive Mobilisation (EAM) with Immobilisation (IM)

SIR DOUGLAS ROBB MEMORIAL FUND

$2,000 1720004

Dr Melissa Cadelis

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

Fungal natural products as a source of novel antibiotics.

$1,875 1720003

Dr Eryn Kwon

Dept. of Anatomy & Medical Imaging,
The University of Auckland

Heart rate sensitivity evaluation of a 3D amplified-MRI method to reveal subtle brain biomechanics and pathologies

$1,072 1720002

Dr Jo James

Dept. of Obstetrics & Gynaecology,
The University of Auckland

Support for Australian and New Zealand Placental Research Association Satellite Meeting.

TRAVEL GRANTS

Due to the impact of Covid-19 on worldwide travel, many conferences have been postponed, canceled or shifted to an online format. Where possible, researchers have been encouraged to reschedule their travel†, attend an on-line meeting#, or decline* their award if no alternative exists.

Dr Kathryn Beck#

School of Sport Exercise and Nutrition, Massey University

To participate in the virtual International Conference on Diet and Activity Methods (eICDAM 2021), 8 - 12 February 2021.

Dr Mark Bekhit†

Radiology, Auckland District Health Board

To attend the International ESC Preventive Cardiology 2020 Conference, Malaga, Spain, 1 - 10 April 2020.

Dr Melissa Cadelis†

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

To attend the XI European Conference on Marine Natural Products in Galway, Ireland, 28 June - 2nd July 2021.

Dr Rhea Desai#

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

To attend the Annual Congress of the European Hematology Association, Frankfurt, Germany 11 - 14 June 2020.

Dr Waruni Dissanayake#†

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

To participate in Virtual EASD 2021, 27 September – 1 October 2021, and to attend Queenstown Research Week, 30 August - 2 September 2021.

Dr William Good†

Respiratory Department, Middlemore Clinical Trials (MMCT), Counties Manukau District Health Board

To attend the Thoracic Society of Australia and New Zealand Annual Scientific Meeting 2020, Melbourne, Australia, 26 March - 2 April 2020.

Dr Muhammad Hanif†

School of Chemical Sciences, The University of Auckland

To attend the Metals in Medicine - Gordon Research Conference, Andover, USA, 26 June - 1 July 2022.

Dr Jiney Jose*

Auckland Cancer Society Research Centre, The University of Auckland

To attend the EFMC-ISMC 2020 XXVI EFMC International Symposium on Medicinal Chemistry, Basel, Switzerland, 6 - 10 September 2020.

A/Prof Rozanne Kruger#

School of Sport, Exercise and Nutrition, Massey University

To participate in the virtual International Conference on Diet and Activity Methods (eICDAM 2021), 8 - 12 February 2021.

Dr Euphemia Leung*

Auckland Cancer Society Research Centre, The University of Auckland

To attend the Mammary Gland Biology Gordon Research Conference, Lucca, Italy, 7 - 12 June 2020.

Dr Catherine Morgan†

School of Psychology, The University of Auckland

To attend the International Society for Magnetic Resonance In Medicine (ISMRM) 2020 Conference, Sydney, Australia, 17 - 24 April 2020.

Dr Rebecca Pullon†

Dept. of Anaesthesiology, The University of Auckland

To attend the Mechanisms of Anaesthesia Conference (MAC2020), Xi'an, China, September 2020 (postponed from 21 - 28 March 2020).

Dr Ravi Reddy†

Health Sciences, Massey University

To attend The 13th ICBEN Congress on Noise as a Public Health Problem, Stockholm, Sweden, 13 - 19 June 2020.

Dr Ana Luiza Sayegh#†

Dept. of Physiology, The University of Auckland

To participate in the virtual 2021 Experimental Biology conference, 27 - 30 April 2021, and to attend Queenstown Research Week, 30 August - 2 September 2021.

Dr Anna Serlachius†

Dept. of Psychological Medicine, The University of Auckland

To attend the European Health Psychology Society annual meeting, Bratislava, Slovakia, 24 - 31 August 2020.

A/Prof Darren Svirskis*

School of Pharmacy, The University of Auckland

To attend the 11th World Biomaterial Congress in Glasgow, Scotland and visit to University of Freiburg, Germany, 17 - 28 May 2020.

GAVIN AND ANN KELLAWAY MEDICAL RESEARCH FELLOWSHIP†

$32,416 2720001

Dr Michael Collins

Dept. of Renal Medicine, Auckland District Health Board

Dr Michael Collins

To participate in the Global Clinical Scholars Research Training Program of advanced training in health care research and methods, Harvard Medical School, USA, June 2020 – May 2021.

WALKING INDEPENDENTLY AFTER STROKE

Dr Marie-Claire Smith

AMRF Postdoctoral Fellowship

Dr Marie-Claire Smith works in the Dept. of Medicine at The University of Auckland and talks about the difference the AMRF Postdoctoral Fellowship will make for herself and stroke patients.

"The generous support of this Auckland Medical Research Foundation Postdoctoral Fellowship will provide essential funding to support me to progress from an early career researcher to an independent clinical academic. This involves continuing to grow into leading our internationally recognised work on walking prediction after stroke and ultimately leading my own independent area of research. The fellowship will also enable me to continue to mentor and support allied health clinicians to grow their research capabilities, support and facilitate implementation of research findings in clinical practice locally and nationally, and provide leadership in stroke rehabilitation at a national level."

"Being awarded an AMRF fellowship is a huge privilege and I am grateful for the opportunity to continue with my work in stroke research."

Read more on page 6.

GRANTS COMPLETED

GESTATIONAL DIABETES, BIG BABIES, AND LIFELONG HEALTH

Dr Christopher McKinlay

Liggins Institute,
The University of Auckland

Chris McKinlay and his BabyGEMS team studied the effect of gestational (pregnancy) diabetes on infant body composition using the PEA POD machine.

The PEA POD is a fast, non-invasive way to painlessly determine fat mass and fat-free mass in infants. The rate at which a baby grows in their first 6 months, especially of fat, influences growth patterns throughout life and risk of later obesity.

PEA POD measurements were one way that the team evaluated the health and development of BabyGEMS infants to 12 months of age. While some international organisations have argued for lower blood glucose thresholds for diagnosis of gestational diabetes in pregnant mothers, which would at least double the number of women requiring treatment, it's not clear that treating more mums with mildly elevated blood glucose levels has any benefit for their infants.

The information these researchers have generated will help determine if New Zealand should adopt the lower blood glucose thresholds for diagnosis of gestational diabetes and whether this will benefit babies or not.

Read more on Page 25.

Grants Completed

PROJECTS

LIN28B AND WILM'S TUMOUR ($159,999 - 1.5 years) 1117018

A/Prof Alan Davidson, Dr Zhenshen Peng

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

Prof Alan Davidson (back row, left), with his team

Our project aimed to establish a novel model of the most common paediatric kidney cancer Wilms' tumour using human-induced pluripotent stem cell-derived kidney organoids (mini kidneys in the dish). We employed the powerful genetic engineering tool CRISPR/Cas9 to create organoids that overexpress the LIN28B gene, which is an oncogenic driver found in ~25% of Wilms' tumour patients. Our results from comparing these edited organoids to control organoids indicated that LIN28B overexpression initially promotes accumulation of kidney progenitor cells at the expense of mature kidney tissues, reminiscent of the situation in Wilms' tumour. At later stages of organoid development, such recapitulation of the disease was less obvious, presumably because the extra copy of the LIN28B gene was insufficient to maintain the Wilms' tumour-like state. Building on our promising results, future work will address if additional gene edits, such as deletion of the Wilms' Tumour 1 gene (another player involved in this disease), in combination with LIN28B overexpression may be required to drive Wilms' tumourigenesis in the kidney organoid model.

FUNDING CONTRIBUTION BY: Sir Lewis Ross Estate

STRIDER NZAUS CHILDHOOD OUTCOME STUDY ($75,061 - 2 years) 1117001

Dr Katie Groom, Prof Lesley McCowan, Prof Frank Bloomfield, Dr Christopher McKinlay

Dept. of Obstetrics & Gynaecology,
The University of Auckland

Dr Katie Groom

Being born too small poses significant risks of handicap and disease throughout life. There are no treatments available to improve growth before birth; the only option is early delivery which adds further disadvantage to long-term health. Sildenafil was assessed as a potential therapy for fetal growth restriction in the STRIDER NZAus trial. Sildenafil was given to mothers with pregnancies affected by severe fetal growth restriction across New Zealand and Australia and compared to a similar group of mothers who receive a placebo. The results showed that sildenafil citrate did not change babies' growth rates during pregnancy. The STRIDER NZAus Childhood Outcome Study has followed the surviving babies born to mothers in this clinical trial to assess their development at 2-3 years of age. The study aims to determine whether the use of sildenafil in pregnancy improves the neurological and emotional-behavioural development of these children as well as effects on their cardio-metabolic, respiratory and general health. This study will provide highly valuable information on longer term benefit and/or harm as a consequence of antenatal sildenafil therapy for the treatment of fetal growth restriction. The final children were seen in early 2020 and results are now expected in 2021 due to Covid-related delays.

CO-FUNDED BY: Neurological Foundation of New Zealand

Neurological Foundation
A pathway to hope.

NOVEL BIOMARKER FOR COGNITIVE IMPAIRMENTS IN PD ($159,294 - 2 years) 1117008

A/Prof Jian Guan, Prof Tim Anderson, Prof John Dalrymple-Alford, Dr Toni Pitcher

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

A/Prof Jian Guan

Insulin-like growth factor-1(IGF-1) is a hormone and plays a critical role in cognition. A large proportion of Parkinson disease patients develop mild cognitive impairment in part due to poor IGF-1 function. The aim of this study was to invesigate whether a fragment of IGF-1, plasma cyclic Glycine-Proline (cGP), could be used as a biomarker to reflect cognitive status. We have completed biological and statistical analysis and the results lead to a publication in Alzheimer's and dementia: diagnosis and disease monitoring and the project also contributed to the completion of a PhD thesis. The results are very exciting and confirm our hypothesis that the changes of cGP and cGP/IGF-1 molar ratio in plasma are associated cognitive status of Parkinson disease patients. If further confirmed through a longitudinal study plasma cGP and cGP/IGF-1 ratio can be developed as a prognostic biomarker for cognitive risk and progression in Parkinson disease patients, as well as identify the window of and individuals suitable for cGP intervention.

FUNDED BY: Anonymous Donor

DNA-PK INHIBITORS ($159,981- 2 years) 1117020

A/Prof Michael Hay, Prof William Wilson, Ms Rosanna Jackson, Dr Yongchuan Gu

Auckland Cancer Society Research Centre, The University of Auckland

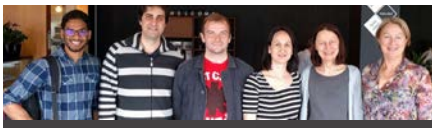
A/Prof Michael Hay

Radiotherapy plays a central role in the management of cancer. DNA-dependent protein kinase (DNA-PK) exerts a key role in repair of radiation-induced DNA damage. Existing DNA-PK inhibitors sensitise tumour cells to radiotherapy, but also cause off-target toxicity. We have recently discovered new, potent and selective inhibitors of DNA-PK and have developed prodrugs of these for tumour-selective delivery. Critical to the preclinical development of these prodrugs are new methods to measure their selectivity in cells and in tumours. We explored a series of antibody- and phosphoproteomic-based methods to determine the selectivity of the inhibitors in cells. We used an antibody-based method to show selective inhibition of DNA-PK autophosphorylation in cells, and selective activation of prodrugs under anoxia. However, this approach was not useful in solid tumours. We have developed an assay to measure normal tissue sensitisation by DNA-PK inhibitors in the radiation field. These assays have been used to develop a new class of DNA-PK inhibitor and to demonstrate the ability of hypoxia activated prodrugs to selectively release the DNA-PK inhibitor in solid tumours and so improve the potential of these inhibitors to potentiate radiotherapy.

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

Dr Maggie Kalev-Zylinska, Prof Stefan Bohlander, Dr Lochie Teague, Dr George Chan, Dr Cherie Blenkiron

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



Left to right: Ahmed Adam, Leandro Ladvanszky, James Hearn, Taryn Green, Dr Maggie Kalev, and Jane Wylie.

Normal megakaryocytes give rise to peripheral blood platelets, but abnormal megakaryocytes drive chronic and acute blood cancers, including leukaemia. This project examined the role of calcium signalling in both normal and cancerous megakaryocytes. We used modern methods of genetic modification in a cell line, a novel transgenic mouse model produced in our laboratory, and studied patient-derived cells. We found that in normal megakaryocytes, calcium signalling regulates platelet production and helps shape the bone marrow microenvironment. In contrast, in leukaemic megakaryocytes, calcium pathways were diverted to increase proliferation. Encouragingly, inhibition of calcium signalling reduced proliferation of leukaemic cells and assisted differentiation. Our findings suggest that modulation of calcium signalling offers the potential to correct abnormal platelet production and may help treat megakaryocytic cancers. We now test patient-derived cells to identify the best points for therapeutic intervention.

FUNDED BY: Pritchard-Coutts Charitable Trust

with you for generations to come Public Trust

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

Dr Christopher McKinlay, Prof Caroline Crowther, Emeritus Prof Elaine Rush, Dr Mike Meyer, Dist. Prof Jane Harding

Liggins Institute, The University of Auckland

GEMS Study Team

Gestational Diabetes (GDM), defined as glucose intolerance (high blood glucose) first appearing in pregnancy, is an increasing health problem worldwide. Not only does it affect maternal health, but it also carries risks for the baby including being born too large, birth complications and greater likelihood of diabetes and obesity in adulthood. The rate at which a baby grows in the first 6 months influences growth patterns throughout life and this period may be particularly important for babies exposed to GDM as gaining too much fat in the months after birth is another risk factor for later obesity. Recent expert international guidelines have recommended that the threshold for diagnosing GDM should be lower than is currently used in New Zealand, but this could see rates of GDM increase substantially, up to ~18%. While treating women with mild glucose intolerance may reduce the number of large babies, it is unclear if this will translate into better health outcomes overall. In this study we investigated whether treating women with mild GDM, as diagnosed under the new criteria, will optimise infant growth and feeding patterns and prevent excessive early fat accumulation. This will assist in deciding whether New Zealand should adopt the new criteria and may help to explain why babies exposed to GDM are at increased risk of diabetes themselves.

FUNDED BY: Marion Ross Memorial Fund

Grants Completed continued

CHARACTERISING THE ROLE OF CARDIAC NEURONS IN HEART RHYTHM ($154,539 – 1.5 years) 1118003

A/Prof Johanna Montgomery, Prof Julian Paton, Prof Bruce Smaill, Dr Martin Stiles, Dr Kirsten Finucane, Dr Jesse Ashton

Dept. of Physiology,
The University of Auckland

Members of the Synaptic Function Research Group, with A/Prof Johanna Montgomery standing centre

Brain cells not only exist in the brain, but also on the surface of the heart. These cells are thought to be important in inducing the most common abnormal heart rhythm, atrial fibrillation (AF), which increases the risk of stroke, heart failure, and dementia. However, how this occurs is not known. As treatments for AF can be ineffective, it is imperative that we determine what these brains cells are doing and how we can target them to develop new treatment strategies. We have successfully developed whole cell recording techniques from human heart neurons, revealing significantly increased functional and morphological complexity compared with animal models. This characterisation will enable the detection of changes in human heart neuron excitability and synaptic activity that could drive AF. We have also developed calcium imaging techniques which enable us to see the activity in these neurons during AF. Our data show that there are differences in the way these neurons respond, which suggests a subset may drive aberrant activity that induces AF and therefore could be targets for treatment.

IMMUNE PRIMING IN RHEUMATIC FEVER ($160,000 - 2 years) 1117002

Dr Nicole Moreland

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

Dr Natalie Lorenz and Dr Nikki Moreland

The overarching aim of our research is to determine whether the number of Streptococcus A (StrepA) infections a child experiences increases their risk of developing rheumatic fever. Rheumatic fever is a serious autoimmune disease associated with long term heart valve damage. To quantify the number of StrepA infections we have measured the specificity of antibodies in sera collected from children with rheumatic fever and compared this with sera from closely matched healthy children that are the same age and ethnicity and live in the same area. We designed an array of type-specific StrepA peptides that provides >90% overage of all strains in New Zealand so that infections with different strain types can be distinguished from each other in the serum samples. Using this novel serological approach we have shown that children with rheumatic fever do indeed experience significantly more StrepA infections than matched healthy controls. The average number of prior StrepA infections in the acute rheumatic fever cases was 11, compared with 4 in the healthy controls. This has important implications for future disease prevention programs and the need to reduce cumulative StrepA infections in high-risk children.

FUNDING CONTRIBUTION BY:
Room-Simmons Charitable Trust

perpetual guardian

INTERACTIONS BETWEEN FAT AND TENDONS ($159,924 – 2 years) 1117019

Dr David Musson, Prof Jillian Cornish, Mr Brendan Coleman, Dr Dorit Naot

Dept. of Medicine,
The University of Auckland

Dr David Musson giving an invited talk at the European Orthopeadic Research Society annual meeting 2018

The overall aim of this project was to understand the mechanisms that link increased fat mass to the risk of tendon disease. With clinical observations suggesting that increased fat mass is associated with an increased risk of tendon disease in weight-bearing and non-weightbearing tendons alike, understanding how this happens is an important first step in tailoring ways to treat fat-induced tendon disease. Here, we have determined that factors released directly from fat cause the cells of tendon to grow too fast, and increase their expression of factors that degrade tendon matrix. This was coupled with the finding that animals fed a high fat diet had weaker tendons that healed poorly. Interestingly, altering diet back to a normal diet was able to recover tendon strength, but seemingly not in injured tendons. Work is currently underway to determine the best way to use this information to improve patient wellbeing.

FUNDING CONTRIBUTION BY:
Rose Richardson Estate

perpetual guardian

CAMK2 IMBALANCE IN OSTEOARTHRITIS ($156,023- 2 years) 1117012

Dr Raewyn Poulsen, Prof Nicola Dalbeth

Dept. of Medicine,
The University of Auckland

Dr Raewyn Poulsen

In osteoarthritis, cartilage cells ("chondrocytes") become hyperactive and begin to produce high amounts of cartilage degrading enzymes. This activity contributes to the cartilage loss which is the major culprit of the reduced joint mobility and increased pain associated with disease. Activity of the enzyme calcium/calmodulin kinase 2 (CaMK2) has previously been reported to be increased in osteoarthritis and this increase in activity is thought to contribute to disease development. The aims of this project were to determine why CaMK2 activity was altered in osteoarthritis and how this caused disease-associated changes in chondrocyte behaviour. Surprisingly, we found that the increase in CaMK2 activity in osteoarthritic chondrocytes was only apparent at a specific time of day. At all other times of day activity of CaMK2 was actually lower in diseased chondrocytes compared to healthy cells. We found this reduction in CaMK2 activity led to reduced levels of Hes1 which is normally responsible for repressing production of cartilage-degrading enzymes in chondrocytes. Our data shows therefore that reduced, rather than increased CaMK2 activity contributes to osteoarthritis development. These findings have uncovered new avenues to explore in the search for a treatment for osteoarthritis.

FUNDING CONTRIBUTION BY:
Rose Richardson Estate

perpetual guardian

HYALURONAN IN NEONATAL SEIZURES ($113,745- 2 years) 1117007

Dr Sumudu Ranasinghe, Dr Rashi Karunasinghe, A/Prof Justin Dean

Dept. of Physiology,
The University of Auckland

Dr Sumudu Rangasinghe

In New Zealand, approximately 1.3 in 1000 babies that are born at term experience hypoxic-ischemic encephalopathy and many of these babies develop seizures too. Indeed, the biological factors that contribute to seizure activity in neuronal cells following hypoxic-ischemic encephalopathy currently remain unclear. Our laboratory had previous evidence that extracellular molecules that surround neuronal cells may be important for controlling neuronal activity in the brain. The overall aim of the proposed study was to determine the role of these extracellular molecules in regulating neuronal activity following hypoxic-ischemic brain injury. The proposed study was conducted using two experimental models of neonatal brain development; in vitro neuronal cultures exposed to hypoxia and in vivo neonatal rats exposed to hypoxia-ischemia. We demonstrate that early injury causes breakdown of the extracellular matrix including hyaluronan and perineuronal nets.

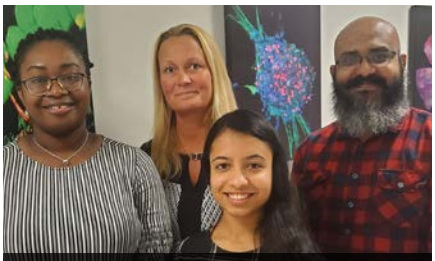
CO-FUNDED BY: Neurological Foundation of New Zealand

Neurological Foundation
A pathway to hope.

NOVEL TREATMENTS FOR DIABETIC VASCULAR COMPLICATIONS ($159,582- 2 years) 1117015

Dr Ilva Rupenthal, Prof Colin Green, Dr Odunayo Mugisho, Dr Monica Acosta

Department of Ophthalmology,
The University of Auckland



Left to right: Dr Lola Mugisho; A/Prof Ilva Rupenthal; Jyoti Aryal and Avik Shome.

Diabetic retinopathy, an ocular complication of diabetes that can lead to blindness, is a significant health and financial burden in New Zealand. Whilst current treatments are effective, they only target late stage disease signs to slow down the progression without addressing the underlying disease mechanism. We have identified a cell channel involved in upstream inflammation that when targeted not only restores retinal blood vessels to treat disease signs, but also promotes recovery of the affected tissues preventing further vision loss. During this project, we developed a relevant animal model of the disease to test two drugs targeting this channel, one injected into the eye and one taken orally. We found that both prevented blood vessel damage and thus the development of diabetic retinopathy signs. To move this research closer to clinical translation, we will now test these drugs in a human donor eye model as well as correlate our findings to blood inflammation markers in diabetic patients..

FUNDING CONTRIBUTION BY: Marion Ross Memorial Fund

Grants Completed continued

MRI STUDY OF PLACENTAL OXYGENATION IN PREGNANCY
($24,600 – 1 year) 1118010

Prof Peter Stone, Dr Alys Clark, Dr Seyed Ali Mirjalili

Dept. of Obstetrics & Gynaecology,
The University of Auckland

Clockwise from top left: Dr Ali Mirjalili, Dr Alys Clark, Ms Sophie Couper, Prof Peter Stone

This study used novel MRI scan and analytical techniques to investigate the effect of maternal supine position in healthy late gestation pregnancy on oxygen transfer to the unborn baby. We studied mechanisms which may explain the increased risk of stillbirth in women who go to sleep supine compared with those who sleep on their side. Our study showed not only that there is a significant reduction in uteroplacental blood flow when the woman is supine compared with lying on her left side, but that this is directly related to reduced oxygen delivery to the placenta and transfer to the baby. This is the first study to show this. Future studies are now investigating the effect of maternal position in pregnancies where the baby is growth restricted and maybe at more risk of adverse outcomes related to reduced oxygen delivery.

FUNDED BY: MRI ERD Trust

AUTOMATICALLY IDENTIFYING HYPOXIC ISCHEMIC, HIGH-RISK PRETERMS WITH MACHINE LEARNING & ARTIFICIAL NEURAL NETWORKS.
($159,951 – 2 years) 1117017

A/Prof Charles Unsworth, Prof Laura Bennett, Prof Alistair Gunn

Dept. of Engineering Science,
The University of Auckland

A/Prof Charles Unsworth

This research will develop an automated risk assessment system for hypoxic ischemic (HI) preterm infants, enabling them to be prioritised effectively for new clinical trials of potential neuroprotective therapies. Currently, preterm infants get missed by current clinical criteria since their neurological signs are more subtle than at term infants. In addition, the preterm EEG record is of limited range where the evolution of HI is not always known, making it very difficult to identify where temporally the infant is in the latent phase at birth, critical to the identification of how at risk they are. This is unlike in utero sheep models of HI where the full evolution of HI is available. Using our team's expertise in HI, 'Machine Learning' and 'Artificial Neural Network Approaches' we attempt to derive a nonlinear map between the full evolution of HI of in utero sheep models and the limited unknown evolution of HI in preterms. Such a map will be translational, enabling us to 'bridge the gap' between experiment and cotside to predict where, temporally, a preterm infant is in its latent phase at birth, currently not possible. Thus, enabling the effective prioritisation of preterm infants for new randomised controlled clinical trials.

FUNDING CONTRIBUTION BY:
Curtis-Tonkin Paediatric Fund

miRNAS AS EARLY PREDICTORS OF PRETERM BIRTH
($114,379 - 2 years) 1116010

Prof Mark Vickers, Prof Lesley McCowan, Dr Katie Groom, Dr Clint Gray

Liggins Institute,
The University of Auckland

Prof Mark Vickers

At a global level, more than one in 10 babies are born too early (<37 weeks of pregnancy) equating to over 15 million preterm births and more than one million newborn deaths. Preterm birth also increases the risk of death due to other causes including neonatal infections. In New Zealand, nearly 8% of babies are born preterm with rates higher in Maori women at around 14%. Although women with a previous spontaneous preterm birth (SPTB) are considered to be at high risk for recurrence, the majority occur in women without a prior history. Accurate prediction of SPTB risk, before the clinical event, would allow for improved care and the potential for targeting novel and existing therapies to prevent SPTB, which may result in improved outcomes for both infant and mother. This project allowed us to capitalise on our pilot data showing that miRNA signatures in maternal blood as early as 20 weeks gestation can differentiate between those that go on to deliver at term or experience early SPTB (28-32 weeks). Our findings will work towards the development and validation of effective non-invasive biomarkers to identify women at risk for SPTB.

FUNDING CONTRIBUTION BY:
Rotary Club of Auckland Harbourside, Inc.

RUTH SPENCER MEDICAL RESEARCH FELLOWSHIPS

MANAGEMENT OF NEONATAL HYPERGLYCAEMIA ($257,333, 3 years) 1413002

Dr Kathryn Williamson

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

Dr Kathryn Williamson

Babies who are born very preterm have a high risk of suffering brain damage. High blood sugar levels (hyperglycaemia) are common in these very small babies and are associated with poor outcome. Hyperglycaemia is usually treated with insulin, but in very small babies the correct dose of insulin can be difficult to determine and babies' insulin requirements can fluctuate over a short period of time. This means that sometimes the babies' blood sugar level can fall too low (hypoglycaemia). Unfortunately, hypoglycaemia can put babies at further risk of brain damage. A computer program has been developed to help keep blood sugar levels within a safe range for preterm babies treated with insulin. We have completed a randomised clinical trial in very preterm babies in 4 neonatal intensive care units in New Zealand and Australia. We are currently analysing the data to determine if this computer program can reduce the incidence of hypoglycaemia, and also whether it improves growth and later development.

FUNDED BY: Ruth Spencer Trust

perpetual guardian

OPTIMISING THE CARE OF WOMEN AT HIGH RISK OF SPONTANEOUS PRETERM BIRTH ($66,061 – 1 year) 1418001

Dr Lisa Dawes

Dept. of Obstetrics & Gynaecology, The University of Auckland

Left to right: Dr Lisa Dawes, Gillian Vernon, Mariska Oakes-Ter Bals, Laura Mackay, A/Prof Katie Groom, Clara Mossinger.

Preterm birth is an important global health problem with 1 in 10 babies born prematurely each year. The focus of current management is prevention of preterm labour and identification of women at highest risk of preterm birth, so that interventions can be given to improve outcomes for babies born early. My research includes six studies aimed to optimise care of women at high risk of preterm birth. Two studies assessed the use of vaginal biomarker tests in the prediction of preterm birth for women with symptoms of preterm labour. Three studies explored the role of specialised preterm birth clinics, including review of five years of practice in the first preterm birth clinic in New Zealand, and the psychological impact of this care. Lastly, one study assessed care when birth is expected at the threshold of viability. The Ruth Spencer Fellowship allowed me to undertake full-time research towards my Doctor of Medicine, and my thesis was submitted in February 2020. The results of my research will be used in the development of a New Zealand-wide preterm birth prevention programme, which will include standardisation of care for women at risk of preterm birth and introduction of preterm birth clinics across New Zealand.

FUNDED BY: Ruth Spencer Trust

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DOUGLAS GOODFELLOW MEDICAL RESEARCH FELLOWSHIP

ECONOMIC ANALYSIS OF NEONATAL HYPOGLYCAEMIA ($244,000 – 2 years, 6 months) 1417003

Dr Matthew Glasgow

Liggins Institute, The University of Auckland

Dr Matthew Glasgow

My PhD is made up of a series of economic analyses of the management of low blood sugar in the newborn infant (neonatal hypoglycaemia), which is a common condition that can lead to long-term problems such as brain injury, epilepsy, cerebral palsy, vision impairment, or problems with learning. Our early models examined the screening of babies who are at increased risk of low blood sugar, and showed that the use of more accurate, but more expensive to purchase, glucometers were less costly overall due to the reduced need to confirm low blood sugar results with laboratory testing. We then went on to analyse the cost and benefits of oral dextrose gel as a treatment for low blood sugar and showed that this approach can improve outcomes at less cost than the current approach to care. The latter analyses of my PhD focused on the use of dextrose gel to prevent hypoglycaemia in babies who are at increased risk, and considered the outcomes over the lifetime of the individual. We showed that using dextrose gel as a preventative measure reduced costs to the health system, and across the population, improved the quality of life of those who received it.

Grants Completed continued

BARBARA BASHAM DOCTORAL SCHOLARSHIP

EXPLOITING BRAIN MECHANISMS TO PROTECT THE PRETERM BRAIN FROM INJURY ($128,000 - 3 years) 1216004

Dr Hyeon Tae (Kenta) Cho

Dept. of Physiology,
The University of Auckland

Dr Hyeon Tae (Kenta) Cho

Many preterm infants develop brain injury around the time of birth, with a high risk of life-long disability. Currently, we have no effective way of preventing disability. In my PhD, I investigated for the first time whether it is possible to treat brain injury after low oxygen levels in the very immature brain by stimulating one of the body's natural anti-inflammatory pathways using an infusion of a new agent. I found that infusing this agent up to 4 hours after low oxygen levels strikingly normalised brain waves during infusion and reduced loss of brain cells after 3 days recovery. However, after the end of infusion rebound seizures developed, and blood pressure was increased. By contrast, during a study of 7 days recovery, I found ongoing, extremely delayed abnormal brain wave activity and, ultimately, loss of initial protection. These studies show that early but brief activation of this natural anti-inflammatory pathway is only transiently protective and has prolonged effects on heart and brain function. These new findings suggest that a much longer period of treatment, different doses, or stimulation of some of more specific, downstream pathways may have potential to offer long-term protection and reduce the risk of disability in preterm babies.

FUNDED BY: Barbara Basham Medical Charitable Trust

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GAVIN AND ANN KELLAWAY MEDICAL RESEARCH FELLOWSHIP

TO PARTICIPATE IN THE ACCELERATED MASTER'S PROGRAM IN BIOMEDICAL INFORMATICS, HARVARD UNIVERSITY, USA, AUGUST 2019 - JULY 2020 ($60,000) 2518003

Dr Chang-Ho Yoon

Auckland District Health Board

Dr Chang-Ho Yoon

Through the Master's in Biomedical Informatics at Harvard University, I learned a diverse array of skills (computational, statistical, machine learning) in preparation for a PhD at the University of Oxford. This PhD will be on the impact of antimicrobial resistance in the UK at both population and patient-specific levels. This PhD will involve the manipulation of large datasets ("big data"), and will necessitate the application of advanced computational, statistical and machine learning techniques

FUNDED BY: Gavind & Ann Kellaway Fund

SIR DOUGLS ROBB MEMORIAL AWARD

VERBAL HISTORIES: EARLY MEDICAL WOMEN IN NEW ZEALAND ($1,338) 1718002

Professor Cynthia Farquhar

Dept. of Obstetrics & Gynaecology,
The University of Auckland

University of Otago third year medical students, 1959, featuring 10 women medical students

The Sir Douglas Robb Memorial Fund has allowed us to make significant progress on the Early Medical Women Project since 2018. These funds have given us the opportunity to travel outside of Auckland to complete oral histories that we would otherwise not have been able to include in our project. With most interviews now complete, we look forward to the publication phase of our project, where we make these biographies freely available online.

Read the stories online at www.earlymedwomen.auckland.ac.nz

FUNDED BY: Sir Douglas Robb Fund

SIR HARCOURT CAUGHEY AWARD

P2X RECEPTORS AND HEMICHANNELS AS TARGETS TO PREVENT DIABETIC CATARACT ($16,121) 1718005

Dr Haruna Suzuki-Kerr

Dept. of Physiology,
The University of Auckland

Dr Haruna Suzuki-Kerr

The Sir Harcourt Caughey award has provided me with an irreplaceable opportunity to join the Molecular Vision laboratory to start developing this novel approach for transient gene manipulation in the lens. During this project, we have established workflow for conducting lens transfection experiment using electroporation. There is very little report of successful transient transfection to the lens tissue, and no report on use of electroporation of mammalian lens cells to date as the only examples of similar experimental approach are studies using chick embryo of extremely early-developmental stage. Overall, feasibility testing of electroporation in vitro and in vivo in this project showed some promise. The challenge in vivo was maintaining healthy lens culture post-electroporation. In both in vivo and in vitro, achieving some success was feasible but improving the transfection efficiency is challenging. Since electroporation was mostly successfull in cells located at the lens periphery, confirming their identify as lens cells and examining their properties is also necessary.

FUNDED BY: Sir Harcourt Caughey Fund

SUMMIT POSTDOCTORAL RESEARCH PRESENTATION AWARD

$3,000 Travel Award 6719001

Dr Caroline Walker

Centre for Longitudinal Research,
The University of Auckland

This award enabled me to attend the American Society of Human Genetics meeting in Houston, Texas, USA in October 2019. This is the largest genetics conference in the world that routinely attracts over 6,000 scientific attendees each year. This conference was an excellent forum to present my research on biological ageing in New Zealand children titled 'Association between maternal depression symptoms and child telomere length: Evidence from Growing Up in New Zealand'. It provided me with an opportunity to discuss my research with experts in the field.

HEALTHEX EMERGING RESEARCHER AWARD

$3,000 Travel Award) 6719002

Miss Pania Bridge-Comer

Liggins Institute,
The University of Auckland

The AMRF Travel Award I received following Healthex 2019 allowed me to travel to Vancouver, Canada where I was to attend the Society of Reproductive Investigate International Conference 2020. I was to present my research on the effects of a maternal diet of artificial sweeteners on the metabolic and reproductive health of both the mother's post-partum, and the offspring in later life. Sadly, due to COVID-19, the conference was cancelled. Already in Canada, I was nevertheless able to make connections with other researchers already there and was grateful for the opportunity.

FUNDED BY: Wellington Sisters Charitable Trust

AMRF SUPPORT OF THE WAITEMATĀ DHB HEALTH EXCELLENCE AWARDS

$500 Award 6719007

Mr Daniel Wen

School of Medicine,
The University of Auckland and
Waitematā District Health Board

Dr Wen used his 2019 Emerging Researcher Award to support publication costs for his paper titled 'Proposed Quality Performance Indicators of sentinel lymph node biopsy for cutaneous melanoma', ANZ Journal of Surgery.

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2020 ANNUAL RESEARCH AWARDS

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

The 2020 Research Awards recognised our scholars, fellows and special award recipients and celebrated the break-throughs they are making in medical and health science. It was also the opportunity to launch a special new initiative designed to sustain our mid-career researchers at a critical point in their career.

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.

Financial Highlights 2020

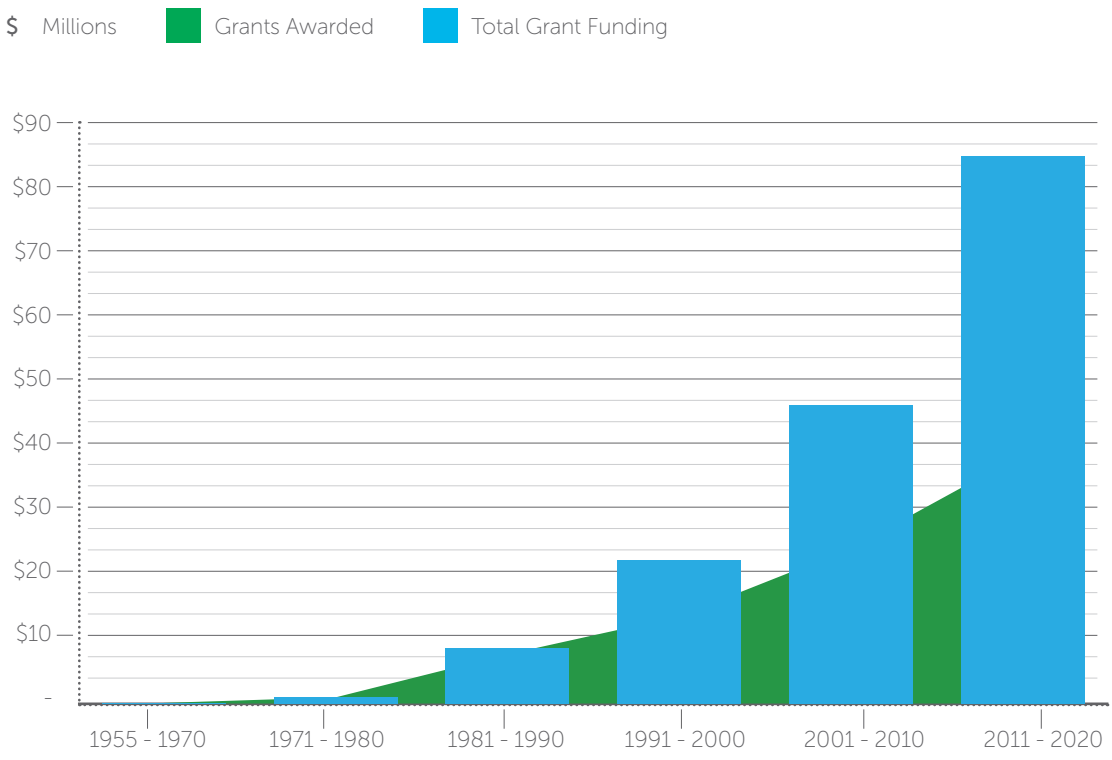
RESEARCH FUNDING 2020 $4.69MILLION TOTAL RESEARCH FUNDING SINCE 1955 $84.1 MILLION

FINANCIAL PERFORMANCE

	Note	2020 $		2019 $	
Revenue					
Donations/Research Income	1	3,341,025		1,319,142	
Investment Income (Total Return)	2	1,969,119		10,980,646	
Other Comprehensive Revenue / (Expense)	1	1,074,572		301,866	
Total		**6,384,716**		**12,601,654**	
Expenditure					
Operational expenses		565,070		536,694	
(Less Donation)	3	(565,070)	-	(536,694)	-
Net Research Grant Expenditure	4	4,615,369		2,994,011	
Net Surplus / (Deficit)		**1,769,347**		**9,607,643**	
Trust Equity		**63,733,435**		**61,964,088**	

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 - 2020



Notes to the 2020 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
John A Jarrett Trust	40,000
Anonymous	3,750
The John & Poppy Stilson Endowment Trust	145,000
N.R. Thomson Charitable Trust	50,000
The Peter and Jenny Vincent Trust	56,185
The Room Simmonds Charitable Trust	50,000
Rose Richardson Estate & Trust	31,657
N.H. Taylor Charitable Trust	10,000
Jean Cathie Research Fund	149,719

Public Trust Administered Funds	
The Audrey Simpson Trust Fund	5,500
Ralph Dingle Trust	2,000
Pauline Gapper Charitable Trust	3,400
The Reed Charitable Trust	10,600
The Wellington Sisters Charitable Trust	6,000

Other Trusts/Funds	
Anonymous	300,000
Douglas Goodfellow Charitable Trust	1,977,651
The J.I. Sutherland Fund	75,000
The Kelliher Charitable Trust	166,199
Paul Stevenson Memorial Trust	25,000
Beverley Olsen	25,000

Other Comprehensive Revenue including: Legacies, Bequests and Capital Gifts

Jeffrey Todd	Marjory Charlton
Jennifer Bowie	Margaret Collings

2. Investment Income (Total Return)

Following the 2019 switch to managed funds, investment income is recorded on a Total Return basis, whereby all direct income (interest and dividends) and portfolio gains or losses are recorded via the Statement of Financial Performance. Total Return for 2020 reflects the initial impact of COVID-19 on world markets, and the partial recovery later in the financial year.

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 2020

PROJECT GRANTS (22)	2,840,065
COVID-19 SPECIAL GRANTS (7)	507,937
POSTDOCTORAL FELLOWSHIPS (4)	712,131
DOCTORAL SCHOLARSHIPS (4)	380,000
AMRF TRAVEL GRANTS (16)	43,735
OTHER GRANTS	
UoA / AMRF Senior Research Fellowship	100,000
Kelliher Charitable Trust Emerging Researcher Start-up Grant (2)	60,000
Gavin and Ann Kellaway Medical Research Fellowship	32,416
Sir Douglas Robb Awards (3)	4,947
HealtheX Emerging Research Awards (3)	7,000
Summit Award	3,000
CMDHB Award	1,000
TOTAL GRANT FUNDING 2020	4,692,231
Less amounts allocated but not required	(76,862)
NET GRANT EXPENDITURE 2020	**4,615,369**

Special Acknowledgements

WE ARE MOST GRATEFUL TO ALL THE INDIVIDUALS, TRUSTS AND ORGANISATIONS LISTED

Honorary Life Members

Blincoe, Chris
Bowie, Jennifer
Byrne, Judi and Peter
Chan, Rebecca and David
Hart, Cliff
Lawrence, Dr Dick
Levene, Sir David
Nicholson, Prof Louise
Stevenson, Nari

Life Members

Bain, Roy
Baird, Dr Tony
Batt, Leonie
Bunning, Natalie
Christie, A/Prof David
Collings, Margaret
Crookbain, Margaret
Davies, Amelia
Davies, Matthew
Davies, Noel and Heather
Dickey, Mr K L
Ding, Allan
Ding, Christine
Ding, Thomas
Donne, Adrienne
Fish, Barbara
Friedlander, Sir Michael
Gibbons, Dr Hannah
Glass, Paul
Glover, Bill
Glover, Donna
Goodfellow, Dr Bruce and Maryanne
Goodfellow, T.B.
Goodfellow, Peter
Graham, David
Green, Prof Colin
Gunman, Kirk
Hall, Henry
Hall, Judith
Hall, Richard and Yvette
Hall, Simon
Hendry, Ian
Herle, Suryashobha
Hobbs, Emmet
Jenkinson, Vivienne
Jollands, Elizabeth
Keeling, Paul
Kellaway, Ann
Lake, Margaret
Lawry, Jean
Londeen, Maree
Lorimer, Michael
Lu, Prof Jun
MacCulloch, Donald
MacCulloch, Robert
MacDonald, Cathrine
McElroy, Robyn
McWilliams, Kim
Menzies, Mr and Mrs P
Moffitt, Dr A R
Mount, Elspeth
Mutch, James
Nathan, David
Owens, Mark
Owens, Maryanne
Parkes, Bruce
Puvanakumar, Malini
Rotary Club of Auckland Harbourside Inc,
Scott, Emer Prof Dugald
Taylor Family
Todd, Jeffrey and Glenys
Yates, Anna
Young, Prof Alistair

Annual Members

Andrew, Julia
Arms, Shona
Barber, Prof Alan
Barnett, Dr Leanne
Blackie, Shirley
Blamey, Jan and Barry
Cockerell, Eileen
Coppolino, Katie
Cowie, Keith and Eliane
Denton, Joanne
Eady, Kay
Fairbanks, Rosemary
Fisher, Sheila
Gouwland, Leicester
Gunn, Graham
Halsey, Cliff
Keeling, J.A.
Keeling, A.W.
Kleemann, Sue
Lam, Ashley
Loftus, Michael
Loiselle, A/Prof Denis
Macky, Elaine
Mason, Barbara
Molloy, Thea
Peace, Su
Proft, A/Prof Thomas
Pyne, Jenny
Radcliff, Dr Fiona
Russell, Bruce
Taylor, Alice and Warren
West, Lilian
Winder, Rosemary

Thanks also to our benefactors who wish to remain anonymous.

BELOW WHO HAVE GIVEN GENEROUS SUPPORT TO THE FOUNDATION DURING THE YEAR.

LEGACIES, SPONSORS, FUNDING PARTNERS 2020

Funding Partners

Perpetual Guardian
Public Trust
Douglas Goodfellow Charitable Trust
The Kelliher Charitable Trust
Gooduck Charitable Trust
The J.I. Sutherland Fund
Paul Stevenson Memorial Trust

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
Noel & Heather Davies Fund
Jeffrey Todd Fund

Sponsors

Blue Star Group
Constellation Brands
Dioscuri
MindFood
Else Apps
Compelling PR

A LEGACY OF LEADERSHIP AND INTELLIGENCE

AMRF celebrates the life and contribution of Dr Bruce Goodfellow.

In late December 2020, AMRF received the very sad news that Dr Bruce Goodfellow, a longtime Trustee on the AMRF Board, had passed away after a long illness.

Bruce first joined the AMRF Board back in 2007 and as the eldest son of Dr W. Douglas Goodfellow, Bruce continued the long and rich history the Goodfellow family has had with AMRF.

The exceptional philanthropic support of the Goodfellow family, and in particular Bruce's father, has been the cornerstone of AMRF's sustainability over the years. With Bruce's wealth of business acumen, along with a sharp eye for figures, Bruce ensured the ongoing prudent financial management and success of AMRF.

Bruce's contribution to AMRF has been immense and even in the latter days of his illness, when he was unable to attend Board meetings in person, he zoomed in to provide his invaluable pearls of wisdom.

It is difficult to express the depth of gratitude we have for Bruce, other than to say his commitment to AMRF has left a legacy that will continue to make a lasting difference in the lives of so many.

Along with his services to the charitable sector and the business world, Bruce was a dedicated family man and our thoughts continue to be with his wife and children.

How You Can Help To Change Lives

ONE OF AMRF'S LOYAL SUPPORTERS, MARGARET COLLINGS, SHARED WITH US THE STORY OF HOW SHE CAME TO BE A FOUNDING AND LIFE MEMBER OF AMRF.

"My being a foundation member came about when my Great Aunt Edith Mary Winstone-Blackwell (MBE) decided to make this gift to me," wrote Margaret.

"Aunt Edith was one of two women who obtained their driving license in the early 1900s except it was never quite known which of the two was the first licensed lady driver in Auckland."

Margaret referred to her aunt's interests as being many and varied, the same aunt who was a pioneer of her time, working to improve the status of women and known for her passion for education and societal advancement, including health and medical research.

Edith took up a founding membership of AMRF for herself and Margaret in 1955 as part of her drive to make a difference in other people's lives and Margaret followed in her footsteps knowing that her support of AMRF would do exactly that.

In March 2020, Margaret passed away and left a gift in her will to AMRF to ensure she continued to help transform lives beyond her own lifetime.

Just like Margaret becoming a founding member back in 1955, Margaret's gift made her a 'Foundation' supporter of the newly launched Futures Fellowship Fund.

Margaret's husband, Stan, acknowledged that Margaret would have been delighted with the choice of the Futures Fellowship Fund as a vehicle for her bequest and that Margaret and Stan's wider family were equally pleased.

OUR WORLD-CLASS RESEARCHERS COULDN'T DO WHAT THEY DO WITHOUT YOUR SUPPORT.

THIS CAN COME IN ANY SHAPE OR SIZE.

BECOMING A MEMBER, GIVING A DONATION, LEAVING A GIFT IN YOUR WILL OR SETTING UP A REGULAR GIFT WILL HELP TO FIND ANSWERS — ANSWERS THAT WILL CHANGE LIVES FOREVER.

Contact us:

Auckland Medical Research Foundation,
PO Box 110139,
Auckland Hospital, Auckland 1148

If you would like to speak to us, phone 09 923 1701

Email us at amrf@medicalresearch.org.nz

www.medicalresearch.org.nz

Charity Commission Registration Number: CC22674

Join us in our timeless mission to improve the quality of life for all New Zealanders through funding world-class medical research.
Become a supporter today by filling out the slip below and returning to us, visit us online to pay securely or visit your bank to discuss how to set up a one time or recurring donation.

Yes! **I will help to make a life-changing difference.**

Please accept my gift of:

☐ $1000 ☐ $500 ☐ $250 ☐ $100 ☐ My choice of $.....

☐ A recurring monthly gift of $..... (Please provide credit card details below for monthly gift)

Please sign me up for a membership:

☐ $50 (Individual Annual Membership) **or** ☐ $1,000 (Individual Life Membership)

My preferred payment type is:

☐ I've made a Direct Deposit to AMRF's account: BNZ 02 0160 0012991 00
(Please ensure your name is referenced for receipting).

☐ Please debit my: ☐ Visa ☐ MasterCard

☐ **Yes**, I will make this a recurring monthly donation

Card Credit No. ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Name on card: (please print).....

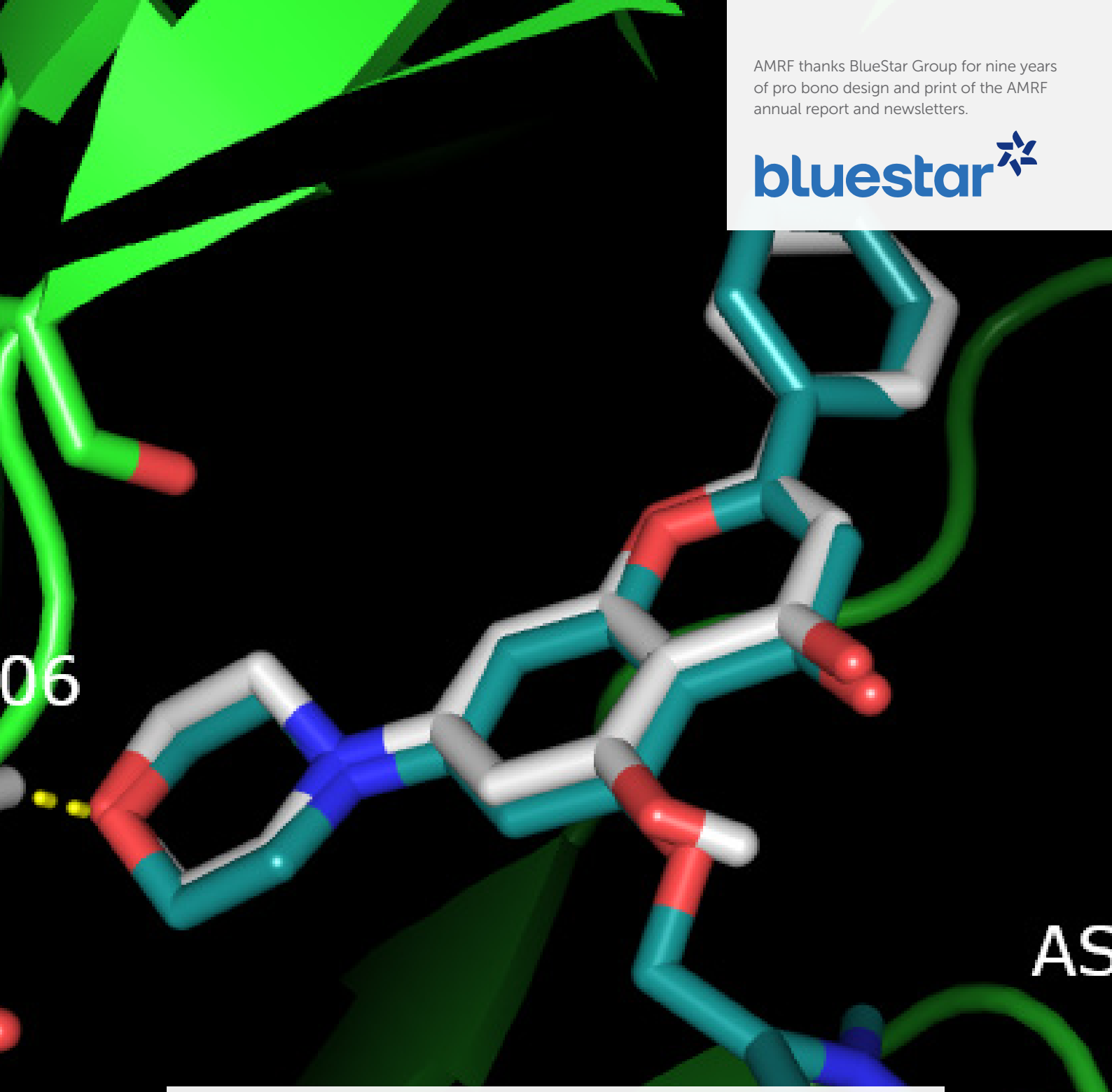
Expiry...../.....

☐ YES, I would like to share my story about life saving medical research. Please contact me.

☐ Please send me information on leaving a bequest through my will

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

bluestar



MAKING GOOD CANCER THERAPIES BETTER

A/Prof Mike Hay

Auckland Cancer Society Research Centre,
The University of Auckland

Radiation therapy is widely used for cancer treatment and there has been a surge in interest in sensitisers that will improve the benefit of radiation therapy for patients.

A/Prof Michael Hay's team at the Auckland Cancer Society Research Centre have identified a new drug, shown here in 3D modeling, that binds to one of the key enzymes that repairs DNA damage caused by radiotherapy.

This binding inhibits the repair of the damaged DNA in cancer cells, making the drug an effective sensitiser of radiation therapy in tumour models.

The team are developing new ways to deliver this drug selectively to tumours.

Photo credit Dr Lydia Liew

Read more on Page 25.

Auckland Medical Research Foundation

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