Heart 2 Heart

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Newsletter of the **Christchurch Heart Institute** - ***A University of Otago Research Centre***

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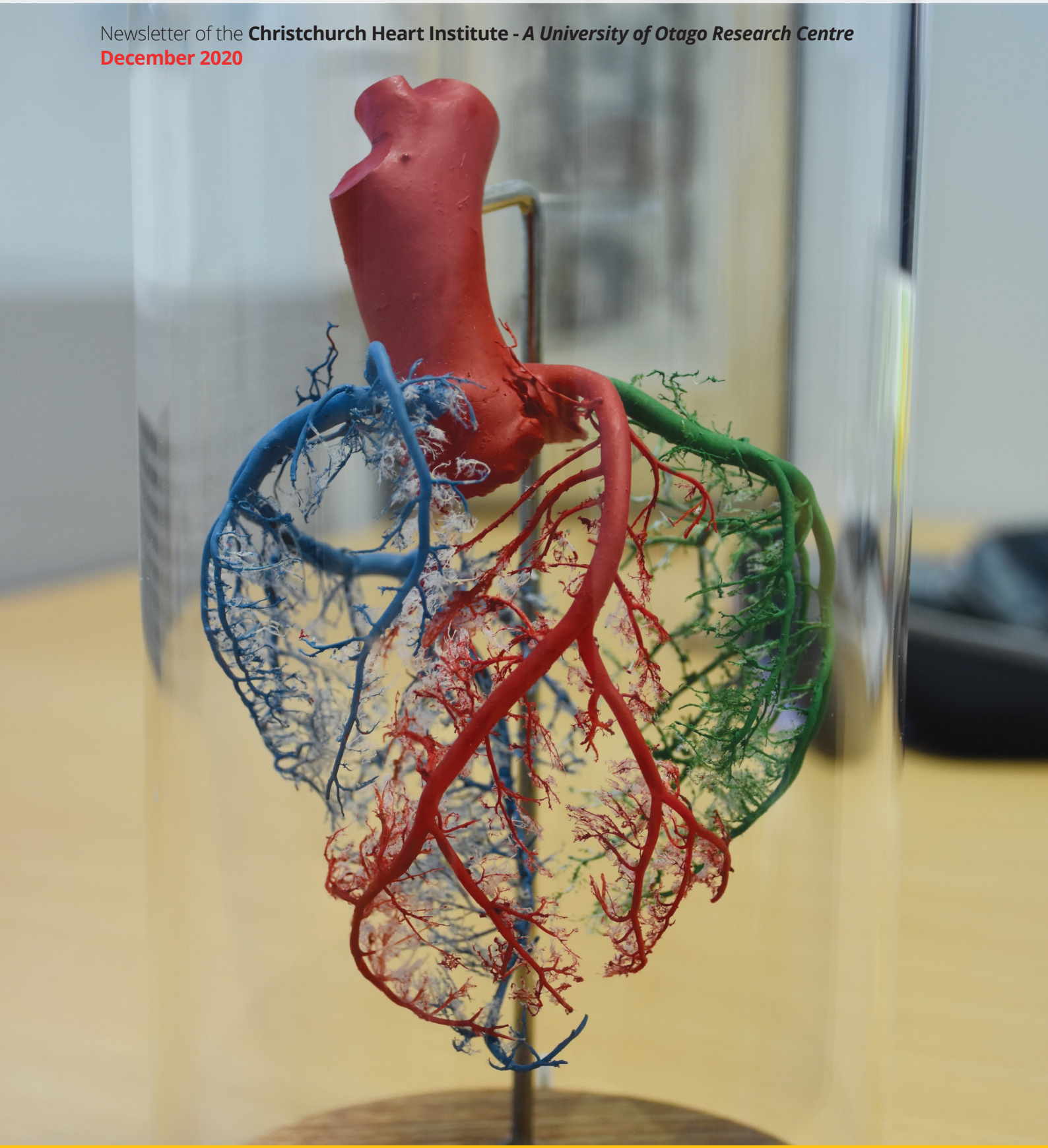

Welcome

As we near the end of the year, perhaps we can all start to take a deep breath and change gear to a slower pace. It has been a year of great challenges and changes for most. It is unlikely that anyone has not felt the impacts of Covid-19 on lifestyle and in the way we work. It has caused everyone to re-evaluate and to ensure focus and energy is pointing in the right direction. Above all, it has offered the opportunity for a fresh approach.

The CHI is no exception. Professor Mark Richards initiated a new structure to the running of the group. Although planning for this change began in late 2019, it was implemented during 2020. The directorship of the CHI has now been handed over to a steering group with a balanced spread of responsibility for clinical and research vision. Our team is comprised of: Professor Mark Richards, Professor Richard Troughton, Professor Vicky Cameron, Professor Chris Charles, Associate Professor Chris Pemberton and Dr Anna Pilbrow. Together we work to ensure the most effective and beneficial outcomes for the studies, the CHI team and, therefore, our study participants.

During lockdown, young researchers at the CHI, worked exceptionally hard on funding applications and their efforts have paid off with each one of them receiving project grants or Fellowships from the Heart Foundation, or funding from the Canterbury Medical Research Foundation. Congratulations to them all and our gratitude to the funders. You can read about their projects in this newsletter.

A special congratulations to Professor Chris Charles who received the University of Otago Gold Medal for Research earlier this year. The medal is in recognition of his cutting edge work and leadership spanning a career of more than 30 years.

Two significant findings have grabbed media attention recently. Professor Mark Richards received international media coverage for a collaboration with the National University of Singapore, combining two kinds of testing in blood and heart cells, resulting in fast identification of new blood markers, flagging potential future heart failure. Another media story covered Emeritus Professor Eric Espiner and Senior Research Fellow Dr Tim Prickett's world-first study on a hormone in the blood called C-type Natriuretic Peptide (CNP) and its importance in protecting the body from inflammation and helping to reduce cardiovascular deaths. These two stories are included in this issue.

Other important media coverage that you may have seen on TV1 and TV3 have been stories about the significance of sodium in relation to heart health from Professor Richard Troughton, and Professor Mark Richards' contribution to a programme on long-Covid, (long-Covid, being the coined phrase for the prolonged symptoms of Covid-19), where he spoke about the effects on the heart.

Despite many disruptions to our year, we are pleased with the way our team has responded and continued on with great results. Thank you to our research nurses, who work tirelessly to attract and support our study participants, for whom we hold great gratitude, respect and admiration.

We wish you all a happy festive season and look forward to what 2021 will bring.

Left to right: Dr Anna Pilbrow, Prof Vicky Cameron, Prof Mark Richards, Assoc Prof Chris Pemberton, Prof Chris Charles (Prof Richard Troughton not pictured)

Five minutes with ...
Dr Anna Pilbrow

Dr Anna Pilbrow, Senior Research Fellow in the Omics Laboratory, talks about her attraction to science as a career, her vision for large international studies and moments of inspirational connection in the mountains of Peru.

What is your research interest at the Christchurch Heart Institute?

My research focusses on understanding the mechanisms underlying our inherited susceptibility to heart disease. I have a particular interest in discovering new molecules in the blood that may signal the early stages of heart disease or the progression from a heart attack to heart failure.

How did you come to the Christchurch Heart Institute?

I first came to the CHI in 2001, while an undergraduate studying biochemistry at the University of Otago in Dunedin. I took part in the University of Otago, Christchurch summer studentship programme (a 10-week programme that supports undergraduates to undertake a research project and explore their interest in research), working in Professor Vicky Cameron's lab. I enjoyed it so much I came back for my PhD in 2003 and have stayed ever since.

Although you have worked overseas during that time.

Yes, I went to the Salk Institute for Biological Studies in San Diego from 2008-2010 to investigate a hormone system that influences stress, diabetes and the heart. I worked under the mentorship of Professor Wylie Vale (now deceased), who had previously mentored Professor Vicky Cameron for her post-doctoral studies at the Salk. He described me as his first "grand post doc" – like a grandchild – the next generation.

How was that experience for you?

It was extremely stimulating and a very valuable experience. To see how different labs do things and to live in a city with the same population as NZ, with such a strong focus on biotechnology and biomedical research– the scale was mind blowing. People had come from all around the world to work at the Salk. The vast majority of my colleagues were young postdoctoral researchers like me and everything was very fast paced. It was a very dynamic research environment.

Back in NZ, how did the science compare?

We're much smaller, but that can have advantages, too. It seems that here in NZ, and particularly in the CHI, it's easier for clinicians and scientists to work more closely together. We're used to making do with fewer resources, which makes us adaptable and more used to working with researchers in different fields – both major advantages in research.

Why did you choose science as a career?

My interest in science began through entering school science fairs, where I won the Premier Technology Award at the National Science and Technology Fair in 1997 for developing a 'continuous, ready-to-serve hard-boiled egg' for the food and catering market. By the time I finished high school I knew I enjoyed problem solving and discovering things, and the medical field appealed. Biochemistry was the obvious choice for me.

Dr Anna Pilbrow tramping in Penny Pass

What vision do you have for your work?

My dream is to discover what information our DNA can contribute to predicting who is at risk of heart disease. A few years ago the CHI was invited to be part of a large consortium of researchers from around the world to investigate the genetics of patients with established heart disease. I am now leading a project within this group to identify the parts of our DNA that contribute to developing heart failure after a heart attack. We couldn't do this work alone and I'd love to see even more of this collaborative work taking place. It's been exciting to contribute NZ data to a large international effort.

What grabs your imagination away from the laboratory?

I am inspired by the NZ outdoors. I get out there as often as possible, bike-packing, tramping, skiing, climbing, sea kayaking. But one of the most inspirational experiences I have had was in Peru, bike-packing with friends. It was tough biking more than 3,000m above sea level, but we were amply rewarded by the friendliness and warmth of the locals in the remote villages we visited – an amazing experience that I really valued.

What advice would you give to early career researchers?

Find a mentor and team that's a good fit for you. My primary mentor, Professor Vicky Cameron, has been extremely supportive and has provided me with valuable advice and guidance every step of the way.

For undergraduates, I highly recommend taking part in a summer studentship programme. This is an ideal way to find out what doing research is really like and to experience the culture of a research group. You might just find yourself going back to do a PhD!

Breakthrough findings may help prevent heart failure after a heart attack


Professor Mark Richards

A breakthrough discovery combining two powerful technologies looks set to help doctors intervene earlier and perhaps prevent heart failure in at risk patients, who have already had a heart attack.

The international collaboration between research clinicians at the University of Otago's Christchurch Heart Institute, and the National University of Singapore, combines two kinds of testing in blood and heart cells, resulting in fast identification of new blood markers flagging potential future heart failure.

Professor Mark Richards, Consultant Cardiologist and Senior Researcher with the Christchurch Heart Institute, and Deputy Director at the National University Heart Centre Singapore, says the findings will make a significant difference to the prognosis and treatment of heart attack patients who are at risk of heart failure.

The teams' innovative method has involved sifting through massive amounts of data to reveal six new, high priority indicators of heart failure in patients with a heart attack which will be further researched.

It is hoped that the proteins identified, or the pathways within which they operate, may provide predictive or diagnostic tests to be applied after heart attacks to identify those at highest risk of HF allowing targeted surveillance and early intensification of protective treatment.

Secondly, the proteins and their intra-cellular pathways may be therapeutic targets subject to either blockade or augmentation by new drugs or biological treatments that can protect the injured heart from progression to HF.

"Finding the precise biomarkers in the blood that indicate potential for future heart failure after a heart attack is like looking for a 'needle in a haystack'," Professor Richards says.

"First, Associate Professor Mark Chan and his team in Singapore applied plasma proteomics– a term used to describe high-throughput analysis of plasma proteins – using a highly sensitive technique. This made it possible to reliably detect more than a thousand proteins in the blood of each patient, despite some proteins having very low levels."

Minute quantities of proteins were detected, revealing more than 200 marker proteins that predicted the future onset of heart failure up to seven years after a heart attack.

Professor Richards says a second technology discovery was to cross-reference the proteins by analysing single heart cells one-at-a-time, rather than the usual method of cells in bulk.

That meant the researchers were able to detect subtle but important changes in the way the genes encoding the marker proteins (discovered in patients' blood samples by proteomics), were turned on and off in individual cells.

This study, the results of which were published online ahead-of-print in the journal Circulation, involved 200 patients from Singapore and 500 New Zealanders who had experienced a heart attack.

"Strong and reliable signals to identify those patients who may be unfortunate enough to incur heart failure following their heart attack, remains an urgent need," said Professor Richards.

"This work, the result of bilateral and inter-disciplinary collaboration, has taken us an important step closer to being able to step-in post-heart attack and more fully protect patients from further harm."

Centres for Research Excellence

The Christchurch Heart Institute is excited to be part of a new cardiovascular Centre for Research Excellence (CoRE), aiming to close a seven-year gap in life expectancy for Māori and Pacific people, compared with other New Zealanders.


Professor Mark Richards

Healthy Hearts for Aotearoa New Zealand will bring together researchers, healthcare practitioners and community groups, hosted by the University of Auckland.

Lead researcher at the CHI, Professor Mark Richards, led the CHI's input into the CoRE and is now the Principal Investigator for the Biomarkers and Genetics section.

"We are very pleased to be a part of this NZ first cardiovascular CoRE. Achieving this involved a rigorous selection process, culminating in the bringing together of researchers, healthcare practitioners and community groups. We will work together, towards cardiovascular healthcare equity in New Zealand," he said.

Meanwhile, Professor Vicky Cameron who heads up the CHI's 'Omics laboratory takes on a Principal Investigator role on another new CoRE success, also hosted by University of Auckland, known as the Maurice Wilkins Centre CoRE. This team, will target major diseases affecting New Zealanders, particularly diabetes and cardiovascular disease, cancer and infectious disease, by delivering world-class research that enables the discovery of new therapies, diagnostics and vaccines.

The CoREs are comprised of experts from the University of Otago, University of Canterbury, Auckland University of Technology, University of Waikato, and Massey University with the Malaghan Institute of Medical Research (New Zealand's world-leading independent biomedical research institute).

The CoREs are Government funded for the next eight years, when a renewal selection process will take place.

Faster detection of kidney injury

Aiming to develop better blood tests to identify which patients with acute heart failure are at risk of incurring damage to their kidneys, is the focus of work led by Dr Anna Pilbrow, for which she has received a Heart Foundation small project grant of $14,900.


Dr Anna Pilbrow

According to Dr Pilbrow, acute heart failure is a leading cause of hospitalisation and death in older adults. In these patients, an abrupt loss of kidney function (called acute kidney injury) doubles the risk of dying within a year.

In addition to the strain that acute heart failure itself places on the kidneys, several drugs commonly used to treat acute heart failure can impair kidney function and promote injury. Thus the beneficial effects of heart failure medications on relieving the symptoms of heart failure need to be balanced against their detrimental effects on the kidneys.

Currently, it is impossible to detect kidney injury early enough to change a patient's treatment, because the gold-standard indicator of kidney function, blood concentrations of creatinine, may take many hours or days to increase after kidney damage has occurred, during which time the damage may become irreversible.

Consequently, there is an urgent need for new ways to detect kidney injury in patients with acute heart failure early.

"In this project we will optimise a protein analysis method that will allow us to test whether gene changes in the kidney that we have previously observed, lead to altered protein concentrations in the kidney. If so, these proteins could represent ideal biomarkers of kidney function/ health for follow-up studies in blood," Dr Pilbrow said.

This project will explore cutting-edge protein analysis methods and provide a short-list of candidate protein biomarkers for future studies. The long-term goal is to develop a blood test for early detection of acute kidney injury that will reduce hospital readmissions and deaths in patients with acute heart failure.

Chocolate Chickpea Cookies

I've included a picture of my latest bake - Nadia Lim's Chocolate Chickpea Cookies...sound a tad unusual, but are pretty tasty!

Ingredients

400 g can chickpeas drained, rinsed
½ cup nut butter e.g. almond, cashew or peanut ½ cup
1 teaspoon vanilla essence
½ cup brown sugar
1 teaspoon baking powder
2 tablespoons ground almonds
1 tablespoon butter or coconut oil melted (use coconut oil for dairy-free/vegan)
70 g good-quality dark eating chocolate at least 70% cocoa solids (about ½ cup), finely chopped (check label for dairy-free/vegan)

Instructions

Preheat oven to 170degC. Line a baking tray with baking paper.

Pat chickpeas dry with paper towels. Place in the food processor with nut butter, vanilla, brown sugar, baking powder, ground almonds, and butter or coconut oil. Blitz until all ingredients are well combined and have formed a cookie dough consistency.

Add dark chocolate and pulse briefly to distribute the chocolate throughout the cookie dough.

Roll heaped tablespoonfuls of cookie dough into balls (having wet hands helps stop the dough from being too sticky to roll) and place on prepared baking tray, about 3cm apart (they won't spread much).

Flatten slightly with the back of a wet fork.

Bake for 12-15 minutes until lightly golden. Remove from oven and leave cookies to cool slightly. Use a fish slice to transfer them carefully to a wire rack to cool completely – they will be quite delicate.

These cookies are lovely eaten warm, but can be stored in an airtight container in the pantry for up to a week, or frozen for several weeks – when you want to eat one (or two!) just warm for 10 seconds in the microwave and the chocolate will melt and go gooey.

Eva

Eva Mieklejohn,
Registered Dietitian

World First study on protective blood hormone could help reduce cardiovascular deaths

Emeritus Professor Eric Espiner

Deaths from cardiovascular disease could be reduced thanks to another world first finding by researchers at the Christchurch Heart Institute.

Emeritus Professor Eric Espiner and Senior Research Fellow Dr Tim Prickett have been studying a hormone in the blood called C-type Natriuretic Peptide (CNP) and its importance in protecting the body from inflammation. Their research was recently published in the international journal Peptides.

"If left unchecked, inflammation can cause numerous physical problems including scarring and stiffness of arteries and damage to organs such as the heart, liver and kidneys. We found that CNP in the blood stream reflects an increased production of CNP in tissues, as part of a protective response to inflammation," said Professor Espiner.

The finding that CNP acts to protect the body is key to helping save lives through early detection of serious conditions such as atherosclerosis, which can lead to heart attack or stroke. Dr Prickett explains, "We examined two quite different groups of healthy people – one group age 28 years, the other age 50 years – both without history of heart or kidney disease. High levels of CNP in both age groups were found in people who had stiffer arteries, reduced pumping action of the heart, higher fat levels in the blood and liver, and reduced kidney function."

In many studies over the past three decades the CHI has pioneered the use of blood measurements of the heart hormones ANP and BNP in the diagnosis of heart disease, as well as their roles in maintaining a healthy heart and circulation.

Unexpectedly, according to Professor Espiner, during the CNP study, ANP and BNP were found to be similarly linked but in opposite directions – high CNP is associated with high fat and stiff organs, whereas high ANP and BNP is associated with lower fat and healthier hearts in people free of known heart disease.

"This told us that the three hormones work together to reduce damage from inflammation in heart and blood vessels. The higher levels of BNP in these healthy people likely reflect a genetic advantage reducing fat accumulation and improving heart function. On the other hand, higher CNP likely reflects the body's response to inflammation and scarring that is already present. Based on this, future interventional therapies aimed at increasing the activity of both systems, when appropriate, will lead to reductions in cardiovascular deaths," said Professor Espiner.

Dr Tim Prickett

Gold Medal for Research

Professor Chris Charles has received the University of Otago Gold Medal for Research.

The medal is in recognition of his cutting edge work and leadership spanning a career of more than 30 years. Professor Charles has significantly contributed to the CHI's research into understanding how heart hormones function in healthy individuals and patients with heart disease and how these can be manipulated to develop better treatments for cardiovascular disease.

"Looking back at my 30+ year career it is satisfying to realise that, among other research, I have contributed in some way to understanding the applied or translated science that formed the evidence for widespread use of at least five classes of prescription drugs. Millions of people take those drugs today, for treatment of or preventing progression of cardiovascular disease.

Professor Chris Charles

"I'm honoured to receive the gold medal for my part of a larger research picture. It is exciting to know that my CHI colleagues and I are key players in the international group of scientists fitting together pieces of a very large jigsaw puzzle; that of understanding how our hearts function in normal health, what goes wrong in heart disease and how we develop drugs/therapies to treat and improve life in patients living with heart disease."

Celebrating Heart Foundation Fellowships

Award Recipient 2020

Dr Janice Chew-Harris of the Translational Biodiscovery Lab and Evie Templeton, who is nearing the end of her PhD in the 'Omics Lab, have both been awarded Heart Foundation Research Fellowships.

Fellowships provide much needed funding and help to kick-start or enhance a career. For Evie and Janice, the Heart Foundation Fellowship award provides $255,000 over three years and $251,783 over three years, respectively, and will allow them to each forge ahead in their research areas.

Dr Janice Chew-Harris

A suPAR biomarker

Inflammation is a key component underlying heart disease, which can complicate the behaviour of the disease and its treatment. Janice is investigating a blood marker known as suPAR, an inflammatory protein that has actions that are important in the evolution of atherosclerosis and in inflammatory dysfunction which may contribute to heart disease complexity. She has already found that increased amounts of suPAR in patients suspected of having acute heart failure to be highly predictive of worse outcomes.

Her Fellowship work will continue to build on those preliminary findings. The first goal is to determine whether suPAR levels are also altered in patients after a heart attack and whether it can be used to predict outcomes and guide treatment in those patients. "Additionally, my research will also determine whether suPAR itself may have a role on heart function. If it does, there may be a possibility of identifying a new therapy," Dr Chew-Harris said, "I am very grateful to receive this Heart Foundation Fellowship. With this award, I can now take further steps towards achieving our main aim, which is to provide a new blood test to further assist clinicians in discerning who will gain from treatment, leading to improved outcomes."

Building tools

Evie's Fellowship research focusses on the genetic links to heart health, aiming to identify those most likely to have poor outcomes after a heart attack. Heart attacks can change the shape, form and functioning of the heart chambers (known as adverse remodelling) and cause irregular heart rhythms - all of which increase the risk of heart failure, stroke and death.

"I aim to develop new tools that will help identify patients who will subsequently have adverse remodelling or atrial fibrillation (the most common type of irregular heart rhythm) after a heart attack," Evie said.

This information will allow Evie to build genetic risk scores and pin-point genetic pathways that lead to harmful remodelling and atrial fibrillation.

"By understanding the genes involved in these processes, we may be able to discover new therapeutic treatments and blood tests for heart patients. Beyond this research, the fellowship will support my transition from PhD student to Postdoctoral Research Fellow. I am very grateful to the Heart Foundation for this opportunity."

Evie Templeton

Super charging heart hormones

Award Recipient 2020

Dr Nicola Scott and Associate Professor Miriam Rademaker of the CHI's Preclinical Lab, have won funding from the Canterbury Medical Research Foundation (CMRF; $109,252) and the Heart Foundation ($154,802), to investigate how to maximize the effects of heart hormones – the natriuretic peptides - that act favourably on blood pressure and the kidneys, lessen heart failure symptoms and slow down its progression.

Left Dr Nicola Scott, Right Dr Miriam Rademaker - sand dunes near Nazca in Peru, after a conference

Drs Scott and Rademaker are working to find ways to increase the effectiveness of these protective hormones. Their work will look at comparing and combining a number of approaches that enhance either natriuretic peptides levels or their actions. This includes reducing the impact of the enzyme neprilysin, which breaks down the natriuretic peptides, as well as another enzyme called phosphodiesterase-9 (PDE9), which acts to reduce down-stream actions of these hormones.

The two Researchers said that they aim to compare, for the first time, the effectiveness of inhibition of enzymes PDE9 versus neprilysin as heart failure therapies, and whether their combined administration may have added benefits.

"These studies will produce highly original information and may lead to a novel treatment strategy for this disease," Scott said.

Pasifika heart health

Award Recipient 2020

Research Fellows Dr Moritz Lassé and Dr Allamanda Faatoese have been awarded a two-year Heart Foundation project grant ($157,549) to support their study looking at concentrations of the heart health marker, NT-proBNP, in Pasifika.

There is an urgency to address heart health among Pasifika communities in Aotearoa. National statistics show higher rates of heart disease events and death among this population. According to Dr Lassé, the number of deaths from cardiovascular diseases have been declining over the past half century, but they are declining more slowly in Pasifika.

"This suggests that Pasifika have benefitted less than other ethnicities from the advances in screening and management of these health conditions. Death rates from ischaemic heart disease are two-fold higher in Pasifika and Māori compared with European NZers," he said.

Dr Moritz Lasse

Dr Allamanda Faatoese

The blood marker, NT-proBNP, is not normally measured when you go to the doctor for your heart health check-up, but it is tested to diagnose heart disease so the doctor can continue to monitor your heart, and prescribe the right medication at the right time. Now, heart doctors and leading scientists think that NT-proBNP should be included as part of normal heart health check-ups to assess the risk of future heart disease for the patient.

In a study of 300 heart-healthy participants, we observed that concentrations of NT-proBNP in Pasifika are only half compared with those of European NZers. We think that the test may be underestimating the risk of future heart disease in Pasifika, said Dr Lassé. In this important study, funded by the Heart Foundation, we are trying to understand why NT-proBNP levels are lower in Pasifika than in European NZers.

We will investigate if NT-proBNP assays perform less accurately for Pasifika, what the reason for that may be and whether something in our DNA could contribute to the observed anomaly between Pasifika and European NZers," Dr Lassé said.

This project aims to improve equality of health outcomes for Pasifika patients when NT-proBNP concentrations are measured as part of clinical care.

Dr Phil Adamson

Award Recipient 2020

Dr Phil Adamson has been awarded a Health Research Council grant of more than $1.3 million from a new fund for research that will help the health system deliver the best services to communities.

His Health Delivery Research Investment grant will allow him to investigate the potential of CT scans in the diagnosis and treatment of heart attack patients who would otherwise need to undergo the risks of an invasive heart angiogram. We will report back on progress of this study, known as the CRITICAL-ACS trial, in a future issue of Heart 2 Heart.

International opportunities enhance PhD perspectives

When Evie Templeton began her PhD she was not expecting overseas travel, so when she found herself standing in front of a 12th century monastery in northern Italy, she had to pinch herself.

"Kloster Neustift is in the Dolomite Mountains of Italy's Tyrol region. I was there for a one week summer school course in Advanced Proteomics and I was blown away. Not only by gorgeous mountains, the beautiful abbey and its grounds, but most of all, by the opportunity to study with a range of high-calibre international students."

Evie is completing her PhD with the Christchurch Heart Institute's (CHI) Omics Laboratory, looking at acute kidney injury in patients with heart failure.

"Part of my research is to look more closely at proteins released into the blood when kidney injury has occurred. I am hopeful this may contribute to the development of a blood test to see whether a person with heart disease also has kidney injury."

The summer school was run by the Federation of European Biochemical Societies and provided Evie with a new perspective on her research.

"I was accepted to the summer school following submission of an abstract about my kidney injury work. I am fortunate to have great supervision and mentorship by senior researchers at the CHI who encouraged me to apply for the summer school. The experience deepened my understanding and knowledge, with the additional benefit of an international perspective."

Despite the course being held in a monastery, life was far from quiet for the students, with plenty of opportunities for socialising and networking.

"Meeting so many international students who are all interested in similar research and making great connections with them, not only as friends but as scientific contacts, was definitely the greatest gain for me. In medical research, forging links with other scientists and clinicians in the same field of study is vital for the sharing of information and collaboration in progressing research."

The Dolomite Mountains were the stage for activities that exposed the students to Northern Italy's natural world, history and culture.

"We all took part in hiking. It was incredible! We began at a place called Zanser Alm, walking up to an alpine hut called Schlutterhutte which was at 2306m. The views the entire way were amazing - lots of green slopes and wildflowers, mountain streams, cows with bells. A great part was that the hut at the top was also a pub of sorts - so we all bought a beer and enjoyed the sunshine at the top....more NZ hikes need this!" Evie commented.

There was also a choice of four other activities for an afternoon - rock climbing, white water rafting, downhill carting or sightseeing at the nearby town.

"I chose sightseeing - as I thought you can do the sporting activities here in NZ - and got to go on a guided tour of the nearby medieval town Bressanone, including the medieval city gates, the cathedral and cloisters."

Funding for Evie's summer school came through the University of Otago, Christchurch Department of Medicine PhD fund, which supports the development of PhD students to enhance their early careers. Unfortunately, in the current economic and health climate post the Coronavirus in NZ, these types of trips are on hold. We look forward to when our students (and all researchers) can take part in career enhancing international opportunities once again.

Evie Templeton in the Dolomite Mountains

Personalised healthcare

Award Recipient 2020

Dr Sarah Appleby has been awarded a Canterbury Medical Research Foundation (CMRF) grant ($109,719) and a Heart Foundation project grant ($150,000), for her work that will explore novel biological markers for the detection and follow up of heart failure in patients that also have conditions such as obesity, diabetes and atrial fibrillation.

Dr Sarah Appleby

Her work will address the 'one size fits all' testing for heart failure, which currently disadvantages patients with additional health problems. "We hope to improve the accuracy of heart failure diagnosis and determine risk when the clinical picture is complicated by additional health problems such as obesity, diabetes and atrial fibrillation. This will also address health inequalities by promoting more personalised healthcare, resulting in increased quality of life and a reduction in deaths from heart failure in these patient groups," Dr Appleby said.

When the heart is under increased stress, it releases more of the heart protein B-type natriuretic peptide (BNP) into the blood. "BNP is produced from a parent protein called proBNP, which is then 'chopped' into two main products, BNP and NT-proBNP, with the latter generally being an excellent marker for the detection and follow-up of heart failure. However, in patients who are obese, have irregular heart rhythm (atrial fibrillation), are diabetic, very old or have reduced kidney function, the test is less accurate. Therefore, we aim to investigate novel biomarkers in obese and/or diabetic people and those with atrial fibrillation who have acute or chronic heart failure."

The research will determine whether these markers can complement or replace NT-proBNP for detecting heart failure or forecasting outcomes in these important heart failure subgroups, facilitating more personalised care."

Heart health risk of premature birth

Award Recipient 2020

The heart health of adults born prematurely, and their mothers, is the focus of a new collaborative study between the CHI and Dr Sarah Harris, specialist neonatal paediatrician. Dr Harris has been awarded a Heart Foundation project grant of $300,000.

Dr Harris said that emerging evidence shows adults who were born prematurely, and mothers who give birth to a premature baby, are at increased risk of cardiovascular disease but neither are included in our national guidelines for cardiovascular risk screening.

"Cardiovascular disease is known to originate early in life. Even the in-utero environment and experiences in the early post-natal period can affect the development of cardiovascular disease." Sarah said. "However, traditional prevention programmes recommend screening at middle age when vascular changes are established, cardiac function is declining and risk factors such as smoking, obesity, poor diet and lack of exercise are challenging to change," she said.

"The birth of a premature baby may be an opportunity to review cardiovascular risk for both mother and baby and to initiate an earlier programme of risk surveillance, health education and preventative care that could have intergenerational benefit."

This research project will review the current evidence for the link between premature birth and cardiovascular disease later in life and compare cardiovascular risk in a national cohort of adults born prematurely to that in term-born peers. "We will also compare cardiovascular risk, event rates and deaths in mothers of this cohort to see if there is a difference between those whose pregnancy was complicated by preterm delivery and those who delivered at term." This project is the continuation of work that Dr Harris and the team have been doing investigating differences in the structure and function of the heart after premature birth using heart ultrasound.

This work is of particular importance to Māori, who have higher rates of premature birth and cardiovascular disease, and to ensure our cardiovascular screening programme is not missing an important risk factor contributing to premature death for women.

Dr Sarah Harris

Welcome to the CHI!

We warmly welcome Dr Wendy Ip to the CHI team, as Laboratory Manager in the Omics Lab.

Trained in the Department of Physiology, The University of Melbourne, Australia, Wendy brings to the CHI more than 10 years of experience in experimental cardiovascular physiology research.

She has a considerable background in the development of laboratory methods using both 'whole heart' and 'single cell' techniques, to gain insight into the mechanisms of heart disease development and progression.

Prior to joining the CHI, Wendy has successfully coordinated the use of CRISPR/Cas9 gene editing technology, and led a multi-disciplinary team to characterise the effect of these heart-specific gene deletions in laboratory systems.

If a recent grant application is successful, Wendy is hoping to develop new cutting-edge research technologies here in the CHI, using lab-grown human heart muscle cells that would allow researchers to examine functional effects of genetic modifications, an aspect of research that has been challenging to implement in human studies.

Furthermore, this platform has the potential to be combined with CRISPR/Cas9 gene editing technology, which would allow researchers to discern causal effects of genetic modifications. According to Wendy "the potential is unlimited".

The Omics laboratory, led by Professor Vicky Cameron, focuses on investigating the influence of genomics and epigenetics in heart disease development and progression, and the association of genetic variation with clinical outcomes in New Zealand heart disease patients.

As the laboratory manager Wendy keeps the health and safety of scientists on track, maintains lab operation and ensures professional practices are adhered to. But her role is more than that.

"Patient study samples are incredibly valuable. One of my key responsibilities here is to make sure that the samples we collected from our study participants are handled and processed using the best clinical practice."

Wendy is particularly skilled in working with challenging patient study samples. She has previously developed a protocol for obtaining high quality RNA from human atrial tissue specimens collected from cardiac surgery patients.

Currently she's working on optimising extraction method for another kind of challenging clinical sample type: blood samples collected as dried blood spots from neonates born 30 years ago. These samples are from a study of young adults who were born with a very low birth weight in 1986, and who have been followed up recently to study their current health and well-being.

With Wendy meticulously processing valuable clinical study samples and working on her plan to build a new research platform here at CHI, I can't wait to hear the next instalment of her story.

Dr Wendy Ip

Find us on Facebook

We invite you to donate and/or bequeath to the Christchurch Heart Institute. If this is something you would like to do or find out more about, please contact Lorraine Skelton, Clinical Studies Co-ordinator on **03 364 1063**, email: **lorraine.skelton@cdhb.health.nz**

Please post a cheque and return the slip below to us, including your address details, or direct credit our bank account **02-0800-0877177-00** – with your name as a reference, please email Lorraine Skelton indicating you have direct debited the account.

The Nicholls Clinical Research Centre,
Otago University Christchurch Medical School,
PO Box 4345, Christchurch 8140

First Name:_____ Last Name:_____

☐ Yes, I want to help research into cardiovascular disease.

I am making a gift of ☐ $20 ☐ $40 ☐ $60 ☐ or my choice

☐ A cheque is enclosed payable to the Christchurch Heart Institute Trust

otago.ac.nz/chch-heart-institute