Otago Medical Research FOUNDATION

# 2023 Annual Report

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Charities Number: CC33444


OMRF.ORG.NZ

# ABOUT THE FOUNDATION

*The Otago Medical Research Foundation is dedicated to supporting important medical research carried out in the Otago region, and encouraging young and gifted people to engage in research.*

The Foundation supports innovative, early stage medical research projects and student scholarships in Otago.

Founded in 1967 to further medical research in Otago, we have committed over $11 million dollars to a broad range of medical research projects. The Foundation is a careful steward of donations, and we do not receive any Government funds. Research is undertaken in Otago with funds raised from a variety of bequests, trusts, individual and corporate sponsors, and a number of fundraising events each year.

## OUR FUNDS ARE:

**Annual Grants** –our premier round of year-long, innovative early-stage research projects, normally up to $40,000 per grant

**Student Summer Scholarships** – 10-week student summer research projects, supervised by senior researchers. These often lead to research and teaching careers for the students, and the projects contribute knowledge to the field. These are $6,000 which goes directly to the students as a student stipend.

**Jack Thomson Bequest** – research into the problems and treatment of arthritis

**Laurenson Bequest** – research into the effects of proper diet and/or drugs on human health

You can read about recent research projects funded in the Scientific Committee report on page 12

## ALLOCATING FUNDS:

All medical researchers are passionate about their work, so to be certain our funding is distributed wisely we have a committee of scientific experts to oversee the process.

The Foundation's Scientific Committee reviews all annual grant and scholarship student projects through rigorous application rounds, choosing the very best each year.

Funding excellent projects and scholarships ensures that students and researchers are able to work in Otago, helping build our community along with focused research outcomes.

## YOUR SUPPORT MAKES A DIFFERENCE

Every one of us has family members and friends who have experienced the benefits of improved health from medical research. We need your help to build our understanding of a wide variety of medical conditions, leading to better diagnosis and treatment for all of us.

**To donate please go to our website www.omrf.org.nz or donate directly to our ANZ bank account Otago Medical Research Foundation 01 0815 0104572 00**

## BEQUESTS

Many people make gifts to charitable causes throughout their life. If you wish to contribute beyond your own lifetime in a way that creates meaning for future generations, you could make a bequest.

A legacy gift in your will is a great way to ensure your generosity benefits others for years to come. By gifting some of your estate to the OMRF, you will be creating a legacy of support for medical research.

"Every person's journey is different, but if you're looking for a practical way to give back and fight the impact of these diseases on individuals and families, the bequest option is a good choice." - *OMRF donor.*

*Medical research is a life changer.*
*Our supporters are life changers.*

# CHAIRPERSON'S REPORT

**2023 GRANTS TOTALLED**
**$471,006**

**TOTAL AMOUNT FUNDED***
**$11,358,620**
*Since the Foundation's inception

## It is with pleasure that I present the 55th Annual Report on the Otago Medical Research Foundation's activities for the 2023 financial year.

During the year under review, the Foundation approved Grants totalling $471,006, an increase of $36,592 on last year's total of $434,414. Since the Foundation's inception, a total of $11,358,620 has been spent on medical research in Otago.

The extract from the Financial Statements, as published elsewhere in the Annual Report, shows a deficit for the year of $193,652 compared with a deficit for the previous year of $180,441, which is $13,211 higher than last year. Total Operating Income (Donations, Bequests, Subscriptions and Investment Income) increased by $145,770, after a downturn in 2022, while Expenses increased by $122,389 and Grant expenditure increased by $36,592. Last year's income included a realised gain of $5,353 on sale of Investments while in the current year there was a gain of $39,919 on disposal of Investments. It would be good to see an increase in the receipt of further injections of capital for investment, which would help to counter the reduced investment rates that we earn on our conservatively invested funds.

The Investment Sub-Committee has continued to face the challenge of finding suitable low risk investments while acknowledging that income and growth are also important. The reinvestment of maturing fixed interest investments remains a major challenge, although it is starting to improve again. It is pleasing to report that at balance date, the market value of our Company Securities and Shares shows an unrealised gain on cost of $1,247,295, which is 63% of cost.

"This year marked the 26th year in which the Otago Community Trust has awarded an Annual Grant to the Foundation"

At 31 March, 2023, Accumulated General Funds has a Deficit of $236,901 and Accumulated Special Funds a Surplus of $4,708,522 yielding a total of $4,471,621, both these figures comprising Capital and Income.

This year marked the 26th year in which the Otago Community Trust has awarded an Annual Grant to the Foundation with the details of grants awarded from this year's funding being published in the Scientific Committee Report. This brings the total grants received from the Otago Community Trust to $1,871,000 a truly generous contribution. On behalf of all members of the Foundation and all Researchers based in Dunedin I would like to sincerely thank the Otago Community Trust for their very generous, and much needed, contributions over the 26 years.

The Foundation is deeply indebted to those people who have named the Foundation as a beneficiary in their wills. Medical research is a never-ending activity, and the role of the Foundation will continue as long as there are medical scientists willing to ask critical questions and people willing to help fund these researchers in their quest for the vital answers. I would ask members to consider the Foundation when preparing their wills. A bequest to the Foundation will be effectively used and your influence will be felt beyond your lifetime.

## COUNCIL MEMBERSHIP

Changes in Council since the 2022 Annual Report are as follows:

We farewelled from Council in December 2022 Appointed Member, Associate Professor Gisela Sole, whose two-year term as President of the Otago Medical School Research Society had just ended. I thank Gisela for her active contribution to Council over those two years. In March 2023 we welcomed to Council her replacement, Associate Professor Shymal Das.

At the August 2022 meeting of Council we farewelled Judy Bevin, an Elected Member of Council, who over her six years on Council had brought many insights to her role and has continued to maintain an active interest in the Foundation. In March 2023 we welcomed Louisa Homersham as a Co-opted Member; Louisa brings financial acumen to Council and an extensive knowledge of the Foundation from her earlier days as part of the Deloitte team that provide secretarial support to the Foundation.

We are still seeking persons to fill the Appointed Member positions representing the Southern District Health Board (re-named Te Whatu Ora Southern) and the Otago University Faculty of Medicine. The latter position needs some adjustment to accomodate changes in structure and to gain wider representation within the University's Division of Health Sciences of other health professions – hence the AGM will consider associated changes to the Foundation's Constitution.

## THANKS

Firstly, to all those Trusts, Companies, Individuals, Members and Non–Members listed in this Annual Report who have supported the Foundation in the year under review. The Foundation is very grateful that it has continued to receive the support that it has in these difficult economic times.

To the Foundation's Director of Development, Susan Sims, and the Foundation's Event Manager, Sarah Rickerby, my sincere and grateful thanks. Susan and Sarah are the faces and voices of the Foundation and their efforts in re-establishing events and continued sponsorship post Covid-19 restrictions are much appreciated. Susan's report can be found on page 9 and Sarah's report on page 22.

To the Scientific Committee and their dedicated Chairperson, Professor Greg Jones, and Deputy Chairperson, Associate Professor Heather Cunliffe, for the many long hours spent on the assessment of and advice on grant applications to ensure a transparent and robust process which ensures the Foundation's funds are used in the best possible way. Thank you; your efforts are really appreciated. Without you all, we would not be able to achieve the object of the Foundation: "The Furtherance of Medical Research in Otago".

To all Council Members, and our Patron, Emeritus Professor Gil Barbezat, for your contribution and support, my sincere thanks for your continued interest in, and work done, for the Foundation. Council Meetings were held on 9 August 2022, 27 October 2022, 13 December 2022, and 7 March 2023 (and since then 11 July 2023).

To the Investment Sub-Committee members, Judy Bevin (until October 2022), Michael Milne, Jamie Adamson and from March 2023 Louisa Homersham, for their wise counsel, advice and time so willingly given to serve on this Sub-Committee, I thank you most sincerely.

To the Deloitte team of Jamie Adamson, Nathan Lee, Josh Aitcheson and Trudy Corbett for continuing to provide very professional, friendly and efficient administrative services for the Foundation. Jamie and Nathan are the face of Deloitte for Council while Trudy works quietly in the background and Josh fills in for Nathan when required, ensuring that the Foundation's day-to-day requirements are attended to in a timely and professional manner which is very much appreciated.

"Medical research is a never ending activity and the role of the Foundation will continue as long as there are medical scientists willing to ask critical questions and people willing to help fund these researchers in their quest for the vital answers."

To my fellow members of the Executive, Greg Jones and Jamie Adamson, who meet monthly or more frequently if required, and with the Director of Development and the Events Manager, to keep things progressing in between Council meetings and scope new initiatives, my grateful thanks.

On behalf of the Council,

**Emeritus Professor Pat Cragg**
*Chairperson*

# THE OTAGO MEDICAL RESEARCH FOUNDATION COUNCIL

## PATRON

**Emeritus Prof G Barbezat**

## EX OFFICIO MEMBERS

**Prof G Jones**
Chairperson of Scientific Committee

**Mr J Adamson**
Deloitte (Secretaries)

**Prof J Baxter** (From July 2022)
Dean Dunedin School of Medicine

**Prof N Gemmell**
Dean Otago School of Biomedical Sciences

**Assoc Prof H Cunliffe**
Deputy Chairperson of Scientific Committee

## APPOINTED MEMBERS

**Assoc Prof G Sole** (to December 2022)
President of the Otago Medical School Research Society

**Assoc Prof S Das** (from December 2022)
President of the Otago Medical School Research Society

## ELECTED MEMBERS

**Emeritus Prof P Cragg**

**Dr M Coleman**

**Mrs S Knowles**

**Mr M Milne**

## CO-OPTED

**Mrs L Homersham**

## EXECUTIVE

**Emeritus Prof P Cragg**
Chairperson

**Prof G Jones**
Deputy Chairperson

**Deloitte representative**
Secretary/Treasurer

## DIRECTOR OF DEVELOPMENT

**Ms S Sims**

## EVENT MANAGER

**Ms S Rickerby**

## SECRETARIES

**Deloitte**

## HONORARY SOLICITOR

**Mr J Anderson** (Gallaway Cook Allan)

## AUDITORS

**Crowe**

# BEHIND THE FOUNDATION

# DR MICHELE COLEMAN

Dr Michele Coleman sees first-hand the pivotal role the Otago Medical Research Foundation has in research, in kick-starting careers, and in making a difference to retaining talent in Dunedin.

The University of Otago Health Sciences Research and Development Manager has been involved with the OMRF for many years, initially through promotion and engagement input, and now as a council member.

Her daily work and in depth knowledge of all of the university's health sciences research gives her a valuable overview of what's being done, where the gaps are, and what researchers need to do their work.

Being involved in the Foundation also brings an outside perspective to her job.

"I'm surrounded by academia – being in the OMRF council and attending its public functions means engaging with the business community which offers new ways of looking at issues."

"National grants are so hard to get – it is challenging to get that untagged money to do basic research. OMRF offers the opportunity to take an idea and test what's possible. "

"I love the role we have as intermediary – in helping the wider community understand the science but also the research process and why studies can take a long time. People might understand the value of health research but so often they're blown away by what we are capable of doing and the sheer range of expertise right here in Dunedin."

"And at the same time, we're taking on board what the business community says, giving me a feel for their problems, expectations and drivers, what they want and if we can tailor or prioritise research to help."

"It allows cross-fertilisation of skills, which challenges, helps our focus and enhances our ability to do meaningful work, to the benefit of everyone. It's a really satisfying part of the job."

She sees daily how OMRF funding has impact.

"National grants are so hard to get – it is challenging to get that untagged money to do basic research. OMRF offers the opportunity to take an idea and test what's possible. The researcher can build on that to then produce a proof-of-concept for a larger funder, one that requires evidence in order to invest in a much broader study or in clinical trials. Or we fill in a gap between funding. Whatever way, it's a vital step both in progressing research big and small, and supporting researchers."

Michele's office manages summer internships and research scholarships, which also gives her a direct view of how the OMRF helps develop careers. "It's about the skills students pick up in their internship, be it writing grants and publication abstracts, which forms a solid foundation. And it's about nurturing a love of science. We have all helped in some small way towards helping a young person to see what they are capable of when they finish their studies."

# OTAGO MEDICAL RESEARCH FOUNDATION MEMBERSHIP

## ORDINARY MEMBERS

Prof W C Abraham
**Ashburn Hall Charitable Trust***
Emeritus Prof G Barbezat
Mr J Burton
**Dr S O Chin***
Dr J I Clayton
Dr A Cook
Mr M Farry
Assoc Prof M Hibma
Mrs L Homersham
Prof I L Lamont
Ms J O'Rourke
Emeritus Prof D.C.G. Skegg
Dr W Sutherland
Dr & Mrs G P White
Assoc Prof S Wilbanks
**Mrs S M Wilkinson***
Mrs N Jones

## RESEARCH PATRONS

Hope & Sons Limited

## LIFE MEMBERS

Mrs J Callon
Cerebos Gregg's Ltd
Mr P Chronican
Ciba-Geigy New Zealand Ltd
Mr S Davie
Donaghys Ltd
Dunedin City Council
Farra Engineering Ltd
Mr & Mrs H Fraser
Dr C M Goodall
Healthcare Otago Ltd
Dr R S Henderson
Janssen-Cilag Pty Ltd
Mr R Lewis
Lions Club Dunedin South
Ms S Mackinlay
Marsh Family Trust
Mr D Marsh
Mrs E Marsh
Mr G J Marsh
Mr W J Marsh
Dr J A McMahon
Mondelez New Zealand
Northern Southland Transport Holdings Ltd
Schering NZ Ltd
Roche Products (New Zealand) Ltd
St Margaret's College Council
Mr I A Thomson
Mr H R Wilson & Mrs N Ellis
Emeritus Prof J G Mortimer

## HONORARY LIFE MEMBERS

Mr G T Adams
Mrs E Brown
Emeritus Prof P A Cragg
Mr K G Dempster
Mr P C L Gibson
Prof J I Mann
Rotary Club of Dunedin South
Rotary Club of St Kilda
Dr C N A & Mrs J Trotman
Prof RJ Walker

* *Indicates Founding Member*

# FUNDS RECEIVED

Events
$38,546


Community Grants and Donations
$327,853

$383,502

Bequests
$17,103

## DONATIONS:

G Barbezat
S O Chin
A Goulding
Hope & Sons
J Hinds
M Kumar
C&E Matheson
Platinum Recruitment
Rosey McConnon
Ross & Bev Middlemass
J Mortimer
Reid Partnership
S Rickerby
S Sims
SpecSavers Dunedin
W Sutherland
Dr & Mrs GP White
S Wilkinson

## GRANTS:

ADEPT-MACTODD Charitable Trust
Aotea Group Holdings Limited
Aotearoa Gaming Trust
Deloitte Dunedin
EMM Haynes Charitable Trust
JAD Iverach Memorial Fund
Lion Foundation
Margaret Begg Charitable Trust
Otago Community Trust
Rotary Club of Taieri
ACE Shacklock CT
Stonelake Foundation
Werribee Trust (Chirnside Family)
William Downie Stewart Charitable Trust

## BEQUESTS:

Ethel Johnston Charitable Trust
Downie Stewart Foundation - Estate of S Bruce
S A Rowley

# A REPORT FROM THE DIRECTOR OF DEVELOPMENT

## The Foundation exists to further medical research in Otago, supporting our local researchers in their innovative work.

Each year we fund annual grant projects; two major bequest project rounds; and for last summer 19 student research scholarships were funded. These scholarships allow the students to work in a lab on a research project through the summer and are highly sought after with 82 applications received for 2022/2023. The students funded often go on to be researchers and clinicians, so we help ensure the future of medical research in our community is bright.

Last year was a challenging year for fundraising, and therefore, for the Foundation, with lower levels of available funding received, particularly from events. We are glad to once again be able to hold our full roster of events and are extremely grateful to all those who have continued their support through this period.

The Scientific Committee, headed by Professor Greg Jones, assesses each and every application for research funding and scholarships, and selects the very best to ensure that the Foundation is supporting the students, researchers and innovative projects which will have genuine impact. I am very grateful for all the work of the committee.

My sincere thanks to the OMRF Council, a committed group of highly skilled governance experts chaired by Emeritus Professor Pat Cragg, who bring a variety of business and academic skills to the OMRF table, and to Sarah Rickerby, our Events Manager.

I also want to acknowledge the excellent behind-the-scenes support provided by Deloitte; considered portfolio management by Craigs Investment Partners, who ensure our financial position is healthy; and Crowe Horwath, our auditors. Thanks also to Walsh & Beck who do great work behind the scenes for us on our website and social media accounts.

To finish, I'd like to thank the individuals, families and trusts for the financial support you give the Otago Medical Research Foundation. With demand for funding increasing for both our scholarships of $6000 and annual grants of up to $40,000, all donations are gratefully received as they add to our ability to help fund research undertaken here in Otago. The genuine interest you take in our work is very heartening and your ongoing generosity is humbling, the researchers truly couldn't do their important, innovative work without you.

**Susan Sims**
*Director of Development*

# OMRF RESEARCHER PROFILE

**RESEARCHER SPOTLIGHT**

## PROFESSOR IAIN LAMONT

### Improving outcomes for cystic fibrosis sufferers with bacterial infections

What exactly happens to the bacteria in the lungs of cystic fibrosis patient when they're treated with common antibiotics, and can antibiotic treatment be improved to better fight infection?

These questions, faced globally by researchers and clinicians treating cystic fibrosis, are being addressed right here in Dunedin by Professor Iain Lamont at the University of Otago's Biochemistry Department in collaboration with Associate Professor Greg Walker and Dr Pummy Krittaphol Bailey at the School of Pharmacy.

Iain, who's had a lifelong interest in understanding the interactions between bacteria and human health, has worked over many years at the University of Otago to build invaluable knowledge on the physiology of bacteria.

Using funds from the Otago Medical Research Foundation and OceanaGold, Professor Lamont has been looking at the bacteria *Pseudomonas aeruginosa*.

He explains infection from *P. aeruginosa* doesn't affect healthy lungs, but is a common cause of chronic infections in cystic fibrosis sufferers. Unfortunately, tobramycin, an antibiotic widely used to treat the infection, is currently more effective when tested in laboratory conditions than it is in eradicating these bacteria when it reaches a patient's lungs.

"It should work, but there is clearly barriers to its effectiveness in mucus-filled lungs and that needs to change to make a difference for the outcomes for cystic fibrosis patients; clinicians would like a better predictor of the clinical effectiveness of antibiotic treatment," he said.

Mucus samples from the lungs of patients show low levels of oxygen, indicating that *P. aeruginosa* bacteria are oxygen-deprived during infection. This could explain why the antibiotic isn't as effective as it should be.

The key to knowing what is occurring and why is understanding bacterial physiology under different growth conditions.

Professor Lamont and his team showed that *P. aeruginosa* contains less tobramycin when it is deprived of oxygen, explaining why the antibiotic is less effective during infection. Having more accurate information on *P. aeruginosa* activity will now open the doors for others to develop more targeted treatments for patients, perhaps such as using hyperbaric oxygen in conjunction with antibiotics.

> "We really appreciate the support from the Otago Medical Research Foundation – it simply allows us to do work we wouldn't otherwise be able to do."

A scientific paper to be published is expected to create international interest.

Further OMRF-funded research is now looking at the genetics of different strains to explain what is going on in much more detail. Understanding gene expression has the potential to provide a powerful next-generation tool for managing life-threatening bacterial infections.

Iain said Dunedin has proved a great place to build a network between the School of Pharmacy, Dunedin Hospital clinicians and an active group of Cystic Fibrosis sufferers. "We really appreciate the support from the Otago Medical Research Foundation – it simply allows us to do work we wouldn't otherwise be able to do."

# FUNDING DISTRIBUTION

*Scholarships, grants, trust grants, Laurenson grants and Jack Thomson grants*

## SUMMER RESEARCH SCHOLARSHIPS

Brain
**$6,000**

Breast Cancer
**$6,000**

Diabetes
**$12,000**

Fertility
**$6,000**

Cancer
**$20,000**

Infection
**$6,000**

Genes/Cells
**$18,000**

Hearing
**$6,000**

Immunity/ Microbiology
**$6,000**

Mental Health
**$6,000**

Oral health
**$18,000**

Prostate Cancer
**$6,000**

## ANNUAL GRANTS & OTAGO COMMUNITY TRUST

Cancer
**$104,000**

Antibiotic Resistance
**$31,000**

Heart Disease
**$42,000**

Kidney
**$31,000**

Blood
**$33,000**

## LAURENSON BEQUEST

Antibiotic Resistance
**$18,000**

Diet
**$19,000**

Heart
**$23,000**

Kidney
**$20,000**

## JACK THOMSON BEQUEST

Osteoarthritis
**$43,000**

Funding distributed financial year ending March 2023

# SCIENTIFIC COMMITTEE REPORT

## *1 July 2022 to 30 June 2023*

## 1. MEMBERSHIP

**Chair: Professor Greg Jones,**

**Deputy Chair: Associate Professor Heather Cunliffe** (Co-opted)

**Associate Professor Hesham Al-Sallami**
(Co-opted)

**Dr Sarah Baird**
(Nominee Otago Medical School Research Society)

**Dr Sierra Beck**
(Nominee Dunedin School of Medicine)

**Associate Professor Chris Brown**
(Co-opted)

**Dr Cathy Chapple**
(Co-opted)

**Dr Tanya Cully**
(Co-opted)

**Associate Professor Shyamal Das**
(President OMSRS, ex officio, 2023)

**Dr Natasha Flack**
(Co-opted)

**Dr Rhodri Harfoot**
(Co-opted)

**Dr Nick Heng**
(Co-opted)

**Associate Professor Rajesh Katar**
(Nominee of the Otago School of Biomedical Sciences)

**Associate Professor Ivan Sammut**
(Co-opted)

**Associate Professor Gisela Sole**
(President OMSRS, ex officio 2022)

**Professor Rob Walker**
(Co-opted)

**Associate Professor Joanna Williams**
(Co-opted)

**Associate Professor Stephanie Woodley**
(Co-opted)

The Scientific Committee is primarily concerned with adjudicating on applications for Research Grants and on applications from students for Summer Research Scholarships. To cover the breadth of topics submitted, the committee is relatively large to ensure it has representatives from all the major sub-disciplines of medical research.

During the last year the Scientific Committee farewelled Professor Gisela Sole, Associate Professors Joanna Williams, Stephanie Woodley and Dr Sarah Baird. The Foundation thanks them for their invaluable contributions to the Committee.

The many research applications submitted to the Scientific Committee in 2022-23 continued to be of an outstanding quality. Unfortunately, many excellent projects were unable to be supported due to limited funds.

Please note that most, but not all research projects, have protocols that require approval by the appropriate Ethics or Safety Committee prior to commencement of the research. Agreement by the Foundation to fund research projects is thus subject to receipt by the Chair of the Scientific Committee of a letter from the University of Otago's Animal Ethics Committee, Human Ethics Committee or Human Ethics Committee (Health) (or the Ethics Committee of a Health Funding Authority) indicating that the research has received full ethical approval. Work involving genetically modified organisms requires evidence of approval from ERMA or from the University of Otago's Institutional Biological Safety Committee.

The Otago Medical Research Foundation has continued its commitment to openness on the use of animals in health research as a signatory of The Openness Agreement on Animal Research and Teaching in New Zealand, and has provided its first report on progress to **ANZCCART**.

The Foundation recognises the important contribution that animal research has made to the advancement of modern medicine. Some of the research projects funded by the Foundation may involve animals and we are committed to only supporting studies that maintain high standards of animal welfare and adhere to the ethical tenants of refinement, reduction and replacement.

> The scientific activities of the Foundation (advertising of up-coming grants and listings of awards) can be found on **www.omrf.org.nz**

# 2. SUMMER RESEARCH SCHOLARSHIPS 2022/2023

Eighty two applications (compared with 142 the previous year) for an OMRF summer research scholarship were received from the University of Otago in late August 2022, of which 19 (compared to 23 in the preceding year) were recommended for funding by the OMRF. It should be noted that the ten-week summer research is not part of the study required in a student's tertiary qualification and any data obtained during the summer research cannot contribute to the dissertation or thesis of such a qualification.

Each OMRF scholarship was worth $6,000 except for the two students with the highest scores who were awarded named Summer Research Scholarships at $7,000 each– named in honour of the late Allan Wilkinson and the late Emeritus Professor Garth McQueen. Allan was Secretary of the Foundation from its inception in 1967 until his retirement in 1993 and Garth was a foundation member of the Foundation and one of the instigators of the formation of the Foundation's Auxiliary.

Due to the continuing sponsorship drive of the OMRF, the other OMRF scholarships were funded by: Stonelake Foundation; Dr Ailsa Goulding; Walsh & Beck; Deloitte Dunedin; OMRF Wilkinson; OMRF McQueen; OMRF Iverach; Aotearoa Gaming Trust; C&E Matheson; Platinum Recruitment; Rosey McConnon; Middlemass Family; S Sims; the Taieri Rotary Club; the Werribee Trust. The involvement of Otago commercial companies and the Otago community for an eleventh year in supporting summer research by tertiary students is very much appreciated.

The OMRF summer research scholars also attended a very successful two-day Workshop in Science Communication, run specifically for the OMRF by the University of Otago's Centre for Science Communication. One outcome of the workshop was the production of short videos about each research project, which can be accessed via the OMRF web site: **www.omrf.org.nz**

All scholars returned excellent reports at the end of February 2023. The Renshaw Prize ($250) for the best report was jointly awarded this year to **Thomas Noble-Campbell** (who worked under the guidance of Associate Professor Peter Cathro in the Department of Oral Rehabilitation, School of Dentistry, University of Otago) and **Annabel Walsh** (who worked under the guidance of Dr Matthias Fellner, Department of Biochemistry University of Otago).

The following is a list of the summer scholars and summaries of the projects undertaken – additional information on these projects can be obtained from the Chair of the OMRF Scientific Committee or from the supervisor concerned.

# RENSHAW PRIZE WINNERS

***The Renshaw Prize is named after one of the founders of the Otago Medical Research Foundation Inc., the late Dr P.K. Renshaw. The prize of $250 is awarded to the Summer Research Student, who in the opinion of the Scientific Committee, amongst the Research Scholars supported, has made the most worthwhile contribution to medical research in that particular year.***

***In recognition of their contribution, prize winners' names are listed below:***

1970 - Mr A.G. Yule
1971 - Mr K.J. Davey
1972 - Mr F.M. Patrick
1973 - no award
1974 - Mr J.C. Montgomery
1975 - Mr A.S. McLean
1976 - Mr N.K. Given
1977 - Miss F.M.F. McQueen
1978 - Mr K.D. Jolly and Mr J.P. Scott
1979 - Mr R.A. Henderson
1980 - Mr D.W. MacFarlane and Mr D.W. Shaw
1981 - Mr N.E. Dickson and Mr Wong Ooi
1982 - Miss C. Page
1983 - Mr I.L. McLean
1984 - Mr I.L. McLean
1985 - Miss B.C. Galland
1986 - Mr R.G. Snell
1987 - Mrs T.E. Inder
1988 - Miss M. Kuipers
1989 - Miss E.R. Dennett
1990 - Miss A. Charlton
1991 - Mr B. McKenzi
1992 - Mr J.W. Corboy
1993 - Ms S.M. Dillon
1994 - Ms N. Dalbeth
1995 - Mr T. Zaharic
1996 - Mr M. Morrison
1997 - Mr A. Brown and Ms S. Safari
1998 - Mr J. Magnum
1999 - Ms J. Pitchforth and Ms A. Steyn
2000 - Mr J. Wales
2001 - Mr M. Rahimi
2002 - Ms S. Jordan
2003 - Ms E. Szymlek-Gay
2004 - Mr D. Kieser
2005 - Mr C. Young
2006 - Mr C. Young
2007 - Mr S. Smart
2008 - Ms S. Saunderson
2009 - Ms J. Lee and Ms E. Winsley
2010 - Mr J. Zhang
2011 - Miss E. Gavey, Mr E. Ottley, and Mr W. Parkyn
2012 - Miss Su Zhou
2013 - Nr Fly Ing-Aram
2014 - Katie Hoeksema and Deepa Mistry
2015 - Alice McSweeney
2016 - Nigaah Khan and Isabelle van Hout
2017 - Sashika Samaranayaka
2018 - Simone Thomas
2019 - Eleni Hackwell
2020 - Nathan MacDonell
2021 - Ella Macbeth
2022 - Sarah Barber
2023 - Thomas Noble-Campbell and Annabel Walsh

## THOMAS NOBLE-CAMPBELL

Supervisors: Associate Professor Peter Cathro and Dr Finn Gilroy, Department of Oral Rehabilitation, Dr David Roessler, Dean's Office and Dr Malcolm Dacker, Department of Oral Diagnostic and Surgical Sciences, Faculty of Dentistry

***Renshaw Prize (joint) Winner for the best OMRF summer research scholar report***

### PROJECT: In plane sight: assessing root canal length using three-dimensional X-ray imaging; a pilot study

*Funder: Aotearoa Gaming Trust*

**ABSTRACT:** The aims of this study were to 1) evaluate the accuracy of canal lengths measured using two three-dimensional X-ray measurement approaches and 2) provide the first report on the canal configurations of M□ori lower first molars. Fourteen extracted New Zealand European and M□ori lower first molars were analysed. Canal lengths and configurations were recorded using each approach. No significant difference was observed between measurement approaches. Compared to actual root canal length, one method (axial view) had a higher proportion of measurements accurate within ±0.5mm. M□ori first molars presented most commonly with four canals. Vertucci type IV and II configurations were most common in the mesial (75%) and distal canals (50%), respectively. Axial canal length measurements may be more clinically accurate in mandibular first molar teeth.

## ANNABEL WALSH

Supervisor: Dr Matthias Fellner, Department of Biochemistry, School of Biomedical Sciences

***Renshaw Prize (joint) Winner for the best OMRF summer research scholar report***

### PROJECT: Developing new treatment tools for bacterial infections

*Funder: Aotearoa Gaming Trust*

**ABSTRACT:** The FphH protein from the disease-causing bacteria, *Staphylococcus aureus*, has been identified as an enzyme associated with biofilm formation. Biofilm formation is a process by which bacterial cells secrete a sticky substance around their growing population, shielding them from the attack of an infected person's immune system or antibiotics taken to treat the infection. FphH has shown potential as a target for new antibiotic development, requiring knowledge about the structure and function of the enzyme for medications to be developed in the future. To characterise FphH, the substrate preference was investigated as well as the activity of a suspected inhibitory compound, and antibiotic, fusidic acid. To connect these observations, an in-depth search of the available publications referencing FphH was carried out. FphH was found to be a lipase, an enzyme which breaks down fats, that was inhibited by Compound 3 and unaffected by fusidic acid.

## NICHOLAS ANDERSON

Supervisor: Dr Michael Pankhurst, Department of Anatomy, School of Biomedical Sciences

### PROJECT: Does the speed of egg development in the ovary affect its quality?

*Funder: Deloitte Dunedin*

**ABSTRACT:** In the ovary, eggs mature inside ovarian follicles. As the egg develops, the fastest growing follicle in the ovary will become dominant and ovulate. Good eggs are important for a successful pregnancy and for IVF success rates. Naturally, ovulated eggs usually are the best quality and have the highest chance of resulting in pregnancy. It has been suggested that the fastest growing follicles contain good quality eggs. This research examined whether we can predict the quality of eggs based on how quickly the follicles grew in culture. No relationship was found between growth speed and egg quality. This suggests that other factors in the ovary are at play in determining and selecting good eggs. Further research in this area is important for improving the success of IVF and assisting those experiencing infertility.

## ISABEL AYORA

Supervisors: Dr Megan Wilson and Dr Mick Watt, Department of Anatomy, School of Biomedical Sciences

### PROJECT: Long lasting disruption to neurocircuitry following adolescent stress: role of epigenetics

*Funder: Don Sims Memorial*

**ABSTRACT:** Stress during adolescence has lasting impacts on the functioning of the adult brain. This study used an animal model to investigate how these lasting impacts might reflect changes to the control of a key gene, DAT1, and whether these changes differed between males and females. DAT1 is responsible for the through measurements of relative DAT1 expression compared between isolated and control rats (kept in pairs), a significantly greater expression of DAT1 was identified in the isolated rats. There was no evidence that this effect differed between male and female rats. These findings are limited by the small number of rats available for analysis, especially female control (paired) rats (of which there was only one). Conclusions about the mechanism for this increased DAT1 expression are still on hold until the converted sequences of the key DAT1 control regions are returned for analysis.

## RHEA BHIDE

Supervisors: Professor George Dias, Department of Anatomy, School of Biomedical Sciences and Associate Professor Harsha De Silva, Department of Oral Diagnostic and Surgical Sciences, Faculty of Dentistry

### PROJECT: Site of the lingual nerve in the third molar region in New Zealand European

*Funder: Aotearoa Gaming Trust*

**ABSTRACT:** Injury to the lingual nerve, which provides sensation to the tongue and various other oral structures, can have detrimental effects. Its close proximity to the mandible makes it vulnerable in various dental and oral surgical procedures, including wisdom tooth extractions. Hence, lingual nerve protection is vital. Adequate nerve protection requires precise knowledge of the site of the nerve, which is not always consistent with textbook descriptions. Research is essential in discovering key anatomical differences specific to certain populations. This study focussed on the New Zealand European population. Data gathered via cadaveric dissections were used to estimate the location where the lingual nerve runs closest to the inner surface of the mandible in relation to three clinically distinct bony landmarks. The study produced a practically applicable guideline clinicians can utilise to estimate the anatomical position of the lingual nerve and thus mitigate the risk of inadvertent nerve damage.

## VENUS CAHUSAC DE CAUX

Supervisors: Professor Peter McIntyre, Associate Professor Ben Wheeler and Dr Alisa Boucsein, Department of Women's and Children's Health, Dunedin School of Medicine

### PROJECT: Using automated technology to improve outcomes for adolescents and young adults with type 1 diabetes

*Funder: Aotearoa Gaming Trust*

**ABSTRACT:** New automated technology is revolutionizing management of type 1 diabetes through both confining blood glucose levels to a healthy range and reducing the overall burden of treatment. This study of 20 participants aged 13-25 years, used the Medtronic 780G advanced hybrid closed loop (AHCL) system that both measures glucose and doses an appropriate amount of insulin to maintain glucose levels in a healthy range. We showed improvements in glucose control over a period of 6 and 9 months, with glycated haemoglobin (HbA1c) lowering by 33.3%. Maintaining tight control on glucose levels reduces the lifelong risks of diabetes complications, thus this new system has potential to alter the course of disease for those living with type 1 diabetes.

"Research is essential in discovering key anatomical differences specific to certain populations"

## NATASHA DRUMMY

Supervisors: Professor Peter Fineran and Dr Rob Fagerlund, Department of Microbiology and Immunology, and Dr Laura Gumy and Dr Macarena Pavez, Department of Anatomy, School of Biomedical Sciences

### PROJECT: CRISPR-Cas technologies for therapeutic outcomes

*Funder: Otago Medical Research Foundation McQueen*

**ABSTRACT:** Silencing of particular genes may hold therapeutic potential if those genes are involved in pathology or are inhibitory for cellular repair pathways. CRISPR-Cas systems can be used to silence genes, but their therapeutic use in this manner has been limited. Here, we have initiated work to generate expression vectors and develop proof-of-concept data to test whether newly characterised CRISPR-Cas systems may have therapeutic potential in eukaryotic cells. Multiple plasmids were constructed and transfection experiments into eukaryotic cells were initiated.

## HARRY GARDNER

Supervisors: Professor Cliff Abraham and Dr Shruthi Sateesh, Department of Psychology, Division of Sciences

### PROJECT: Neurotransmitter regulation of a memory mechanism

*Funder: C&E Matheson*

**ABSTRACT:** The brain works on electrical impulses, and the ability of brain cells to change this electrical conductivity underpins learning and memory. The ability of certain regions of the brain to learn can be influenced by prior electrical activity in completely separate areas of the brain. This is termed metaplasticity and is a crucial memory mechanism which appears to be dysregulated in neurodegenerative diseases such as Alzheimer's. I investigated the trigger of this effect by replacing this prior electrical activity with a chemical which acts like the one that starts this chain reaction. I found a difference in the trigger of the mechanism compared to other major brain memory regions. These novel data help further understand the complexity of this strange phenomenon. This is crucial because understanding these processes helps us generate treatments for diseases such as Alzheimer's which have rising incidence rates due to our ageing population.

## MADDIE HARDIE BOYS

Supervisor: Dr Daniel Pletzer, Department of Microbiology and Immunology, School of Biomedical Sciences

### PROJECT: DNA-binding proteins as potential drug targets in *Pseudomonas aeruginosa*

*Funder: Middlemass Family*

**ABSTRACT:** *Pseudomonas aeruginosa* is a top priority bacterium, causing infections in the urinary tract, lungs, and wounds. It causes especially high death rates in people with cystic fibrosis and is highly resistant to multiple antibiotics. It has a variety of mechanisms that contribute to its high

drug resistance and infectivity, including the ability to clump together and adhere to surfaces such as the airways or medical equipment. The aim of this research project was to delete two genes, hypothesised to be involved in these mechanisms, and analyse the effects of these deletions on the bacterium. If the deletions reduced infectivity, then these genes are possible new drug targets. A screening process identified potential isolates with both genes deleted, but confirmation tests revealed that they had reverted to a wild-type phenotype.

## GRACE KELLY

Supervisors: Dr Anurag Singh, Associate Professor Yiwen Zheng and Professor Paul Smith, Department of Pharmacology and Toxicology, School of Biomedical Sciences

### PROJECT: Hippocampal long-term potentiation in response to tinnitus in rats

*Funder: Taieri Rotary Club*

**ABSTRACT**: Tinnitus occurs when sound is heard in absence of an external sound stimulus. This common condition can lead to insomnia, anxiety, and depression. Tinnitus is thought to be caused by the failure of a "noise cancellation" system in the brain to prevent unwanted sound from being consciously perceived. To further understand how this occurs, this project investigated the ability of neurons to communicate with each other in a specific brain region called the hippocampus, which is part of the "noise cancellation" system, in an animal model of tinnitus. In this animal model, tinnitus was induced by exposing the animals to acoustic trauma. It was found that animals that received acoustic trauma had an increased strength of communication in the hippocampus compared to the control. This suggests that increased neural communication inside the hippocampus may contribute to the failure of the cancellation of tinnitus sound in the brain..

## ERIN PORTER

Supervisors: Dr Magda Ratajska and Dr Suzan AlMomani, Department of Pathology, Dunedin School of Medicine

### PROJECT: An investigation of the differential methylation of certain genes and their potential to aid early diagnosis of lung cancer

*Funder: A Goulding*

**ABSTRACT**: Lung cancer is the leading cause of global cancer-related mortality with M□ori as the most affected ethnic group at the highest incidence and mortality. Lung cancer is associated with DNA methylation, a molecular mechanism of gene silencing of gene promoters, which plays a vital role in the development of a variety of cancers. We hypothesised that because methylation plays an important role in lung cancer progression and if differential methylation could be found for the genes we investigated, that could present them as potential early diagnostic tools. We investigated the methylation status of multiple genes in lung cancer and normal cell samples, and found that every gene tested was differentially methylated with statistical significance. Overall, this is a step toward finding new and promising biomarkers to aid in early diagnosis of lung cancer.

## YANI REMOTO

Supervisors: Dr Andrew Reynolds, Fiona Hood, and Professor Jim Mann, Department of Medicine, Dunedin School of Medicine

### PROJECT: The Healthy Heart Study

*Funder: Platinum Recruitment*

**ABSTRACT**: Non-communicable disease numbers continue to increase, with coronary heart disease (CHD) causing the most illness and death. Thus, we must prevent it and improve current treatments. One way to do so is by looking at what we eat, as it is a major risk factor for CHD. The Healthy Heart Study investigates the benefits of 12-week delivery of free healthy groceries – either high in fibre or high in healthy fats – to those who recently had a major heart event such as a heart attack. My project is an initial analysis of this ongoing study, looking at fat levels in the blood, weight, body mass index (BMI), body fat percentage, blood sugar and diet satisfaction after 12 weeks for 102 participants. Results from this project suggest some changes, but completion of the study is needed to quantify these changes. Findings in this study will help form innovative management of CHD.

## ALICE ROBINSON

Supervisors: Dr Silke Neumann and Dr Sharon Pattison, Department of Medicine, Dunedin School of Medicine

### PROJECT: Investigating a novel target for gastric cancer therapy

*Funder: Walsh & Beck*

**ABSTRACT**: Gastric cancer is the fifth most common cancer in Aotearoa. M□ori and Pasifika experience younger diagnoses and worse outcomes compared to NZ Europeans. We identified a protein complex controlling immune responses in gastric cancer together with the immunoproteasome. This breaks down intracellular proteins, prolonging inflammation in several cancers through effects on immune cells within the tumour. It is unclear why this complex improves survival in some cancers but worsens outcomes in others. In this project, we examined the role of the immunoproteasome in gastric cancer's immune response, and whether it is a suitable cancer therapy target. We did not detect statistically significant differences in immune responses toward gastric cancer cells with decreased immunoproteasome subunit expression. However, we found a trend of decreased immune cell migration towards cancer cells in intestinal type gastric cancer with decreased expression of immunoproteasome subunits, but conversely, increases in immune cell migration in the diffuse type.

## POLINA SHEVCHUK

Supervisors: Dr Magda Ratajska and Dr Sunali Mehta, Department of Pathology, Dunedin School of Medicine

### PROJECT: The effect of an uncharacterised mutation in a tumour suppressor on cell responses

*Funder: Werribee Trust*

**ABSTRACT:** The protein p53 normally prevents damaged cells from turning into cancers, however, it is mutated in about half of all human cancers causing it to lose its function. Although it is frequently mutated, it is not yet understood how each p53 mutation specifically influences the biology of the cancer cell. One mutation causes significantly worse patient outcomes compared to patients with commonly studied p53 mutations, but it is not yet known why. This project created this singular mutation and showed it causes the cell to respond as if the protein is completely absent from the cell, even though this mutation is the only thing different about the p53. This forms a basis for future studies in understanding exactly what changes happen to the cell when this mutation is present.

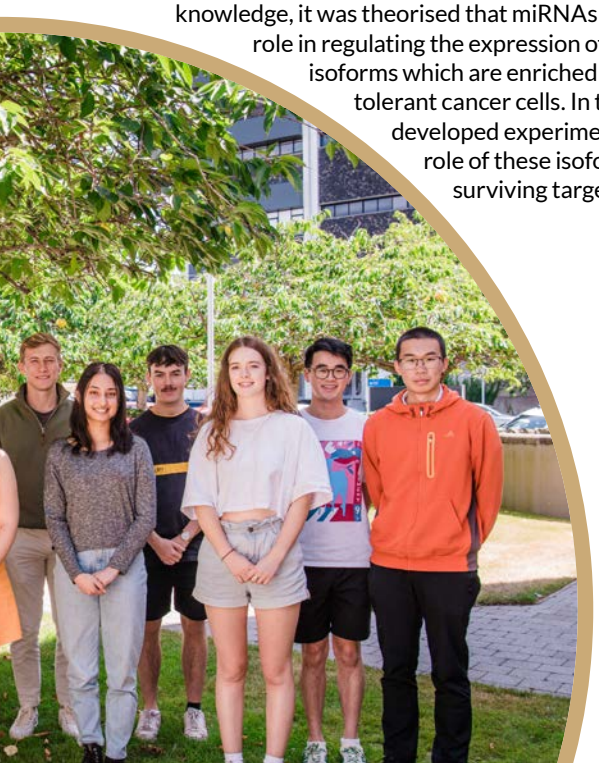
## ZOE VAN WIJK

Supervisors: Dr Glen Reid and Dr Cath Drummond, Department of Pathology, Dunedin School of Medicine

### PROJECT: Regulation of oncogenic p53 isoforms by micro-RNA

*Funder: Otago Medical Research Foundation Wilkinson*

**ABSTRACT:** An issue that often occurs in the treatment of cancer is drug resistance following targeted therapy. Recently, it has been found that isoforms of the p53 tumour suppressor protein are highly expressed in cells surviving targeted therapy and contribute to relapse. These isoforms are proteins with sequence variations to the full-length p53 protein, and importantly have differing 3' untranslated regions (UTRs) at one end of the messenger RNA (mRNA). Micro-RNAs (miRNA) are RNA molecules that bind to mRNA at the 3'UTR region and downregulate the expression of the subsequent protein. With this knowledge, it was theorised that miRNAs could play a role in regulating the expression of the Δ133p53 isoforms which are enriched in drug-tolerant cancer cells. In this project, I developed experiments to test the role of these isoforms in cells surviving targeted therapy.



## STORM VOYCE-MCCULLOCH

Supervisor: Associate Professor Liz Ledgerwood, Department of Biochemistry, School of Biomedical Sciencess

### PROJECT: Understanding how changing the shape of an antioxidant protein affects its function

*Funder: Stonelake Foundation*

**ABSTRACT:** Peroxiredoxins are an enzyme family important in cellular processes due to their range of functions, namely the removal of reactive oxygen species. Altered activity of peroxiredoxins has been implicated in disease development such as cancer. Peroxiredoxins exist as two structures: one smaller, made of two parts, and the other a larger, ring-like structure. No methods are available to study the relationship between the different structures of peroxiredoxin and their activity in cells. Nanobodies are a new tool in the research of proteins and have previously been fluorescently tagged and used to study proteins in cells. This project has made progress in the development of nanobodies specific to peroxiredoxin, through introducing two mutations into the nanobody sequence. This sequence in future can be used to express mutant peroxiredoxin specific nanobodies, that can be fluorescently tagged, and used to study how peroxiredoxin structures relate to their activity in the cell.

## GRAYSON WASS

Supervisors: Professor Rathan Subramaniam, Department of Medicine and Dr Kari Clifford, Department of Surgical Sciences, Dunedin School of Medicine

### PROJECT: Investigating the use and prognostic value of PET scans in patients with prostate cancer

*Funder: Otago Medical Research Foundation - Iverach*

**ABSTRACT:** Prostate cancer (PCa) is an uncontrolled growth of cells in the prostate gland, which can later spread to other areas of the body. During diagnosis, nuclear medicine imaging such as PSMA (prostate-specific membrane antigen) positron emission tomography (PET) can help stage the cancer and determine the best options for treatment. PSMA PET is a new imaging technique which is more accurate for staging PCa compared to conventional imaging. This study analysed the demographic and clinical characteristics of NZ PCa patients who received PSMA scans. We found that patients living in Auckland had the most PSMA (prostate-specific membrane antigen) scans (41.3%). Of the patients who received scans, 85.4% were European and 8.9% were M□ori/Pacific. We found that patients living in the South Island were 0.78 times (CI 0.62-0.99); p = 0.038) as likely to be diagnosed at a public hospital, compared to patients in the North Island, highlighting potential differences in the availability of public healthcare.

## JOSHUA YOUNG

Supervisors: Dr Carolina Loch and Professor Dawn Coates, Sir John Walsh Research Institute, Faculty of Dentistry

### PROJECT: A natural model for unravelling the complexity of tooth development

*Funder: Rosey McConnon*

**ABSTRACT:** Enamel is the outermost layer of mammalian teeth. In humans, enamel has a complex structure. Enamel development disturbances can simplify structure and cause diseases, compromising oral and general health. However, in dolphins, different types of enamel structure are naturally occurring - from complex to extremely simple.

Two key proteins important in human enamel development are Runt-related transcription factor 2 (RUNX2) and Kallikrein-related peptidase-4 (KLK4); the presence of these proteins are yet to be confirmed in dolphins.

We conducted experiments to confirm whether RUNX2 and KLK4 are present in Common dolphins. We identified KLK4, but RUNX2 could not be confirmed. These findings confirm dolphin tissues are viable natural models to study enamel development and structural differences. This project provided foundations for future investigation of key enamel development proteins, and how they may influence enamel structure.

## BOCHEN ZHU

Supervisor: Dr Adam Middleton, Department of Biochemistry, School of Biomedical Sciences

### PROJECT: Targeting the undruggable: investigating small peptide modulators of E2 ubiquitin conjugating enzyme

*Funder: C&E Matheson*

**ABSTRACT:** PProteins are one of the fundamental building blocks of cells. When proteins are not needed or become dysfunctional, they are tagged with a molecule called ubiquitin which signals the cell to degrade these proteins. This project focused on E2 ubiquitin conjugating enzymes which catalyse the central step of ubiquitin transfer. Abnormal E2 enzymes have been found in various types of cancer. So, blocking these enzymes could be beneficial for cancer treatment. Recently, the Middleton lab discovered four small molecules called peptides that could bind to E2 enzymes. However, whether these peptides would block the activity of E2 enzymes was not determined. So, in this project, we used well-established biochemistry methods to investigate the effects of peptides on E2 enzyme activity. Three peptides stopped the E2 enzymes from transferring ubiquitin. These peptides will be used in future experiments to further investigate peptide-E2 enzyme interaction and could eventually be developed into therapeutics.

# 3. RESEARCH GRANTS AWARDED

## (A) ANNUAL GRANTS AND OTAGO COMMUNITY TRUST GRANTS

These one-year grants are for research concerned with human health and the scientific basis of medicine. In June 2022 there were 25 applications from the University of Otago (compared with 31 the previous year) totalling $804,000 and eight of these were funded at a total expenditure of $248,000 of which $80,000 was provided most generously by the Otago Community Trust. These grants commenced between August and October 2022 and are nearing completion with full reports due 3 months after the one-year grant ends. Abstracts from the final report will be available on the OMRF website **www.omrf.org.nz** at the end of 2023. The funded projects are summarised below:

### (I) ANNUAL GRANTS

#### Dr Abigail Bland

(Department of Pharmacology & Toxicology, School of Biomedical Sciences, University of Otago )

**Using carbon monoxide to prevent doxorubicin-induced cardiotoxicity.**

*Sponsored by Aotea Holdings Group*

Doxorubicin remains one of the most commonly used chemotherapies for cancers, including triple negative breast cancer. Although doxorubicin provides effective cancer treatment, it can inadvertently produce severe heart damage. However, reducing the dose or discontinuing treatment risks accelerated tumour progression and premature death. As low doses of carbon monoxide have been shown to be cardioprotective, this project will explore a safe carbon monoxide-releasing molecule to prevent heart damage from doxorubicin.

#### Dr Robert Day

(Department of Biochemistry, University of Otago )

**Novel, cost effective solutions for equitable tumour mutational burden testing in NZ**

*ADEPT MACTODD Charitable Trust*

Cancer is New Zealand's biggest killer and targeting effective therapies to patients who are likely to benefit will improve outcomes. The number of DNA changes in a tumour can predict how well a person will respond to therapies that induce the patient's own immune system to attack the cancer. Current genomic profiling methods used to estimate mutational changes are costly, time consuming and inaccessible to many New Zealanders. Here we aim to develop and implement more efficient methods that will facilitate improved and equitable cancer care.

## Professor Iain Lamont
(Department of Department of Biochemistry, University of Otago)

### Role of a cytochrome oxidase in making *Pseudomonas aeruginosa* tolerant to antibiotics

*Sponsored by OceanaGold*

*Pseudomonas aeruginosa* is an extremely problematic bacterial pathogen, causing a wide range of infections. Antibiotics often fail to eradicate the bacteria. During infections *P. aeruginosa* often exists under conditions where little or no oxygen is present. We have identified a protein that helps the bacteria to resist a key antibiotic, tobramycin, during growth in the absence of oxygen. In this research we will investigate how this protein helps the bacteria resist tobramycin. The research could lead to more reliable methods for predicting which antibiotics will be effective in treating *Pseudomonas* infections, and in the long-term much-needed new tools for treatment.

## Associate Professor Elizabeth Ledgerwood
(Department of Biochemistry, University of Otago )

### How does mutation of cytochrome C cause low platelets?

*Sponsored by Margaret Begg Charitable Trust*

Platelets are small blood cells that are essential for clotting and repair of damaged blood vessels. When people have low platelets (e.g. following chemotherapy) they require platelet transfusions. Because donated platelets have a short shelf life, scientists worldwide are trying to develop new ways of producing platelets. This requires us to fully understand how platelets are normally made. Studying people with inherited low platelets helps us understand how human platelets are made. We have identified NZ families with mutations that cause low platelets. We will determine how these mutations change platelet production. By enhancing our understanding of platelet formation, we will help international efforts identifying new therapeutic approaches for treating low platelets.

## Dr Glen Reid (Department of Pathology, Dunedin School of Medicine, University of Otago )

### Switching from tolerance to resistance: are ncRNAs the missing link?

*Sponsored by Aotearoa Gaming Trust*

Cancer treatment has been revolutionised by targeted therapeutics which act by blocking the pathways that drive cancer. However, despite initial dramatic results, relapse is inevitable and a major clinical problem. Recent studies have identified a rare population of drug-tolerant cells as being largely responsible for relapse. These cells evade therapy and become permanently resistant by acquiring mutations. Here we will determine how drug-tolerant cells gain the mutations which allow them to permanently evade therapy. By understanding how drug-tolerant cells become permanently resistant our long-term goal is to prevent their contribution to relapse and improve treatment outcomes for cancer patients.

## (II) OTAGO COMMUNITY TRUST GRANTS

*The Otago Community Trust supports biomedical research in the Otago area with the proviso that the research is selected on topics that can relate well to issues understandable by the layperson. The three projects selected were:*

## Dr Hamish Aitken-Buck
(Department of Physiology, School of Biomedical Sciences, University of Otago)

### Examining the relationship between epicardial fat and heart health of post- menopausal women

The thickness of fat surrounding the heart and the risk of heart disease both increase markedly in women after menopause. How changes in heart fat might contribute to heart disease processes is unknown. Using human samples, this project aims to determine whether fat deposits and formation of scar tissue within the hearts of post-menopausal women is linked to differences in fat metabolism and expression of pro-scarring factors within heart fat. The insights gained from this research will fill important gaps in the understanding of why a woman's heart becomes more susceptible to disease after menopause.

## Professor Mike Eccles
(Department of Pathology, Dunedin School of Medicine, University of Otago)

### Development of a dual action molecular targeting construct for the treatment of ADPKD

Autosomal dominant polycystic kidney disease (ADPKD) is one of the most common inherited fatal diseases in humans, affecting about 1 in 1000 people. Multiple members of one family can be afflicted, with devastating consequences. Tolvaptan is the only available treatment for ADPKD, although it has severe side-effects. We, and others, have shown that lowering the expression of certain genes that promote cyst growth can slow disease progression. In this proposal we will test a molecular approach that targets two of these gene products at once, *PAX2* and miR-17. Developing ADPKD-specific treatments is the key to slow cyst formation and delay kidney failure.

## Professor Ian Morison
(Department of Pathology, Dunedin School of Medicine, University of Otago)

### A NZ family to reveal pathways of B-cell immunity and cancer

Naturally occurring genetic variants within families provide an opportunity to reveal the pathways of human disease. We are studying a NZ family with Otago members who have a specific genetic mutation that predisposes them to autoimmune destruction of their own platelets, but also appears to predispose them to cancers of the immune system. Two members of the family have, at a young age, developed cancers of immune cells. While mouse experiments have shown disturbed immune cell development, humans are different and this family provide an opportunity to determine the role of the affected gene (MYB) in human health and disease.

## (B) LAURENSON AWARDS

Laurenson Awards are one-year grants for research concerned with the effects of diet and/or drugs on human health. In December 2022 there were five applications requesting $109,852, with four grants being funded to a total of $80,256. These grants commenced before 1 March 2023 and final reports are due at the end of April or May 2024. Abstracts from the final report will be available on the OMRF website **www.omrf.org.nz**. The funded projects are summarised below:

### Associate Professor Katherine Black
(Department of Human Nutrition, University of Otago)

#### Continuous glucose monitors (CGMs) as a novel tool for RED-S

Around half of our young active females are putting their health at serious risk, due to inappropriate diets. Yet there is no tool to identify the problems before dire health consequences occur. However, the relatively new technology of continuous glucose monitoring, originally developed for diabetics, could provide useful information before serious health problems develop. We will test the ability of continuous glucose monitors to detect differences between women with low energy and/or carbohydrate intake, and healthy women. If these monitors are accurate, clinicians and researchers working with active females will have a validated tool to facilitate health management amongst this vulnerable population.

### Dr Sherly Parackal
(Centre for International Health, University of Otago)

#### Diet, activity, and medicine usage in South Asians at risk of cardiovascular disease

Cardiovascular disease (CVD) is the most potent killer in New Zealand (NZ) with NZ South Asians (SA) being one of the three high-risk groups. Nevertheless, targeted prevention measures for NZ SAs are glaringly negligible. Poor dietary habits and sedentary lifestyles are strongly associated with CVD as is poor medicine usage among SAs with diabetes, a risk factor for CVD. International research demonstrates the importance of first gaining an understanding of health beliefs, knowledge, and behaviours related to diet, physical activity, and medicine usage before designing ethnic-specific interventions to reduce CVD burden. We aim to gain this understanding for SAs in NZ, which is not known.

### Dr Daniel Pletzer
(Department of Microbiology and Immunology, University of Otago)

#### Liposomal drug therapy to treat bacterial infections

Antibiotic resistance is rising rapidly and there are relatively few novel compounds or strategies under development or entering the clinic. Our research will address these issues by investigating liposomes, small vesicles made from membrane lipids. Liposomes have traditionally been used as lipid-based drug delivery systems, but recently been shown to work as stand-alone drug therapy to neutralise toxins from pathogenic bacteria. In this project, we will assess the utility of liposomes to attack and disarm two important pathogens, *Staphylococcus aureus* and *Acinetobacter baumannii*. In New Zealand, both have emerged with limited antimicrobial treatment options and pose a significant threat to healthcare. The long-term goal of our research is to abrogate the adverse effects of antibiotics on the human body and prevent further development of antimicrobial resistance.

### Dr Luke Wilson
(Department of Medicine, University of Otago)

#### Effects of empagliflozin in individuals with non-diabetic stage 4 chronic kidney disease

Sodium glucose 2 cotransporter inhibitors (SGLT2I) are recent medications that improve glucose control in individuals with type 2 diabetes. They also have a positive impact on the heart, blood vessels and kidneys not only in diabetics but non-diabetic individuals as well. This project will investigate the activity and the effect of empagliflozin (a SGLT2I) in individuals who do not have type 2 diabetes with advanced chronic kidney disease known as stage 4. Empagliflozin has not previously been studied at this level of impaired kidney function. We will look at its activity within the body and the body's response to the drug; with a focus on analysing the cardiovascular and renal response.

## (C) JACK THOMSON ARTHRITIS FUND

This OMRF fund was established in 2011 and was made possible by a bequest from the late Jack Thomson. In December 2022 there were five applications requesting $126,722, (cf. four in the previous year), with two grants being funded, totalling $42,754. Both grants commenced before 1 March 2023 and final reports are due at the end of April or May 2024. Abstracts from the final report will be available on the OMRF website **www.omrf.org.nz**. The funded projects are summarised below:

### Dr Cathy Chapple
(School of Physiotherapy, Health Sciences, University of Otago)

#### Inflammation in knee osteoarthritis: biomarker response to clinical trial interventions

Knee osteoarthritis is very common, with people suffering from pain, inability to undertake their usual activities and decreased quality of life. Many treatments are available but not everyone responds in the same way, possibly due to different types of osteoarthritis, including an inflammatory type. Biomarkers in blood may be one way to measure inflammation and response to treatment. This study will measure biomarkers in people with knee osteoarthritis taking part in a clinical trial of physiotherapy and anti-inflammatory medication. It will evaluate if biomarkers match patient clinical signs and symptoms, and whether they change in response to treatment.

### Associate Professor Gisela Solee
(School of Physiotherapy, Health Sciences, University of Otago)

**Influence of footwear on lower limb movement patterns following anterior cruciate ligament reconstruction**

People with anterior cruciate ligament (ACL) ruptures of the knee have a high risk for developing knee osteoarthritis within 10 years. Movement patterns of the knee during walking, jumping or running can be used to indicate risk for future osteoarthritis. We will explore how such knee movement patterns differ between people with ACL reconstructions and knee-healthy people, and how footwear inserts may change such movement patterns. Those movement patterns will be assessed in a University Human Movement laboratory using three-dimensional movement analysis while participants undertake a series of physical tasks. The results will inform future rehabilitation strategies to improve outcomes of the injury as well as decreasing risk for osteoarthritis.

## 4. OTHER ACTIVITIES OF THE SCIENTIFIC COMMITTEE

### OMRF Student Speaker Awards at the Otago Medical School Research Society:

The Student Speaker awards are given to the student speakers who, in the opinion of a panel of three to four judges, gives the best and second best oral presentation – based on both the components of the presentation and its scientific merit. To be eligible the candidates must report work that has been performed under the auspices of the University of Otago.

At the **16th August 2022** scientific meeting of the Otago Medical School Research Society (OMSRS) there were 10 doctoral candidates.

The first Prize ($500) was funded by the Otago Medical Research Foundation. This year's winner was **Rebecca Lord** (Department of Anatomy), for her talk entitled "Neuronal deletion of STAT3, but not ERK2, causes obesity and delayed puberty onset in mice.

At the **26th April 2023** scientific meeting of the OMSRS there were 10 summer research scholars selected to give presentations of their projects.

The first Prize ($500) was funded by the Otago Medical Research Foundation. Since 2015 the OMRF summer research prizes have been called "The Pat Cragg Summer Scholar Speaker Prizes" in recognition of the long-standing involvement by Professor Pat Cragg in the summer research scholarship assessing committee and was awarded to **Georgia Keelty** from the Department of Physiology (talk entitled: Characterising transverse tubules in the right atrium of arrhythmic patients).

### OTAGO AURORA SCIENCE & TECHNOLOGY FAIR (August 2023):

The Foundation sponsors awards ($50 each) for "Excellence in presentation for medically orientated topics". This year the OMRF judges were Assoc Prof Heather Cunliffe and Dr Rhodri Harfoot.

This year four OMRF awards were awarded at the Otago Science Fair:

- Sleep and wellbeing of adolescents – a national survey, by **Megha Senthilkumar**, St Hilda's Collegiate (Year: 11)
- Do athletic students have better lung capacity than nonathletic students? by **Ivy Clarke**, Tokomairiro School (Year 7)
- An investigation into Children's ability to differentiate between pills & lollies, by **Harry Matheson**, Fairfield School (Year 8)
- Grippy Fingers by **Ari Nielsen**, Dunedin North Intermediate (Year 8)

## ACKNOWLEDGEMENTS

The Foundation continues to play an important role in funding Medical Research in Otago. The last few years have especially highlighted the need for sustained and rapidly responsive medical research capacity. It has been a privilege to be part of the Foundation's contributions to the ongoing challenges posed by the global pandemic.

I wish to thank the members of the Scientific Committee for their dedicated efforts in carefully assessing the merits of the large number of summer research projects and grant applications that were received by the Foundation over the last year. We thank the Council of the Foundation for the support, advice and enthusiasm with which our funding recommendations are endorsed and the many Benefactors and Sponsors of the Foundation whose financial support has made all this possible.

*Professor Gregory T. Jones*

*Chair of the OMRF Scientific Committee*
*15 September 2023*

# EVENTS

## *GALA*

**What a night! Our annual Gala, in association with OceanaGold, was back with full force in February 2023 with a fantastic evening of fun, song and dance, NZ talent and beautiful food and wine.**

Doug Kamo returned as MC extraordinaire and had the audience on their toes from the get-go with his behind the scenes opening sequence, with the help of some fantastic cameos!

The audience heard from Associate Professor Heather Cunliffe about the fantastic work she and the Pathology team are doing with breast and ovarian cancer research, and a delicious meal from Compass Group and Dunedin Venues was enjoyed accompanied by a selection of wines from Misha's Vineyard.

The entertainment kept coming with a wonderful and moving performance by Marcus Winter – The Sandman, who had the audience enthralled with his sand art and storytelling. Marcus also created two ink pieces live and they were auctioned off later in the evening.

We were then treated to an amazing opera performance by "The Waiters" a trio of young Dunedin talent who had been hiding in plain sight through the evening, teasing what was to come. By the end of their performance the audience was on their feet and twirling their napkins!

It was truly an amazing night, and we are so grateful for our supporter, sponsors and table hosts who help raise another significant amount towards Medical Research in Otago.

We are ready to do it again in 2024 – Join us on Friday 16 February 2024.

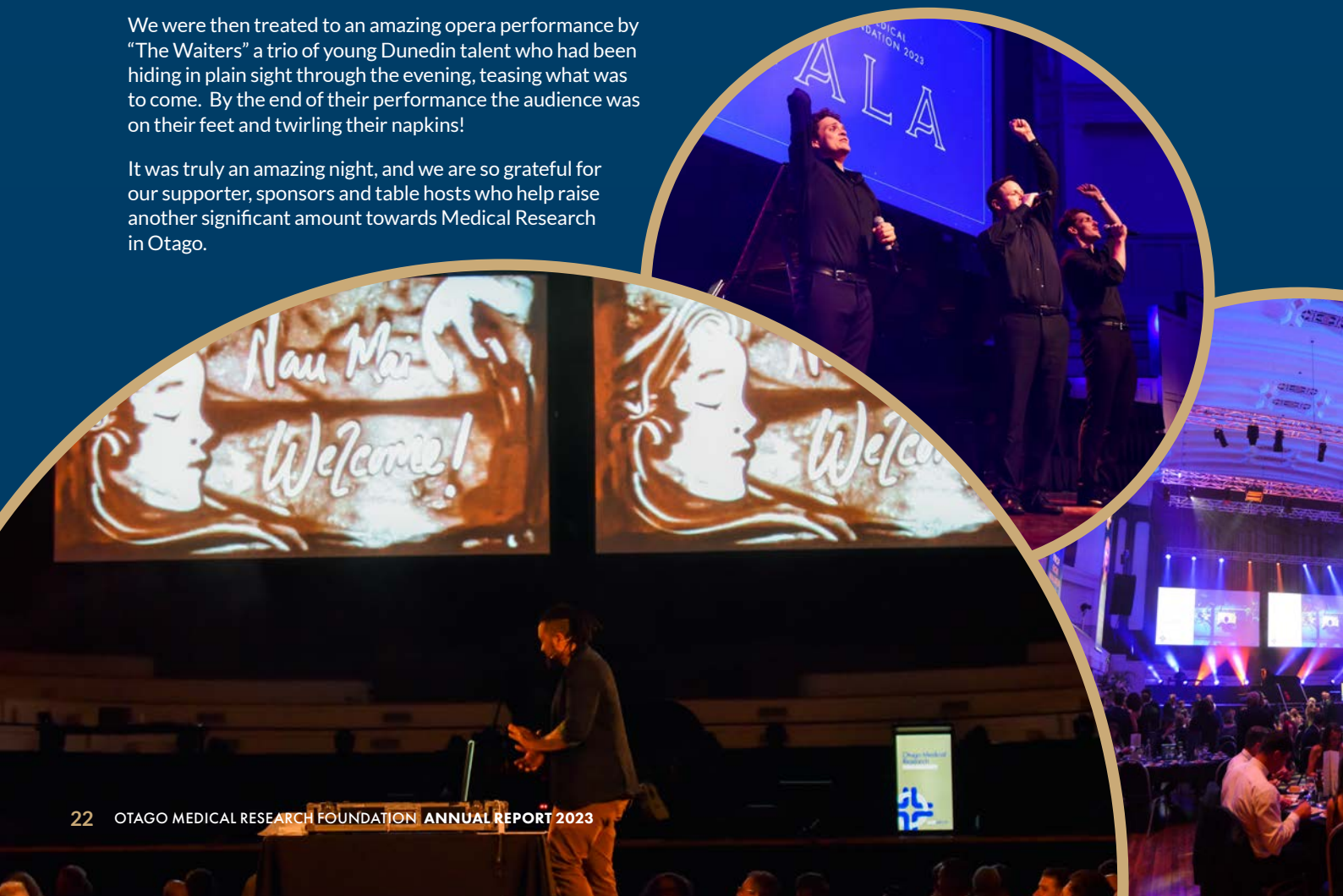
*SPONSORS:*
*Major Sponsor: OceanaGold*

*Associate Sponsors: Vero Liability and Aotearoa Gaming Trust*

*Supporting Sponsors: Forsyth Barr, Walsh and Beck, Select Recruitment, Anderson Lloyd, Misha's Vineyard, Stewart Construction*

*Auction donors: John Toomer, Highlands – 'Experience the Exceptional', Mark and Nick Fraser, Monarch Wildlife Cruises, The Artists Room, Cardrona Distillery, Alice Toomer, Highland Helicopters and Vull Design*

*Additional prize donors were: Klone, Rialto Cinema Dunedin, Estelle Flowers, Michelle Chalklin-Sinclair*



# *OMRF Annual Golf Day*

## A fantastic day was had by all at the OMRF Annual Golf Day at St Clair on Friday 12 May 2023.

The Autumn weather played the game and all teams had a successful round. Our winners for the second year in a row were the team from Forsyth Barr with an impressive score of 51.25.

Dr Glen Reid from the Department of Pathology joined us at the Prizegiving as our Face of Research for the event. Dr Reid was the recipient of OMRF Annual Grant funding in 2022 and gave us a quick update on his research and highlighted where the funds raised can really help in Otago.

Our day would not be the success it is without the following sponsors:

St Clair Pro Shop, The Warehouse, Polson Higgs, Fulton Hogan, Deloitte, Craigs Investment Partners, Dunedin City Motors, McCoy Wixon Architects, Impact Roofing and Plumbing, Jarden, Mainfreight, Aotea Electric, Stewart Construction and Calder Stewart.

Thank you also to those that supported the day by donating additional prizes and product: Cardrona Distillery, Challenge Marketing, Otago Brew School, Goodman Fielder, St Clair Golf Course, Misha's Vineyard, St Clair Four Square and PaperPlus Dunedin.

### RESULTS FROM THE DAY:

1st – Forsyth Barr with a score of 51.25
2nd – Aotea Electric
3rd - Craigs Investment Partners
4th – St Clair Pro Shop Team
5th – Stewart Construction
6th - Burns and Co
7th – Deloitte
8th – DC Motors

*Sarah Rickerby - OMRF Events Manager*

# OMRF CLUB OTAGO

## Our OMRF Club Otago Lunches are now back in full swing, and we are delighted to have had a selection of wonderful guest speakers.

We ended 2022 with a research focused lunch at the Forsyth Barr Stadium with Professor Warren Tate. Professor Tate's presentation on the relationship between the post viral syndromes, ME/CFS and Long COVID, was very interesting and struck a personal note with some of our audience.

In March 2023, our guest speaker was New Zealand Cricket Umpire and Otago Cricket Rep, Shaun Haig. An engaging discussion with Shaun and many cricket fans in the room , facilitated by Melanie Kerr, allowed us to hear a new perspective on the game and learn a few secrets from behind the scenes. Our Face of Research speaker Professor Iain Lamont provided the audience an update on his work with Cystic Fibrosis.

The Hon Grant Robertson joined us for our June event, alongside Business South CEO Mike Collins, Minister Robertson gave the audience some candid responses to questions and some insights into his passion for politics and where his career may head in the future. At this event we had Professor Rob Walker present to us on his work with kidney disease.

We would like to extend a huge thank you to our OMRF Club Otago Membership base who continue to support our events and bring colleagues, clients and friends along to enjoy the afternoons and support the OMRF.

### JOIN US

To join OMRF Club Otago, simply go to our website **omrf.org.nz/club-otago/** and fill out the form or contact Sarah Rickerby at **sarah.rickerby@omrf.org.nz**

Membership for the OMRF Club Otago is open to anyone, with memberships starting at $250 per year. All profits from the OMRF Club Otago lunches go towards funding life changing research.

# *Our members in the 2023 year were:*

## PATRONS

## SENIOR FELLOW

Calder Stewart

## FELLOW

Ross & Bev Middlemass

Deloitte

McMahon Investments

## ASSOCIATE FELLOW

Forsyth Barr

Fulton Hogan

Brian Stevenson

Mike Bird (AMBI Properties)

Moore Markhams Otago

Harvie Green Wyatt

## INDIVIDUAL

Adam Binns
*(Adam Binns Commercial Ltd)*

Adam La Hood, Blair McGill
*(Cook Brothers Construction)*

Ant & Chris Wither
*(Awhirk Farms)*

Otago Community Trust

Carl Spruyt
*(Boost Media Ltd)*

Darryn Wilkie
*(Otago Properties 2018 Ltd)*

Dave Callon
*(ShareNZ)*

Warren Taylor
*(Aotea Electric)*

Dr Michael Schultz
*(Gastroenterology Otago Ltd)*

Dr Paul Templer
*(Sandman Anaesthesia Services)*

Hamish Caithness
*(Oteha Valley Holdings)*

Janine Young

John & Jacqui Brenssell
*(Paper Plus Dunedin)*

James Nation
*(PKF Bredin McCormack Rewcastle)*

Justin & Eterei Stonelake
*(Stonelake Foundation)*

Jackson Miller
*(Polson Higgs)*

Tracy Stevenson
*(Webb Farry Lawyers)*

Michael Milne
*(Craigs Investment Partners)*

Mr Will McMillan
*(McMillan Medical Specialists)*

Noel Davie

Emily Lam

Peter & Paula Anstey

Robert & Jill Reid

Sharon Hyndman
*(BayleysMetro)*

Simon Parker
*(Parker Warburton Team Architecture)*

Tom West
*(Tom West Risk Advisors Ltd)*

Trevor Millar

# FINANCIAL HIGHLIGHTS

## *Otago Medical Research Foundation Inc.*

This summary financial report has been authorised for issue by the Chairperson of the Council Prof Pat Cragg. The results presented in the summary financial report have been extracted from the full financial report for the year ended 31 March 2023. As such, this summary report cannot be expected to provide a complete an understanding as provided by the statements of financial performance, financial position and movements in equity of the Otago Medical Research Foundation Incorporated. A full copy of the audited financial report for the Otago Medical Research Foundation Incorporated for the year ended 31 March 2023 is available from the office of the Foundations administrators - Deloitte, Otago House, 481 Moray Place, Dunedin.

### Statement of Financial Performance

**For the Year ended 31 March 2023**

| | 2023 | 2022 |
|---|---|---|
| | $ | $ |
| **Operating Income** | | |
| Donations, Bequests, Subscriptions | 505,777 | 430,131 |
| Investment Income | 164,583 | 129,025 |
| Gain on Disposal of Investments | 39,919 | 5,353 |
| | **710,279** | **564,509** |
| **Less Expenses** | | |
| Administration | 113,508 | 120,230 |
| Promotion Costs | 319,417 | 190,306 |
| **Total Expenses** | **432,925** | **310,536** |
| **Net Surplus before Research Grants** | **277,355** | **253,973** |
| Research Grants approved during the | 471,006 | 434,414 |
| **Net Surplus for the year** | **(193,652)** | **(180,441)** |

### Statement of Financial Position

**As at 31 March 2023**

| | Market Value | 2023 | 2022 |
|---|---|---|---|
| | | $ | $ |
| **Current Assets** | | **241,332** | **152,084** |
| **Investments** | **5,521,963** | **4,276,736** | **4,582,344** |
| **Total Assets** | | **4,518,068** | **4,734,428** |
| **Current Liabilities** | | **46,447** | **69,154** |
| **Total Liabilities** | | **46,447** | **69,154** |
| **NET ASSETS (EQUITY)** | | **4,471,621** | **4,665,274** |

## Statement of Cash Flows

**For the Year ended 31 March 2023**

| | 2023 | 2022 |
|---|---|---|
| | $ | $ |
| Net Cash Flows from Operating | (302,464) | (352,672) |
| Net Cash Flows from Investing | 344,455 | 319,119 |
| **Net Increase / (Decrease) in Cash Held** | **41,991** | **(33,553)** |
| Cash at the Beginning of the Year | 127,353 | 160,906 |
| **Cash at the End of the Year** | **169,344** | **127,354** |

## Statement of Service Performance

**For the Year ended 31 March 2023**

The Foundation aims to establish world-class medical research for the benefit of local, national and international health.

The Foundation has provided a calendar of events in which members, supporters and the public were invited to participate - the Club lunches, annual dinner, annual golf day, and various other one-off events.

**Grants & Scholarships approved during the year:**

| | 2023 Number | 2023 Actual ($) | 2023 Budget ($) | 2022 Number | 2022 Actual ($) |
|---|---|---|---|---|---|
| Annual Grants | 5 | 145,289 | 171,666 | 4 | 142,100 |
| Annual Grants - Covid | - | - | - | - | - |
| Special Fund Grants | 7 | 114,114 | 120,000 | 3 | 50,937 |
| Summer Research Scholarships | 18 | 115,500 | 108,000 | 18 | 117,000 |
| Otago Medical Research Society Award Sponsorship | 4 | 3,450 | 4,500 | 4 | 4,450 |
| **Total** | **34** | **$ 378,353** | **$ 404,166** | **29** | **$ 314,487** |

The full financial report of the Otago Medical Research Foundation for the year to 31 March 2023 was authorised for issue by the Chairperson of the Council. The full financial statements applied Public Benefit Entity Simple Format Reporting - Accrual (Not-For-Profit). The auditor expressed an unqualified opinion. The summary financial report has been examined by the auditor for consistency with the full financial report. The auditor has expressed an unqualified opinion.

# AUDITOR'S REPORT

**Crowe New Zealand Audit Partnership**
44 York Place
Dunedin 3016
PO Box 188
Dunedin 9054

Tel +64 3 477 5790
Fax +64 3 474 1564
www.crowe.nz

## REPORT OF THE INDEPENDENT AUDITOR ON THE SUMMARY FINANCIAL STATEMENTS

**To the Council of Otago Medical Research Foundation Incorporated**

*Opinion*

The summary financial statements, which comprise the summary statement of financial position as at 31 March 2023, the summary statement of financial performance and the summary statement of cash flows for the year then ended, and related notes, are derived from the audited financial statements of Otago Medical Research Foundation Inc. (the "Foundation") for the year ended 31 March 2023.

In our opinion, the accompanying summary financial statements are consistent, in all material respects, with the audited financial statements, in accordance with FRS-43: *Summary Financial Statements* issued by the New Zealand Accounting Standards Board.

*Summary Financial Statements*

The summary financial statements do not contain all the disclosures required by Public Benefit Entity Simple Format Reporting – Accrual (Not-For-Profit). Reading the summary financial statements and the auditor's report thereon, therefore, is not a substitute for reading the audited financial statements and the auditor's report thereon. The summary financial statements and the audited financial statements do not reflect the effects of events that occurred subsequent to the date of our report on the audited financial statements.

*The Audited Financial Statements and Our Report Thereon*

We expressed an unmodified audit opinion on the audited financial statements in our report dated 11 July 2023.

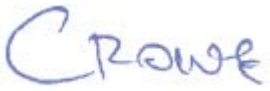
*Council's Responsibility for the Summary Financial Statements*

The Council are responsible on behalf of the entity for the preparation of the summary financial statements in accordance with FRS-43: *Summary Financial Statements*.

*Auditor's Responsibility*

Our responsibility is to express an opinion on whether the summary financial statements are consistent, in all material respects, with the audited financial statements based on our procedures, which were conducted in accordance with International Standard on Auditing (New Zealand) (ISA (NZ)) 810 (Revised), *Engagements to Report on Summary Financial Statements*.

Other than in our capacity as auditor we have no relationship with, or interests in, the Foundation.



**Crowe New Zealand Audit Partnership**

CHARTERED ACCOUNTANTS

Dated at Dunedin this 11th day of July 2023

The title 'Partner' conveys that the person is a senior member within their respective division and is among the group of persons who hold an equity interest (shareholder) in its parent entity, Findex Group Limited. The only professional service offering which is conducted by a partnership is the Crowe Australasia external audit division. All other professional services offered by Findex Group Limited are conducted by a privately-owned organisation and/or its subsidiaries.

# Otago Medical Research FOUNDATION

Annual Report to 31st March 2023

Charities Number: CC33444

OMRF.ORG.NZ