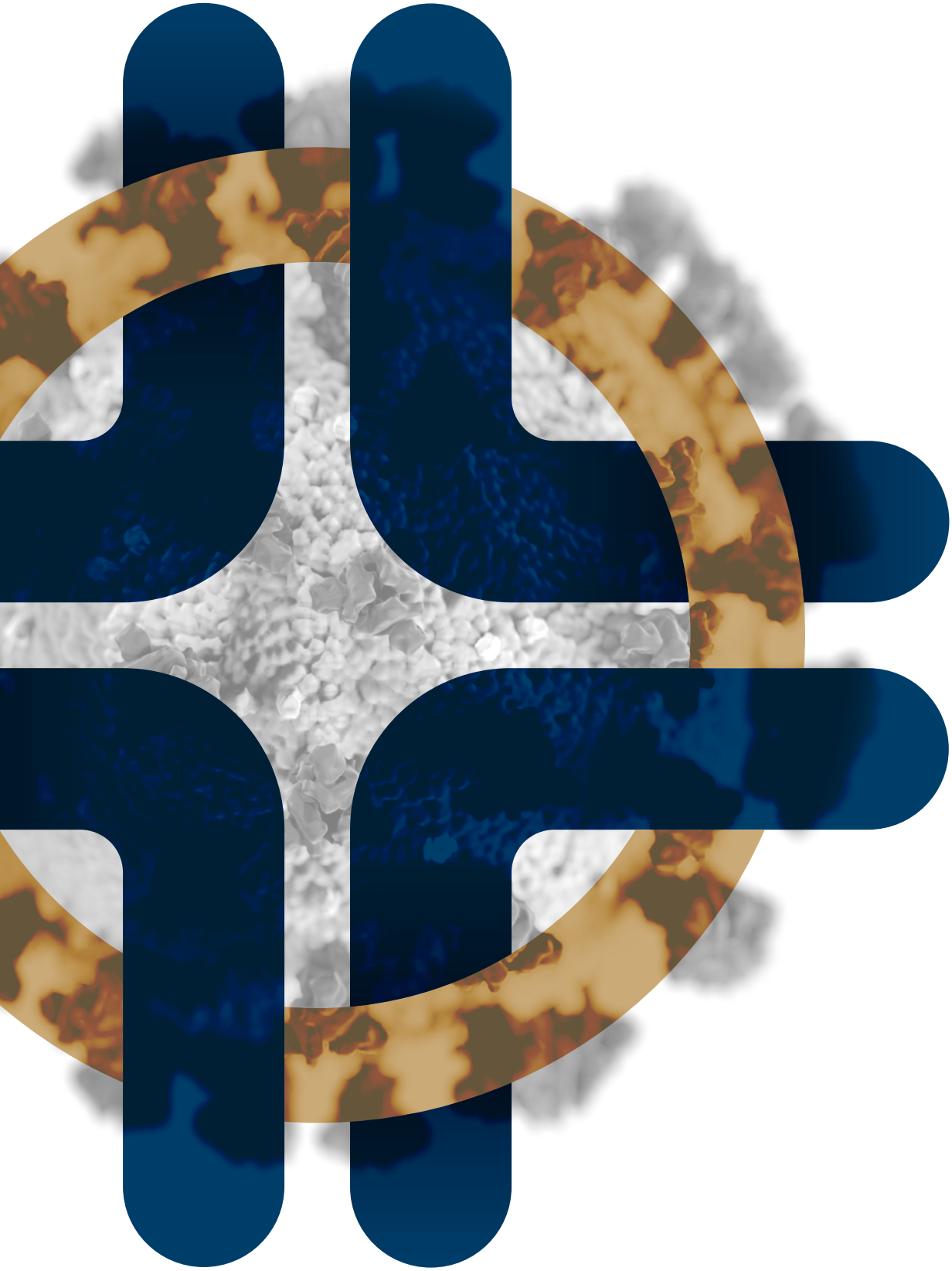
Otago Medical Research FOUNDATION

2020 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.

The Foundation was founded in 1967 to further medical research in Otago and we have now funded almost $10 million dollars in 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

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

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

COVID-19 Special Fund – research to help understand and treat the virus behind the global pandemic and its impact

You can read about recent research projects funded in the Scientific Committee report on page 13.

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 eligible projects and scholarship students 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, or donate directly through our ANZ bank account 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." - *Anonymous*

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

CHAIRPERSON'S REPORT

2020 GRANTS TOTALLED
$529,956

TOTAL AMOUNT FUNDED*
$9,835,706
*Since the Foundation's inception

It is with pleasure that I present the 52nd Annual Report on the Otago Medical Research Foundation's activities for the 2020 financial year.

During the year under review, the Foundation approved Grants totalling $529,956, an increase of $122,174 on last year's total of $407,782. Since the Foundation's inception, a total of $9,835,706 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 $80,562 compared with a surplus for the previous year of $196,223, $276,785 worse than last year. Total Operating Income (Donations, Bequests, Subscriptions and Investment Income increased by $39,448 while Expenses decreased by $5,789 and Grant expenditure increased by $122,174. Last year's income included a realised gain of $158,318 on sale of Investments while in the current year there was a loss of $41,530 on disposal of Investments. It would be good to see an increase in the receipt of further injections of capital for investment, which would to help 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. 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 $877,255, which is 32.42% of cost.

At 31 March, 2020, Accumulated General Funds total $387,176 and Accumulated Special Funds $4,827,670 a total of $5,214,846, both these figures comprising Capital and Income.

This year marked the 23rd 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 $1,631,000 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 23 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 2019 Annual Report are as follows:

In December 2019 the Foundation received the resignations of Professor Barry Taylor and Professor Vernon Ward and their replacements were, for Barry, Professor Rathan Subramaniam as Dean of the Otago Medical School and for Vernon, Professor Brian Hyland, as Dean of the Otago School of Biomedical Sciences. We welcome Rathan and Brian to the Council table and thank Barry and Vernon most sincerely for their contributions around the Council table, Barry since 2013 and Vernon since 2014.

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 continuing difficult economic and troubling times.

To the Foundation's Director of Development, Susan Sims and our Events Manager, Steve Davie, who are the faces and voices of the Foundation, my sincere thanks. Your efforts in

raising the profile of the Foundation and funds for research during the year are really appreciated. Susan's report can be found on page 7.

To the Scientific Committee and their dedicated Chairperson, Professor Greg Jones, and Deputy Chairperson, Dr Heather Cunliffe, for the many long hours spent on the assessment and advice on grant applications to ensure a transparent and robust process which ensures the Foundations 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.

To my fellow Investment Sub-Committee members, Judy Bevin, Michael Milne, and Jamie Adamson, 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, Josh Cuming and Trudy Corbett for continuing to provide very professional, friendly and efficient administration services for the Foundation. Jamie and Josh are the face of Deloitte for the Council while Trudy works quietly in the background, ensuring that the Foundations day to day requirements are attended to in a timely and professional manner which is very much appreciated.

SIGNIFICANT EVENTS SINCE 31 MARCH, 2020.

COVID - 19

No one reading this report will be unaware of the effects of the Covid- 19 Pandemic on the world, which continue at the time of writing this report. (5th August, 2020)

It is reassuring that the measures taken by the New Zealand Government were generally accepted by the people of New Zealand as being necessary, and to date, the country is in a better position than most other countries but it is obvious that vigilance must still be maintained if New Zealand is to remain relatively free of the virus.

The Foundation was in the fortunate position that no major fundraising events were scheduled for the period of Lockdown and immediately after Lockdown finished, but we would be naïve to expect that the Foundation will not be affected in its fundraising events in the future.

Following suggestions made to Council that the Foundation should consider supporting some research grants relating to COVID-19, applications were called for a Special COVID –19 Grants round with a total funding pool between $70,000 and $80,000. Applications were considered by the Scientific Committee and 3 grants totalling $74,251 were recommended to Council for funding, which Council approved. Details of these grants appear in Prof Greg Jones Scientific Committee Report on pages 15-25.

These grants, together with a conscious decision to increase the amount of individual Annual Grants and Summer Research Scholarships has meant that the Foundation has dipped into its reserves to a small extent. Over the years, various interested parties have been critical of what they perceive to be the large amount retained in our reserves, which is the result of the prudent approach taken over many years by Council. However, the COVID-19 Grants, arising as they did from such an unprecedented event, appeared to be an opportunity to release some of our "rainy day" reserves for extremely worthwhile and topical projects.

Steve Davie

It is with regret that I advise that, after 10 and ½ years with the Foundation, Steve Davie advised that, due to family circumstances, he would be resigning from his position as Event Manager on 31 July, 2020. Steve was initially employed as Director of Development and then became Events Manager.

In his years with the Foundation Steve raised the profile of the Foundation from a virtually unknown organisation to one with a very high profile. This resulted in many and varied events organised by Steve, raising more than $6 million dollars which has found its way into many research projects.

On behalf of all associated with the Foundation and, in particular Researchers based in Otago, I express our gratitude to Steve for all his efforts while with the Foundation.

FINAL REPORT

At a Council meeting held on 10 March, 2020, I advised Council that I would not be standing for election as an Elected Member at the AGM, thus ending at least 27 years association with the Foundation, firstly looking after the Foundation's affairs while employed by Deloitte, then attending my 1st Council Meeting on 18 October, 1993, as part of the Secretarial team, becoming an Elected Member in 2008 and Chairperson in 2011.

I would like to wish the Foundation all the best for the future and will continue to be a supporter and a firm believer in the fact that the Foundation makes such a worthwhile contribution to Medical Research in Otago.

On behalf of the Council,

Ken Dempster
Chairperson

BEHIND THE FOUNDATION

SHARON KNOWLES

The range of Dunedin's research capability never ceases to amaze Otago Medical Research Foundation council member Sharon Knowles, but none more so than during a pandemic.

In May 2020 the Foundation committed funding to an urgent, fast-tracked fund specifically for COVID-19 medical research by supporting three projects:

- *Assessing the cellular immune response to SARS-CoV-2 infection*
- *Development of a SARS-CoV-2 spike protein pseudovirus assay*
- *The impact of SARS-CoV-2 infection on human neurons.*

Sharon says being part of a Foundation that has both the foresight and flexibility to respond to the needs of researchers who want to help with the fight against Covid-19 is just fantastic.

"As council we approve a broad range of interesting and worthwhile projects – it is impossible to single out any one in particular as I know they all have a part to play in better understanding human health, but I am pleased we can help with these ones. It's great to see local researchers with the level of expertise that can contribute on the global stage, and that we could react rapidly and support them in a practical and meaningful way. Every contribution counts."

Sharon, a partner with New Zealand law firm Anderson Lloyd in Dunedin, has been an elected member of the 14-strong Foundation council since 2017.

Having regularly enjoyed the Foundation's social functions, including Club Otago and the Night to Remember, Sharon had become more aware of just what research is undertaken in Dunedin, and the Foundation's quiet, underpinning role in helping researchers and students in those pivotal studies.

So, when the opportunity arose, she didn't hesitate to put her hand up to take on a governance role contributing her legal skills to the broad mix of capability on the council.

"I enjoy working with the strong breadth and depth of knowledge in the council, particularly with the scientific committee led by Professor Greg Jones, which has the important role of assessing the projects for council approval four times a year.

"Seeing what we are capable of in Dunedin and getting to know the professionals on the council that I may not have otherwise met makes it such an interesting role.

"It's a privilege to know we make a difference in projects that can get off the ground because we provide that initial backing. And of course, its great to support the University and the Medical School, which are so important to Dunedin."

> "It's great to see local researchers with the level of expertise that can contribute on the global stage, and that we could react rapidly and support them in a practical and meaningful way. Every contribution counts."
>
> SHARON KNOWLES

OTAGO MEDICAL RESEARCH FOUNDATION MEMBERSHIP

ORDINARY MEMBERS

Prof W C Abraham

Ashburn Hall Charitable Trust*

Dr F J Austin*

Emeritus Prof. Gil Barbezat

Mr J Burton

Caversham Pharmacy (2005) Ltd

Dr S O Chin*

Mr E J Chronican*

Dr J I Clayton

Dr Michele Coleman

Dr Alison Cook

Mr K G Dempster

Mr Malcolm Farry

Dr Peter Gootjes

Assoc Prof A Goulding

Assoc Prof Merilyn Hibma

Mrs L Homersham

Mr M Horne

Dr JB Howie* (deceased)
& Mrs E Howie

Dr R B Keillor

Prof I L Lamont

Emeritus Prof A C B Molteno

Emeritus Prof J G Mortimer

Assoc Prof D Oorschot

Emeritus Prof D.C.G. Skegg

Dr Wayne Sutherland

Dr M Turner

Dr & Mrs G P White

Assoc Prof Sigurd Wilbanks

Mrs S M Wilkinson*

Dr M E Wyatt

J O'Rourke

** Indicates Founder Member*

RESEARCH PATRONS

Hope & Sons Limited

Otago Asthma Society Inc.

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

HONORARY LIFE MEMBERS

Mr G T Adams

Mr & Mrs L J Brown

Assoc Prof P A Cragg

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

A REPORT FROM THE DIRECTOR OF DEVELOPMENT

With the COVID-19 global pandemic having massive impact on all of us from the beginning of 2020, the Foundation committed funding to an urgent, fast-tracked fund specifically for COVID-19 medical research.

In these extraordinary times, the Foundation responded rapidly to the need for research in this area and used a truncated application and review process for awarding funds from our reserves. At the time of writing three projects have been funded for research towards treatments and vaccines, see more on page 13.

Medical research is often a long game, however, the immediate impact of the Foundation continues to improve with both our annual grant projects and with a record 28 student summer scholarships funded. These scholarships allow the students to work in a lab on a research project through the summer and are highly sought after with 138 applications received for 2019/2020. 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.

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 Ken Dempster, who bring a variety of business and academic skills to the OMRF table, and to Steve Davie, our Event Manager who built further on his previous success with our major events, A Night to Remember, Club Otago and golf day, to bring in funding so necessary for the Foundation. Steve will be missed, and the Foundation is grateful for all his hard work over the years.

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, our auditors. Thanks also to Walsh & Beck who do great work behind the scenes for us on our website and social media accounts.

The Foundation is grateful for the support of the Lion Foundation in funding our recent website rebuild. This gives us a terrific platform where our supporters can see how their generosity leads to tangible improvements in understanding, diagnosis and treatment of a wide range of medical conditions which impact our families and friends. It is easy to donate through this platform too.

To finish, I'd like 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 $5,000 and annual grants of $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

FUNDS RECEIVED

A Night to Remember
$121,321

Community Grants and Donations
$353,849

Annual Golf Tournament
$22,446

Club Otago
$71,832

$582,940

Bequests
$13,492

DONATIONS:

ACE Shacklock CT

F J Austin

G Barbezat

J Burton

Caversham Pharmacy

S O Chin

E Chronican

A Cook

K Dempster

A Goulding

J Hinds

I Lamont

Lion Foundation

Mike Bird & Friends of the Foundation

J Mortimer

RD Petroleum

Mr Robertson *(in memory of)*

S Wilkinson

SpecSavers Dunedin

C & J Trotman

Dr & Mrs GP White

Yarrow South Trust

BEQUESTS:

Ethel Johnston Charitable Trust

GRANTS:

ADEPT-MACTODD Charitable Trust

ANZ Private

Margaret Begg Charitable Trust

Deloitte

EMM Haynes Charitable Trust

The Healthcare Otago Charitable Trust

MM & JH Hughes Trust

JAD Iverach Memorial Fund

Kingston Sedgefield Trust

J N Lemon Chartitable Trust

B A Lewis Charitable Trust

Lions Club of Dunedin

South (Administered by Perpetual Guardian)

Marsh Family Charitable Trust

The Otago Community Trust

Otago Southland Diabetes Research Trust (Administered by Perpetual Guardian)

The Southern Trust

Southern Victorian Charitable Trust

William Downie Stewart Charitable Trust

The Stonelake Foundation

Werribee Trust

C & A Wither

OMRF SUPPORTER AND RESEARCHER PROFILES

RESEARCHER SPOTLIGHT

PROFESSOR GREG COOK

The use of antibiotics to treat animal and human disease is changing, and Otago Medical Research Foundation funding is helping the cause.

Inappropriate and overuse of antibiotics coupled with ever-growing antimicrobial resistance are forcing a global rethink of the drug's use and driving development for new products.

A biomedical human programme is looking at new drugs for diseases, and New Zealand researchers are also looking for new ways to treat infectious diseases in animals.

Antibiotics currently used on animals were originally developed for human use, without understanding how they worked on animals and what impact that would have on human use. Changing attitudes to antibiotics that come from treated animals into the food chain, in New Zealand and overseas, are putting pressure on farmers and the drug industry to develop more effective and highly targeted animal-specific products, as well as new management processes.

The challenge for Professor Greg Cook and his microbiology and immunology team at the University of Otago is navigating the ethical and regulatory pathways to advance novel molecules that target bacterial pathogens causing disease into pre-clinical development. They have partnered with local and international companies to drive this.

One project is a collaboration with researchers in China to screen new compounds that have the potential to be developed into drugs that kill the tuberculosis causing bacterium Mycobacterium tuberculosis.

Traditionally, drug development has been based on the fact that the drug works, without necessarily understanding what is happening and why. Greg's PhD student Zoe Williams has been documenting the underlying mechanisms that make drug candidate compound (TB47) effective against Tb disease, and has found it shows good activity against all drug-susceptible and drug-resistant Mycobacterium tuberculosis strains. Importantly, the new drug works in synergy with current Tb drugs in animal models.

Greg said the Foundation's role in their work has been significant. "Firstly, it is an enabler that starts off fundamental research to attract the attention of significant external funders and collaborators – we couldn't do without it. But also, the work engine for this type of research are the postgraduate students, so Foundation funding for student research support has been critical to encourage new students into science careers. The students we're producing here are world class, and other centres are envious of the support they get from the Foundation and the University."

"Our research is hugely important to the industry – we are part of this global shift in breaking the link between human and animal antimicrobial use. It's a long-term goal, but if we can develop new narrow spectrum therapeutics for animal-only use it will be a huge achievement and a paradigm shift for animal health and farming," Professor Cook said.

"This field of research an exciting place to be."

SUPPORTER SPOTLIGHT

JAYNE MACDONALD

ADEPT Mactodd Charitable Trust

The Otago Medical Research Foundation has been a positive choice for a charitable trust looking to support research beneficial to the elderly.

The ADEPT Mactodd Charitable Trust has committed to invest in an Otago Medical Research Foundation's Annual Grant research project for each of the next 10 years.

Originally set up with funds from philanthropist David Swiffen in 1979, the ADEPT Mactodd Charitable Trust is now a substantial investment portfolio administered by Mactodd Lawyers in Queenstown.

Its objectives are to support work that improves lives of the elderly, and Mactodd partner Jayne Macdonald says working with the OMRF has provided the charity with a good opportunity. "Supporting health research gives us a stake in building knowledge that will answer vital questions about major diseases that affect our elderly."

"For us, it's really thinking about the future; slowing down diseases like Alzheimer's and Parkinson's and helping

to develop prevention medicine to make lives better. It will ultimately improve the wellbeing of those enjoying retirement, and everyone benefits - here and in the rest of the world. And we know we are helping our parents and grandparents – those who are important to us."

"But not only is it taking steps towards tackling big disease problems, our investment in the OMRF means the work is happening right here in Otago, and that's also really positive. It's investment in the local community, in our hospital and University.

"And we're fortunate to get to meet and be updated about the researcher and the students they support – it's great to see the fruits of the labour."

The researcher for the first project the Trust has invested in is Professor John Reynolds, University of Otago Brain Health Centre – he is looking at Parkinson's biomarkers.

Parkinson's disease is a progressive nervous system disorder that affects movement and develops in older age. There is currently no cure, but research is focusing on genetic factors to better understand how it affects the brain - to improve treatments and ultimately prevention.

"It is research that is very much work in progress, but we are helping it advance. And that is a significant thing from our perspective – it's a good fit for our charity," Jayne said.

RESEARCHER SPOTLIGHT

PROFESSOR IAN MORISON

The diagnosis for childhood cancer is devastating, but it's not just the family who feel the effects.

As soon as haematologist Professor Ian Morison sees the tell-tale leukaemia cells through his microscope he knows the next three years is going to be full of stress for the patient - cure rates are now great compared to the 1960's, but there is still a huge cost involved for families. It's a sobering feeling.

Research into childhood leukaemia has already made massive strides. We know the identity of the mutations in leukaemia cells that cause the disease, and we know that vulnerability to leukaemia occurs in early fetal life. Funding from the Otago Community Trust through the Otago Medical Research Foundation contributes to this research.

Professor Morison, from the University of Otago's Department of Pathology has now discovered an interesting pattern in development cells - these are cells found before birth and in babies that disappear when the body matures for life after birth. It appears as if these particular development cells remain in the one in 3,000 or so children who get childhood leukaemia each year.

"We're speculating they have a role, and that is something happening to these particular cells. We therefore need to find where these cells come from and understand their functions."

"Internationally, this is unique approach, but we are only one piece in the jigsaw – identifying the cells of interest is just the first step for further studies to develop targeted clinical treatments."

At present Professor Morison and his team are painstakingly sequencing and analysing thousands of cells to find DNA methylation patterns in the blood cells of babies born prematurely and in newborn babies, and comparing them to leukaemia cells' sequences.

"We have already found patterns of interest, but they need to be "black and white" for us to be confident in our predictions, so the search continues."

"This is what we are using the Otago Medical Research Foundation funding for."

"It may be far from the rest of the world, but we have the resources here to add to global knowledge. We're supporting an infrastructure of excellence at Otago by nurturing careers offering an interesting field of research. We're providing training to our students – particularly to PhD student Abdul Alsaleh who has been working in the project. And we are feeding into excellence in the New Zealand health system."

"But ultimately, we have eyes on the horizon. While it's long term research I feel optimistic we can make a difference to the statistics and to the families affected by childhood leukaemia – it's what makes the research enjoyable."

SUPPORTER SPOTLIGHT

KAREN SHEA

The Southern Trust

Contributing to a medical fund that makes a difference is awesome, but so too is supporting an initiative that nurtures young people in the region.

So says the Southern Trust CEO Karen Shea, whose organisation funds the Otago Medical Research Foundation's Summer Scholarship Programme.

The Southern Trust is a community-focused gaming trust based in Dunedin, which provides funding to a diverse range of organisations and communities right across the country including amateur sport, education, community purposes,

welfare organisations, arts and culture.

The Trust has long been a supporter of the Foundation; in fact, Ms Shea says the relationship's gone from strength to strength as they appreciate just how much it benefits the community.

"The foundation does a great job of building relationships in the region and identifying what funders need; it's an asset we should all be proud of," she said.

Over the last few years the Trust has focused on supporting the Foundation's scholarship programme. "We feel it is a really good fit for us because the benefits for the wider community are significant – for the students, the University, the Otago region, and for contributing to medical knowledge. It's been extremely worthwhile."

"Sponsoring a student through a scholarship helps University staff develop their research ideas; this seed funding can potentially take a project a long way. We are in awe of some of the projects we have supported over recent years."

"And for the student, having a scholarship over summer is more than just holiday employment. It provides an incentive in what is a highly competitive study environment and opens student's eyes to the opportunities. We're retaining knowledge and brain power, developing careers, and showing students that Dunedin has opportunities for long-term employment.

"To me, that is a very positive and a proactive way of community support for both the Foundation and for the Trust."

SUPPORTER SPOTLIGHT

ALISON PAUL

General Manager, Corporate & Legal Affairs
OceanaGold

OceanaGold started life at Macraes Mine in Otago, 30 years ago.

Today, combined with Macraes, the company/Oceana Gold has mines in the North Island at Waihi; in the Philippines at Didipio; and in South Carolina on America's east coast at the Haile Gold Mine. Alison Paul is General Manager, Corporate & Legal Affairs, for the company's New Zealand operations. She is a long-time Otago resident, and has watched both OceanaGold and its association with the Otago Medical Research Foundation develop and flourish.

"Throughout the history of our company we have embraced opportunities to grow the body of knowledge in our field and delivered award-winning initiatives driven by a commitment to social, economic, operational, and environmental sustainability. The Otago Medical Research Foundation shares this commitment to innovation and excellence, which makes OceanaGold's support of their medical research projects such a natural fit."

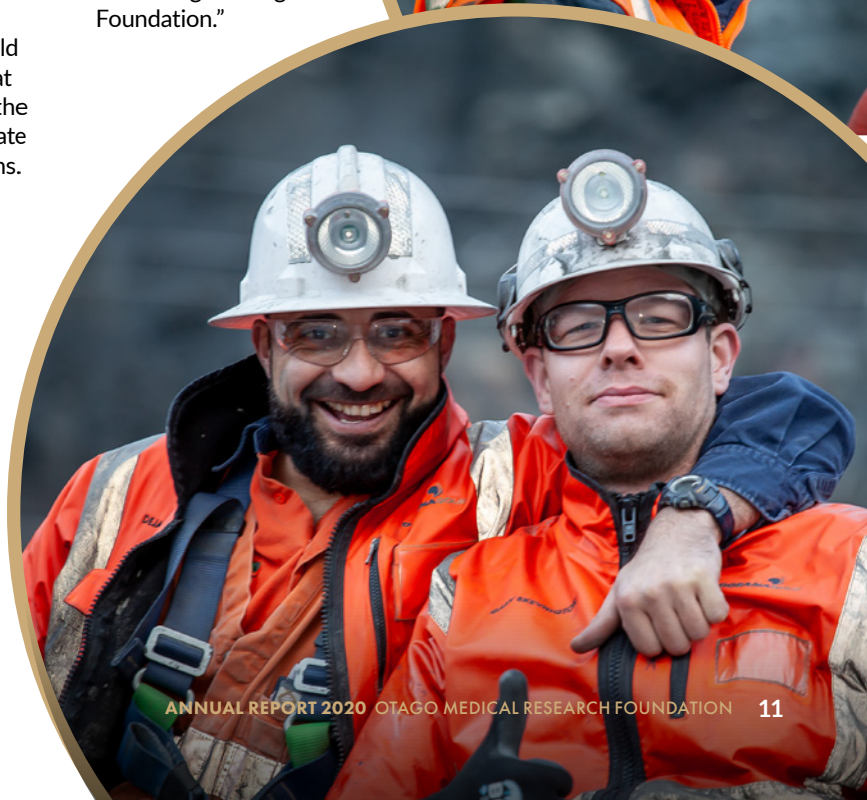
"Our Macraes staff live, work and play in Otago. They are part of the community, as is our company. As such, we firmly believe that we have a responsibility and commitment to organisations like the Foundation. Since our involvement began in 2014 we have supported six significant research projects through sponsorship of the Foundation's Golf Day and Night to Remember events."

Alison says that OceanaGold values the people and the community in which it operates, and that it is these same people who benefit from the ongoing research of the OMRF and its pre-eminent reputation as a facilitator of research that takes those benefits far beyond Otago's borders.

"In our day-to-day mining operations, we set out to give back through well-researched environmental restoration and partnerships with organisations involved in scientific and medical research and education. Our funding partnership with the Foundation provides us with the opportunity to contribute to projects which have the ability to change lives and contribute to an enduring legacy. It's all about building the foundations for a resilient community. Despite operating in very different fields of endeavour, our objectives are very similar. We all want the best that science and learning can deliver for our communities."

The vision of OceanaGold is to be the best gold mining company across the complete spectrum of their stakeholders - for employees, communities, the environment, regulators, investors and their business partners. It's a vision that the company puts into practice through partnerships with established and respected organisations like the Foundation, which is able to fund research with an international reach.

"Medical research changes lives for the better", says Alison. "OceanaGold is pleased to be a part of that change through the Foundation."



FUNDING DISTRIBUTION

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

SUMMER RESEARCH SCHOLARSHIPS

- Cancer $25,000
- Surgery $5,000
- Brain $11,000
- Antibiotic Resistance $5,000
- Paediatrics/ Obesity $5,000
- Heart $10,000
- Cells $5,000
- Heart/ Diabetes $5,000
- Elderly/Rural $5,000
- Mental Health $15,000
- Diabetes $5,000
- Immunity/ Microbiology $15,000
- Elderly/Brain $11,000
- Oral Health $12,000
- Hearing $5,000

ANNUAL GRANTS

- Breast Cancer $20,055
- Immunity/ Microbiology $30,598
- Gut Health $29,226
- Immunity/Vaccine development $32,624
- Brain/Mental Health $25,151
- Elderly/Parkinson's $35,000

JACK THOMSON BEQUEST

- Arthritis $53,504

OTAGO COMMUNITY TRUST

- Cancer $35,000
- Brain $32,883

SPECIAL FUND

- COVID-19 $74,251

LAURENSON BEQUEST

- Heart/Diabetes $25,903
- Drug Development $29,801
- Brain/Elderly $34,078
- Kidney $30,218

SPECIAL FUND

Scientific Committee COVID-19 related research grant round 2020

The OMRF Scientific Committee COVID-19 related research grant round in 2020 was awarded to three recipients: Associate Professor James Ussher, Assessing the cellular immune response to SARS-CoV-2 infection; Professor Alex McLellan, Development of a SARS-CoV-2 spike protein pseudovirus assay; Dr. Indranil Basak, The impact of SARS-CoV-2 infection on human neurons.

Associate Professor James Ussher

Department of Microbiology and Immunology, University of Otago

Assessing the cellular immune response to SARS-CoV-2 infection

Understanding the immune response to SARS-CoV-2 infection, the cause of COVID-19, is critical for understanding the disease and for vaccine design. In this study we will evaluate the cellular immune response to SARS-CoV-2 in patients who were confirmed to have COVID-19 and who have recovered. Blood will be collected and stimulated with fragments of different SARS-CoV-2 proteins to determine and clearly identify T cell responses. This will inform work on the design of a vaccine to combat SARS-CoV- 2.

Professor Alex McLellan

Department of Microbiology and Immunology, University of Otago

Development of a SARS-CoV-2 spike protein pseudovirus assay

We will develop a non-infectious and safe platform towards the therapeutic treatment of COVID-19 patients with (convalescent) serum from patients that have recovered from SARS-CoV-2 infection. The project will develop the use of a safe (non-replicating and non-virulent) model to study the interaction of the SARS-CoV-2 with human cells. The study will form the basis for future use of convalescent sera treatment for patients. In addition, the techniques will be valuable for screening new and existing drugs that might prevent virus attachment and entry into host cells.

Dr. Indranil Basak

Department of Biochemistry, University of Otago

The impact of SARS-CoV-2 infection on human neurons

The global COVID-19 pandemic continues to have a devastating impact on our lives. Thousands of patients have died with various complications. Although lung infections primarily account for the most serious outcomes, a progressively increasing number of cases of COVID-19 involve neurological symptoms like loss of taste and smell, dizziness, unconsciousness, seizures, encephalitis and stroke. The SARS-CoV-2 virus, which causes COVID-19, can attack the brain, manifesting as brain dysfunction leading to aforementioned symptoms. Hence, our aim is to investigate the impact of SARS-CoV-2 on neurons, the fundamental units of the brain, which are likely involved in the observed neurological complications.

THE OTAGO MEDICAL RESEARCH FOUNDATION COUNCIL

EX OFFICIO MEMBERS

Prof G Jones
Chairperson of Scientific Committee

Mr J Adamson
Deloitte (Secretaries)

Prof B Taylor (to December 2019)
Dean Dunedin School of Medicine

Prof R Subramaniam (from January 2020)
Dean Dunedin School of Medicine

Prof V Ward (to December 2019)
Dean Otago School of Biomedical Sciences

Prof B Hyland (from January 2020)
Dean Otago School of Biomedical Sciences

Dr H Cunliffe
Deputy Chairperson of Scientific Committee

APPOINTED MEMBERS

Dr P Gootjes
NZ Medical Association (Otago Division)

Dr N Millar
Otago District Health Board

Prof A van Rij
Otago University Faculty of Medicine

Dr S Baird
President of the Otago Medical School Research Society

ELECTED MEMBERS

Mrs J Bevin

Dr M Coleman

Mr K G Dempster

Mrs S Knowles

Mr M Milne

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Mr KG Dempster
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Prof G Jones
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DIRECTOR OF DEVELOPMENT

Ms S Sims

EVENT MANAGER

Mr S Davie

SECRETARIES

Deloitte

HONORARY SOLICITOR

Mr J Anderson (Gallaway Cook Allan)

AUDITORS

Crowe

PATRON

Emeritus Professor Gil Barbezat

SCIENTIFIC COMMITTEE REPORT

1 July 2019 to 30 June 2020

1. MEMBERSHIP

Chair: Professor Greg Jones

Deputy Chair: Dr Heather Cunliffe (Co-opted)

Dr Hesham Al-Sallami (Co-opted)

Dr Andrew Bahn
(Nominee Otago Medical School Research Society)

Dr Sarah Baird (President Otago Medical School Research Society, *ex officio*)

Dr Sierra Beck
(Nominee Dunedin School of Medicine)

Dr Chris Brown (Co-opted)

Dr Cathy Chapple (Co-opted)

Dr Nick Heng (Co-opted)

Associate Professor Keith Ireton (Co-opted)

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

Associate Professor Ivan Sammut (Co-opted)

Professor Rob Walker (Co-opted)

Associate Professor Joanna Williams (Co-opted)

Associate Professor Stephanie Woodley
(Nominee Otago Medical School Research Society)

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.

The Scientific Committee farewelled Dr Damian Scarf (co-opted member from the Department of Psychology) at the end of 2019. Damian has been a knowledgeable, consistent and enthusiastic contributor to the committee and the Foundation thanks him for his significant contribution.

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

2. SUMMER RESEARCH SCHOLARSHIPS 2019/2020

138 applications (compared with 121 the previous year) for an OMRF summer research scholarship were received from the University of Otago in late August 2019, of which 28 (cf 25 last year) were recommended for funding by the OMRF. Of the 28 students funded by the OMRF, **17 were studying biomedical science, 3 dentistry, 6 medicine, 1 pharmacy and 1 science**. 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 $5,000 except for the two students with the highest scores who were awarded named Summer Research Scholarships ($6,000) – 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: ANZ Private; Chris & Anthony Wither; EMM Haynes Charitable Trust; Stonelake Foundation; Dr Ailsa Goulding; Howard and Jane Fraser; Walsh & Beck; Flavell Memorial Summer Research Scholarship; Manning Memorial Summer Research Scholarship; Esperanz Summer Research Scholarship; Esperanz Summer Research Scholarship; Healthcare Otago Charitable Trust; Lions Club of Dunedin South; Marsh Family Charitable Trust; Middlemass Family; The Southern Trust; MM & JH Hughes Family Trust; Deloitte; OMRF Wilkinson; OMRF McQueen; OMRF Iverach; Otago Southland Diabetes Research Trust; and the Werribee Trust. The involvement of Otago commercial companies and the Otago community for an eighth 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 website: **www.omrf.org.nz**

All scholars returned good to excellent reports at the end of February 2020. **The Renshaw Prize ($250) for the best report was awarded this year to Nathan MacDonell** who worked under the guidance of Professor Bob Hancox, Department of Preventive and Social Medicine.

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.

NATHAN MACDONELL

Supervisor: Prof. Bob Hancox, Dept. of Preventive and Social Medicine

Renshaw Prize Winner for the best OMRF summer research scholar report

PROJECT: Childhood Television Viewing and Metabolic Syndrome at 45 years.

Funder: Middlemass Family

ABSTRACT: Metabolic syndrome (MetS) is a clustering of risk factors which significantly increases risk of cardiovascular disease and diabetes. Evidence of an association between youth TV viewing and MetS is vastly lacking. Using data collected over a lifetime (to age 45 years), we are one of the first to provide evidence that there is an association between TV viewing during childhood and adolescence with MetS in adulthood. Evidence shows approximately 35-40% of youth (5-17 years) average less than 2 hours of screen-time per day. We found those averaging greater than 2-hours-per-weekday of TV between 5-15 years had 1.39 times the odds of developing MetS at age 45 compared to those below this measure. This finding must provide a wake-up call for parents, health practitioners and government officials alike, that changes must be made to promote less screen-time in our youth population.

STEPHANIE BALDWIN

Supervisor: A/P Pete Jones, Dept. of Physiology

PROJECT: Controlling Arrhythmia in the Heart

Funder: OMRF – Dr Ailsa Goulding

ABSTRACT: Cardiovascular disease (CD) is the leading cause of death in New Zealand and is currently treated with β-blockers. This treatment successfully reduces abnormal heart rhythm (arrhythmia) in patients, however, it is also associated with an increased risk of heart failure. With an ageing population the prevalence of CD is expected to increase, thus, research into future drug targets with reduced risks for patients is crucial. This project investigates the effect of altering the activity of a certain cardiac protein on the generation of arrhythmia, using genetic alterations and drug treatments to inhibit its function. A general trend from this pilot study revealed that there is a possible link between reduced protein activity due to drug inhibition and an increase in arrhythmia generation. This has the potential to be significant for future research into this protein as a prospective drug target; that could influence the lives of many people suffering with CD symptoms.

ALL PAST 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

SHREYA BIR

Supervisor: A/P Rajesh Katare, Dept. of Physiology

PROJECT: Exosomes as the future for treating heart disease in diabetes

Funder: OMRF – Otago Southland Diabetes Research Trust

ABSTRACT: As we advance into this new genetic age, gene therapies are starting to be considered as the future of treating and managing chronic diseases such as diabetes. The current area of interest is finding an effective mode of delivery. Exosomes are bubble-like structures responsible for transporting small genetic molecules known as microRNAs in the blood. Changes in the levels of these molecular regulators have been shown to damage the heart and blood vessels in the diabetic state. In this project, we isolated exosomes from the blood of diabetics and non-diabetics and used them to deliver the beneficial microRNAs-126 and 132 to cells in the diabetic state, which improved both proliferation and migration. With diabetic heart disease accounting for 80% of deaths in diabetics, it is our hope that in the future exosomes can be administered therapeutically to correct the levels of microRNAs, reducing morbidity and mortality in this vulnerable population.

EMMA BULTITUDE

Supervisor: Prof. Paul Smith, Dept. of Pharmacology and Toxicology

PROJECT: Use of Interleukin-10 to Prevent Gentamicin Induced Cochlear Ototoxocity

Funder: OMRF – Healthcare Otago Charitable Trust

ABSTRACT: Gentamicin, an aminoglycoside antibiotic, is used extensively for its effectiveness at treating bacterial infections. Unfortunately, gentamicin is ototoxic, meaning it can irreversibly kill the hair cells within the cochlea and vestibular system of the inner ear. Damage to cochlear hair cells results in severe, permanent hearing deficits, meaning thousands of gentamicin users become infection free but unable to hear as they used to. This summer studentship research aimed to investigate whether the ototoxicity of gentamicin treatment could be reduced using interleukin-10, an anti-inflammatory mediator. The cochleae of post-natal day one rats were dissected, exposed to either gentamicin or no antibiotic, and the resultant effects on the hair cells were assessed. Due to the complexity of this experiment, it cannot be determined if interleukin-10 can reduce gentamicin ototoxicity, but this experiment was significant in establishing an in vitro cochlear culture model.

PADDY CHEAH

Supervisor: A/P Ming Zhang, Dept. of Anatomy

PROJECT: Minimising complications in Jugular foramen tumour surgery

Funder: OMRF – MM & JH Hughes Family Trust

ABSTRACT: Thirty skulls were scanned using a 3D scanner and data involving the jugular foramen were collected. These data were analysed to provide neurosurgeons a more detailed understanding of the area. This is important as endoscopic surgery to the jugular foramen region is becoming more popular recently. Unlike traditional macroscopic surgery, structures which are normally not visible to the naked eyes are now able to be seen with an endoscope. These knowledges will help surgeons to avoid damaging neighbouring important structures such as the facial nerve. Damaged facial nerve could result in facial paralysis. The results suggest no significant differences between two sides and bony landmark is used to better protect the facial nerve.

PHOEBE DEWAR

Supervisor: Dr James Ussher, Dept. of Microbiology and Immunology

PROJECT: The role of cell metabolism changes in activation of anti-bacterial immune cells

Funder: OMRF – Esperanz

ABSTRACT: Mucosal associated invariant T (MAIT) cells are antibacterial immune cells found in the blood, liver and mucosal sites. MAIT cells can be activated via interaction of the T cell receptor with MR1, on antigen presenting cells (APCs), displaying an activating antigen. This antigen is formed by a reaction between a bacterial-derived metabolite of riboflavin synthesis and methylglyoxal, a by-product of cell metabolism. Previously, we found the presence of bacteria enhances activation of MAIT cells, particularly when bacteria are intact. Using a Seahorse assay, we investigated a potential mechanism by which intact bacteria could enhance antigen formation, thus MAIT cell activation, which was hypothesised to be cell metabolism. Early evidence suggests that glycolysis (cell metabolic process) may be enhanced to a greater degree by intact bacteria, giving promise to the potential identification of a mechanism that in the future, could be externally targeted to fine-tune the immune response during bacterial infection.

SHARNEE DIAMOND

Supervisor: A/P Chrystal Jaye, Dept. of General Practice and Rural Health

PROJECT: Aging in rural communities; access to specialised support

Funder: OMRF - ANZ Private

ABSTRACT: The rural aging population is negatively affected by barriers which prevent both access to, and the provision of, support services. In partnership with Aged Concern Otago (ACO), this qualitative study set out to identify the unmet needs of the older rural folk in Central Otago, and to assess the types of support which they need in order to age in place confidently. Informant interviews included: 1) the social worker, 2) referrers of the ACO clientele, and 3) the older rural residents supported by ACO. An evaluation of the fixed term social work position, funded by ACO and based in Central Otago, revealed the frustration felt by social workers. Analyses of interview transcripts involved an adapted template organising style. Key findings from this project include: Context: rural uniqueness; Aged social work; and action points: what is still needed.

CASSANDRA GLANFIELD

Supervisor: Dr Tim Hore, Dept. of Anatomy

PROJECT: Does passive removal of DNA methylation favour particular DNA sequences?

Funder: OMRF – The Southern Trust

ABSTRACT: Many people are aware of how DNA sequences provide the instructions for our cells. However, DNA methylation, a chemical modification on top of DNA, can provide additional information. DNA methylation is accumulated on DNA during development, helping cells decide what cell type to become, and is erased with each generation. DNA methylation can be removed by two methods in cells; actively through the function of enzymes, or 'passively' through the dilution of methylation as cells divide. Active demethylation has been shown to favour particular DNA sequences for the removal of methyl marks. My research examines whether 'passive' demethylation also causes methylation to be removed from DNA at different rates. Understanding how demethylation occurs is important for regenerative medicines and the creation of pluripotent cells.

JERRY GOH

Supervisors: Dr Sarah Fortune, Dept. of Psychological Medicine and Dr Gabrielle McDonald, Dept. of Women's and Children's Health

PROJECT: Suicide in young people aged under 25 years within NZ: Asian compared with NZ European

Funder: OMRF – The Southern Trust

ABSTRACT: The Asian population is growing rapidly within New Zealand and is expected to overtake Māori and Pacific population groups by 2038. Although there has been research on suicide among elderly Asian people in New Zealand, there is relatively little knowledge regarding suicide within Asian young people. This study describes the characteristics and prevalence of suicide among Asian young people aged 10-24 years between 2002-2017. Although tragic, results indicate the number of deaths each year by suicide among Asian young people is relatively small, with large fluctuations observed in the annual suicide rate. Overall, there has been no significant change in the rates of suicide between 2002-2017. Methods and circumstances of suicide vary compared with NZ Europeans. Young Asian people who die by suicide come from heterogeneous cultural and linguistic traditions, so prevention strategies need to be culturally responsive and delivered across settings including education, primary care and mental health services.

CARIS HEINIGER

Supervisor: Dr Peter Mei

PROJECT: A 3D evaluation of the relationship between craniofacial traits and facial soft tissue changes with the mandible in rest position and maximum intercuspal position

Funder: OMRF – Walsh & Beck

ABSTRACT: The determination of the correct vertical dimension of maxilla-mandibular relation is one of the most important steps of several dental disciplines in order to achieve adequate aesthetics and function. The rest position of the mandible is of considerable interest to dentists, as it is used to determine the occlusal vertical dimension. The rest position has typically been measured with external soft-tissue landmarks. This research investigated the face shape (morphology) changes when the lower jaw is in rest position and maximal intercuspation position, using 3D imaging techniques (3dMD). Further, it explored the relationship between these facial changes and different orofacial features; long face, short face, overbite and crossbite. 3D images were captured in the two jaw positions for the 120 subjects who were selected from volunteer staff and students at the University of Otago Faculty of Dentistry. 3dMD Vultus software was used for analysis, where 9 soft tissue landmarks were identified on each image, recorded as x, y, and z coordinates. These coordinates were used to identify any changes from the jaw in rest position compared to maximum intercuspation.

LARS HUMBLESTONE

Supervisors: Dr Htin Lin Aung, Dept. of Microbiology and Immunology and Dr Brendan Arnold, Southern DHB

PROJECT: Translating complex TB genomic data for clinicians

Funder: OMRF – Flavell Memorial

ABSTRACT: Tuberculosis (TB), mainly caused by a bacterium Mycobacterium tuberculosis (Mtb) is responsible for a great deal of suffering worldwide. Rising levels of drug resistant strains of Mtb pose a significant risk to global public health. Whole genome sequencing is a constantly evolving technology that could be of great benefit in drug susceptibility testing (DST). This project aims to translate complex Mtb genomic data into an easily interpretable report for hospital clinicians, to help combat drug resistance. In this project we constructed a pipeline of programs to process TB whole genome sequence data in order to identify mutations that could confer resistance. This information was then input into a report framework tailored for New Zealand clinicians to simplify treatment options for the patient.

ABDUL-KAREEM IPOSU

Supervisor: A/P Phil Sheard, Dept. of Physiology

PROJECT: Do age-related changes at the cell nucleus occur in skeletal muscle?

Funder: OMRF – McQueen

ABSTRACT: Living beyond 90 years of age is becoming more common, but our independence during this time is very poor due partly to sarcopenia, the age associated loss of muscle mass. In recent studies, sarcopenia has been attributed to the death of motor neurons which is linked to breakdown of the nuclear barrier. However, this phenomenon has not been demonstrated in tissues that feature cell turnover and generation of cells with new nuclei. Skeletal muscle features a stem cell population

able to provide new nuclei to muscle cells in response to growth or damage. For this reason, I sought to discover whether the age-related deterioration of skeletal muscle might occur due to loss of nuclear barrier proteins. My hypothesis was that it would not, and that muscle would be protected from this manifestation of cellular ageing by the intrinsic mechanism of nuclear replacement, and the project provided support for this hypothesis.

GARETH JONES

Supervisor: Prof. Catherine Day, Dept. of Biochemistry

PROJECT: Turning off immune responses

Funder: OMRF – Stonelake Foundation

ABSTRACT: Retinoic acid Inducible Gene I (RIG-I) is an antiviral sensing protein that initiates an immune response against invading viruses. However, overactivation of this pathway has been identified in various autoimmune diseases. The development of better treatments for these diseases is dependent on understanding how the RIG-I signalling pathway functions. Ring finger protein 125 (RNF125) has been identified as having a key role in the termination of RIG-I signalling pathway. This project produced many essential components to investigate the termination of RIG-I signalling. This included optimising a purification procedure for RNF125. An assay system was developed that demonstrated that RNF125 can add degradative ubiquitin to a di-ubiquitin substrate and that the ubiquitin interacting motif (UIM) of RNF125 promotes ubiquitylation. This research provides a foundation for future investigations into RNF125 function.

MARIA LARSEN

Supervisor: Dr Anita Dunbier, Dept. of Biochemistry

PROJECT: Investigating a potential biomarker in oestrogen receptor positive breast cancer.

Funder: OMRF – Middlemass Family

ABSTRACT: Oestrogen receptor positive breast cancer causes more deaths than any other form of breast cancer in New Zealand. Resistance often arises to current treatments. The cancer cells can express a protein called PDL1, which enables the cancer cells to evade the immune system. Immunotherapy is a new type of cancer treatment that can retrain the immune system to recognise cancer cells, enabling the immune system to attack the cancer. However, immunotherapy does not work for the majority of patients. There is evidence suggesting PDL1 could be used to predict which patients will respond to immunotherapy. This project showed that SSM3 cells, which model breast cancer, do overexpress PDL1 when transfected with a PDL1 containing construct.

BARRY LEUNG

Supervisors: Prof. Richard Cannon and Dr Jithendra Ratnayake, Dept. of Oral Sciences

PROJECT: A new treatment for root caries in the elderly – a microbiological study

Funder: OMRF – Chris and Anthony Wither

ABSTRACT: Tooth decay (caries) is the most common chronic disease in New Zealand. With an aging population, and with people retaining their teeth well into old age, the incidence of root caries is increasing. This project was the lab-based component of a clinical trial of a new treatment for root caries – incorporating an antimicrobial compound into caries restorations. Saliva and dental plaque were collected from trial participants, diluted, plated on agar, and microbial colonies counted. The study aim was to determine whether the novel treatment reduces the number of caries-inducing microorganisms around the antimicrobial-containing restorations and is associated with a reduction in the number of new carious lesions. The novel treatment, unlike the conventional treatment, led to initial decreases in all microbial counts, with a sustained reduction, over 6 months, in bacteria that cause caries. Further statistical analysis is needed, however, to confirm the significance of these results.

XIAO LI

Supervisor: Dr Andrew Reynolds, Dept. of Medicine

PROJECT: An audit of blood glucose testing in the community: who uses this health service, and does it detect hyperglycaemia?

Funder: OMRF – Iverach

ABSTRACT: On-the-spot blood glucose testing is a health service performed at public events or in pharmacies to raise diabetes awareness and screen for elevated blood glucose levels. We audited data service collected over the last 20 months to identify who uses on-the-spot blood glucose testing, and the frequency of detecting elevated blood glucose levels. Data from 2156 individuals from all major ethnic groups and socioeconomic quantiles were audited, 78% of whom were female. For 53% of responders, this was the first time their blood glucose had been checked. 153 (7.1%) cases of elevated blood glucose (>8mmol/L) were identified. Those identified with elevated blood glucose levels accessed their medical practitioner more frequently than those with normal blood glucose, regardless of a previous diabetes diagnosis. Further research set in the general practice could identify prompts in the timeline leading to a diabetes diagnosis, such as receiving an elevated blood glucose level reading at an on-the-spot service.

JORDON LIMA

Supervisor: Prof. Parry Guilford, Dept. of Biochemistry

PROJECT: Tracking Cancer-Specific DNA in the Bloodstream to Monitor Progression of Colorectal Cancer

Funder: OMRF – Howard and Jane Fraser

ABSTRACT: A new cancer monitoring technology detects and measures the amount of cancer-specific DNA, called circulating tumour DNA (ctDNA), in a patient's bloodstream. Levels of ctDNA can be traced by following cancer-specific changes that drive cancer development show how a patient is responding to cancer treatments, such as chemotherapy, and predict the likelihood of the disease reoccurring. This technology requires only a blood test and is more accurate and risk free than CT scans that expose patients to harmful

radiation. In this project, I analysed tumour samples from patients diagnosed with colorectal cancer. I found that part of the tumour DNA, called the RNF43 gene, was changed at similar positions throughout the patient samples, and that these may have played a role in the development of cancer. Therefore, I concluded that RNF43 should be added to a list of genes that doctors will screen for when testing a newly diagnosed patient.

JANET LIN

Supervisors: Prof. Neil McNaughton, Dr Shabah Shadli and Tame Kawe, Dept. of Psychology, Division of Sciences

PROJECT: The common brain mechanism of treatment effect of ketamine on treatment resistant generalised and social anxiety disorder

Funder: OMRF – The Southern Trust

ABSTRACT: Ketamine is known to improve a variety of neurotic disorders. A possible neural explanation is that ketamine generates its therapeutic brain changes through a common brain mechanism for all the disorders. A decrease in right frontal EEG theta rhythm (but not other EEG changes) was previously found to correlate with improvement in patients with anxiety disorders but this result remains to be confirmed. Here, we confirmed that there was no such decrease after two hours in people who received no drug at all, strengthening the evidence that ketamine produces a decrease.

THOMAS LUNT

Supervisor: A/P Bruce Russell, School of Pharmacy

PROJECT: Determining Schizophrenia Risk Using Imaging Technology

Funder: OMRF – Esperanz

ABSTRACT: Schizophrenia is a debilitating mental condition creates a substantial burden on the lives of those afflicted and the people close to them. Because there is no cure for schizophrenia the best way to treat it is through early intervention, which can be achieved if the early warning signs, known as Psychosis Experiences (PEs) are detected. Current methods of detecting PEs are useful but subjective, so this study aims to create a more objective method using existing imaging technology. Magnetic Resonance Imaging is an effective tool for understanding the structure and function of the brain, and by comparing the brains of those at risk for schizophrenia to those who are not at risk, we hope to gain a better understanding of how psychosis works before the onset of symptoms. Currently there is no data from this study.

NIKITA LYONS

Supervisor: A/P Beulah Leitch, Dept. of Anatomy

PROJECT: Investigating altered inhibitory brain chemistry in mice with absence epilepsy

Funder: OMRF – EMM Haynes Charitable Trust

ABSTRACT: Childhood absence epilepsy is the most common paediatric epilepsy, yet one third of sufferers do not respond to currently available treatments. These children endure frequent non-convulsive seizures where they briefly lose consciousness. Seizures are thought to be caused by imbalanced inhibition and excitation in the brain, but the precise mechanisms are uncertain. Our mouse, the stargazer, has a mutation thought to reduce inhibition. This project determined if stargazers have altered levels of proteins that produce and transport GABA, an inhibitory signalling molecule. Expression patterns for all targets were as expected with no differences observed between epileptic and non-epileptic animals. However, levels of a production protein were elevated in epileptic animals, but no significant alterations detected in other targets. This protein may be increased to allow production of more GABA in an attempt to compensate for reduced inhibition. Therefore, this may be important in defining an underlying mechanism to therapeutically target.

SUSAN NAING

Supervisor: Prof. Brian Hyland, Dept. of Physiology

PROJECT: Raclopride and methylphenidate as a combined drug for Parkinson's disease

Funder: OMRF – Werribee Trust

ABSTRACT: The most effective treatment for Parkinson's disease is Levodopa (L- DOPA), but its use is limited by side-effects. Methylphenidate is a potential treatment that prevents the reuptake of dopamine into the nerve terminals, prolonging the effects of released dopamine. This, however, triggers a negative feedback which dampens dopamine release to reduce the therapeutic benefit. Raclopride is a drug that blocks this negative feedback but may result in Parkinsonian symptoms. Our aim was to construct a dose-response curve to find a raclopride dose that does not produce symptoms, to be used in combination with methylphenidate. The effect of different raclopride doses was assessed using a series of behavioural tests in a rat model of Parkinson's disease. Severe lack of limb movement was seen with 0.04mg/kg of raclopride, although this improved significantly with 0.02mg/kg of raclopride. This sets a benchmark for future studies combining methylphenidate and raclopride as a drug for Parkinson's disease.

JENNIFER PALMER

Supervisors: A/P Stephanie Hughes and A/P Peter Mace, Department of Biochemistry

PROJECT: Investigating a Protein Involved in Childhood Brain Disease

Funder: OMRF – Wilkinson

ABSTRACT: Batten disease is a childhood condition that causes blindness, seizures, movement difficulties, learning challenges and premature death. It can be caused by changes in a protein called CLN5 (Ceroid Lipofuscinosis, Neuronal Five), which is part of the recycling system of brain cells. Currently, no-one knows the normal function of the CLN5 protein, so this project aimed to work out the structure of CLN5 to gain insights into its potential function(s). However, working out protein structures

requires crystals of the protein to form, and this has been an ongoing challenge for CLN5. Advances in protein production, purification and treatment made during this project have brought us closer to discovering the structure of the CLN5 protein. Determining the structure of CLN5 would provide ideas of its possible functions, increasing our understanding of this childhood disease and providing potential drug targets for Batten and related neurodegenerative diseases.

FERGUS PAYNE

Supervisors: Dr Joanne Harrison and A/P Ivan Sammut, Dept. of Pharmacology and Toxicology

PROJECT: The Effect of Carbon Monoxide Releasing Drugs on Immune Cells

Funder: OMRF – Marsh Family Charitable Trust

ABSTRACT: People who undergo surgery after a heart attack are at risk of an unavoidable injury termed ischaemia-reperfusion injury (IRI). This causes more problems such as inflammation in the hearts of patients after surgery which can injure their hearts further. Low doses of carbon monoxide (CO) has been seen to be an anti-inflammatory and could potentially reduce IRI. Our Otago collaborative team have developed a drug that can release CO and is believed to reduce inflammation. In order to investigate this research was conducted in inflammatory immune cells to see whether our drug could reduce the inflammation it produces. Currently we were unable to obtain a conclusive finding within this study however, recent research points towards the ability of CO to reduce inflammation so further research needs to be done to make any definitive conclusions.

OWEN PENG

Supervisors: Prof. Iain Lamont and Lois Martin, Dept. of Biochemistry

PROJECT: Unmasking antibiotic resistance in Pseudomonas aeruginosa

Funder: OMRF – The Southern Trust

ABSTRACT: Pseudomonas aeruginosa is one of the most problematic pathogens due to its ability to develop antibiotic resistance. It is a frequent cause of chronic and nosocomial infections in cystic fibrosis patients, which causes an arms race between the bacterium and modern medicine. The bacterium is constantly evolving new mechanisms to increase its survivability in presence of antibiotics. The aim of this project was to develop a CRISPR-Cas method to understand how deletions in the genome of P. aeruginosa confer antibiotic resistance.

KAITLYN TIPPETT

Supervisor: Dr Sarah Diermeier, Dept. of Biochemistry

PROJECT: Identification of new drives of tumour growth in metastatic triple-negative breast cancer

Funder: Otago Medical Research Foundation

ABSTRACT: Triple negative breast cancer (TNBC) accounts for ~15% of all breast cancer in New Zealand. TNBC lacks the three markers found in the other types of breast cancer. TNBC is particularly prone to metastasis, meaning the primary tumour commonly spreads to other organs in the body, resulting in secondary tumours. The aim was to identify molecules that are found at high concentrations in metastatic TNBC but at low concentrations in the primary tumour. This was done by quantifying potential molecules in TNBC that metastasizes specifically to the lung, brain and bone. From this, two molecules were identified, AC025176.1 and CASC9. AC025176.1 was identified in all three metastasis sites and CASC9 was identified in just the lung-specific site. The discovery of these molecules can be used to do further research to identify whether they are drivers of metastatic TNBC, and if they could be used as markers of metastatic TNBC.

TIFFANY TSANG

Supervisors: A/P Mark Thompson-Fawcett and Dr Kiri Clifford, Dept. of Surgical Sciences

PROJECT: What is the benefit of carcinoembryonic antigen (CEA) testing in colorectal cancer surveillance?

Funder: OMRF – Lions Club of Dunedin South

ABSTRACT: ***Background:*** After surgical treatment, colorectal cancer (CRC) recurs in 30-40% of patients. Carcinoembryonic antigen (CEA) can be elevated by recurrent disease, so CEA is measured for early detection. However, it can be elevated in the absence of recurrence, triggering extra unnecessary investigations. We aimed to evaluate CEA testing in CRC surveillance. ***Methods:*** We analysed data on 350 patients who started colorectal cancer surveillance at Dunedin Hospital. Data collected included CEA and imaging results, detection of recurrence, and survival. ***Results:*** 15.1% patients had recurrence. CEA testing had a sensitivity and specificity of 64.2% and 57.6% respectively. 194 (61.2%) scans done due to elevated CEA did not detect a recurrence. In CEA-detected recurrences, 91.7% were still alive compared to 75.9% of non-CEA-detected recurrences, but this may be due to chance. ***Conclusion:*** CEA testing in our surveillance programme provides limited benefit. Further research is needed to refine CEA testing guidelines.

JACINTA VAN DER LINDEN

Supervisor: Dr Heather Cunliffe, Dept. of Pathology

PROJECT: Investigating the role of Fn14 in cancer metastasis

Funder: OMRF – Manning Memorial

ABSTRACT: Cancer metastasis is the process whereby cancer cells move from the initial tumour site to other locations in the body. It is often cancer metastasis, rather than the initial tumour, that causes patient death. A key requirement for cancer metastasis is epithelial to mesenchymal transition (EMT), a process where cancer cells lose the ability to adhere together and gain traits that allow them to move and migrate to other locations in the body. It is thought that a specific protein, Fn14, may play a role in EMT. This project

aimed to determine whether excess Fn14 expression was required for EMT to occur. Results indicated that while Fn14 is not the sole causal factor of EMT, it does play a role in the process, and may therefore be required in order for this process to occur.

SHAUN VAZ VIEGAS

Supervisors: Deanna Beckett and Dr Carolina Loch, Dept. of Oral Sciences, and A/P Benjamin Wheeler, Women's and Children's Health DSM.

PROJECT: Investigating the dental consequences of perinatal vitamin D deficiency with energy dispersive x-ray analysis

Funder: OMRF – The Southern Trust

ABSTRACT: Severe vitamin D deficiency commonly results in developmental defects in bone as well as defects in tooth mineralisation. The effects of milder vitamin D deficiency on foetal and neonatal oral health outcomes is still unclear. This study used energy dispersive x-ray analysis (EDX) to characterise the mineral content in vitamin D deficient, insufficient, and sufficient primary exfoliated teeth. A negative relationship between placental cord blood vitamin D status and both calcium and phosphorous weight percentages in enamel and circumpulpal dentine was found, however these differences were not statistically significant (p-value >0.05). This differed from the known relationship between severe vitamin D deficiency and mineralisation defects in bone and non-bone tissues. EDX is a powerful tool but has detection limits that prevent detection of trace elements such as fluoride and magnesium that might have been affected by vitamin D. Future studies could employ other tools such as LA-ICPMS to investigate this.

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 2019 there were 34 applications from the University of Otago (cf 20 the previous year) totalling $990,096 and eight of these were funded at a total expenditure of $205,537 of which $70,000 was provided most generously by the Otago Community Trust. These grants commenced between August and October 2019 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 2020. The funded projects are summarised below:

(I) ANNUAL GRANTS

Professor Alison Heather (Department of Physiology, University of Otago) & **Dr Louise Bremer (SDHB)**

Serum estrogen receptor bioactivity and breast cancer risk - AG378

Sponsored by Mike Bird and Friends of the Foundation

Breast cancer is the most frequently diagnosed cancer in women. All women are at risk of recurrence after mastectomy. The measurement of serum estradiol in these patients can be used to guide therapy and as a prognostic tool. Unfortunately, estradiol measurements have proven unreliable on both counts. In contrast, estrogen receptor bioactivity is reported to be high in women that develop breast cancer. As such, there is now considerable interest in using estrogen receptor bioassays to track breast cancer patients. We aim to measure estradiol levels and estrogen receptor bioactivity in serum of women pre and post-aromatase inhibitor treatment. If the bioassay identifies estrogen receptor bioactivity beyond that derived from residual estradiol levels, this will provide a major impetus for discovering non-classical estrogens that can drive recurrence.

Dr. Htin Lin Aung & **Thomas Devine** (Department of Microbiology & Immunology, University of Otago)

Transcriptional Profiling of the New Zealand Tuberculosis Rangipo strain within macrophages - AG379

Sponsored by OceanaGold

Tuberculosis (TB) is the number one cause of death from an infectious disease in the world. Elevated TB rates among indigenous peoples are a major theme in the history of worldwide TB. Despite New Zealand being a low TB burden country, the disease has a disproportionately higher incidence in Maori (six times higher) when compared to New Zealand Europeans and the causes of the disparity in TB infection between Maori and Non-Maori remain unknown. TB is a prime example of a "social disease" with the risk factors including a complex combination of human factors (obesity, diabetes, smoking and alcohol use), socio-economic factors (crowding, poverty and unemployment) and bacterial factors (strain and transmissibility). In addition, a New Zealand unique Mycobacterium tuberculosis (MTS) strain known as the Rangipo strain is highly prevalent in Maori. In this study, we will unravel the genetics of the Rangipo strain to discover its transmission characteristics compared to other strains in the Maori population.

Assoc Prof Roslyn Kemp, Paulo Urbano, (Department of Microbiology & Immunology, University of Otago) & **Prof Michael Schultz** (Department of Medicine, University of Otago)

The control of inflammation by regulatory T cells - an immune-intestinal organoid model - AG384

Sponsored by JN Lemon Charitable Trust

Inflammatory bowel diseases (IBD) are caused by uncontrolled inflammation in the gut. This inflammation causes a breakdown in gut function, chronic pain and inflammation. Many factors are involved in both the cause and progression of IBD, including the immune system, the gut microbiome, the epithelial barrier, and the genetic background of the individual. The immune response is usually controlled by a type of immune cell, regulatory T cells (Tregs) to prevent inflammation. We plan to study the types of Tregs in people with IBD using intestinal organoids, which replicate the epithelial barrier, immune response and gut microbes from individual patients

Assoc Prof Joanna Kirman & Assoc Prof James Ussher (Department of Microbiology & Immunology, University of Otago)

Improving vaccination against TB: inducing trained innate immune cells in the lungs - AG380

Sponsored by The Southern Trust

Tuberculosis (TB) kills more people annually than any other single infectious agent. The existing vaccine, BCG, protects children but not adults against TB. Understanding the protective immune mechanisms of the BCG vaccine is a critical first step to progress development of an improved TB vaccine that will also protect adults. This study will investigate a new idea - that the first responding immune cells (innate cells) can be trained by vaccination. We will provide the first insight into whether innate immune training is uniform across lung innate cells following BCG vaccination or whether certain innate cells are more "trainable" than others.

Dr. Narun Pornpattananangkul (Department of Psychology, University of Otago) & **Dr. Argyris Stringaris** (NIH, USA)

Using Big Data in Neuro-Genomics to Solve the Mechanisms of Mood Disorders - AG383

Sponsors: the M. Begg Charitable Trust and The Southern Trust

Mood disorders, including depression and bipolar disorder, are the leading causes of disability worldwide, accounting for around 60% of suicidal cases. Alarmingly, almost a million New Zealand adults suffer a mood disorder in their lives. But we do not fully understand the biological drivers of these disorders, hampering effective prevention and treatment. Exciting new work (including by our own group) uses neuroscience Big Data to map brain abnormalities related to mood disorders. By combining this with our unprecedented access to genomics data collected from around the world (including NZ), we will examine the biological basis of mood disorders. With this comprehensive investigation, we anticipate a greater understanding of the causes of these disorders, which will in turn inform the development of more effective treatments.

Professor John Reynolds, Dr Mariana Leriche Vasquez (Department of Anatomy, University of Otago), **Dr Ben Brockway, Dr Nick Cutfield** (Department of Medicine, University of Otago).

Detecting changes in habits in rapid eye movement sleep behaviour disorder (RBD): a pilot study - AG385

Sponsored by the ADEPT-MACTODD Charitable Trust

One of the early signs of Parkinson's disease (PD) is the loss of habitual movements, however it is unclear if this loss is also present in disorders associated with PD. We have developed a simple computational tool by which to detect habit loss and will test a sample of people with a condition called rapid eye movement sleep behaviour disorder (RBD). Comparison between results obtained from RBD and healthy participants with our ongoing PD study, will allow us to determine the specificity of our tool for PD and the ability to detect habit loss in a population with some association with PD.

(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 two projects selected were:

Dr Louise Bicknell & **Dr Karen Knapp** (Department of Pathology, University of Otago)

Investigating the mechanisms of a novel genetic cause of intellectual disability - CT381

We have identified genetic alterations in 20 patients with intellectual disability in novel disease genes that serve to fit DNA inside cells. While our genetic evidence is significant, we need to understand how these alterations impact the normal functioning of the encoded protein. In particular, the association of these proteins with DNA is dynamic, and we hypothesize the efficiency of this dynamic association could be impacted by these genetic alterations, ultimately impacting normal cell functioning during brain development. Our research has the potential to gain insight into more common, complex neurodevelopmental conditions such as autism, epilepsy and developmental delay.

Professor Mike Eccles, Dr Aniruddha Chatterjee, Dr Euan Rodgers (Department of Pathology, University of Otago) & **Dr Chris Jackson** (SDHB)

A blood-test to epigenomically predict melanoma patient response to Immunotherapy - CT382

These are exciting times for cancer immunotherapy, since after many frustrating years, new immunotherapy drugs have now become clinically validated and successful treatments for a number of cancer types. However, only a small proportion of treated patients actually respond to these treatments, while all treated patients frequently are susceptible to permanent and debilitating adverse drug effects. Unfortunately, no accurate predictive tests are available at present for determining who will respond to treatment. In this project we will identify markers from blood to eventually allow us to develop a convenient blood-test to predict melanoma patient response to immunotherapy.

(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 2019 there were 7 applications (compared with 12 the previous year) from the University of Otago totalling $220,180 and four of these were funded at a total expenditure of $123,966. All grants commenced on 1 February or 1 March 2020 and Abstracts from the final report will be available on the OMRF website **www.omrf.org.nz** mid-2021. The funded projects are summarised below:

Associate Professor Rajesh Katare & **Dr Martin Fronius** (Department of Physiology, University of Otago)

Pharmacological activation of the intrinsic regulator of heart metabolism for a healthy heart aging – LA387

Heart disease will result in 40% of all deaths in adults aged 75 and above, and rank as the leading cause. Aging

impairs heart function by reducing glucose transport. We have recently identified that reduced acetylcholine (a nerve signalling factor) production in aged heart muscle cells is associated with reduced glucose transport. We aim to investigate if restoring acetylcholine bioavailability in the aged heart by preventing its breakdown improves recovery following a heart attack. Results from our study will provide knowledge for a novel treatment option for aging hearts by targeting acetylcholine bioavailability.

Dr Allan Gamble (School of Pharmacy, University of Otago), **Professor Gregory Cook** (Department of Microbiology & Immunology, University of Otago) & **Associate Professor Joel Tyndall** (School of Pharmacy, University of Otago)

Mycobacteria-responsive prodrugs to combat drug-resistant tuberculosis - LA388

M. tuberculosis is a bacterium that causes tuberculosis, a disease that infects more than 10 million people per year. Patients are treated with a mixture of drugs but as the bacteria mutates the drugs no longer work. To fight drug-resistant strains of M. tuberculosis, new drugs and drug delivery methods are needed. Two new classes of drugs have been shown to kill the bacteria, but clinical challenges exist. The drugs need to be in the bacteria at the exact same time, and one of the drugs in the combination is toxic to human cells. By attaching a linker we can convert the drugs into inactive forms (prodrugs), and trick the bacteria to activate each drug individually, killing itself and sparing human cells. Successful prodrug activation in this project will enable us to explore co-drugs, inactive forms of the drugs linked together for simultaneous delivery and bacteria-specific activation

Dr Shakila Rizwan (School of Pharmacy, University of Otago)

Investigating the anti-inflammatory response of novel bioactive lipid vesicles to treat inflammation at the blood-brain barrier – LA389

Inflammation at the blood-brain barrier (BBB), a cellular barrier which safeguards the brain from the rest of the body, is an early hallmark of many neurodegenerative disorders. A group of fatty molecules known as NAEs promote neuroprotection and may slow down the progression of neurodegenerative disorders and thus have the potential to be transformative therapies. However, these molecules are challenging to formulate into a medicine and target to the BBB, which we have addressed with formulation science. This study will investigate the anti-inflammatory properties of our new therapeutic formulation.

Professor Robert Walker (Department of Medicine, University of Otago), **Dr Tania Slatter, Gregory Gimenez** (Department of Pathology, University of Otago) & **Professor Hans-Peter Marti** (University of Bergen, Norway)

Lithium-induced changes in renal tubular cell regulatory pathways – LA390

Lithium is an effective agent used to manage bipolar disorders. However, long-term lithium therapy can be associated with the development of chronic kidney disease. Our research group has been investigating how lithium induces kidney damage. Lithium induces changes in the specialised kidney cells responsible for handling salt and water. In addition, lithium is associated the slow development of fibrosis (scarring) in the kidney. We plan to explore the pathways that lead to the lithium-induced changes. Understanding these pathways could lead to new ways to treat and prevent chronic kidney disease

(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 2019 there were two applications (compared with three in the previous year) from the University of Otago totalling $53,504 and both of these were funded. All grants commenced on 1 February or 1 March 2020 and final reports are due at the end of April or May 2021. Abstracts from the final report will be available on the OMRF website **www.omrf.org.nz**. The funded projects are summarised below:

Dr Paul Hessian & **Melanie Millier** (Department of Medicine, University of Otago)

Fibroblasts and extra-articular inflammation in rheumatoid arthritis - JT384

Pathogenic mechanisms driving extra-articular inflammation in rheumatoid arthritis (RA) are unknown. Rheumatoid subcutaneous nodules are extra-articular lesions associated with severe RA. A unique combination of resources, including a collection of rheumatoid nodule tissues and knowledge of the complete nodule transcriptome from RNA-sequencing analysis has revealed evidence of fibroblasts contributing to inflammation in nodule lesions. In this proposal, we focus on confirming this possibility as we work towards understanding the pathogenesis of extra-articular rheumatoid inflammation and the potential for therapy that will benefit patients with extra-articular disease.

Dr Sarah Ward, Associate Professor Gisela Sole (School of Physiotherapy, University of Otago) & **Dr Peter Lamb** (School of Physical Education, Sport and Exercise Science, University of Otago)

Anterior Cruciate Ligament Reconstruction Outcomes in New Zealand - JT385

Knee injuries, and Anterior Cruciate Ligament (ACL) ruptures in particular have a large impact on the individual and health care system. ACL rupture and surgery have a high risk for early development of arthritis in the knee. To inform clinical decision-making after these injuries, we need to understand which factors may predict a successful recovery and which are risks for osteoarthritis development. This project will explore factors that may relate to 12-month post-surgery outcomes and will provide preliminary data to inform the design of a larger and longer-term study to deepen our understanding long-term ACL injury and ACL rupture and reconstruction outcomes in New Zealand.

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.

(1) At the **August 2019** scientific meeting of the Otago Medical School Research Society (OMSRS) there were 10 doctoral candidates (selected from 22 applicants based on their submitted abstracts).

The first Prize ($1,000) funded by Otago Postgraduate Medical Society was awarded to **Shivani Sethi** (supervisor Dr Colin Brown, Department of Physiology) on the topic of *"Type 2 diabetes is associated with increased activation of brain regions that regulate sympathetic drive to the heart."*

The second prize ($500), which was funded by the OMRF, was awarded to **Sophie Mathieson** (supervisors Associate Professor Stephanie Hughes, Department of Biochemistry and Professor Cliff Abraham, Department of Psychology) on the topic of *"Improved gene transfer for the treatment of neurological disease using modified viral vector AAV-PHP.eB."*

(2) At the April 2020 scientific meeting of the OMSRS there were 11 candidates selected to give presentations of their projects. Due to the Covid-19 lockdown, presentations were recorded in advance and viewed by judges before an online question and answer session. All were summer research scholars and 3 of the 11 had been sponsored by the OMRF. The winners were:

First prize ($500) funded by the OMRF was awarded to **Jennifer Palmer** (supervised by Associate Professors Peter Mace and Stephanie Hughes, Department of Biochemistry) on the topic of *"The Batten disease-associated CLN5 protein is a soluble lysosomal glycoprotein with weak homology to cysteine proteases."*

Second prize ($250) funded by the OMRF was awarded to **Nahid Khalajiassadi** (supervised by Professor Michelle Glass, Department of Pharmacology and Toxicology) on the topic of *"ABM300, a new negative allosteric modulator of the CB1 cannabinoid receptor, exhibits a similar mechanism of action as ORG27569."*

The first prize winner was an OMRF sponsored summer scholar

The OMRF summer research prizes since 2015 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.

OMRF-sponsored prizes at the Otago School's Science Fair:

The Foundation sponsors four prizes ($50 each) each year in the Special Prize category at the Otago Aurora Science & Technology Fair for secondary schools for projects involving medically orientated topics.

The 2020 recipients were:

"Colourful Thoughts" by Matty Richards, Dunedin North Intermediate (Year 7),

"Fit and Fast" by Cooper Ollerenshaw, Rosebank Primary School (Year 8),

"How does screen-time affect your sleep" by Eden McKay, Mt Aspiring College (Year 7),

"Little miss pimple popper" by Eve Morton, Fairfield School (Year 7).

The Foundation's judges were Drs Heather Cunliffe, Sarah Baird, Nick Heng and Andrew Bahn

ACKNOWLEDGEMENTS

The Foundation continues to play an ever-increasing role in funding Medical Research in Otago. This year, in particular, has 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, 12 August 2020

EVENTS

A Night to Remember 2020

A Night to Remember 2020, the Otago Medical Research Foundation's eighth annual black-tie fundraising dinner, hosted in the Dunedin Town Hall in mid-February, was another outstanding success.

A record $121,321 was raised to support our work in launching catalyst research projects and summer scholarships, that funding beginning just over 50 years ago in 1968.

It was a terrific night and our grateful thanks go to our sponsors, those who donated items to the auction and raffle, the successful bidders in the auction, who bought raffle tickets and all who attended.

Dunedin city organist David Birchall performed twice during the night on 'Norma', the Town Hall organ – playing the Wedding March by Felix Mendelssohn to open proceedings and Andrew Lloyd Webber's overture from the Phantom of the Opera immediately after the main course had been cleared.

The 450-strong crowd listened intently to the 'face of research' Dr Chris Jackson's outline of the rapid progress in cancer diagnosis and treatment, this very much allied to the advances in medical discovery in recent years.

Our own superstar magician Jonathan Usher turned his time on stage into a brilliant mix of comedy, magic and crowd participation, setting the evening up perfectly. Electric violinist Yoomia Sim then whipped up a storm with her renditions of various heavy metal classics before returning with a beautiful rendition of Etta James At Last, rated as one of the great love songs of all time (it was Valentine's Day after all) and we then welcomed back the world's fastest portrait painter Brad Blaze, who had been with us at A Night to Remember 2014.

In double-quick speed Brad painted Sir Elton John (highly appropriate with Sir Elton having played in Dunedin just 10 days previously), Marilyn Monroe (in a shower of glitter) and – through a mini-pyrotechnic display – Freddie Mercury (again timely with Queen and Adam Lambert having performed at the Forsyth Barr Stadium earlier that week).

Ending the night's entertainment was the brilliant Queenstown-based band LA Social with the dance floor packed for two hours.

Dunedin Venues and Compass Catering added to the genuine quality of the event, the expertise of Strawberry Sound and the Video Factory, who combined to bring the show to life, was also greatly appreciated as were the superb efforts of auctioneer Rob Fowler and the backstage team of Lois Scott and Alan Muir.

The night's sponsors were: OceanaGold Corp (Naming Rights), Vero Liability, Stewart Construction and the Southern Trust (all Associate) and Forsyth Barr, Misha's Vineyard, Bayleys Metro Realty (Sharon Hyndman & Kees Meeuws), Liquorland Leith Street & Andersons Bay, Anderson Lloyd, Nova and Select Recruitment (all Supporting Partners).

Auction items were donated by: Misha's Vineyard, the Drivesouth Otago Rally, Fiordland Discovery, Prohibition Smokehouse, Regus Dunedin, Mitre 10 MEGA Dunedin, Hannagan & Grieve Travel Associates, Ziabatsu Hair Art, Artistry, No. 7 Balmac, Larnach Castle, FloatFix, Sir Graham Lowe, Highland Helicopters, Mt Difficulty and Quartz Reef.

Our raffle donors were: Mind Muscle gym, Warbirds over Wanaka, Estelle Flowers, Scenic Suites Queenstown, Jizo, Mac's Brew Bar, Muscle Mechanics, Rialto Cinemas Dunedin, Paper Plus Dunedin, Klone Hair and Experience Dunedin.

2019 Foundation Golf Tournament

Blue skies, a gentle nor-easterly breeze and a course in perfect order greeted the near-capacity field in the 10th annual Foundation golf tournament at St Clair in late-September.

Staged again in association with major sponsor OceanaGold, funds raised through the tournament open the way for the Foundation to establish a new research project each year.

Thirty teams strode the course in search of the ultimate prize, the champion's trophy donated by Forsyth Barr as the inaugural winner in 2010. And the scoring matched the conditions with the The OceanaGold # 2 team put together a very fine round and, assisted by luck and an expert dice-tossing technique, won by three clear shots from the Stewart Construction team with the Mornington Pharmacy/RPB Law combination a further half-point back in third spot.

At the prizegiving, the recipients of the OceanaGold research grant from the 2017 tournament, Prof Iain Lamont and Dr Kay Ramsay, outlined the progress made with their investigation into how better to manage antibiotic use for those with cystic fibrosis, a disease which affects lung and stomach efficiency.

The 2019 tournament raised just over $22,500, bringing total funds generated since the first small event in 2010 to $180,000, which has seen the launch of a dozen high quality projects and summer scholarships.

As well as the tournament's naming rights' sponsor OceanaGold, our hole sponsors played a major role in the success of the day and the Foundation acknowledges the support and enthusiasm of Keith Newton and Robin Bates (Unichem Mornington Pharmacy/RPB Law), Dr Alan Wright's team (from the Marinoto Clinic), Deloitte (Luke Murdoch), Palmers Mechanical (Craig Stringer), Southern Colour Print (Sean McMahon), Forsyth Barr (Peter Young), Polson Higgs (Stanley Hebden), Myers Marketing (David Myers), Vault 21 (Andre Shi), Fulton Hogan (Grant Sime), ANZ Private (Jenny Soper), Chas E. George & Sons (Tony Grimaldi), Stewart Construction (Paul Mulholland), Cowell's Pavlova Kitchen (Matthew Heaton), Adrian Cashmore at Bayleys Metro, Pro Signs (Mark Collie), Mr Patrick Dawes (Marinoto Clinic) and Hamish Harvey (RD Petroleum).

There were also a number of individual team entries whose support is appreciated: Ken Dempster, Dave Sharp's Whatsoever team, Mike Bird, Aotea Electric, Heath Johnson (Abbott Insurance), Alan Muir (Dunedin City Motors) Sherman Weatherall (Agility Logistics), Brendan Murray (Gardens New World), David Ehlers (Webb Farry Lawyers), Judy Bevin (J Bevin Ltd), John White (Telfer Electrical Otago) and a very fine collection of gentlemen representing the Foundation.

Our appreciation too to our prize and refreshment sponsors and others who supported the tournament: Calder Stewart Industries, Dr Brian McMahon, Dr Jenny McMahon, Lab Supply, Forsyth Barr, Living Corporation, Cook Brothers Construction, Maher Shoes, Patrick Moore (the pro at St Clair), Aravin Estate, Gardens New World, the Dunedin Casino, John Griffin at Jack's Point, helloworld Travel Dunedin, Armstrong Prestige, Rockburn Vineyard, Misha's Vineyard, RD Petroleum, Knox & Anderson, ANZ Private, Webb Farry Lawyers, Select Recruitment, Mike Bird, Telfer Electrical Otago and McDonald's Dunedin.

THE RESULTS WERE:

- Closest to the pin: 4th – Ash Clinch; 7th – Russell Clayton; 13th – Antony McCullough; 16th – Michael Brandso.
- Closest to the pin (2nd shot on the 11th): Sherman Weatherall.
- Long putt winners: Neil McDonald, Sherman Weatherall

TEAM RESULTS:

- 1st: playing off a handicap of 8.25 and finishing with a nett score of 50.75 – OceanaGold # 2

- 2nd: 8.125, 53.875 – Stewart Construction
- 3rd: 8.625, 54.375 – Mornington Pharmacy/RPB Law
- 4th: 8.125, 54.875 – Alan Muir's team
- 5th: 10, 55 – Judy Bevin's team
- 6th: 8.875, 55.125 – Aotea Electrical
- 7th: 4.75, 55.25 – Whatsoever Ltd
- 8th: 4.5, 55.5 – Palmers Mechanical
- 9th: 14.375, 55.625 – ANZ Private
- 10th: 9, 56 – Agility Logistics
- 11th: 4.875, 56.125 – Cowell's Pavlova Kitchen
- 12th: 8.875, 56.125 – Webb Farry Lawyers
- 13th: 2.375, 56.625 – ProSigns
- 14th: 8.25, 56.75 – OceanaGold # 1
- 15th: 5.5, 57.5 – Deloitte

OMRF CLUB OTAGO LUNCH SERIES

It seems the sky is the limit for the Foundation's Club Otago lunch series with membership numbers and enthusiasm for the concept growing hand in hand.

Since the first lunch was hosted in April 2012, more than $700,000 has been generated through members' annual subscriptions as corporate and individual supporters alike utilise the functions to host clients, family and friends.

During the 2019-2020 year were:

We created history by welcoming a speaker back for the second time when Prof Robert Patman presented again in June – in light of the Christchurch mosque killings and the rise of Far-right political platforms around the globe.

The amazing Billy Graham enthused us in September with his message of daring 'to just do it' backed by a lifetime of experience and dreaming big. Billy fought his way out of a desperate childhood to become a four-times New Zealand boxing champion, the owner of a number of butcher's shops and a successful businessman and entrepreneur. His biggest legacy though is his work for disadvantaged young people through the Billy Graham Youth Foundation. Billy's presentation was vibrant, serious, funny and inspiring all in one.

JOIN US

To join Club Otago, simply go to our website **omrf.org.nz/club-otago/** and fill out the form or contact Susan Sims at **susan.sims@omrf.org.nz**

Membership of Club Otago is open to anyone. Membership fees cost as little as $250 per year, of which all goes towards funding medical research.

We then welcomed the highly energetic Sir Graham Lowe who enthused our members with tales of his times as a rugby league coach and team owner, his work with the Kick for the Seagulls programme which offers at risk 12 to 19-year-olds a second chance at learning literacy and numeracy skills, and the success of his 12 Dynamic Principles programme which has been adopted by many of the country's highest profile companies.

Rounding out the year was the CEO of the New Zealand Olympic Committee Kereyn Smith. Kereyn outlined the progress of New Zealand athletes as they honed-in on the 2020 Olympics and the likelihood of success of what was shaping as a highly competitive team. We were also privy to some of the inner machination of the International Olympic Committee. Little were we to know that within a fortnight of Kereyn's visit the Covid-19 pandemic would surge, forcing New Zealand into lockdown and the postponement of the Tokyo Games to July 2021.

Our members in the 2019/2020 year were:

PATRONS

SENIOR FELLOW

Otago Polytechnic

Calder Stewart

MTF Finance

FELLOW

Ross & Bev Middlemass

Deloitte

Allied Press

McMahon Investments

Carpet Court Dunedin

RD Petroleum

ASSOCIATE FELLOW

Forsyth Barr

SF Waller Family Trust

Living Corporation

Brian Stevenson

Moore Markhams Otago

Harvie Green Wyatt

Storesafe Dunedin

Dunedin Casino

INDIVIDUAL

Trevor Millar
(Cowell's Pavlovas)

Ian Timperley
(ProSouth IT)

Mary Arnesen

Shirley Laney &
Monica Urquhart

Janine Young

Jenny Soper
(ANZ Private)

Wyn & Dorothy Chirnside
(Werribee Trust)

Rod McMeeken
(The Brothers Hotel)

Michael Milne
(Craigs Investment Partners)

Barbara Bridger
(Otago Community Trust)

Octagon Dental Suite
(Yash Khan)

Otago Orthodontics
(Emily Lam)

Nigel Thrush
(Specsavers Dunedin)

Hudson Biggs
(Accounting & Finance Ltd)

Adam Binns
(Adam Binns Commercial)

Donna Gale
(NZI)

Malcom Farry
(Farry Group)

Tom West
(Tom West Risk Advisers)

David Ford
(Aotea Electric)

Adam La Hood & Blair McGill
(Cook Brothers Construction)

Dave McPhedran
(YBT: Accounting)

Sarah Braun
(helloworld Travel Dunedin)

Dave Callon
(Share)

Steve & Tricia Gillies
(Gillies Financial)

Martyn Ballantyne
& John Larsen
(Suits on Wall Street)

Stuart McLauchlan
(GS McLauchlan & Co)

Carl Spruyt
(Ikulutu Ltd)

Simon Parker
(Parker Warburton Team Architecture)

John White
(Telfer Electrical Otago)

Noel Davie

Jono Bredin
(PKF Bredin McCormack Rewcastle)

Hamish Caithness
(Oteha Valley Holdings)

Ross Gamble
(Roslyn Storage)

Margot Koele
(Webb Farry Lawyers)

Dr Rod Keillor
(Marinoto Clinic)

Malcolm Dore
(Magoo Auto Dunedin)

Sharon Hyndman
(Bayleys Metro Realty)

Sherman Weatherall
(Agility Logistics)

Justin & Eterei Stonelake
(Stonelake Foundation)

Mr Will McMillan
(McMillan Medical Specialists)

Prof Michael Schultz
(Gastroenterology Otago)

Peter & Paula Anstey

Richard Roberts
(Dunedin Airport)

John Freeland
(Aon New Zealand)

Bill Haydon
(Roman Catholic Diocese of Dunedin)

Craig McGregor
(39 Per Cent Ltd)

Jenepher Glover
(NZ RSA Trust)

Peter Cox
(Harraways)

John & Jacqui Brenssell
(Paper Plus Dunedin)

Maggie Burgess
(Polson Higgs)

Dr Paul Templer
(Sandman Anaesthesia Services)

Signature Property
(Neil & Jamie Lyons)

Trevor Hastie
(International Freight Logistics)

Sergio Salis
(London Street Specialists)

Lynn King
(Crombie Lockwood)

Judy Bevin
(J Bevin Ltd)

Sarah Ramsay
(Immersion Ventures)

Andy Campbell
& Ian Anderson
(Knox & Anderson)

Darryn Wilkie
(Otago Properties 2018 Ltd)

Shane Cohen
(2degrees)

Steve Brocklebank
(BB & S)

Robert & Jill Reid

Ant & Chris Wither
(Awhirk Farms)

Dr Norman & Mrs
Barbara Fitzgerald

Grant Chirnside
(Southern Realty)

Ray Grubb *(Morgan GR Tourism Management)*

Steve Cogger
(Black Rock Consulting)

FINANCIAL HIGHLIGHTS

Otago Medical Research Foundation Inc.

This summary financial report has been authorised for issue by the Chairperson of the Council Mr Ken Dempster . The results presented in the summary financial report have been extracted from the full financial report for the year ended 31 March 2020. As such, this summary report cannot be expected to provide as 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 2020 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 2020

	2020	2019
	$	$
Operating Income		
Donations, Bequests, Subscriptions	700,743	634,785
Investment Income	234,111	260,621
Gain on Disposal of Investments	-	158,318
	934,854	1,053,724
Less Expenses		
Administration	104,417	107,332
Promotion Costs	339,513	342,387
Loss on Disposal of Investments	41,530	-
Total Expenses	485,460	449,719
Net Surplus before Research Grants	449,394	604,005
Research Grants - Current year	529,956	407,782
Net Surplus for the year	(80,562)	196,223

Statement of Financial Position

As at 31 March 2020

	Market Value	2020	2019
		$	$
Current Assets		220,022	322,938
Investments	6,094,825	5,217,804	5,331,126
Total Assets		5,437,826	5,654,064
Current Liabilities		222,980	358,654
Total Liabilities		222,980	358,654
NET ASSETS (EQUITY)		5,214,846	5,295,410

Statement of Cash Flows

For the Year ended 31 March 2020

	2020	2019
	$	$
Net Cash Flows from Operating Activities	(113,128)	(19,788)
Net Cash Flows from Investing Activities	70,829	(142,757)
Net Increase / (Decrease) in Cash Held	(42,299)	(162,545)
Cash at the Beginning of the Year	202,872	365,417
Cash at the End of the Year	160,573	202,872

Statement of Service Performance

For the Year ended 31 March 2020

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:	2020 Number	2020 Actual ($)	2020 Budget ($)	2019 Number	2019 Actual ($)
Annual Grants	6	172,654	125,000	4	109,259
Special Fund Grants	6	173,504	240,000	6	159,073
Summer Research Scholarships	25	142,000	142,000	25	102,000
Otago Medical Research Society Award Sponsorship	2	1,000	1,450	2	1,500
Total	39	$ 489,158	$ 508,450	37	$ 371,832

The full financial report of the Otago Medical Research Foundation for the year to 31 March 2020 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 is in compliance with FRS 43 Summary Financial Statements and 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

Opinion

The summary financial statements, which comprise the summary statement of financial position as at 31 March 2020, the summary statement of financial performance, the summary statement of cash flows, and summary statement of service performance for the year then ended, and related notes, are derived from the audited financial statements of Otago Medical Research Foundation (the "Foundation") for the year ended 31 March 2020.

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 14 July 2020.

Other Information

The Council are responsible for the other information. Our opinion on the summary financial statements does not cover the other information included in the annual report and we do not and will not express any form of assurance conclusion on the other information. At the time of our audit, there was no other information available to us.

In connection with our audit of the summary financial statements, if other information is included in the annual report, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on the work we have performed on the other information that we obtained prior to the date of our auditors' report, we concluded that there is a material misstatement of this other information, we are required to report that fact.

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

Crowe New Zealand Audit Partnership

CHARTERED ACCOUNTANTS

Dated at Dunedin this 14th day of July 2020

Otago Medical Research FOUNDATION

Annual Report to 31st March 2020
& Notice of Annual General Meeting

Charities Number: CC33444

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