2014 ANNUAL REPORT

OTAGO
MEDICAL RESEARCH FOUNDATION

CONTENTS

OBJECT OF THE FOUNDATION

There is not one person alive today who has not benefitted from medical research.

The Object of the Otago Medical Research Foundation: Is for the furtherance of medical research in Otago.

We fund world class research, equipment and facilities for Otago's highly talented medical community of scientists, students, practitioners and lecturers.

Our recipients contribute invaluable medical knowledge that can be applied to medicine and prevention in future, and in doing so we also retain top medical talent and intellectual property in Otago.

MEDICAL RESEARCH IS A LIFE CHANGER. YOU'RE A LIFE CHANGER.

The answers unearthed through medical research irrefutably lead to greater quality of life for society – through earlier diagnosis and treatment. Since the Foundation was established in 1967 it has identified and funded close to $7 million worth of grants and scholarships, with much of the work undertaken now acclaimed around the world.

The lives of millions of people have ultimately been improved by the research funded by the Otago Medical Research Foundation. Made possible by you, our generous supporters.

IT ALL STARTS SOMEWHERE.

The Foundation helps to fund medical research projects and scholarships which are highly novel and scientifically worthy, but due to their early exploratory nature don't attract the interest of larger funding agencies.

However, in the world of medical research what the Foundation launches cannot be underestimated. Once that initial research has been completed and the answers discovered, it often opens up new areas of investigation for bigger entities to develop.

So the research never stops and many of our esteemed alumni are now global leaders in their medical fields.

EVERYONE BENEFITS FROM MEDICAL RESEARCH.

There is not one person who has not benefitted from answers found through medical research, whether that be personally, through parents or children, partners or siblings, work mates or their friends. We will all know many who wouldn't be with us had it not been for the discoveries made, the earlier diagnosis and less invasive treatment that research unveils.

It is irrefutable that from medical research we all benefit.

OMRF COUNCIL

Professor Barry Taylor
Dean Dunedin School of Medicine
ex-officio

Assoc Prof P A Cragg
Chairperson of Scientific Committee
ex-officio

Assoc Prof Colin Brown
Otago Medical School Research Society

Mr M C Horne
Deloitte (Secretaries)
ex-officio

Prof A van Rij
Otago University Faculty of Medicine

Dr P Gootjes
N.Z. Medical Association (Otago Division)

Mrs. Sarah Ramsay
Co-opted

Prof J Highton
General Medical Staff, Otago District Health Board

Mr R Bunton
Otago District Health Board

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Elected by Members of the Foundation

Mr K G Dempster
Elected by Members of the Foundation

Mr R P Lewis
Elected by Members of the Foundation

Dr J McMahon MBE
Elected by Members of the Foundation

Ms S Saunderson-Warner
Elected by Members of the Foundation

EXECUTIVE

Mr K G Dempster - Chairperson
Assoc Prof P A Cragg - Deputy Chairperson
Deloitte representative - Secretary/Treasurer

SCIENTIFIC COMMITTEE

Assoc Prof P A Cragg - Chairperson
Physiology Department
Otago Medical School Members
(see report on page 10)

DIRECTOR OF DEVELOPMENT

Mr S. Davie

SECRETARIES

Deloitte

HONORARY SOLICITOR

Mr J Anderson
(Gallaway Cook Allan)

AUDITORS

Crowe Horwath

PATRON

Dr. Gil Barbezat

REPORT FROM THE DIRECTOR OF DEVELOPMENT

To use a Commonwealth Games analogy, we're out of the blocks and sprinting hard.

Since its launch into a structured fundraising campaign in early-2010 more than $3 million in new funding had been attracted by March 31 2014, this comprising a mix of charity and trust grants, revenue generated through the Foundation's growing calendar of events, individual gifting and bequests.

As the Foundation's profile builds, so does its ability to establish funding opportunities. That, in turn, increases the long-term capacity to identify and tangibly support world-class medical research.

The Foundation prides itself on its ability to identify and nurture research which, although highly scientifically worthy, does not attract attention from larger funding bodies. However, without the Foundation acting as a catalyst for this investigation to be established, more in-depth study simply wouldn't occur. We are the rippa-rugby of medical research!

Our funding base expands monthly. There is a growing list of individuals who are now regular benefactors, a number of business owners lend their support through 'sponsoring' annual summer research scholarships, several gaming machine trusts have now made a number of donations, and many within the charitable industry are financially supportive of the Foundation's vision.

The Foundation's annual golf tournament, with OceanaGold partnering up as the major naming rights sponsor, is now seen as a 'must play' event and raises significant funds in its own right. Club Otago, a lunch club open to individual and corporate supporters alike, is growing at an exceptional rate and now boasts more than 100 subscribing members. The Foundation has developed partnerships with RD Petroleum in offering a fuel card to supporters and with Payless Energy, which donates funds as residential and business account holders switch their electricity needs.

The Foundation's Bequest Society is also gaining a greater awareness.

And the annual dinner is easily the best of its type in Otago.

We were very sad to lose our Patron, Emeritus Professor Barbara Heslop who passed away in late-2013. Barbara was a terrific inspiration to me personally and her reputation globally never diminished in retirement. Her philosophy that 'medical research is all about finding out' will stand the Foundation in good stead in the decades ahead.

We are very pleased that Dr Gil Barbezat, another internationally acclaimed Otago-based researcher, has agreed to take up the role of Patron and his enthusiasm will serve us well.

My thanks go to all supporters and friends of the Foundation. Your generosity and foresight in supporting the terrific work our scientists and researchers undertake is very much appreciated.

It is irrefutable that from medical research we all benefit.

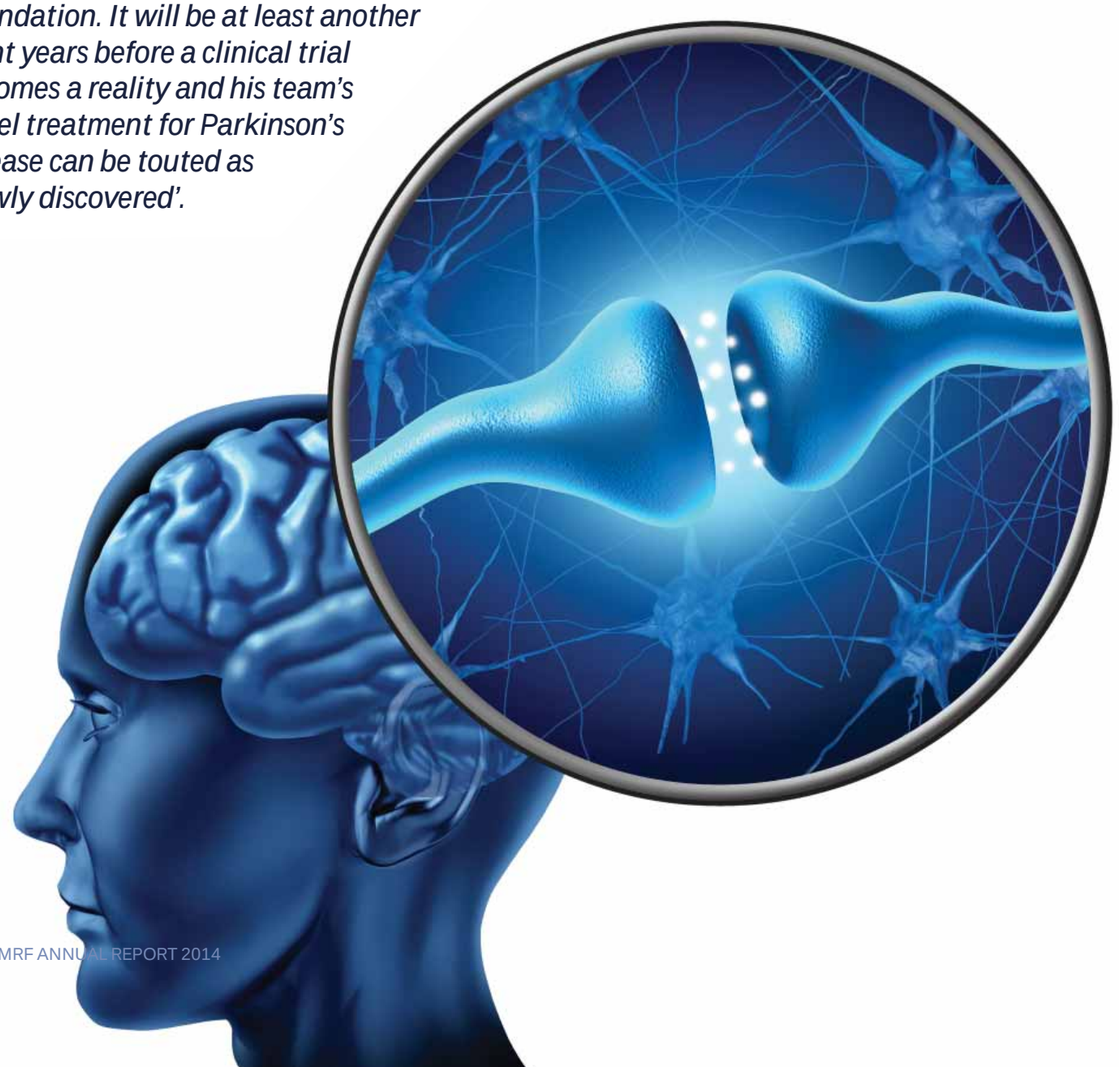
Steve Davie
Director of Development

UNDER THE MICROSCOPE

With Parkinson's, timing is everything.

The release of chemical neurotransmitters from brain cells (neurons) happens in milliseconds but developing a technology to mimic this natural release has been a much slower process for Associate Professor John Reynolds (Department of Anatomy). John's research into an effective treatment for Parkinson's began eight years ago with funding from the Foundation. It will be at least another eight years before a clinical trial becomes a reality and his team's novel treatment for Parkinson's disease can be touted as 'newly discovered'.

In June 2008, along with collaborators Dr Eng Tan (Department of Chemistry) and Prof Brian Hyland (Department of Physiology), John was awarded an Annual Grant from the Foundation for a project entitled 'Targeted magnetically controlled delivery system for bioactive chemicals'. A complicated title for what was basically a two part idea:



1. Create a biological package (liposome) from the same substance as human cells, containing the drug of choice.
2. Have a controller of the liposome for timing the precise and manageable release of the drug.

In Parkinson's disease it is the death of the dopamine neurons and resulting lack of dopamine which results in shaky slow movements and/or rigidity in the body. The current treatment of choice replaces the lost dopamine with a chemical called levodopa, but because it is given as a tablet, it literally floods the brain causing numerous side affects including uncontrolled movements. John's desire is to develop a drug which can mimic the natural release of dopamine from the biological packages in very specific brain areas, providing a treatment which will improve the signs and symptoms of the disease, without the unwanted side affects.

John describes the initial research funded by the Foundation as a 'crucial stepping stone' for his present work. The money awarded by the Foundation allowed John and the team to begin the investigation into the various ways to release the drugs on demand from the liposomes using different controllers.

During the 2008 Foundation funded project John and colleagues established how an effective amount of drug could be controllably released without disturbing other normal brain functions, a vital first stage in the work. John says that the Foundation grant was extremely beneficial, because it was during that first set of experiments they discovered the initial control system they had considered was not ideal, so could set about finding others.

John's research is a great example of why the money granted by the Foundation is enormously important to researchers. In comparison to many of the government funded grants it's not a huge amount of money; however it helps people get started on their research path. Every little bit of money helps, John believes that the money from the Foundation helped his team establish a better way to go and without it, this line of his research may not have progressed.

What is most exciting about John's work is that in the future other drugs used in neurology research might be able to be packaged and released using the same technology. Although the big idea is compelling, the specific detail of the research work was described by his wife (an ex journalist) as a little less exciting for non-scientists. Obviously, like dopamine, John's science can sometimes be difficult to package and deliver.

JOHN'S DESIRE IS TO DEVELOP A DRUG WHICH CAN MIMIC THE NATURAL RELEASE OF DOPAMINE

Cancer-fighting coffee and wound-healing wine? Cheers all-round!

Our first drink in the morning and last drink at night might be doing more than just keeping us sane, as two summer students have discovered this year.

Chloe Squires

(Dr Sarah Baird, Department of Pharmacology & Toxicology)

Title: Effect of coffee and its constituents on tumour stromal cell death

(PricewaterhouseCoopers Foundation Scholar)

Summer student Chloe Squires working with Dr Sarah Baird has found that coffee has anti-oxidant properties that can change the growth of cancer cells. This initial research has suggested that depending on the amount, coffee can have a preventative effect on the development of cancer cells and future work will help determine if that daily espresso might also be providing us with some protection against cancer.

Iun Kao

(Dr Greg Walker, Department of Microbiology & Immunology)

Title: A nanofibre "textile-like" dressing which slowly releases wine waste bioactives to prevent bacterial growth

(Otago Medical Research Foundation Scholar)

New Zealand wine waste contains a high amount of polyphenols with antioxidant and antimicrobial activities and may help protect wounds from infection, and increase healing. To take advantage of these properties, summer student Iun Kao, with Dr Greg Walker, has been developing a nanofibre textile containing wine marc (grape skin and pulp) and seed extracts for wound dressings.

Their breakthrough study showed marc extracts contained in the nanofibres were potent against a common skin infection (Staphylococcus aureus) and Dr Greg Walker will focus future studies on increasing the nanofibre extract-loading dose to improve outcomes.

iPods used for good and not evil in the fight against childhood obesity.

Brittany Davison

(Dr Paula Skidmore, Department of Human Nutrition, and Dr Robin Quigg, Department of Preventive & Social Medicine)

Title: Pilot testing an electronic food diary app in nine and ten-year olds

(Foodstuffs Community Trust Scholar)

Childhood obesity is a worldwide issue and some say partly to blame is the shift in how children play and socialise in the 21st century; with their thumbs on a screen instead of being on their feet in the big wide world. But what if hand-held gadgets could be on the frontline of the fight against obesity, rather than an enabler to the epidemic? University of Otago researchers hope this will be the case, thanks to digital diet diaries.

Summer student Brittany Davidson investigated if iPod-based food diaries are an appropriate tool to measure nutrient intake in children aged nine to 12 years. The results from her study of eight Dunedin children showed that iPod-based food diaries produce similar results to written diaries for all macronutrients (carbohydrates, protein and fats) and major micronutrients (e.g. calcium, fibre, vitamin C). However, the new technology reduced the burden on the children and had a novelty factor they enjoyed. Brittany concluded that iPod-based diaries are therefore likely to be suitable, after additional testing, for use in measuring nutrient intake in children.

It's all in the delivery – Making chemotherapy more simple and successful.

'Nanoparticle and nanomicelle medicine', sounds like a storyline from a sci-fi movie but thanks to Dr Khaled Greish and colleagues, with funding from the Foundation, nanoparticle anti-cancer drugs are fast becoming a reality.

Killing cancer cells without destroying healthy cells is optimum in chemotherapy but often the anti-cancer drugs available are not as effective as they could be, due to poor absorption and/or the body's ability to break down drugs before they take full effect. Khaled's work uses known drugs and by packaging them in nanoparticles, he enhances their efficiency by targeted drug delivery and improved absorption.

The Foundation has supported Khaled's work since 2011 when he and Assoc. Prof Rhonda Rosengren were awarded a Laurenson grant for the project: "Utilising nanotechnology for producing effective anticancer therapy against breast cancer".

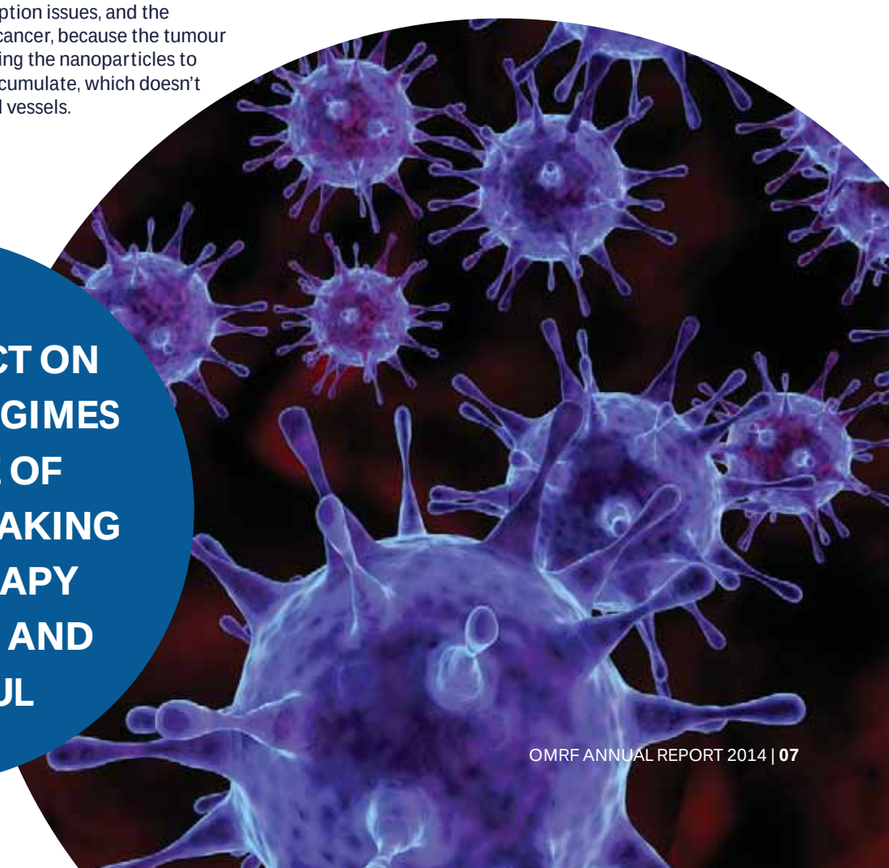
Research has found that curcumin from tumeric has anti-oxidant, anti-inflammatory and other anti-tumour properties, but due to solubility and absorption issues, it can be difficult to use as a treatment. Khaled therefore set about manufacturing a synthetic form of curcumin with enhanced toxicity against cancer and packaged the drug into micelles; spheres of drugs encased in a fat layer, which cells can absorb. The nanomicelles drug overcomes solubility and absorption issues, and the micelles are 'targeted' to the breast cancer, because the tumour makes abnormal blood vessels allowing the nanoparticles to pass through into the tumour and accumulate, which doesn't happen in healthy tissue with normal vessels.

In 2013 Khaled was awarded his second Laurenson for the project: "Utilizing nanotechnology for improving anticancer therapy of pancratic cancer". For successful anti-cancer treatment, a good blood supply is essential and pancreatic cancer is hard to treat because the pancreas has few blood vessels. Khaled's aim is to treat pancreatic cancer using dual nanoparticle therapy: first, a nanoparticle drug to dilate the blood vessels increasing blood flow; second, a set of anti-cancer nanoparticles to target the tumour. So far, he has successfully prepared the nanoparticles and in the following months he will test them in pancreatic tumour cell cultures, before using the treatment in a mouse model with pancreatic cancer.

Khaled's work was further supported in 2013 by two summer student grants: Monica Archibald's research found that a combination treatment of two nanomicelles containing prostate cancer cell inhibitors had the strongest anti-cancer effect; and because we'd all prefer to pop a pill than get an injection, Paul Hsu's summer work aimed to develop nanoparticle medicine in tablet form which would be absorbed without breakdown in the stomach.

It is clear that Khaled's impressive research, thanks to support from the Foundation, will make a huge impact on treatment regimes of a range of cancers by making chemotherapy more simple and successful.

A HUGE IMPACT ON TREATMENT REGIMES OF A RANGE OF CANCERS BY MAKING CHEMOTHERAPY MORE SIMPLE AND SUCCESSFUL



Map reading not the only difference between male and female brains.

Dr Megan Wilson and Professor Ian McLennan

(Department of Anatomy)

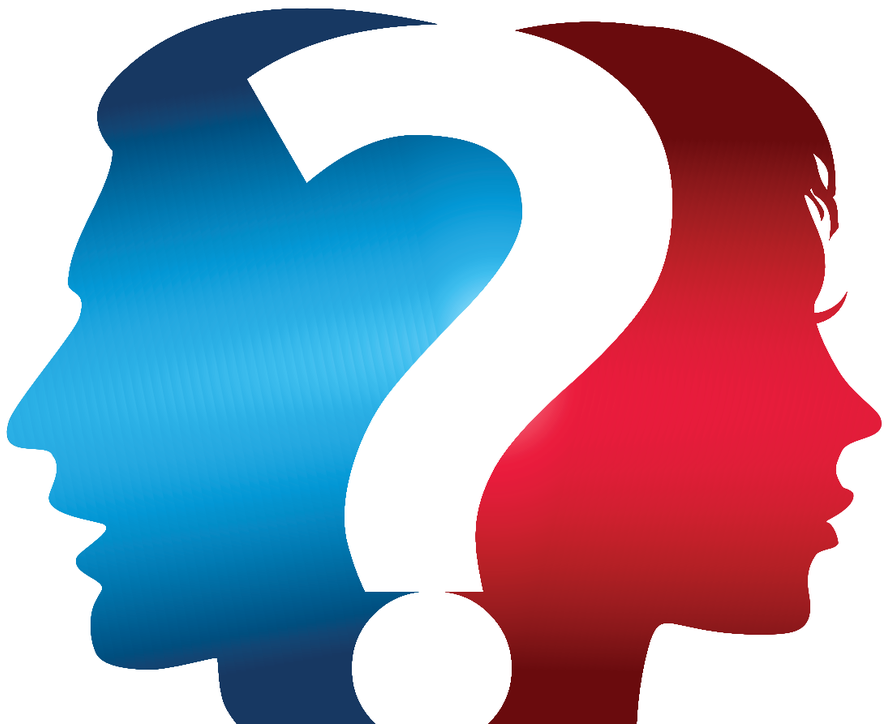
The molecular factors underlying male susceptibility to neurological disorders and injury – AG 315

Sponsored by the Dunedin Casino Charitable Trust & Southern Victorian Charitable Trust

It's long been joked, 'Men are from Mars and Women are from Venus' and it doesn't take a neuroscientist to tell us male and female brains work differently. This doesn't just result in better map reading abilities but could have an important impact on the occurrence of neurological disorders, including autism. Dr Megan Wilson and Professor Ian McLennan's research, supported by the Foundation, aims to identify sex differences in the brain contributing to neurological disorders.

Male and female brains develop subtle differences in the womb, and neurological disorders occurring at a greater rate in males could be a result of these variations. Certain sex specific hormones alter the brain and one in particular may have a role in the development of autism. Brain anatomy cannot show how differences lead to complex disorders, so using gene technology Megan and Ian's work will increase understanding of brain gene pathways.

Megan and Ian have examined DNA from male and female brain cells during development and are mapping differences in the genes, comparing them with genes involved in neurological disorders. Their work is providing important new information showing the influence of the sex hormones on gene variation during early development in male and female brains. In the future this will be used to help find ways to decrease the increased risk in males for developing neurological disorders like autism.



FUNDING BREAKDOWN

OF STUDENTSHIPS, GRANTS, TRUST GRANTS, LAURENSON GRANTS AND JACK THOMSON GRANTS 1ST SEPTEMBER 2013 – 31ST AUGUST 2014

Summer Studentships

- Infection treatment $5000
- Cancer treatment $5000
- Cancer $20,000
- Heart $8,000
- Infection treatments $16,000
- Neuroscience (brain) $4,000
- Muscle degeneration $4,000
- Nutrition/ Diet $4,000
- Eye $4,000
- Vaccine developement $4,000
- Dental $4,000
- Pancreas Physiology $4,000

Annual Grants

CANCER
Spread $29,005
Blood $33,470
Prostate treatment $33,881

NEURO SCIENCE
Injury $13,500

Community Trust

CANCER
Prostate $25,687

NEURO SCIENCE
Memory $20,000

TB TREATMENT
$23,000

Jack Thomson

OSTEOARTHRITIS
Shoulder $10,127
Hip $26,320

GOUT
$34,578

Laurenson

PANCREATIC CANCER
$19,882

BRAIN INJURY
$29,931

PROSTATE CANCER
$29,265

SCIENTIFIC COMMITTEE REPORT

1 September 2013 to 31 August 2014

1. MEMBERSHIP

Chair: Associate Professor Pat Cragg
(Nominee of the Otago School of Medical Sciences)

Deputy Chair: Associate Professor Greg Jones
(Nominee Otago Medical School Research Society)

Professor Antony Braithwaite
(Co-opted)

Associate Professor Colin Brown
(President Otago Medical School Research Society, ex officio)

Dr Tamlin Conner
(Co-opted)

Dr Peter Gootjes
(Nominee Otago Branch of the NZ Medical Association)

Associate Professor Bob Hancox
(Nominee Dunedin School of Medicine)

Dr Nick Heng
(Co-opted)

Dr Beulah Leitch
(Co-opted)

Associate Professor Russell Poulter
(Co-opted)

Professor Clive Ronson
(until May 2014)

Dr Joanna Kirman
(from June 2014) (Co-opted)

Dr Ivan Sammut
(Co-opted)

Dr Paula Skidmore
(Nominee Otago Medical School Research Society)

Associate Professor Joel Tyndall
(Co-opted)

Professor Rob Walker
(Co-opted)

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

In mid 2014 there was one retirement from the committee: Professor Clive Ronson who joined the committee in June 2011 and has provided excellent input to our deliberations. For 2014 we welcomed in Clive's place: Dr Jo Kirman as a co-opted member representing the Department of Microbiology & Immunology. To help spread the workload and aid succession planning, the Scientific Committee now has from 2014 onwards a Deputy Chair – Associate Professor Greg Jones.

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 Scientific Committee's Chairperson of a letter from the University of Otago 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 web site http://www.omrf.org.nz

2. SUMMER RESEARCH SCHOLARSHIPS 2013/2014

One hundred and two applications (compared with 95 the previous year) were received from the University of Otago in early September 2013, of which 21 were recommended for funding by the OMRF (and a further 41 gained scholarships from other funding bodies and the Division of Health Sciences and its Schools). Of the 21 students funded by the OMRF, four were studying dentistry, three medicine, one pharmacy and thirteen science or biomedical 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 scholarship was worth $4,000 except for the two students with the highest scores who were awarded named Summer Research Scholarships ($5,000) – 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. One of the projects was funded from the Foundation's own funds, another from its Iverach Fund and another was administered by the OMRF but sponsored by the Otago Diabetes Research Trust.

Due to the continuing sponsorship drive of the OMRF, all the other 16 OMRF scholarships were funded from such sponsorship: Crowe Horwath, Deloitte, Foodstuffs Community Trust, Healthcare Otago Charitable Trust, Hughes Family Trust, Kingston Sedgfield Charitable Trust, Lions Club of Dunedin South, OceanaGold, Otago Service Clubs Medical Trust, Pub Charity (2), PricewaterhouseCoopers Foundation, Southern Trust (2) and Southern Victorian Charitable Trust (2). The involvement of Otago commercial companies and the Otago community for a third year in supporting summer research by tertiary students is much appreciated.

All scholars returned good to excellent reports by the end of February 2013. The Renshaw Prize ($250) for the best report was awarded this year to two students: Katie Hoeksema, who worked under the guidance of Dr Pete Jones of the Department of Physiology, and Deepa Mistry, guided by Professor Richard Cannon of the School of Dentistry.

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 Chairperson of the OMRF Scientific Committee or from the supervisor concerned.

Katie Hoeksema

(Dr Pete Jones, Department of Physiology)

Title: Development of a cellular anti-arrhythmic drug screening model

(Southern Victorian Charitable Trust Scholar and Renshaw Prize Winner)

Arrhythmias are irregular heartbeats that can be triggered by the spontaneous opening of a calcium channel named the cardiac ryanodine receptor (RyR2). Anti-arrhythmic drugs typically act by blocking ion channels or sympathetic nervous activity to alter cardiac action potentials, although recently some have been discovered to act by directly inhibiting RyR2. Currently, tools used to screen drugs for inhibiting RyR2 are time-consuming and expensive processes. This project aimed to develop a higher throughput cell model to allow efficient screening using calcium measurement techniques. The results indicated that our model will help rapidly identify drugs with the potential to prevent arrhythmia.

Deepa Mistry

(Professor Richard Cannon, Dr Masakazu Niimi & Dr Kyoko Niimi, School of Dentistry)

Title: Understanding how fungal drug efflux pumps (Cdr1p) work

(Deloitte Scholar and Renshaw Prize Winner)

Candida albicans, an opportunistic fungal pathogen affecting the immunocompromised, can become resistant to currently used azoles. A drug efflux pump Cdrlp in the plasma membrane is responsible for this azole resistance. Amino acids, G521 and A713, have been found to be important for Cdr1p function. We hypothesised that G521 affects inhibitor binding and the entry of substrates into the pump. DNA sequencing and phenotypic characterisation of G21R-derived resistant strains revealed that G521 acts like a gate and controls Cdrlp substrate and inhibitor access and binding. This discovery will facilitate future development of drugs that inhibit Cdr1p-mediated efflux.

Monica Archibald

(Dr Sebastian Taurin and Dr Khaled Greish, Department of Pharmacology & Toxicology)

Title: Tyrosine kinase inhibitors for the treatment of hormone refractory prostate cancer

(OceanaGold – Prostate Scholar)

Overall, the five-year survival essorof patients with hormone refractory prostate cancer is less than 25%. We assessed a new combination of tyrosine kinase inhibitors, sorafenib and nilotinib, for the treatment of prostate cancer. These inhibitors however, are extensively metabolised and inactivated in vivo. Through the use of poly(styrene co-maleic acid) (SMA) to create nanoparticles containing these inhibitors, SMA-drug particles were synthesised that had the desired characteristics for tumour targeting and increased cytotoxic effects in vitro than the free drugs. The combination of the two nanoparticles demonstrated the strongest anti-cancer effect when compared to the free drug.

John Brady

(Associate Professor Phil Sheard, Department of Physiology)

Title: MuSK: A muscle protein involved in Age-related weakening?

(Healthcare Otago Charitable Trust Scholar)

With age a loss of muscular strength compromises our independence and quality of life. In order to mitigate this inevitable process, the causes of age-related weakening must first be elucidated. Currently, the cause of age-related weakening is attributed to a process whereby the nerves, which are responsible for activating the muscle, lose contact with the muscle. As the contact between the nerve and the muscle is reliant on maintenance proteins, an age-related decline in these proteins may account for the age-related decline in the nerve-muscle contact. Therefore I have attempted to answer this question and determine whether a decline in an important maintenance proteinMuSK occurs with age. However, due to problems with associated with the antibodies used for the

experiment, no tangible results were yielded and therefore no conclusions could currently be made on this topic.

Brittany Davison

(Dr Paula Skidmore, Department of Human Nutrition, and Dr Robin Quigg, Department of Preventive & Social Medicine)

Title: Pilot testing an electronic food diary app in nine and ten-year olds

(Foodstuffs Community Trust Scholar)

Childhood obesity is a global issue and is largely determined by diet. The aim of this study was to investigate if iPod-based food diaries are appropriate to measure nutrient intake in children aged nine to 12 years. The results from eight Dunedin children show that iPod-based food diaries produce similar results to written diaries, for all macronutrients and major micronutrients (e.g. calcium, fibre, vitamin C) The new technology reduces the burden on participants and has a novelty factor the children enjoy. iPod-based diaries are therefore likely to be suitable, after additional testing, for use in measuring nutrient intake in children.

Regina Hegemann

(Professor Cliff Abraham, Department of Psychology)

Title: Do hippocampal granule cells "retire" as they age?

(Kingston Sedgfield Charitable Trust Scholar)

Episodic memory formation is believed to require information processing in the hippocampus. Previous work showed that young cells born in this brain region during adulthood are particularly responsive to incoming information, while older granule cells "retire". However, overall low activation rates may have biased these results. The present research aimed to replicate previous work and provide a more accurate estimate of the contribution of young and old granule cells to hippocampus-dependent processing by amplifying cell activity through exposure to an enrichment environment. While environmental enrichment was sufficient to increase cell activity, the results showed no difference between cell ages suggesting that the time of neurogenesis during development may determine cell incorporation.

Adelaide Hopkins

(Dr Anita Dunbier, Department of Biochemistry)

Title: The role of DNA variants in controlling expression of genes involved in breast cancer

(Otago Service Clubs Medical Trust Scholar)

Breast cancer is the most common cancer in women accounting for 400,000 deaths per year worldwide. The majority of breast cancers produce the oestrogen receptor and require the hormone oestrogen to grow. Drugs that act by preventing the production of oestrogen are the most effective treatment currently available for this type of cancer. However, these drugs do not work well for all patients. We investigated the expression of three genes which are thought to influence how the gene that encodes the oestrogen receptor is turned on. This has potential to help evaluate risk of breast cancer and develop new treatments.

Paul Hsu

(Dr Khaled Greish and Dr Sebastian Taurin, Department of Pharmacology & Toxicology)

Title: Use of nanotechnology for oral delivery of targeted anti-cancer drugs

(Lions Club of Dunedin South Scholar)

Oral medicine is more patient friendly than intravenous injection, but bioavailability is low due to gastrointestinal absorption dynamics. Here, styrene malic acid (SMA)-paclitaxel has been developed as a potential oral nano-medicine for cancer. SMA-paclitaxel was prepared at 100 uM and translocation across in vitro intestinal epithelial cells was 119.89 ± 8.7 % (n = 3) and absorption by ex vivo rat everted intestinal sacs was 3.4 ± 0.46% (n = 3). Fundamentally, the detection method for paclitaxel in this project is flawed and results were inaccurate as evident by the 119% translocation in the in vitro study. In conclusion, to fully evaluate SMA-paclitaxel as an oral chemotherapeutic, high performance liquid chromatography should be employed to detect paclitaxel

Mark Huang

(Dr Harry Bradshaw and Associate Professor Gordon Sanderson, Department of Medicine)

Title: Prevalence of short-sightedness in people with rhegmatogenous retinal detachment in New Zealand

(J.A. Iverach Scholar)

Rhegmatogenous retinal detachment (RRD) is a medical emergency that can lead to blindness if left untreated. It has been suggested that myopia (short-sightedness) is a major risk factor for developing a RRD. This study aimed to investigate the prevalence of myopia in 92 participants from the Otago and Southland regions. Of the 62 participants with known refractive error (powers of glass/contact lens) 72% were myopic and 32% were highly myopic. The findings can be used to estimate the relative risk of developing a RRD given a person's refractive error. This allows clinicians to estimate the likelihood of retinal detachment from the refractive error of their patients and appropriately counsel their patients.

Iun Kao

(Dr Greg Walker, Department of Microbiology & Immunology)

Title: A nanofibre "textile-like" dressing which slowly releases wine waste bioactives to prevent bacterial growth

(Otago Medical Research Foundation Scholar)

New Zealand wine waste contains a high amount of polyphenols with antioxidant and antimicrobial activities. An electrospun nanofibre textile could be a controlled delivery dressing for application in wound healing or prevention of dental caries requiring antimicrobial activities. The study showed advantages in using marc extracts over seed extracts as it is more potent against Staphylococcus aureus despite exhibiting similar total phenolic content and antioxidant activities. Nanofibre containing wine seed extract was not effective against bacterial growth. This lack of activity may be due to the low loading, therefore future studies will focus on increasing the nanofibre extract-loading dose.

Joanne Lee

(Dr Joanna Kirman, Department of Microbiology & Immunology)

Title: Development of a test to measure memory immune responses to tuberculosis (TB)

(Pub Charity Scholar)

Mycobacterium tuberculosis is a known cause of TB. With growing rate of TB incidence on top of multidrug-resistant TB, there is a need for an effective vaccine. However, there is only one vaccine currently on the market called Bacille Calmette-Guerin (BCG). This vaccine offers effective protection against mycobacterium meningitis but has varying efficacy against pulmonary tuberculosis. Understanding the mechanisms of the development of T memory cells using the BCG is vital for a development of more effective vaccine. In this experiment, we are developing a new immunophenotyping panel that can measure different types of CD4 T memory cells.

Ivor Malahay

(Associate Professor Fiona McDonald, Department of Physiology)

Title: Effect of a novel protein on pancreatic secretion

(Pub Charity Scholar)

Digestive enzyme secretion by pancreatic acinar cells is a vital and highly regulated process required for the digestion of food. Secretion defects or premature activation of digestive enzymes may lead to the illness pancreatitis. COMMD (Copper Metabolism MURR1 Domain containing) proteins are a family of recently discovered proteins, known to be important in protein trafficking. One of those proteins, COMMD10, was shown to decrease the production of a digestive enzyme, and COMMD10 expression appears to be influenced by hormones involved in digestion and food absorption. Further related research will advance the understanding of enzyme handling and secretion in the pancreas.

Kate Mcelroy

(Lara Friedlander, Dr Ben Motidyany, Associate Professor Mary Cullinan and Dr Claire Cameron; School of Dentistry)

Title: Evaluation of direct pulp capping of permanent teeth in general practice -A PBRN study

(Southern Trust Scholar)

ARCH (Applied Research through Clinicians Hands) was recently established as Practice Based Research Network (PBRN) in New Zealand (NZ) with the objective of engaging academics and clinicians in collaborative research. This inaugural PBRN study investigated the use of direct pulp capping (DPC) as a treatment procedure in NZ dental practices. A literature review informed the project prior to distribution of an online survey to NZ dentists. Quantitative and qualitative data analysis was undertaken. Respondents indicated that DPC is part of routine practice for NZ dentists. Most had updated their knowledge, understanding and practices around the management of an exposed pulp and DPC was seen to be a viable treatment option for patients.

Tara Miller

(Dr Heather Brooks, Department of Microbiology & Immunology)

Title: Antibiotic susceptibility of bacteria isolated from Oamaru school children

(Southern Trust Scholar)

Staphylococcus aureus (S. aureus) is a common pathogen in New Zealand and can be found living on our skin, in our throats and up our noses. S. aureus causes many infections, some requiring hospitalisation. The aim of this study was to determine the antibiotic susceptibility of 30 S. aureus samples which were isolated from Oamaru school children. Doctors prescribe antibiotics before knowing what bacterium is causing the infection and what antibiotics will work against them. Knowing the antibiotics that S. aureus are susceptible to could help guide antibiotic administration for infections caused by S. aureus to achieve better outcomes of treatment.

Danny Nam

(Dr Jeff Erickson, Department of Physiology)

Title: CaMKII Hyperactivity: does it play a role in cell death in the human diabetic heart?

(Otago Diabetes Research Trust Scholar)

Ca2+/Calmodulin-dependent protein kinase II (CaMKII) is a protein that, when activated, modifies other proteins in the body and contributes to specific physiological functions. Normally CaMKII is in an inactive state in cardiac tissue. Recent studies in the context of the heart have shown that diabetics have increased mortality compared to non-diabetics, and CaMKII hyperactivity has been implicated. One of the proposed downstream consequences is cell death. Our study found there was no difference in cell death between the human diabetic and non-diabetic heart. These observations may indicate CaMKII may play a protective role over a pathological role in diabetes.

Hazel Nissen

(Professor Ian McLennan, Department of Anatomy)

Title: Why do the brains of autistic boys develop rapidly?

(Southern Victorian Charitable Trust Scholar)

Autistic spectrum disorders (ASDs) are male-biased, and associated with accelerated early brain development. Testicular Anti-Müllerian hormone (AMH) putatively slows development and may protect against ASDs. I investigated whether AMH causally slows brain development, by comparing AMH-deficient male mice with normal male littermates. A method was developed using sequentially developing layers of the cerebral cortex to measure maturity. Pilot data did not show any consistent differences, possibly due to biological variation between individual mice. Future studies could therefore benefit from a larger sample, with more developmental time points. The anterior commissure was also identified as an alternate sensitive indicator of maturity.

Jeffrey Ong

(Dr Mikhail Kenita and Dr Brian Monk, School of Dentistry)

Title: Genetic regulation of drug resistance in yeast

(Allan Wilkinson Scholar)

This research project aimed to identify the component(s) in Bacto™ Peptone that activates Pdrlp mediated multidrug resistance in Saccharomyces cerevisiae. Fractions soluble in 80% acetone or in chloroform methanol that were eluted with ~40% acetonitrile in 0.1% trifluoroacetic acid from a C-18 column by reverse-phase chromatography contained species making a major contribution to the activation of Pdrlp. It is proposed that those species might be sterols and liquid chromatography mass spectrometry can be used to test this idea. By identifying the molecules activating to Pdrlp, antagonists may be developed to block the xenobiotic binding site of Pdr1p and prevent the activation of multi- drug resistance.

Dan Preston

(Dr James Crowley, Department of Chemistry)

Title: Cisplatin containing supramolecular cages

(Garth McQueen Scholar)

While cisplatin is an effective anti-cancer agent, its utility is hampered by its cytotoxicity. Drug delivery vectors carry drugs direct to the target tissue, circumventing their toxicity. The cages previously synthesised by the Crowley group bind cisplatin, but require improvements to be viable vectors. This project has worked on improved cisplatin binding through working towards anthracene-linked ligands that would more fully encapsulate the drug within the cavity. A range of ligands and their cages with alterations conferring greater stability in the presence of biological nucleophiles have been synthesised, with accurate kinetic studies quantifying the stability increase to follow.

Chloe Squires

(Dr Sarah Baird, Department of Pharmacology & Toxicology)

Title: Effect of coffee and its constituents on tumour stromal cell death

(PricewaterhouseCoopers Foundation Scholar)

Mesenchymal stem cells (MSCs), part of solid tumours, contribute to cancer malignancy and therefore are good targets for cancer therapy. This project investigated the effect of coffee and its constituents on cancer cells and MSCs. Overall it was found that they hold potential as therapeutics, although only on cancer cells themselves, not MSCs, as MSC growth was partially enhanced at high doses. Possible benefits could be had for people that regularly consume coffee as these compounds can act as anti-oxidants enabling protection from cancer development. Therefore, depending on concentration, coffee and its constituents can be both preventative or curative.

Joyce Tang

(Associate Professor Brian Monk, School of Dentistry)

Title: Understanding the electrochemistry of the fungal ABC transporter Cdr1p

(Crowe Horwath Scholar)

ATP binding cassette (ABC) transporters play a pivotal role in the development of xenobiotic resistance. Two highly conserved features, the pairs of nucleotide binding domains and the pairs of transmembrane domains, suggest ABC transporters may be electrogenic primary pumps because ATP hydrolysis generates protons and transported substrates are partially positively charged. This study aimed to confirm the concept that overexpression of the Candida albicans Cdrlp drug efflux pump confers on yeast the ability to produce an enhanced electrochemical gradient at the plasma membrane and to test whether this applies more broadly to efflux pumps of the ABC transporter superfamily.

Aaron Yap

(Professor Anthony Molteno and Associate Professor Gordon Sanderson, Department of Medicine)

Title: The detection of choroidal melanoma in the New Zealand population

(Hughes Family Trust Scholar)

This audit aimed to investigate the pathways of detecting choroidal melanoma in New Zealand. A case note review was undertaken of 222 patients with choroidal melanoma identified at Dunedin and Auckland hospitals from 1999 to 2013. It found that 24% of patients presented incidentally and the first health professional most commonly seen were optometrists (55%) followed by ophthalmologists (32%). Thirteen patients (6%) were found to have choroidal metastases and 35 (16%) were deceased. This audit found that optometrists played an important role in detecting choroidal melanoma and more frequent eye checks in those over 65 years should be considered.

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 2013 there were 43 applications from the University of Otago (cf 28 the previous year) totalling $1,128,850 and eight of these were funded at a total expenditure of around $181,000 of which $60,000 was provided most generously by the Otago Community Trust. These grants commenced between July and October 2013 and are nearing completion with full reports due 3 months after the one-year grant ends. Progress as at the end of July 2014 is summarised below:

(i) Annual Grants

Associate Professor Alex McLellan

(Department of Microbiology & Immunology)

Understanding how cancer spreads to the lymph nodes – AG 312

Sponsored by the JN Lemon Trust

The first line treatment for most cancers is chemotherapy. An inevitable consequence of chemically-induced tumour cell death is the release of tumour cell fragments (vesicles) into the lymphatics. We have recently found that tumour vesicles bind to a specific receptor on lymph node macrophages and suppress the immune response - potentially allowing tumour escape. Using a novel model of metastatic disease, we determined that tumour vesicles interfere with the host immune response against cancer. We have also developed a new test to allow us to quantify the invasion of tumour cells into draining lymph nodes that will be submitted for publication. The results will assist in the development of diagnostic and intervention strategies to improve clinical outcomes for cancer patients.

Dr Euan Roger and Professor Ian Morison

(Department of Pathology)

Does a New Zealand family hold the key to myelodysplastic syndrome? – AG 313

Sponsored by the Dunedin Casino Charitable Trust & Southern Victorian Charitable Trust

Myelodysplastic syndrome (MDS) is a common blood cancer of the elderly. We have discovered a novel abnormality called an inversion in chromosome 5 of a patient with MDS. Other family members with this inversion have consistently low neutrophils, which is a common feature of this condition. We predicted that the inversion has disrupted a gene or genes required for normal neutrophil production, which has led to MDS presented in the patient. We used next generation sequencing to pinpoint the exact location of the inversion. Using state-of-the-art genome sequencing and software analysis methods we determined location of the inversion on the genome of one of the siblings. One end of the inversion locates in a gene that encodes a putative tumour suppressor in colorectal and liver cancer. We predict that the inversion truncates the transcription of this gene, which we are currently characterising further in the family.

Dr Sebastien Taurin, Dr Khaled Greish and Associate Professor Rhonda Rosengren

(Department of Pharmacology & Toxicology)

Encapsulation of raloxifene into styrene maleic acid micelles for the treatment of hormone refractory prostate cancer – AG 314

Sponsored by OceanaGold & Southern Victorian Charitable Trust

The survival of patients with hormone-resistant prostate cancer is less than 25% over five years. Studies have highlighted the potential of raloxifene, a drug currently used for the treatment of breast cancer, in the control and treatment of prostate cancer. However, raloxifene is rapidly metabolised. To enhance raloxifene efficacy, we have encapsulated the drug in a nanomedicine carrier. Preliminary data show the superior toxicity of the nanomedicine containing raloxifene against prostate cancer cells. In this project, we aim to further evaluate our system in animals with prostate cancer to develop an efficient therapeutic alternative for prostate cancer treatment.

Dr Megan Wilson and Professor Ian McLennan

(Department of Anatomy)

The molecular factors underlying male susceptibility to neurological disorders and injury – AG 315

Sponsored by the Dunedin Casino Charitable Trust & Southern Victorian Charitable Trust

Human male and female brain development is sexually dimorphic; the male and female brains acquire subtle differences during embryonic development. This dimorphic development is influenced by circulating sex-specific hormones during fetal development such as anti-Müllerian hormone (AMH), a molecule that has recently been linked to autism. Many common childhood brain disorders have a strong male bias, including autism, and this is likely to be linked to differences in neurological development. We have profiled gene expression (by RNA-sequencing) to understand how the sex of an individual affects differentiation of the brain and how AMH influences male brain development using a mouse model with a mutation in the AMH gene.

RNA was collected from male and female heterozygotes, and mutant embryos, at two important time points (E12.5 and E15.5) during brain development. Three biological replicates were collected and sequenced individually to control for any biological variation. Following RNA-sequencing, we determined what pathways are disrupted by AMH loss in addition to the pathways that are expressed differentially between the sexes. Pathway analysis supports an important role for AMH in male brain development. Unexpectedly, we also identified differences in gene expression in the female mouse brain upon mutation of AMH. RNA-sequencing data indicated that AMH is expressed in both the male and female mouse embryonic brains during development and this was confirmed by quantitative RT-PCR (qRT-PCR). Currently we are validating our data using qRT-PCR on biological replications and by using a mouse model that over-expresses AMH (thus we would expect to see pathways regulated by AMH altered in this model as well). We will then map sex-dimorphic genes back to the human genome to identify those associated with susceptibility loci for human neurological disorders exhibiting a strong sex-bias. This will allow for the first time, on a genome-wide scale, a study of the molecular differences between the sexes during the early stages of brain development in addition to the influence of a hormone AMH, associated with human neurological disorders.

Dr Joel Tyndall

(Department of Pharmacy)

Optimizing protease inhibitors against HtrA in Chlamydia – AG 319

Sponsored by the Otago Medical Research Foundation's General Funds

The pathogen Chlamydia trachomatis is responsible for the most common sexually transmitted bacterial infection worldwide. This is commonly an asymptomatic infection resulting in infertility, pelvic inflammatory disease or ectopic pregnancy. In addition this bacterium causes trachoma, an infectious eye disease which is the leading cause of infectious blindness worldwide, especially in Africa. The hydrolytic enzyme, HtrA, has been identified as being at high levels in Chlamydia. The grant-in-aid has enabled us to purchase chemicals and complete the synthesis of 5 new molecules for inhibition of HtrA (with others partly completed) based on our initial inhibitor. These have been sent to our collaborators in Australia for testing against both the enzyme and Chlamydia cells.

(ii) Otago Community Trust Grants

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

Professor Cliff Abraham
(Department of Psychology)
and Dr Joanna Williams
(Department of Anatomy)

Defining the novel contribution of microRNA to long-term memory mechanisms – CT 316

MicroRNA are important negative regulators of protein synthesis in nerve cells, and we hypothesise that microRNA are gate-keepers controlling gene expression and the production of proteins specifically related to the changes at nerve cell synapses critical for memory formation. Our aim in this project has been to develop an easily manipulated experimental system that can be used to determine the direct link, if any, between specific microRNA and the activation of these memory mechanisms. To this end, we have studied two versions of cultured nerve cells from a brain region important for memory, the hippocampus. The second methodology has revealed itself capable of producing the changes at synapses that are considered to be related to memory formation. We have shown that these changes are associated with changes in the expression of specific genes known to be linked to memory as well. Thus we are now prepared to determine whether microRNA are key regulators of this gene expression response, as well as of the changes at the synapse. Ultimately this study will shed new light on memory storage mechanisms, potentially identifying new therapeutic targets for neurological diseases affecting memory, such as Alzheimer's disease.

Professor Gregory Cook
(Department of Microbiology & Immunology)

Prognostic markers to determine PSA failure in prostate cancer – a pilot study – CT 318

Tuberculosis (TB) kills 1.7 million people annually and 10 million new cases of TB are diagnosed per year. Treatment of TB is difficult and new drugs are urgently required to combat increasing drug resistance and tolerance in Mycobacterium tuberculosis. The first anti-TB drug to be developed in 40 years, bedaquiline, was licensed in December 2012. Bedaquiline targets the F1Fo ATP synthase, a nanosized ATP-generating motor that is fuelled by the respiratory chain of M. tuberculosis. We have identified succinate dehydrogenase (SDH) as a key component of the respiratory chain and propose that SDH represents a potential target for inhibitor design. We have successfully developed a high throughput screening method for inhibitors of succinate dehydrogenase and identified a number of hits. These hits are currently being tested against M. tuberculosis during replicative growth and in non-replicative cells (hypoxic cultures) to further validate SDH as a target for TB drug development.

Dr Elspeth Gold
(Department of Anatomy)

Succinate dehydrogenase: a new target for tuberculosis drug discovery – CT 317

Optimal management of prostate cancer presents unique challenges because of the highly variable nature of the disease. Some men have organ-confined indolent disease that can be safely followed without immediate treatment, whereas others have aggressive prostate cancer and need immediate intervention. There are limitations with the current clinical variables used to predict the likelihood of cancer progression and they give little information concerning best treatment. This grant is working towards identifying a panel of biomarkers for use in prostate tissue sections to identify those cancers that are likely to recur following prostate removal, as it is these cancers that are the most aggressive.

A study nurse has been working on the project for 6 months to identify all men who underwent prostate surgery in Otago in the last 15 years. Archival prostate tissue blocks are being located through Southern Clinical Labs. Sections are being stained with our panel of markers and once staining is complete analysis will be undertaken to determine which markers offer clinical utility to identify those men at highest risk of prostate cancer recurrence.

If we are able to identify a "signature" indicative of aggressive prostate cancer, the next step will be to undertake analysis on many more tissues New Zealand wide and move towards placing our biomarker panel into pathology clinics in New Zealand.

(iii) Recent Annual Grant Round

In June 2014 there were 38 applications from the University of Otago totalling $975,468. Five of these applications were funded by the Foundation and their sub-sponsors, JN Lemon Trust, OceanaGold, Southern Trust and Southern Victorian Charitable Trust, (~$90,500), and two by the Otago Community Trust ($60,000). Abstracts of the proposed work can be found on the following web site http://www.omrf.org.nz

(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 2013 there were 21 applications (compared with 14 the previous year) from the University of Otago totalling $504,856 and three of these were funded at a total expenditure of around $84,000. Final reports are not due until the end of March to June 2015, depending on start date of grant. Work in progress is summarised below:

Associate Professor Dorothy Oorschot
(Department of Anatomy)

Can brain injury due to extreme prematurity be prevented? – LA 324

This translational research aims to investigate whether treatment with melatonin rescues the brain injury of extreme prematurity. Specifically, we are investigating if treatment with melatonin prevents the death of brain glia (i.e. pre-oligodendroglia), and prevents myelin and memory deficits, in an innovative, clinically relevant animal model. The animal model was developed by Associate Professor Oorschot and her research team at the University of Otago. This model was published in the prestigious international journal, the Journal of Neuroscience, in July 2013. Detailed analyses on coded brains are currently underway to determine if treatment with melatonin rescues pre-oligodendroglia and prevents myelin deficits. Memory deficits are also being investigated. A positive outcome would drive clinical trials to develop an effective treatment for brain damage due to extreme prematurity.

Associate Professor Rhonda Rosengren and Dr Sebastien Taruin
(Department of Pharmacology & Toxicology)
and Dr Elspeth Gold
(Department of Anatomy)

Using raloxifene in a drug combination for the treatment of metastatic hormone refractory prostate cancer – LA 325

We have shown that raloxifene, a drug that is approved for the prevention of osteoporosis in post-menopausal women also has a role in the treatment of aggressive prostate cancer, especially when used in combination. Our results in cell cultures have shown that, in combination, raloxifene and a curcumin analog (RL91) kill 90% of aggressive prostate cancer cells. This work is being further explored in a mouse model of metastatic prostate cancer. The model we have developed is highly relevant to human prostate cancer because human prostate cancer cells are injected directly into the mouse prostate. The growth of the tumor over time is then measured using a technique called live imaging. Importantly, this allows us to track the growth of the tumor over time in the same animal. We have established the model and are currently treating the mice daily with raloxifene, RL91 and the two drugs in combination. When the treatment period has concluded we will be able to report on the effectiveness of each drug and determine if the combination has a superior ability to halt metastasis.

Dr Khaled Greish
(Department of Pharmacology & Toxicology)

Dual nano-miceller system for enhanced delivery of chemotherapeutics to resistant pancreatic cancer – LA 326

We are working on improving the treatment outcome for pancreatic cancer. Pancreatic cancer is especially difficult to treat because it has limited blood vessels, which are essential to deliver anticancer drugs. Our new strategy relies on first increasing the blood supply to pancreatic tumours through a nitric oxide donor that causes selective vasodilation upon light exposure. This is followed in the next step by applying targeted anticancer micelles. So far, we have successfully prepared the targeted anticancer system to be delivered to the tumour. Within the next few months we are planning to test the system in cell cultures of pancreatic tumours to be followed by testing in animals inoculated with pancreatic cancer. In addition, we have a review article from OMRF funded research accepted to be published in the Journal of Therapeutic Delivery describing the advantages of micelles for targeted delivery of tumours.

(C) JACK THOMSON ARTHRITIS FUND

This OMRF fund was made possible by a bequest from the late Jack Thomson and commenced in 2011. For the third grant round in December 2013 there were five applications (compared with eight in the previous year) from the University of Otago totalling $140,900 and three of these were funded at a total expenditure of ~$71,000. All grants commenced on 1 March or April 2014 and final reports are due at the end of May or June 2015. Work in progress is summarised below:

Dr Cushla McKinney and Associate Professor Tony Merriman
(Department of Biochemistry)

Identification and characterisation of a potential functional variation in TLR4 associated with gout – JT 320

Gout is the most common form of inflammatory arthritis affecting New Zealand males, especially those of Maori and Pacific Island descent, and is also strongly associated with other metabolic conditions. It arises when levels of urate in the blood (arising from both diet and normal physiological processes) become high enough (hyperuricaemia) that urate crystals form. These crystals deposit in joints and soft tissues, where they trigger the body's immune system, leading to acute inflammation and pain, and, if untreated, permanent damage. At this point in time, treatment options are focussed on decreasing serum urate levels by decreasing production and/or enhancing the body's ability to excrete uric acid. However these approaches do not work for a significant number of people, and an alternative approach would be to target the immune response to urate. Recent genetic studies have identified a variation in a gene called TLR4 that is more common in Chinese and Caucasian gout patients than in healthy controls, suggesting it may be important in immune-cell recognition of urate crystals. However this same variation does not seem to increase the risk of gout in Maori and Pacific Island populations, and we think that it is more likely that the real causal variant is in the promotor region of the gene, which influences the amount of the gene product made. We are now preparing to test whether naturally-occurring variations in this region alter the way cultured cells respond to urate, to identify which of them is involved in gout susceptibility, and potentially confirm TLR4 as a new therapeutic target for treatment or prevention.

Dr Daniel Ribeiro and Dr Gisela Sole
(Department of Physiotherapy)

Can we optimise rotator cuff motor control? Exploring novel rehabilitation exercises for shoulder osteoarthritis treatment – JT 321

The aim of this study is to quantify shoulder rotator cuff muscle activity during selected shoulder exercises, and to determine which exercises actually increase rotator cuff muscle activity levels. Thirty young asymptomatic individuals took part in the study, and completed the protocol. We monitored the activity of seven shoulder muscles using surface electrodes. Our results suggest that by applying an anterior gentle pressure over the humerus and sustaining it, while participants performed shoulder movements, resulted in reduced shoulder muscle activity when compared to control conditions (shoulder movement without manual mobilisation). Up to now, it has been unclear what the effect of shoulder mobilisation is on shoulder muscles. Our data suggest that the therapist's hand may help to increase joint stability. Our data also suggests that superficial shoulder muscles (pectoralis major and latissimus dorsi) together with rotator cuff muscles contributed to the dynamic relocation test. Finally, supraspinatus presented higher mean activity levels during the 'dynamic relocation test', when compared to external shoulder rotation exercise.

Dr Stephanie Woodley, Professor Helen Nicholson and Dr Natasha Flack
(Department of Anatomy)
and Dr Cathy Chapple
(Department of Physiotherapy)

Can prehabilitation improve patient outcomes following hip joint replacement? – JT 322

Osteoarthritis of the hip is a common chronic condition that affects the health and wellbeing of New Zealanders with approximately 7,000 people undergoing hip joint replacement per year. This pilot study will examine the feasibility and effectiveness of implementing an exercise programme for patients awaiting hip replacement (prehabilitation). It will also investigate whether ultrasound can be used as a reliable tool to assess hip muscle volume, a modifiable parameter with potential as an outcome measure. To date, we have started recruiting patients from the waiting list of the Orthopaedic Department, Dunedin Hospital. We will soon commence baseline assessments and imaging. Participants will then take part in an exercise programme, attending two sessions (1-hour duration) per week for 8 weeks as well as performing some of the exercises at home on a daily basis.

4. OTHER ACTIVITIES OF THE SCIENTIFIC COMMITTEE

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

(1) At the **September 2013** scientific meeting of the Otago Medical School Research Society (OMSRS) there were nine **doctoral** candidates (selected from 11 applicants based on their submitted abstracts). The first Prize ($1,000) funded by Otago Postgraduate Medical Society was awarded to **Simon de Croft** (supervised by Professor Allan Herbison, Department of Physiology) on the topic of "Peptidergic intercommunication between kisspeptin neurons of the arcuate nucleus of the male mouse". The second prize ($500), which was funded by the **OMRF**, was awarded to **Maggie Corr** (supervised by Associate Professor Greg Anderson, Department of Anatomy) on the topic of "Insulin receptor signaling in gamma-aminobuutyric acid (GABA) neurons play a role in regulating metabolic function, but not reproductive function, in female mice".

(2) At the **May 2014** scientific meeting of the OMSRS there were ten candidates (selected from 23 applicants based on their submitted abstracts). All were s**ummer research scholars** and one of the ten (and six of the 23) had been sponsored by the OMRF. Two **first prizes** were awarded ($500 each, funded by the OMRF with $250 from the OMSRS) to **Ivor Malahay** (supervisor Associate Professor Fiona McDonald, Department of Physiology, sponsored via the OMRF by Pub Charity) on the topic of "COMMD10 is important for zymogen granule formation in AR42J pancreatic acinar cells" and to **Chris Marshall** (supervisor Dr Rebecca Campbell, Department of Physiology) for "Measuring pulsatile luteinizing hormone secretion in a prenatal androgen treated model of polycystic ovarian syndrome".

The Student Speaker awards are given to the student speakers who, in the opinion of a panel of five 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.

OMRF-sponsored Invited Speaker for the Otago Medical School Research Society:

The opportunity for such sponsorship occurred in **September 2014** when an excellent Annual Review Lecture was given by **Professor Christine Theoret**, Director of the Comparative Veterinary Tissue Healing Laboratory, Department of Veterinary Biomedicine, University of Montreal on the topic of "Wound healing across the species: naturally occurring conditions that model those in man".

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

The Foundation sponsors prizes each year in the Special Prize category at the **Otago Aurora Science & Technology Fair** for secondary schools for projects involving medically orientated topics. This year five awards were given at $40 each. In **August 2014** the recipients were "Singing isn't Everything" by Charlotte Mason & Tam Chanthasen (Year 7), "Optical Confusion" by Charlotte Smith & Sophie Palmer (Year 7), "Familial Fingerprints" by Tamara Mason (Year 8), "M is for Mummy" by Thomas Geary (Year 8) and "Sup, Brew?)" by Krystal Lamsdale (Year 9). The Foundation's judges were Dr Nick Heng, Associate Professor Greg Jones and Dr Beulah Leitch.

ACKNOWLEDGEMENTS

The Foundation continues to play an ever increasing role in funding Medical Research in Otago – may I thank the Scientific Committee for its dedicated efforts in the arduous, though satisfying, work of assessing the scholarship and merit of the many summer research projects and grant applications that it receives. 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.

- Associate Professor Patricia A. Cragg
Chairperson, Scientific Committee

OMRF GRANTS
Awarded June 2013 and December 2013

OTAGO MEDICAL RESEARCH FOUNDATION

Assoc Prof Alex McLellan
(Microbiology & Immunology)
$29,006
Understanding how cancer spreads to the lymph nodes

Dr Euan Rodger & Prof Ian Morrison
(Pathalogy)
$33,470
Does a New Zealand family hold the key to myelodysplastic syndrome

Dr Joel Tyndall
(Pharmacy)
$2,350
Optimizing protease inhibitors against HtrA in Chlamydia

Dr Megan Wilson & Prof Ian McLennan
(Anatomy)
$13,500
The molecular factors underlying male susceptibility to neurological disorders and injury

Dr Sebastien Taurin, Dr Khaled Greish & Assoc Prof Rhonda Rosengren
(Pharmacology & Toxicology)
$33,881
Raloxifene micelles for the treatment of hormone refractory prostate cancer

OTAGO COMMUNITY TRUST

Prof Cliff Abraham & Dr Joanna Williams
(Psycology & Anatomy)
$20,000
Defining the novel contribution of microRNA to long-term memory mechanisms

Dr Elspeth Gold
(Anatomy)
$25,687
Prognostic markers to determine prostate-specific antigen (PSA) failure in prostate cancer – a pilot study

Prof Greg Cook
(Microbiology & Immunology)
$23,000
Succinate dehydrogenase: a new target for tuberculosis drug discovery

LAURENSON GRANTS

Assoc Prof Dorothy Oorschot
(Anatomy)
$29,931
Treatment of brain injury due to extreme prematurity: Is melatonin protective

Assoc Prof Rhonda Rosengren & Dr Sebastien Taurin
(Pharmacology & Toxicology)
& Dr Elspeth Gold
(Anatomy)
$29,265
Using raloxifene in a drug combination for the treatment of metastatic hormone refractory prostate cancer

Dr Khaled Griesh & Dr Greg Giles
(Pharmacology & Toxicology)
$19,882
Dual nano-miceller system for enhanced delivery of chemotherapeutics to resistant pancreatic cancer

JACK THOMSON GRANT

Dr Daniel Ribeiro & Dr Gisela Sole
(Physiotherapy)
$10,127
Can we optimize rotator cuff motor control? Exploring novel rehabilitation exercises for shoulder osteoarthritis treatment

Dr Stephanie Woodley, Prof Helen Nicholson & Dr Natasha Flack
(Anatomy)
& Dr Cathy Chapple
(Physiotherapy)
$26,320
Can prehabilitation improve patient outcomes following hip joint replacement?

Dr Cushla McKinney & Assoc Prof Tony Merriman
(Biochemistry)
$34,578
Identification and characterization of a potential functional variation in TLR4 associated with gout

RENSHAW PRIZE

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	1985	Miss B.C. Galland	2001	Mr M Rahimi
1971	Mr K.J. Davey	1986	Mr R.G. Snell	2002	Ms S Jordan
1972	Mr F.M. Patrick	1987	Mrs T.E. Inder	2003	Ms E Szymlek-Gay
1973	No Award	1988	Miss M. Kuipers	2004	Mr D Kieser
1974	Mr J.C. Montgomery	1989	Miss E.R. Dennett	2005	Mr C Young
1975	Mr A.S. McLean	1990	Miss A. Charlton	2006	Mr C Young
1976	Mr N.K. Given	1991	Mr B. McKenzi	2007	Mr S Smart
1977	Miss F.M.F. McQueen	1992	Mr J.W. Corboy	2008	Ms S Saunderson
1978	Mr K.D. Jolly	1993	Ms S.M. Dillon	2009	Ms J Lee
	Mr J.P. Scott	1994	Ms N. Dalbeth		Ms E Winsley
1979	Mr R.A. Henderson	1995	Mr T Zaharic	2010	Mr J Zhang
1980	Mr D.W. MacFarlane	1996	Mr M Morrison	2011	Miss E Gavey
	Mr D.W. Shaw	1997	Mr A Brown		Mr E Ottley
1981	Mr N.E. Dickson		Ms S Safari		Mr W Parkyn
	Mr Wong Ooi	1998	Mr J Mangum	2012	Miss Su Zhou
1982	Miss C. Page	1999	Ms J Pitchforth	2013	Mr Fly Ing-Aram
1983	Mr I.L. McLean		Ms A Steyn	2014	Katie Hoeksema
1984	Mr I.L. McLean	2000	Mr J Wales		Deepa Mistry

EVENTS

BLACK TIE: An Evening to Remember

The Otago Medical Research Foundation's first-ever black tie fundraising dinner, was a resounding success in the Dunedin Town Hall in mid-October 2013 with just over $35,000 being raised.

More than 400 attended the multi-faceted event which encompassed singing, dancing, story-telling, magic, ventriloquism, illusion, education, fine food, beer and wine, and a world-class auction.

Forsyth Barr was the major naming rights' sponsor, being joined by OceanaGold NZ (associate), and with Taylormade Media, Dunedin Venues, Speight's Brewery and the Ali McD Aart Agency as supporting partners.

Included in the list of entertainers and speakers were 'unusualist' Raymond Crowe, who amazed the crowd with his repertoire of mime, ventriloquism, magic and shadow puppetry; former Wallaby rugby international 'undercover prop' Dan Crowley; the Beat Girls music trio; celebrity chef Alison Lambert; and Professor Greg Cook, a world-renowned microbiologist.

Models from the Ali McD Aart Agency added glamour to the occasion and auctioneer Chris Kennedy's gavel was busy during the auction.

On offer were the chance to ride at full speed with a world or European rally champion at the 2014 Otago Classic Motor Rally, beautiful art works from Sam Foley and Geoff Williams, the chance to walk with the golfing gods at the 2014 Ryder Cup in association with Animation Research, a luxury package (made up of accommodation, meals and spas at the Queenstown Hilton, K-jet boat rides and a Southern Discoveries Mt Nicholas experience, luxury driving with Armstrong Prestige and cosmetics donated by the Farmers Trading Company), and a $10,000 MediaWorks RadioLIVE advertising campaign.

With the final Bledisloe Cup rugby test between the All Blacks and Wallabies scheduled for the city the following night, the Cup itself was on show for much of the evening with many taking the opportunity to have their photos taken alongside the trophy.

DINNER: A Night to Remember

The Foundation's 2014 annual dinner A Night to Remember in the Dunedin Town Hall on March 1st 2014 was an outstanding success.

Not only was $64,000-plus raised – through sponsorships, ticket sales, auction items, a high-class raffle and donations – but the message about the value of medical research was portrayed in spectacular fashion.

Non-Hodgkins lymphoma cancer survivor, legendary unbeaten All Black captain Buck Shelford opened up about his illness and how he tackled it head-on. Buck was diagnosed in 2007 and is currently in remission. He spoke candidly about his battle and how he responded to its treatment, having been especially interested in the presentation about the development of research by Dr Chris Jackson prior to his own appearance on stage, and he also gave a very stern message to the men in the audience about ensuring they took their health seriously.

Buck's daughter Leah was also diagnosed with non-Hodgkins lymphoma four years ago and she too is in remission.

Eight recipients of 2013/2014 Foundation summer research scholarships – Monica Archibald, John Brady, Brittany Davison, Adelaide Hopkins, Mark Huang, Ivor Malahay, Kate McElroy and Hazel Nissen – were introduced to the audience and they then had the opportunity to mingle with the crowd during the serving of the main course. Many and varied were the questions of them about their specific areas of research.

With the dinner plates cleared, Brad Blaze – reputed to be the world's fastest portrait painter – entertained by bringing Buck, Bono, Elvis and Pink to life in the space of just a few minutes, his work completed upside down – not him, his paintings – before being spun to reveal to subject of his talents.

A world-class raffle and auction followed dessert with a rare commemorative Rugby World Cup jersey, donated to the Foundation by All Black captain Richie McCaw, selling for $10,000; a golfing package at the Hills, Millbrook Resort and Jack's Point for $5,100; and Brad's four pieces of art fetching between $2,000 and $3,000 each. A brand new Volvo V40 D2 hatchback, as supplied by the dinner's major sponsor Armstrong Prestige, was knocked down for just over the reserve price at $38,000.

And to finish off in style A Night to Remember brought the country's best rock 'n' roll band The Class of '58 on to the stage for 90 minutes of high energy, exhilarating performance with the majority of the crowd singing and dancing for the full set.

GOLF: Foundation's annual golf tournament

Low scoring was the order of the day at the Foundation's annual golf tournament on the St Clair course in association with OceanaGold in early-October.

In near-perfect conditions and with the St Clair course in magnificent condition, birdies were the norm as the field of 100 players banded together to raise funds for the Foundation's annual research grants' allocation.

OceanaGold continued its strong support as the naming rights' sponsor, all 18 holes were sponsored and there were a number of team entries. With prizes being donated and a number of other supporters also involved, and with the 'mulligans' and raffle selling well, a profit of just under $18,500 was made on the day.

Those funds have been directed into the annual OceanaGold research grant which is investigating how best to prevent a bacterium, prevalent in infections in hospitals, from causing those infections and become more easily controlled by antibiotics. Researchers in Dunedin are collaborating with an Italian-based study.

Money raised at the 2011 event was invested into a study into why women are more prone to diabetic heart disease while the proceeds from the 2012 tournament launched an examination of refractory hormone prostate cancer, a particularly virulent strain of the disease.

In the last three years more than $60,000 has been raised through the tournament.

Again supporting the OceanaGold commitment were our hole sponsors and the Foundation acknowledges their enthusiasm. Our thanks to Silicon Coach, Orbit Corporate Travel, Dr John Greaves and Keith Newton (Mornington Health Centre), Speight's Brewery, Mr Simon McMahon, Dr Alan Wright, Dr Patrick Dawes, Dr David Peart and Mr Andrew Swan (all Marinoto Clinic), Forsyth Barr, Mitchells Tavern, Deloitte, Palmers Mechanical, Body Synergy, Sport Otago, Southern Colour Print, Newstalk ZB, Craigs Investment Partners and the Hong Kong and Shanghai Banking Corporation.

Our appreciation is also extended to our prize and refreshment sponsors, and others who played a part in the success of the day – Dr Jenny McMahon, Dr Brian McMahon, Orbit Corporate Travel, Aravin Central Otago, Dunedin Venues, Valspar Paints New Zealand, Neil Metcalfe (St Clair pro shop), Cadbury Confectionery, Rialto Cinemas (Dunedin), Henry's Beer Wines & Spirits, Rockburn Wines, Gardens New World, Craft Bar, Body Synergy, Paper Plus Dunedin, Bunnings Warehouse Dunedin, Otago Cricket, Luna Bar & Restaurant, Scotia Bar & Bistro, Sky's Rugby Channel, Forbury Park Trotting Club and Polson Higgs.

There were also a number of team entries and their support was also appreciated – our thanks to Ken and Liz Dempster, Dave Sharp, Opus International Consultants and Lab Supply Ltd.

The day's results were:

Closest to the pin – 4th; Tom West, 7th; Matthew Smith, 13th; Colin McNaught, 16th; Chris Timms

Longest drive – 18th; Andrew Cessford

Straightest drive – 14th; Richard Roberts

Team results:

1st	**playing off a team handicap of 8, net score of 53– Forsyth Barr**
2nd	**8.375, 53.625 – Mitchell's Tavern**
3rd	**1, 54 – Sport Otago (16 birdies off the tee!!)**
4th	**5.25, 55.75 – Orbit Corporate Travel**
5th	**6.125, 55.875 - Deloitte**
6th	**7, 56 – Dr Alan Wright's team**
7th	**6.75, 56.25 – Gardens New World**
8th	**5.625, 56.375 – WhatsoEver Ltd**
9th	**5.25, 56.75 – Palmers Mechanical**
10th	**7.375, 57.625 – Body Synergy**

CLUB OTAGO

Club Otago combines the very best in speakers, camaraderie and charity

That was the rationale for the establishment of Club Otago in early-2012 ... and that philosophy has been well and truly embraced by Dunedin's corporate sector and individual enthusiasts.

There are four lunches each year, featuring the topical speakers of the moment (whatever their area of expertise), the gatherings are utilised by members for their own hosting purposes and ALL funds raised are directed towards the Foundation and its on-going mission of identifying and nurturing world-class medical research in the city.

After enjoying presentations from All Black coach and former local lad Steve Hansen, evergreen broadcaster Keith Quinn, former doctor and now successful businessman David Kirk and Sir Peter Leitch (the 'Mad Butcher') in 2012, the latest 12 months have been as equally enjoyable.

Joining us in the 2013/2014 year were the inaugural captains of the Highlanders and Warriors, John Leslie and Dean Bell, as Dunedin celebrated the hosting of a Super Rugby/National Rugby League double; outspoken businessman Sir Bob Jones; another local boy, New Zealand cricket coach Mike Hesson; and new Dunedin Venues boss Terry Davies.

Membership numbers now tally more than 100. With members bringing guests, the attendance at lunches generally number around the 200 mark.

As noted, membership subscriptions are available IN FULL to the Foundation with the lunches run at breakeven, thanks to a quartet of Club Patrons – Armstrong Prestige, Oyster Executive Recruitment, ANZ Private and Dunedin Venues.

Funds raised in 2012 tallied $53,000 while Club Otago's 2013 calendar year accrued a further $77,000.

OUR MEMBERS ARE:

Patrons

Armstrong PRESTIGE · Oyster Executive Recruitment · Dunedin Venues · ANZ

Senior Fellow

Mercy Hospital

Fellow

Allied Press, Carpet Court Dunedin, Farmlands Cooperative, Orbit Corporate Travel, Deloitte, Dunedin City Motors, McMahon Investments, RD Petroleum, Fitzgerald Family Trust, Crombie Lockwood.

Associate Fellow

MediaWorks Otago, Forsyth Barr, Kiwibank, HSBC, Southern Wide Real Estate, Seperex Nutritionals, Dunedin Casino, syndicate of James Reid, Grant Paterson, Mark Scully, Russell Cassidy, This Way Ltd, Living Corporation, Jenepher Glover, Opus International Consultants, Forays Consulting Ltd, Dunedin International Airport, Body Synergy, Asteron Life, Otago Cricket, Immersion Marketing, Harvie Green Wyatt.

Individual

Adam La Hood (Cook Brothers Construction), Dave Callon (Share), Mark Thompson, Craig Brook (Southern Honda), Sarah Saunderson-Warner (Aspinall Joel), Ron Lewis (Craigs Investment Partners), Ian Shore (Shore Associates), Hudson Biggs (Keogh McCormack), Mike Pearce (Strawberry Sound) Adam Binns (Barlow Justice Binns Ltd), Donna Gale (NZI), Andrew Carmody (Brooker Travel), Adam Gain (Metro Realty), Grant Sime (Fulton Hogan), Jules Radich (ActionCoach), Stuart McLauchlan (GS McLauchlan & Co), Peter Taylor (Peter J Taylor & Associates), Dave McPhedran (YBT), Carl Spruyt (10X), Simon Parker (Parker Warburton Team Architecture), Fred Gianone (Etrusco at the Savoy), Murray Hughes (Aotea Electric Group), John White (Telfer Electrical Otago Ltd), Bernie Cull (Hamburg Sud NZ Ltd), Roger Owen (Road Materials), Malcom Farry (Farry Group), Phil Tizard (Otago Electrical & Communications), Andrew Campbell (Wattyl NZ), Rachel Bird (Bird Event Management), Paul Buckner (Downie Stewart), Justin & Eterei Stonelake (McDonald's Dunedin), Bill Haydon (Roman Catholic Diocese of Dunedin), Sherman Weatherall (Agility Logistics), Russell Quin (Spicers), Sharon Hyndman (Metro Realty), Paula & Peter Anstey (Progressive Plastics), Bruce Carvell (Williams Signs & Graphix), Michael Bird (Ambi Properties), Will McMillan (Fernbrae House), Steve Brocklebank (PWC), Garry Clarke (Arbi Monograms), Richard Roberts (Dunedin International Airport), Rosey McConnon (Happy With That), Amy McFadzien (Cook North & Wong), John Freeland (Aon, Mosgiel), Dr Michael Schultz (Gastroenterology Otago Ltd), Professor Ian Morison (Pathology Department, University of Otago), Neil & Jamie Lyons (Signature Property Ltd), Dr Paul Templer (Sandman Anaesthesia Services), Nadene Moore (International Freight Logistics), Barry Timmings (Timmings Partners), John Buckingham (Alert Monitoring), Ian Hogg (ANZ Bank, Commercial), Michael Turner (Polson Higgs), Sergio Salis (London Street Specialists), Chris Timms (Craigs Investment Partners), Grant Chirnside (Southern Realty), Dr Norman & Mrs Barbara Fitzgerald, Sarah Anderson (Regent Theatre), Alan Nicholls.

CHAIRPERSON'S REPORT

46TH ANNUAL REPORT YEAR 2014

$423,965
Decrease of
$32,716
Since **2013**

Total amount funded
Since the Foundations inception
$7,222,999

As recorded in the Notes to the Financial Statements there has been a change in the Accounting Policy regarding Research Grant Expenditure which was previously recognised when paid. For the year under review and subsequent years this expenditure has been, and will be, recognised when the Grant Applicant has been notified of a successful application. Last year's figures have been adjusted and the above figures are based on the amended figures.

The extract from the Financial Statements, as published further on in the Annual Report, shows a surplus for the year of $204,614, this result being attributable in the main to Bequest income, two Evenings to Remember falling in the same financial year and Profits on disposal of Investments. The timing of two Evening to Remember functions in the same year was due to the desire to have this function earlier in the year. The Foundation endeavours to invest surpluses in project grants rather than build up funds but further injections of capital for investment are vital if the Foundation is to continue supporting research, at least at the same rate that we have been.

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. 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 $334,309, which is 8.97% of cost, with the New Zealand and Australian investments being the main contributors.

At 31 March, 2014, Accumulated General Funds total $427,887,and Accumulated Special Funds $4,350,647, both these figures comprising Capital and Income.

This year marked the 17th year in which the Otago Community Trust awarded an Annual Grant to the Foundation with the details of grants awarded from this year's funding being published earlier on in the Scientific Committee Report. This brings the total grants received from the Otago Community Trust to $1,221,000 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, continuing contributions.

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

- In last year's report it was noted that John Adams and Helen Nicholson would be absent from the Council table as ex–officio members. John's replacement was Prof Barry Taylor. and Assoc Prof Pat Cragg is the Acting Dean of the School of Medical Sciences. but is already a Council Member. Assoc Prof Colin Brown has replaced Dr Stephen Bunn as the representative of the Otago Medical School Research Society.
- Since 31 March we have also been joined at the Council table by Sarah Ramsay, who has been co-opted onto Council to provide specialist marketing and promotion advice.
- We welcome these new members to Council and thank John, Helen & Stephen for their positive contributions to the Foundation.

Patron

- I am sorry to record the passing of our Patron. Emeritus Professor Barbara Heslop on 20 December, 2013. Although only our Patron for a relatively short period we were fortunate that Barbara thought the OMRF was a worthy cause for her to lend her name to.
- Dr Gil Barbezat has very kindly agreed to take on the Patron's role and we thank him for this and look forward to benefiting from his very wide experiences in the medical field.

Thanks

- Firstly, to all those Trusts, Companies, Individuals, Members and Non –Members listed further on in this Annual Report who have supported the Foundation in the year under review. The Foundation is very grateful that it has continued to receive the support that it has in these difficult economic times.
- To Steve Davie, our Director of Development, for his commitment to the Foundation. It impresses me that Steve is always coming up with new, innovative ideas for fundraising and raising the profile of the Foundation and we look forward to a continuation of this. Since Steve took on the position the profile and funds of the Foundation have improved greatly and I say thank you Steve for the enthusiasm with which you approach everything you take on for the Foundation.
- Steve's report can be found on page 03.
- To my fellow Investment Sub-Committee members, Mike Horne, Ron Lewis and Jenny McMahon for their wise counsel, advice and time so willingly given to serve on this Sub-Committee, I thank you most sincerely.
- Once again, we must acknowledge the contribution of the Scientific Committee and special thanks must go to the members of this Committee, under their longstanding and dedicated Chairperson, Associate Professor Patricia Cragg. Although all busy with their own career activities, the Scientific Committee still continue to find the time to provide professional assessment and advice on three rounds of Grant applications and then make their recommendations to the Council. Without this group of dedicated people we would not be able to achieve the object of the Foundation, "The Furtherance of Medical research in Otago".
- To all Council Members, for your contribution and support, my sincere thanks for your continued interest in, and work done, for the Foundation.
- To the Deloitte team of Mike Horne, Trudy Reveley and Luke Murdoch for continuing to provide very professional and efficient administration services for the Foundation. Louisa Homersham, who took over the responsibility for the day to day organisation of the Foundation upon the retirement of this writer in December, 2009, recently left Deloitte and we thank Louisa for her efforts over this period and welcome Megan Vintiner as Louisa's replacement.

On behalf of the Council
Ken Dempster
Chairperson

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 2014. 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 2014 is available from the office of the Foundations administrators - Deloitte, Otago House, 481 Moray

Statement of Financial Performance

For the Year Ended 31 March 2014

	2014 $	2013 $
Operating Income		
Donations, Bequests, Subscriptions	708,195	419,964
Investment Income	249,610	269,259
Profit (Loss) on Disposal of Investments	19,162	(30,472)
	976,967	**658,751**
Less Expenses		
Administration	68,485	59,801
Promotion Costs	279,903	163,212
Total Expenses	**348,388**	**223,013**
Net Surplus before Research Grants	**628,579**	**435,738**
Research Grants - Current year	423,965	456,681
Net Surplus for the year	**204,614**	**(20,942)**

Statement of Financial Position

As at 31 March 2014

	Market	2014 $	2013 $
Current Assets		**202,679**	**265,932**
Investments	5,219,858	**4,972,822**	**4,755,667**
Total Assets		5,175,501	5,021,599
Current Liabilities		**396,967**	**447,679**
Total Liabilities		396,967	447,679
NET ASSETS (EQUITY)		4,778,534	4,573,920

Statement of Movements in Equity

For the Year Ended 31 March 2014

	2014 $	2013 $
Revenue		
Net Surplus	204,614	(20,942)
Total Recognised Revenues and Expenses	**204,614**	**(20,942)**
Equity at the Beginning of the Year	4,573,920	4,594,862
Equity at the End of the Year	**4,778,534**	**4,573,920**

The full financial report of the Otago Medical Research Foundation for the year to 31 March 2014 were authorised for issue by the Chairperson of the Council. The full financial statements applied differential reporting concessions. The auditor expressed an unqualified opinion. The summary financial report has been examined by the auditor for consistency with the full financial report. The auditor has expressed an unqualified opinion.

Deloitte

CROWE HORWATH Marked for Identification Purposes NEW ZEALAND

AUDITOR'S REPORT

Crowe Horwath™

Crowe Horwath
New Zealand Audit Partnership
Member Crowe Horwath International
44 York Place
Dunedin 9016 New Zealand
PO Box 188
Dunedin 9054 New Zealand
Tel +64 3 477 5790
Fax +64 3 474 1564
www.crowehorwath.co.nz

REPORT OF THE INDEPENDENT AUDITOR ON THE SUMMARY FINANCIAL STATEMENTS

To the Council of the Otago Medical Research Foundation

The accompanying summary financial statements, which comprise of the summary statement of financial position as at 31 March 2014, the summary statement of financial performance and the summary statement of movements in equity for the year then ended, and related notes, are derived from the full audited financial statements of the Otago Medical Research Foundation for the year ended 31 March 2014. We expressed an unmodified audit opinion on those financial statements in our report dated 2 September 2014. Those financial statements, and the summary financial statements, do not reflect the effects of events that occurred subsequent to the date of our report on those financial statements.

The summary financial statements do not contain all the disclosures required for full financial statements under generally accepted accounting practice in New Zealand. Reading the summary financial statements, therefore, is not a substitute for reading the full audited financial statements of the Otago Medical Research Foundation.

Council's Responsibility for the Financial Statements

The Council are responsible for the preparation of a summary of the audited statements in accordance with FRS-43: *Summary Financial Statements*.

Auditor's Responsibility

Our responsibility is to express an opinion on the summary financial statements based on our audit procedures, which were conducted in accordance with International Standard on Auditing (New Zealand) (ISA (NZ)) 810, "Engagements to Report on Summary Financial Statements".

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

Opinion

In our opinion, the summary financial statements derived from the audited full financial statements of the Otago Medical Research Foundation for the year ended 31 March 2014 are consistent, in all material aspects, with those financial statements, in accordance with FRS-43.

Crowe Horwath

Crowe Horwath New Zealand Audit Partnership
CHARTERED ACCOUNTANTS
2 September 2014

INFORMATION ABOUT THE FOUNDATION

Charities Registration Number CC33444

SUBSCRIPTIONS

Current subscriptions are $30 per annum for Ordinary Members, $100 per annum for Research Patrons (business firms or corporate bodies), and a minimum of $500 paid by individuals, ($1,000 for corporate bodies), applying asLife Members.

Although business firms are welcomed as Ordinary Members, in order to assist in expanding the work of the Foundation, they are invited to consider joining as Research Patrons or Life Members.
The Foundation is an approved body for Income Tax purposes, and is registered for GST purposes.
The taxation position in respect of donations and subscriptions is as follows:

COMPANIES

- From 1 April, 2008 a company making cash donations, or paying a membership subscription to any one doner may treat the amount as a deductible item for tax purposes up to the amount of their net income.

MEDICAL PRACTITIONERS

- Annual subscriptions - claim as a deduction.
- Donations - can be claimed as a rebate as for individual taxpayers.

INDIVIDUAL TAXPAYERS (INCLUDING FULL TIME SALARIED DOCTORS)

- All taxpayers are entitled to a rebate on subscriptions and donations in excess of $5. Receipts should be attached to the Donations Rebate Form in support of the claim. From 1 April, 2008 taxpayers are able to claim a 33.33% tax rebate on all donations up to their annual net income.

GIFT AND DEATH DUTIES

- No gift duty is payable by an individual on gifts to the Foundation.

REMEMBRANCE DONATION

- When you consider this substitute in place of a floral tribute, write or telephone the Secretary giving the name of the deceased, the relationship to the deceased, the relationship to the bereaved, and the name and address of the bereaved. A letter of condolence will be sent to the bereaved notifying them that you have made a donation in place of a floral tribute.
An acknowledgement, with a receipt for your donation (which may be tax deductible), will be sent to you. This is a dignified and practical way of expressing your condolence, which is invariably appreciated by the bereaved.

MEMBERSHIP

- A form for membership application or donations is included within this report. Further information or brochures will be supplied on request to the Secretaries, Deloitte, P.O. Box 1245, Dunedin. Telephone (03) 474-8630.

LIST OF MEMBERS

ORDINARY MEMBERS

Prof W C Abraham
Mr S G Amsden
Dr F J Austin
Assoc Prof M A Baird
Mr M G Bell
Rev Dr John R Brinsley
Mr John Burton
Mr N A Carroll
Caversham Pharmacy(2005)Ltd
* Dr S O Chin
* Mr E J Chronican
Dr J I Clayton
Dr M Coleman
Dr A Cook
Assoc Prof P A Cragg
Mr K G Dempster
* Mr G G Dunckley
Dr J M Faed
* Fairmaid Chance & Crawford
Mr M Farry
* Prof F N Fastier
Dr B Galland
Mrs H L Gibson
Prof W Gillett
Dr P R F Gootjes
Prof A Goulding
Dr S J Greaves
* Ashburn Hall
Dr R J Harvey
* Mr J H Heslop
Prof B F Heslop
Dr M Hibma
Prof J Highton
Dr R S J Highton
Mrs L Homersham
Dr C Mck Holmes
Mr M C Horne
* Prof J B Howie
Mr A K Jeffery
Prof D T Jones
Mr & Mrs S D Jones
Dr R B Keillor
Assoc Prof I L Lamont
Prof R Laverty
Dr Liz Ledgerwood
Mr R Lewis
Mrs J W McChesney
Prof A C B Molteno
Prof J G Mortimer
Dr R Nada-Raja
Dr J Ng
Dr H Nukada
Assoc Prof D Oorschot
* Prof D G Palmer
Assoc Prof D J Perez
Prof G B Petersen
Dr E L Phelan
Prof A E Reeve
Assoc Prof J J Reid
Assoc Prof A Rich
Prof A M van Rij
Prof L R Robinson
Mrs M I Rowe
S Saunderson-Warner
Dr M Schlup
Prof D C G Skegg
Prof R D H Stewart
Dr W Sutherland
Mr M Thompson-Fawcett
Dr M Turner
Dr & Mrs G P White
Dr S Wilbanks
* Mrs S M Wilkinson
Mr T J Williams
Prof D Wilson
Dr R A Wright
Dr M E Wyatt
Dr A I Yelavich

* Indicates Founder Member

RESEARCH PATRONS

AMI Insurance Limited
Respiratory Research Unit (University of Otago)
Hope & Sons Limited
Asthma Society Inc.

LIFE MEMBERS

Cadbury Confectionary Ltd
Mrs J Callon
Cerebos Gregg Ltd Mr L Chronican
Ciba-Geigy NZ Ltd
Donaghys Industries Ltd
Dunedin City Council
Mr S Davie
Farra Dunedin Engineering Ltd
Dr C M Goodall
HealthCare Otago Ltd
Dr R S Henderson
Janssen-Cilag Pty Ltd
Lions Club Dunedin South
Ms S Mackinlay
Mr D Marsh
Mr G J Marsh
Mr W J Marsh
Marsh Family Trust
Dr J A McMahon
Northern Southland Transport Ltd
Schering (NZ) Limited
Roche Products NZ Ltd
St Margaret's College Council
Mr I A Thomson
Mr H R Wilson & Mrs N Ellis

HONORARY LIFE MEMBERS

Mr & Mrs L J Brown
Rotary Club of Dunedin South
Mr G T Adams
Mr P C L Gibson
Rotary Club of St Kilda
Prof J I Mann
Dr C N A & Mrs J Trotman

FUNDING PATHWAYS

The Otago Medical Research Foundation made steady progress as it applied a conscious and deliberate funding strategy during the 2013/2014 financial year. A number of charitable Trusts, organisations and companies joined the Foundation in partnership with the details as follows:

Southern Victorian Charitable Trust	$31,000
Otago Service Clubs Medical Trust	$5,000
Lions Club of Dunedin South	$5,000
Crowe Horwath	$5,000
MM & JH Hughes Family Trust	$5,000
Deloitte	$5,000
The Southern Trust	$20,000
Dunedin Casino Charitable Trust	$20,000
ACE Shacklock Charitable Trust	$500
Givealittle (Steve Davie)	$50
Givealittle (Ken Dempster)	$20
Givealittle (Sarah Saunderson-Warner)	$50
Givealittle (Jenny McMahon)	$50
Infinity Foundation	$5,000
Pub Charity	$10,000
Foodstuffs Community Trust (SI)	$5,000
PWC Foundation	$5,000
Estate of Mrs S A Rowley (bequest)	$89,990.73
Dr Ailsa Goulding	$4,000
JN Lemon Charitable Trust	$30,000
Emeritus Prof Barbara Heslop	$5,000
HJ Wilson Charitable Trust	$5,000
Gardens New World	$1,500
Howard & Jane Fraser	$5,000
Gavin & Lesley Craw	$200
Trish & Roger Oakley	$100
Stu Stevenson	$100
RD Petroleum	$315.54
Payless Energy	$350
JAD Iverach Memorial Fund	$2,000
Otago Diabetes Trust	$4,000
The Community Trust of Otago	$60,000

During the 2013/2014 financial year, the following individuals have made donations to the Foundation:

Mr M G Bell
Mr J Burton
Mr N A Carroll
Dr S O Chin
Dr M Coleman
Dr A Cook
Mr K G Dempster
Mr G G Dunckley
Mr & Mrs S D Jones
Prof R Laverty
B C Galland
J Mortimer
J Robinson
M Thompson-Fawcett
W Sutherland
Ms S Saunderson-Warner
ACB Molento
Steve Davie Ltd
Dr B J McMahon
Dr J A McMahon
Dr M Turner
Dr & Mrs G P White
Mr T J Williams
Mrs S M Willkinson
Caversham Pharmacy (2005) Ltd

OTAGO MEDICAL RESEARCH FOUNDATION

Annual Report to 31st March 2014 & Notice of Annual General Meeting