



ANNUAL REPORT 2021



RAINE
MEDICAL RESEARCH FOUNDATION

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Our Partners & Donors

We have had another year of strong support from our ongoing partners and donors. Our thanks for their continued support toward our aligned objectives to support the highest calibre emerging medical researchers in Western Australia to achieve translatable health outcomes for the community.







About the Foundation

The Raine Foundation was established in 1957 and is dedicated to funding health and medical research with the aim to improve health outcomes for the community. Created from the generosity of Mary Raine and her desire to prevent terrible loss associated with human disease, the Raine Foundation has a 65-year history of supporting health and medical research that seeks to improve outcomes for our fellow humans. The Foundation has now awarded more than \$50 million towards research projects that aim to seek, diagnose and investigate the nature, origin and causes of diseases in human beings, and the prevention, cure, alleviation and combating of such diseases.

In 2021, we have continued our longstanding focus on supporting early-career researchers in Western Australia to help them establish themselves as leaders in their field. We continuously work on improving our grant review processes, including international review, to ensure that we identify the best emerging researchers for support. This is something that is highly regarded and recognised by our partners, who understand the importance of this support for building medical research capacity and capability in Western Australia. We are now also concentrating on assessing the impact of the research the Foundation has supported, spanning the last 65 years. This will highlight the many achievements of our researchers, and the resulting health benefits for the community.

Our 2021 funding support:

Priming Grants: Grants for emerging leaders in health and medical research, particularly those who are progressing towards an independent research career, to assist them in becoming more competitive for national and international funding.

Clinician Fellowships: Fellowships to encourage clinicians, allied health professionals, and nurses employed in Western Australian hospitals to develop their research capability to provide better health care outcomes.

Research Collaboration: Awards and Prizes that facilitate travel to increase research collaboration opportunities, skill and knowledge transfer, and conference attendance in Australia or internationally.

The Raine Study: The Raine Foundation was the initial funder of this internationally leading longitudinal cohort study in 1989, that enables researchers from around the globe to study health and medical questions throughout the whole life course. We continue to provide support as more health data is collected over the life course of the cohort participants.

Chair's Report



Jon and Caro Stewart Family Foundation, the Charter Hall Group, the Forrest Research Foundation, and the Wong Family. We are incredibly grateful for their continued support.

An enormous amount of work goes into the review of funding applications to ensure that the Raine Foundation upholds robust and equitable processes for the selection of the best research to support. All of this is done by volunteers, who are researchers from our universities, hospitals and medical research institutes in Western Australia. We greatly appreciate their generosity and commitment to Raine Foundation activities, and give thanks to the members of the Raine and Healy Research Committees, the Finance & Strategic Advisory Committee, and our Research Advisory Committees.

Like many philanthropic organisations, the financial capacity of the Raine Foundation is not keeping pace with the research needs of the scientific community in WA. This makes the task of our Research Committee more difficult as each year it tries to stretch the funding dollar to support many high calibre research projects. Since its establishment in 1957, the Raine Foundation has supported hundreds of visiting scholars, scientists, academics and clinical practitioners and it has awarded scores of grants, scholarships and fellowships. Yet in all that time, there has been only one 'Mary Raine'. While we may not be able to find another 'Mary Raine', nevertheless, we are keen to see the Foundation continue as the largest, private bequest that supports medical research in WA. So, our priorities are now focused on building the Raine Foundation brand and public profile and seeking support from the community so that the Raine Foundation may continue to provide crucial funding for the best, upcoming scientists of the future.

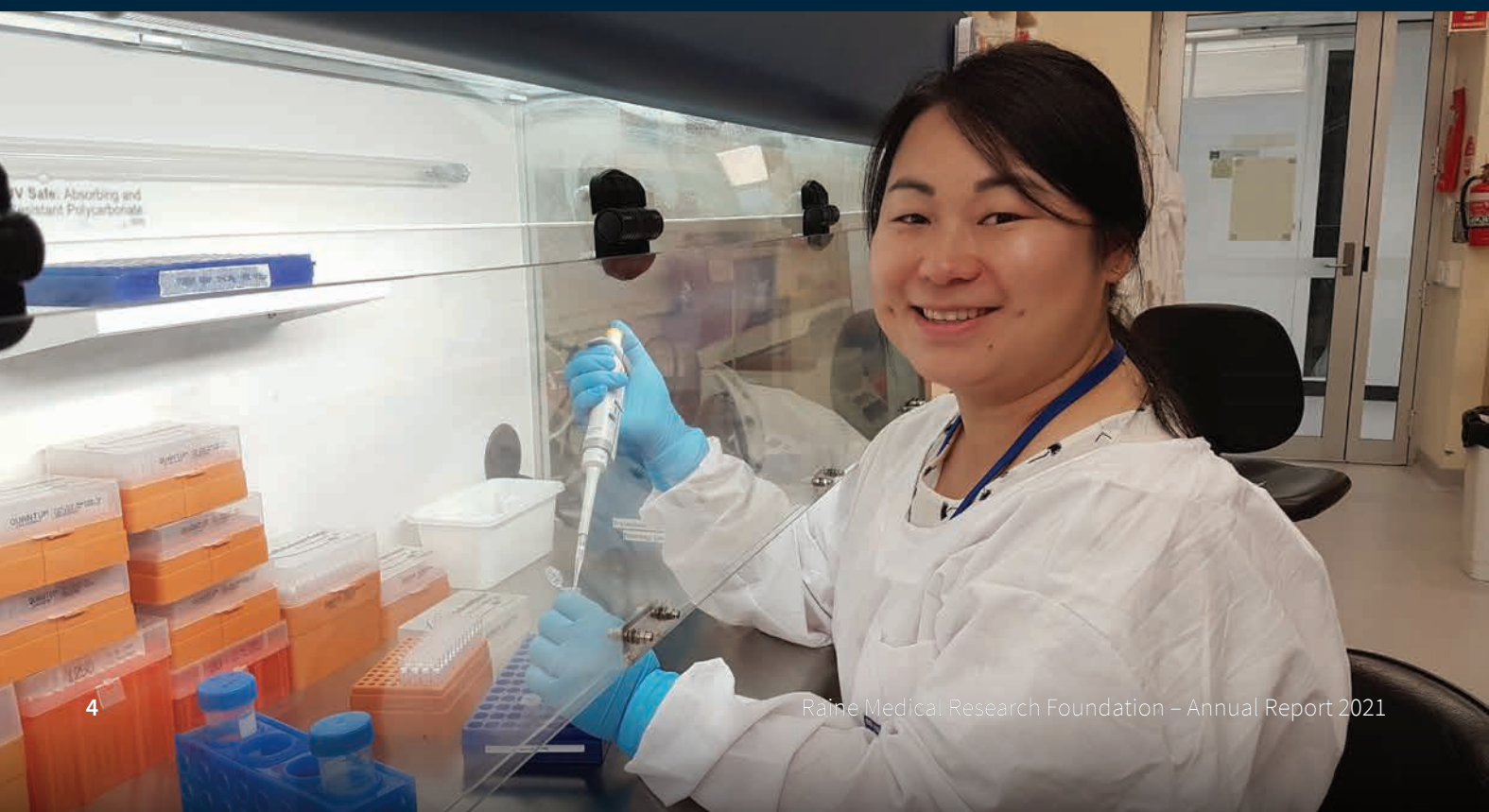
We are striving to grow the Foundation and to work with others to make a real impact to the health and lives of the WA community. As we enter another year of great uncertainty related to the health crisis, we draw strength and resolve from the burgeoning and collaborative research community in WA and look forward to the many and varied successes of such research initiatives.

Professor Amit Chakma
Raine Research Committee Chair

Two years have now passed since the arrival of the COVID-19 pandemic and in many ways it still grips the world, with new variants, cases again on the rise, travel restricted, and momentous impacts to the economy and wellbeing. Medical research has continued to play an integral part of the response to this enduring health crisis, from direct identification of immunology targets and treatment approaches, to informing public health policy and understanding mental health outcomes associated with the pandemic. In such a way, the breadth of offerings of medical research for the betterment of society is indisputable and the Raine Medical Research Foundation is proud to support world-class research being conducted right here in Western Australia.

One of the ways in which we have been able to maximise the support available to medical researchers in WA is to align with organisations who share our vision of supporting medical research excellence. Support of early-career researchers has been a long-standing achievement of the Raine Foundation, with influential research leaders such as Professor John Newnham and Professor Fiona Wood receiving support from the Raine Foundation early on in their research careers. We continue to strive for excellence but are mindful of how we can best facilitate this in a changing and challenging research landscape. Our future funding strategy will focus on building medical research strength in areas of most need to the State, and in growing the pool of WA-based research talent who will lead the way. We hope to work collaboratively with partners and donors to achieve this.

We give thanks to our partners and donors who have provided support throughout 2021 – together we have been able to achieve much more than we could have ever hoped to achieve without such generous support and input. Our major partners and supporters in 2021 were the WA Department of Health, the University of Western Australia, the BrightSpark Foundation, the



Director's Report



Since establishment in 1957, the Raine Foundation has distributed funding to over 500 medical researchers across the Universities, medical research institutes, and hospitals in Western Australia. We have seen an increase in the need for local funding support, with success rates for national funding declining with each passing year. Although the Raine Foundation has a strong investment portfolio and strategy, we have not been able to keep up with this demand, which has resulted in many high-calibre research applications being deemed unsuccessful due to lack of available funds. This has been at the forefront of the Raine Foundation's strategic review and planning activities for 2021.

This year, we reached out to many of our past recipients who were awarded Raine research funding within the last 25 years. We commenced an evaluation of our major funding programs to determine whether these programs have achieved their specific aims, including early-career advancement and leadership development, capacity building, and research impact. Importantly, this review will help us identify key areas of program refinement and will contribute to the future strategic direction of our programs.

In 2021, we have continued with our early-career programs that focus on developing the next generation of WA medical research leaders and building their national and international networks through research communication and collaborative activities. We distributed \$2.7 million towards WA research including 63 ongoing research grants, fellowships, awards and prizes, resulting in the publication of 99 research articles. This also includes ongoing funding for the Raine Study, which we have supported since the study was first established in 1989.

Close to \$2.9 million of new funding was awarded to 21 recipients in 2021 in support of research into the areas of allergy, cancer, cardiovascular disease, child health, chronic disease, gastrointestinal disease, infectious disease, Indigenous health,

- mental health, oral health, respiratory disease, and sleeping disorders. This funding includes:
- **Raine Priming Grants:** Early-career researcher grants of up to \$250,000 each were awarded to five recipients, with a total funding allocation of \$1,174,819.
 - **Clinician Research Fellowships:** Four fellowships were awarded to clinicians and allied health professionals to commence in 2022, with a total funding allocation of \$1,449,802.30.
 - **Research Collaboration Awards:** Six Awards were granted of up to \$30,000 each to facilitate cross-institutional global collaboration, with a total funding allocation of \$147,553.
 - **Publication Prizes:** Three \$5,000 Prizes were awarded to early-career researchers to facilitate collaborative activities and conference attendance, with a total funding allocation of \$15,000.

We would not be able to award as many grants as we do without the continued support of our donors and partners. I would like to extend thanks to those who have supported our 2021 programs, including our major partners the WA Department of Health, the BrightSpark Foundation, the Healy Foundation, and the University of Western Australia. My personal thanks also extends to our committee members and external reviewers who put countless voluntary hours into the review of grant applications and other Raine Foundation activities. I am deeply grateful for this generosity of time and expertise, without which, the Raine Foundation would not be able to uphold its outstanding reputation for identifying and supporting research excellence in WA.

Our focus for the coming years will be on forming strong relationships with our researchers, our partners, and building new relationships with potential donors to grow our pool of funding. We aim to have a broader range of programs that build research capacity and capability in WA.

Dr Amanda Cleaver
Director



Raine Medical Research Foundation – Annual Report 2021

Raine Priming Grants

Building the next generation of research leaders

This program supports early-career researchers to develop research independence and leadership, while building their skills and track record so that they are competitive for national and international funding programs.

Grants awarded in 2021



Dr Qi Fang
(Raine/Robson Fellow)
BRITelab, Harry Perkins Institute of Medical Research, The University of Western Australia
Low-cost and wireless imaging for cancer detection during surgery
\$236,720



Dr Nelly Amenyogbe
(Raine/BrightSpark Fellow)
Telethon Kids Institute, The University of Western Australia
Harnessing innate immune metabolism to save newborns from infectious death
\$242,793



Dr Rachael Zemek
(Raine/BrightSpark Fellow)
Telethon Kids Institute, The University of Western Australia
Leveraging the surgical wound healing immune response to stimulate local cancer eradication
\$244,360



Dr Penelope Strauss
(Raine/Cockell Fellow)
Youth Mental Health, Telethon Kids Institute, The University of Western Australia
Enhancing suicide prevention for LGBTQA+ young people
\$242,886

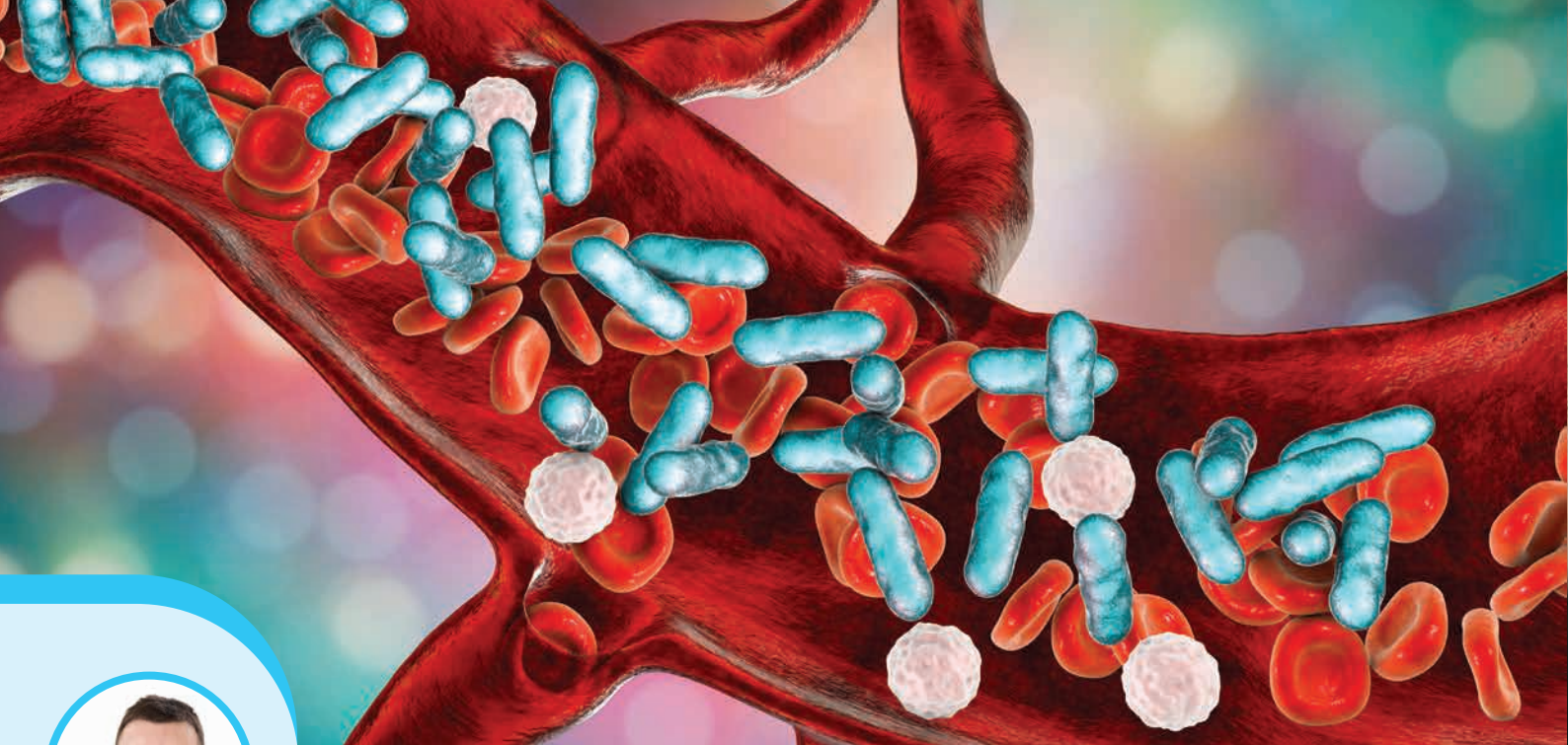


Dr Virginie Lam
Curtin Health Innovation Research Institute, Curtin University
Restoration of myelin genesis with dietary-derived bioactive lipids: An opportunity to improve disease outcomes in Multiple Sclerosis
\$208,060



COCKELL BEQUEST

Raine Medical Research Foundation – Annual Report 2021



Effect of intravenous fluid volume on the pathobiology of sepsis

Improving survival from sepsis

Dr Stephen Macdonald is a clinician researcher, holding dual appointments as an Emergency Physician at Royal Perth Hospital and as a Research Fellow at the University of Western Australia. Dr Macdonald's research seeks to identify better treatments for sepsis in hopes of improving outcomes for patients.

Sepsis has recently been estimated to cause 8,700 deaths each year in Australia. The hallmark of sepsis, and the principal driver of morbidity and mortality, is organ failure. Septic shock is a severe subset of sepsis where the body's immune response to an infection results in insufficient blood pressure to supply oxygen to its tissues. If not corrected quickly, septic shock can be fatal.

The optimal means of resuscitating patients with septic shock has been the subject of active investigation. Traditionally, doctors infuse fluids into a patient's vein to help restore their blood pressure, however there is increasing uncertainty about the safety and effectiveness of this. Indeed, data are emerging that liberal use of fluids may be associated with increased organ failure, ICU length of stay and mortality. Some doctors have suggested giving a smaller amount of fluid and giving medications to raise the blood pressure, however it remains unknown which of these methods is best for the patient.

In the current 'REFRESH' trial, Dr Macdonald sought to collect pilot data investigating these two treatment approaches in a small number (100) of patients who were being treated for septic shock. To try and better understand the way in which fluids and medications

affected the patient, the researchers collected blood samples and measured a range of different chemical markers of inflammation in the blood.

This pivotal trial, endorsed by the Australasian College for Emergency Medicine (ACEM) Clinical Trials Group, is the first step towards resolving a critical research question of global importance: in sepsis with hypotension, does resuscitation with a smaller volume of intravenous fluid, along with earlier institution of key medications, improve outcomes? Their preliminary findings support the hypothesis that intravenous fluids may exacerbate inflammation in the setting of septic shock. The clinical implications of these results need to be tested further, whereby the results of this pilot trial will be used to inform the design of larger clinical trials designed to find out the best way for doctors to treat patients with septic shock in the future.

Following the conclusion of the Raine Priming Grant, Dr Macdonald has been successful in obtaining additional funding to continue this promising work, including the Department of Health (DoH) Near Miss funding program (2022–2023) for being the top-ranked unsuccessful NHMRC Investigator Grant EL2 applicant in the state, as well as a DoH/Raine Clinician Research Fellowship (2021–2024). Furthermore, across the course of this project Dr Macdonald has developed collaborations with several national and international leaders in the field of sepsis research, including a paper currently underway with a world-leading research team at Harvard University.

Attenuation of maternal inflammation to promote normal offspring neuro-immune development

A new animal model for investigating the mechanisms underlying poor child health outcomes following maternal infections in pregnancy

Dr Naomi Scott is a Senior Research Officer at the Telethon Kids Institute and the UWA Centre for Child Health Research. She was awarded a Raine Priming Grant in 2019 to investigate how infections during pregnancy can be harmful to the health of the mother and child.

During pregnancy, the child's immune and nervous system are still developing and are susceptible to perturbation. Maternal inflammation from respiratory infections during pregnancy is associated with long-term poor outcomes for the child including asthma, autism and schizophrenia, which is thought to be due to perturbation to the immune and nervous system during development.

In the current project, Dr Scott and her team aimed to better understand the mechanisms that cause this to occur, which would be the first step towards developing new treatments. They developed a novel animal model to investigate such mechanisms underlying the impact of infections during pregnancy on maternal disease and fetal growth.

While their findings indicated minimal changes in three week-old offspring mice delivered from influenza affected mothers, future studies utilising their novel animal model may reveal altered immune function once the offspring are exposed

to an infection themselves, as it is frequently that dysregulation becomes apparent once the child's immune system is challenged.

The work in this grant has contributed to the field by optimising advanced technologies (RNAseq, high-end flow cytometry, and artificial intelligence) to interrogate mechanistic changes within individual compartments that contain incredibly small numbers of cells. Previously, only data on more global changes in entire organs was able to be collected. This mechanistic data may lead to improved health outcomes by informing therapeutic options for inflammation during pregnancy.

Dr Scott reflected on the Raine Priming Grant outcomes, expressing that the grant has assisted her research career through collaboration and upskilling in bio-informatic techniques, high end flow cytometry panel development, and behavioural analysis techniques, which she will continue to build on in her future research.



RAINE PRIMING GRANT

Dr Naomi Scott

Stewart Family Foundation / BrightSpark Fellow

Telethon Kids Institute/Centre for Child Health Research, The University of Western Australia

\$150,000
2019–2021

Clinician Research Fellowships

Enabling clinicians to improve health care through medical research

This program enables clinicians, nurses and allied health professionals to establish a research career while still maintaining their clinical role, seeking to broaden their impact on Western Australian health outcomes and support rapid research translation into clinical practice.

Fellowships awarded in 2021

21 applications

6 shortlisted

4 successful
(19% success rate)

\$1,449,802.30
awarded



Dr Charlie McLeod
Department of Infectious Diseases,
Perth Children's Hospital
*Validation of a model for predicting
bacterial (co)infection in bronchiolitis*
\$403,808



Dr Pamela Laird
Department of Physiotherapy, Child and
Adolescent Health Service
*Improved respiratory health for
Aboriginal children through knowledge
translation*
\$225,760



Dr Wee Loong Chin
Department of Medical Oncology, Sir
Charles Gairdner Hospital
*Designing a prediction framework for
mesothelioma response to chemo-
immunotherapy*
\$435,259.30



Dr Michael O'Sullivan
Department of Immunology, Perth
Children's Hospital
*Establishing an adaptive platform trial
for food oral immunotherapy (ADAPT-
OIT)*
\$384,975



Government of Western Australia
Department of Health



Western Australian
Future Health Research
& Innovation Fund



RAINE
MEDICAL RESEARCH FOUNDATION



Optimising paediatric kidney transplantation by better HLA matching

Improved kidney transplantation outcomes for WA children

Dr Nicholas Larkins is a Consultant Nephrologist at the Perth Children's Hospital and was awarded a Clinician Research Fellowship in 2018 to develop novel methods to improve successful kidney transplantation in children.

Receiving a kidney transplant is the best treatment for kidney failure, but many eventually fail and people require multiple transplants over time. The main reason for this is 'rejection' of the donor kidney by the recipient's immune system. By better matching the recipient and donor we can avoid some of this rejection, and also make repeat transplantation easier.

During the Clinician Research Fellowship, Dr Larkins compared different ways of matching donors and recipients among Australian children, with the goal of improving long-term outcomes for paediatric kidney transplant recipients. The results also aim to inform clinical practice and policy and reduce the lifetime burden of dialysis for children with end-stage kidney disease.

The results of this project demonstrated that eplet matching can be incorporated into clinical practice, for improvement of the longevity of allografts (i.e., tissue that is transplanted from one person to another) and the ability of recipients to successfully receive further transplants. Furthermore, this project has informed the new Australian Kidney Allocation System, implemented by the Organ and Tissue Authority in 2021. These were the first changes

made to kidney allocation in Australia in 20 years. As a result, organ allocation in Australia now more directly incorporates class II HLA matching for young recipients and facilitates national shipping of organs recognising this as a priority.

At a local level, Dr Larkins' research team has embedded a culture of research within the Nephrology Department at Perth Children's Hospital. Further research initiatives have arisen from the CRF project, including collaborations with international research groups in the United Kingdom (Cambridge), Netherlands and Belgium. For example, further research is underway to investigate the relative benefit of accepting a maternal compared to a paternal kidney donor, which is a common and important question asked by parents of a child with kidney failure.

Dr Larkins' research team is now being approached to lead and collaborate on multi-centre trials, giving local children access to novel treatment approaches previously unavailable to Western Australian children with kidney disease. Dr Larkins noted that this expansion in research capacity would not have occurred without the support of the Department of Health and the Raine Foundation, whereby their department has grown to the point that they have a self-sufficient research program with a pipeline of exciting new trials and an array of clinical benefits associated with an active research program.



CLINICIAN
RESEARCH
FELLOWSHIP

Dr Nicholas Larkins

Perth Children's
Hospital

\$401,802
2019–2021



CLINICIAN
RESEARCH
FELLOWSHIP

Dr Andrew Martin

Perth Children's
Hospital

\$206,698
2018–2021

Feasibility and acceptability of screening children for inherited hypercholesterolaemia

A new approach for early identification of inherited hypercholesterolaemia

Dr Andrew Martin is a Paediatrician with the Department of General Paediatrics at the Perth Children's Hospital. He was awarded a Clinician Research Fellowship in 2017 to investigate better methods of early detection of familial hypercholesterolaemia (FH) for early intervention.

FH is the most common and serious cause of inherited high cholesterol, with an estimated 10,000 individuals affected in WA. Unfortunately FH remains largely undetected and untreated with more than 90% of individuals unaware they have FH. Untreated, 50% of male and 20% of females with FH will suffer a heart attack by 50 years, but those diagnosed and treated from childhood have a normal life expectancy.

The high prevalence of FH, high rates of undiagnosed children and fact that heart attacks in adult life can now be prevented with management in childhood, means that new approaches for detection are required.

In the current study, Dr Martin and his team aimed to investigate the feasibility, acceptability and cost-effectiveness of screening children aged 1–2 years for FH at the time of an immunisation. They demonstrated that such universal screening of children for FH was a feasible, efficacious and cost-effective approach to detect children, parents and other blood relatives with FH.

Diagnosing and treating children with FH will prevent heart attacks in early adult life. Screening parents allows the diagnosis and treatment of the affected parent to commence and benefits the child by preventing a premature heart attack or even sudden death of their parent. The proposed approach has the

potential to prevent medical consequences of FH (i.e. heart attacks or sudden death in young adults) in two generations simultaneously.

The study has generated much interest, discussion and debate in the FH community (patients and health professionals) worldwide, with a swell of support for the concept of universal screening of children for FH that will ultimately improve the detection of all individuals with FH. Indeed, the first child and mother pair detected with FH in this study were interviewed together with Dr Andrew Martin, in a story on Channel 7 news (WA and national), on 7 June 2020.

No country has yet been able to implement a universal screening program for FH, but Dr Martin and his team are in a strong position to lead the worldwide introduction of this approach. In order to ensure that this research has the best opportunity of translating into changes in clinical practice and state and national policy, Dr Martin has teamed up with implementation scientists and is also awaiting the outcome of a MRFF grant application to continue this important work.

"Thank you for providing me with a fantastic opportunity to not only undertake this project and bring us a step closer to being able to offer child and child parent screening for FH to improve clinical outcomes for children and families in WA, but for the chance to have a dedicated focus on clinical research in a way that I have never before."

Dr Andrew Martin

Research
Collaboration Awards

Connecting emerging and established research leaders across the globe

Research Collaboration Awards allocated in 2021

15 applications

6 successful
(40% success rate)

\$147,553
awarded



Dr Jonathan Chee
(Healy Research Collaboration Award)

The University of Western Australia with The University of Melbourne and St Vincent's Institute
Can inhibition of JAK-STAT signalling prevent autoimmunity and improve anti-tumour immunity?

\$27,812



Dr Mohamed Estai
(Healy Research Collaboration Award)

CSIRO with Western Sydney University, The University of Melbourne, Edith Cowan University and the WA Health Translational Network
Enablers and barriers to accessing digital oral health resources: caregivers and health providers' perspectives

\$29,915



Dr Julian Basanovic
(Cockell Research Collaboration Award)

The University of Western Australia with The University of Sydney and Western Kids Health
Creating tools to help clinicians protect the mental health of children with chronic pain

\$12,768



Dr Lynden Miles
(Cockell Research Collaboration Award)

The University of Western Australia with Macquarie University and Wise Realities Institute for Healthcare Emerging Technologies Research
Investigating the negative relationship between social anxiety and interpersonal coordination: identifying mechanisms and developing interventions

\$17,208



Dr Henry Hui
(BrightSpark Research Collaboration Award)

The University of Western Australia with The National University of Malaysia
Improving survival in childhood leukaemia

\$29,864



Dr Akila Rekima
(BrightSpark Research Collaboration Award)

Telethon Kids Institute, The University of Western Australia with Amsterdam University Medical Center
Influence of early life diet on intestinal epithelial cell development and function

\$29,986





**BRIGHTSPARK
RESEARCH
COLLABORATION
AWARD**

Dr Amy Finlay Jones

Telethon Kids
Institute/Centre
for Child Health
Research, The
University of
Western Australia

In collaboration
with the Brain and
Body Lab (BABLab),
The University of
California, USA

**\$29,433
2020–2021**

Beyond Brain and Behaviour: Understanding the role of the gut microbiome in infant and child mental health

Identifying early life physical health factors to improve mental health outcomes in children

Dr Finlay-Jones was awarded a BrightSpark Research Collaboration Award in 2019 to investigate how different body systems, such as gut health, influence child and adolescent mental health.

To promote positive mental health and neurodevelopment, and to improve identification, prevention, and management of psychopathology, it is vital to improve our understanding of the interactions between the biological and psychosocial mechanisms implicated in mental health and illness. A key area of interest is the relationship between the gut microbiome (i.e., the diverse collection of microbes found in the gastrointestinal tract) and the brain, with mounting evidence indicating that the gut microbiome plays a role in mental health, illness, and neurodevelopment. Key behaviours, such as colic in infants, or gastrointestinal or somatic distress in young children may hold potential as an 'early warning sign' that the child is at risk of developing mental

ill-health in later life. Identifying these signs and understanding their associations with later mental health outcomes can provide new opportunities for prevention and early intervention efforts.

This RCA project sought to prevent childhood mental illness by:

- finding better ways to determine which infants and young children are most likely to develop mental health problems in later life;
- improving our understanding of how different body systems (such as the digestive system and immune system) influence child and adolescent mental health;
- developing and testing new programs to improve children's physical and mental health from conception onwards; and
- understanding how to improve the uptake of such programs in practice.

To achieve these aims, Dr Finlay-Jones and her team collaborated with several researchers in Australia and the US whose research focuses on how we can better understand the earliest signs of mental health problems in infants and young children, and what we can do to prevent these problems from developing into more complex difficulties. Such collaborations include with the University of California, Northwestern University, the University of North Carolina, the Stanford Psychophysiology Laboratory, and the Food and Mood Centre at Deakin University.

Collaborative activities that arose throughout this project included data collection and analysis, collaboration on journal articles and systematic reviews, and a virtual seminar series, as well as a planned longitudinal cohort study across multiple sites world-wide in future.

Their collaborative activities identified that some children display chronic physical health symptoms from an early age that indicate that they are more likely to develop mental illness in later life. While new programs like probiotics and nutritional strategies appear promising, are appealing to parents and may be more accessible than other mental illness prevention programs, a lot more work is required to understand the specific biological pathways involved in the development of childhood mental health problems.

Since receiving this award, Dr Finlay-Jones has been appointed Head of the Early Neurodevelopment and Mental Health team at Telethon Kids Institute, which sits within the International Child Development program, alongside the Child Health, Development and Education team and the Food and Nutrition team. Together, they aim to develop integrated intervention approaches that combine behavioural and nutritional strategies to improve child development and prevent childhood mental illness.

"My research trajectory in this field has been immensely helped by the support of the BrightSpark Research Collaboration Award and the collaborations that have been developed through this opportunity."

Dr Amy Finlay Jones





**HEALY RESEARCH
COLLABORATION
AWARD**

Dr Nicola Bondonno

Edith Cowan
University

In collaboration with
The University of
Western Australia,
Gentofte University
Hospital (Denmark)
and the Danish
Cancer Society

**\$29,722
2020–2021**

Investigating the relationship between dietary components and cardiometabolic disease

The role of dietary nitrate and vitamin K in improving cardiovascular outcomes

Dr Nicola Bondonno was awarded a Healy Research Collaboration Award in 2019 to investigate potential associations between dietary components (namely dietary nitrate and vitamin K) and cardiovascular and cancer outcomes.

Current dietary guidelines recommend a high intake of all fruits and vegetables however, studies have shown that some fruits and vegetables may be more protective against cardiometabolic disease than others. Plants contain a wide variety of health promoting compounds including nitrate and vitamin K. Evidence from clinical trials suggests that dietary nitrate may play a critical role in the prevention and treatment of hypertension and a diet rich in vitamin K may help prevent the development of vascular calcification and diabetes mellitus. Long-term epidemiological studies looking at disease incidence are needed to identify whether certain foods or dietary constituents afford greater protection against specific types of cardiometabolic disease and to provide an estimate of their effects at the population level.

The current project examined associations between dietary nitrate and vitamin K intakes and a wide range of cardiometabolic health outcomes, namely mortality, cardiovascular disease and diabetes in a large cohort of 57,000 Danish men and women.

As a result of this collaboration and funding, Dr Bondonno has published three high impact publications demonstrating that dietary nitrate is inversely associated with incident cardiovascular disease and that dietary vitamin K1, but not vitamin K2, is inversely associated with incident atherosclerotic cardiovascular disease, all-cause mortality, cardiovascular disease mortality and cancer mortality.

Dr Bondonno and her collaborators ran successful media campaigns for two of these publications, including more than 500 media mentions, and have presented findings at national and international conferences. They have secured over \$800k in grant funding to continue their research on dietary nitrate and have applied for a further two large grants to

continue their research on vitamin K. The collaboration between the two Western Australian Universities (ECU and UWA) and two Danish Institutes has been strengthened with joint PhD students and plans for student exchanges in place.

The findings of the current project, in conjunction with ongoing studies, seek to provide important future direction for ongoing world-wide research of the role of dietary nitrate and vitamin K in the development of chronic disease. Additionally, Dr Bondonno and her team aspire to achieve a world-first by addressing the critical knowledge gap regarding the beneficial versus harmful effects of nitrate on human health. If positive findings are confirmed in clinical trials, results from the proposed studies can be translated into nutritional advice, encouraging diets high in nitrate and vitamin K to assist in the prevention of cardiometabolic disease.

"This award has greatly enhanced my research track record. I know that this is just the beginning and foresee that this collaboration will continue to grow and develop well into the future."

Dr Nicola Bondonno



Publication Prizes

Facilitating dissemination of research knowledge

These Prizes are awarded to early-career scientists who have published high-quality research that has advanced their medical research field. The Prize facilitates conference attendance and collaborative research activities.

Publication Prizes awarded in 2021

12 applications



3 successful
(25% success rate)



\$15,000 awarded





Dr Lakshini Herat
(Raine Research Prize)
School of Biomedical Sciences and
Dobny Hypertension Centre,
The University of Western Australia
*SGLT2 Inhibitor–Induced
Sympathoinhibition: A Novel Mechanism
for Cardioresenal Protection.*

Published in *Journal of the American
College of Cardiology (JACC): Basic to
Translational Science*

\$5,000



Dr Michelle Olaithe
(Strachan Memorial Prize)
School of Psychological Science,
The University of Western Australia
*Cognitive deficits in obstructive sleep
apnea: Insights from a metareview and
comparison with deficits observed in
COPD, insomnia, and sleep deprivation*

Published in *Sleep Medicine Reviews*

\$5,000



**Associate Professor
Christopher Brennan-Jones**
(BrightSpark Research Prize)
Telethon Kids Institute,
Curtin University
*Topical antibiotics for chronic
suppurative otitis media*

Published in *Cochrane Database of
Systematic Reviews*

\$5,000



Associations between Optic Disc Measures and Obstructive Sleep Apnea in Young Adults

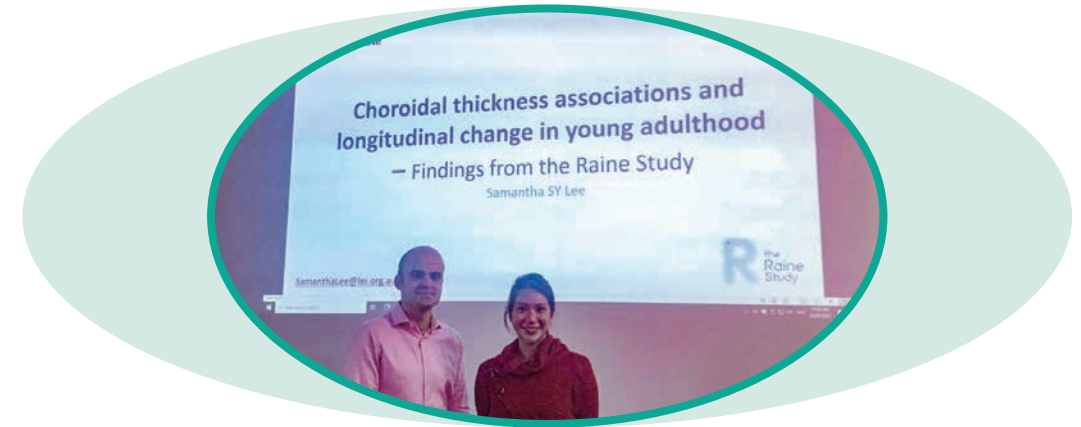
Obstructive sleep apnea and risk of glaucoma

Dr Samantha Lee from the Lions Eye Institute (LEI), The University of Western Australia, was awarded a Strachan Publication Prize in 2020 for her publication entitled *Associations between Optic Disc Measures and Obstructive Sleep Apnea in Young Adults* published in *Ophthalmology* in 2019. This published research showed that Obstructive sleep apnea may be associated with thinning of the nerve fibres in the eye in young adults, leading to increased risk of glaucoma.

The Prize funding was used for travel to Brisbane, Queensland, with a primary purpose of learning statistical genetics at the Queensland Institute of Medical Research (QIMR) Berghofer. Dr Lee travelled

to Brisbane in May 2021, whereby she received one-on-one training to analyse genetic data with statistics, or *statistical genetics*, specifically on genome-wide association study (GWAS). During her visit, she was also invited to give a presentation titled *Choroidal thickness associations and longitudinal change in young adulthood – findings from the Raine Study*.

As a result of her initial training, a longer-term ‘apprenticeship’ at the QIMR Berghofer of approximately one month is planned for 2022, with support from the heads of both the QIMR Berghofer’s Statistical Genetics team (Professor Puya Gharakhani) and the LEI’s Genetics and Epidemiology team (Professor David Mackey).



**Strachan
Memorial Prize**

Dr Samantha Lee

Lions Eye Institute

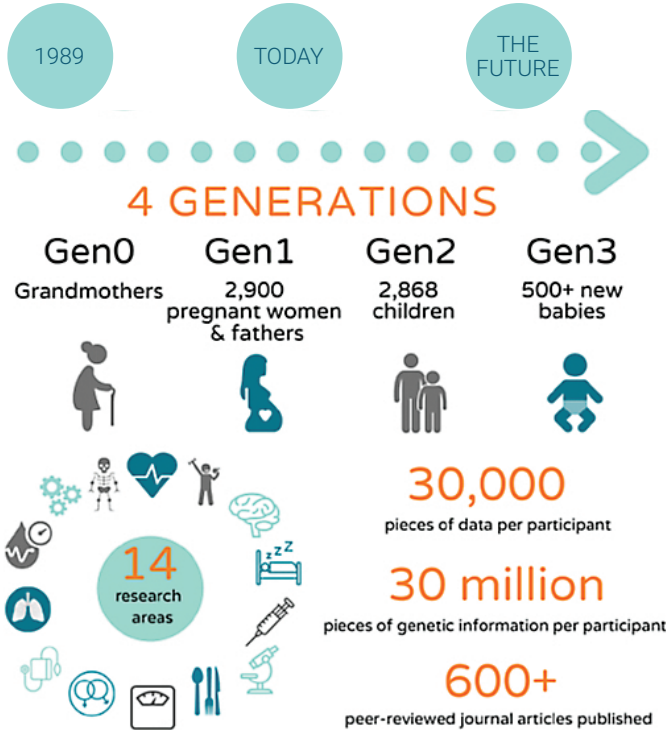
\$5,000
2021

The Raine Study

In 1989, the Western Australian Pregnancy Cohort Study was established after the award of a Raine Medical Research Foundation major research grant. To acknowledge the original grant from the Raine Foundation and its founder Mary Raine, the study was later named "The Raine Study". It's now 31 years on, and the Raine Medical Research Foundation continues to provide funding support for this hugely successful longitudinal study.

The Raine Study is one of the world's longest-running pregnancy and birth cohort studies and the most successful and extensive survey of health from the womb to adulthood. Based in Perth, 2,900 pregnant women (Generation 1) were recruited to be part of the study between 1989 and 1991, giving birth to 2,869 children (Generation 2). The Generation 2 participants have now turned 30 and have taken part in 17 follow-up studies since before they were born until now, each contributing to a rich source of data for local, national and international research. In addition, their families are also part of the study, with 109 grandmothers (Generation 0) recruited and more than 500 babies (Generation 3) born to Generation 2 participants.

The aim of the Raine Study is to improve lifelong health and quality of life through impactful research that examines pathways and outcomes from before birth and through life's course.



Highlights for 2021

- \$2.24 million** was successfully secured in competitive grant and fellowship funding
- 44** new project applications were submitted utilising Raine Study data
- 102** new data access and biosample requests were submitted to the Raine Study
- 55** peer-reviewed papers were published, bringing the total to 649 published papers using Raine Study data since the commencement of the Raine Study.

2021 Raine Medical Research Foundation Prize winners

The Raine Foundation awarded two Prizes for the most outstanding presentation by early-career researchers at the 2021 Raine Study Annual Scientific Meeting held on 29 October 2021.



Dr Anu Bharadwaj (Curtin University) for her presentation entitled *Flexible work fosters a flexible future work-self: the interplay of job autonomy and self-efficacy in the development of future work-self flexibility.*



Dr Qiang Li (Lions Eye Institute) who spoke about *Evaluating the distribution of foveal avascular zone area in a healthy, young population.*

Unveiling of the Mary Raine Tribute Mural

Celebrating Mary Raine's legacy for International Women's Day 2021

A larger-than-life mural of Mary Raine was revealed on 8 March 2021 for International Women's Day in celebration of Mary's success and contribution to the WA community as a businesswoman, philanthropist and founder of the Raine Medical Research Foundation.

This colourful and creative piece was painted by local street artist, Jerome Davenport, and commissioned by Raine Square, the Charter Hall Group.

Raine Foundation Director, Dr Amanda Cleaver, was invited to speak about Mary Raine at the unveiling event hosted by the Charter Hall Group, providing a unique insight into the life and story of Mary Raine – a woman of true gumption and community spirit.

Located in the aptly named Queen Lane at Raine Square in the Perth CBD, we encourage all to take a stroll through the laneways to experience this modern take on a piece of Perth's history.



Raine Annual Awards Ceremony

Each year we celebrate the achievements of our past and present awardees at our breakfast awards ceremony. We were honoured to welcome distinguished guests and alumni, including our guest speaker, Professor Peter Klinken AC, who spoke eloquently to a highly engaged audience about his scientific achievements, career trajectory, and his current work as Chief Scientist of Western Australia.



Above: Professor Andrew Page and Professor Amit Chakma, Raine Foundation Chair



Above: Professor Peter Klinken AC



Above: Professor Peter Klinken AC and Dr Amanda Cleaver



Above: Dr Christopher Brennan-Jones, Jason Barnett, Dr Charlie McLeod



Above: Dr Amanda Cleaver, Emeritus Professor George Yeoh, Emeritus Professor Alan Robson, Professor John Newnham



Above: Professor Anna Nowak, Dr Melvin Chin, Professor Tim Colmer



Below: Ms Melanie Epstein and Dr Virginie Lam



Below: Dr Rachel Zemek, Dr Qi Fang, Dr Nelly Amenyogbe, Dr Penelope Strauss, Dr Virginie Lam



Our People

Our Committees

Our Research and Advisory Committees are made up of volunteers who have generously given their time and applied their expertise to guide the activities of the Raine and Healy Medical Research Foundations. We thank them for their important support in ensuring that we fund the very best medical research in Western Australia. We also give thanks to our many national and international expert reviewers who are invaluable to our grant review processes and to our emerging researcher leaders who benefit greatly from their feedback.

Research Committee

The Raine Medical Research Foundation and the Healy Medical Research Foundation are governed in accordance with their Deeds of Trust. This includes the composition of the Research Committee.



Professor Amit Chakma
Chair Vice-Chancellor,
The University of Western Australia



Associate Professor Aron Chakera
Fellow of the Royal Australasian
College of Physicians



Dr Bennie Ng
CEO, AMA(WA)
Australian Medical Association WA
Branch Representative



Professor Jeff Hamdorf
Professor of Surgery
The University of Western Australia



Professor David Joyce
Professor of Medicine
The University of Western Australia



Mr Garry Prendiville
Financial Consultant
Research Committee Nominee



Mr Peter Smith
Fellow of the Royal Australasian
College of Surgeons



Professor Valerie Verhasselt
Professor of Biochemistry
The University of Western Australia

Advisory Committees

Our Advisory Committees report to the Research Committee each year to provide recommendations for award.

FINANCE & STRATEGIC ADVISORY COMMITTEE	RAINE PRIMING GRANTS ADVISORY COMMITTEE	CLINICIAN RESEARCH FELLOWSHIPS ADVISORY COMMITTEE	AWARDS & PRIZES ADVISORY COMMITTEE
Mr Garry Prendiville (Chair)	Associate Professor Steven Mutsaers (Chair)	Ms Jodie Hegarty (Chair)	Professor Andrew Page (Chair)
Mr Geoff Anderson	Dr Amanda Cleaver	Professor Garry Allison	Dr Amanda Cleaver
Mr Tony Barber	Professor Elizabeth Davis	Dr Aron Chakera	Dr Andrew Currie
Dr Amanda Cleaver	Dr Archa Fox	Dr Amanda Cleaver	Associate Professor Elin Gray
Mr Graham Dowland	Professor Shane Patman	Professor Jeff Hamdorf	Professor Gerard Hoyne
Mr Peter Smith	Professor Phil Stumbles	Professor Merrilee Needham	Professor David Joyce
Mr Andrew Thompson	Professor Valerie Verhasselt	Professor Lisa Whitehead	Professor Anna Nowak
	Dr Lisa Wood		

Raine Management Team



Dr Amanda Cleaver
Director



Dr Amelia Scaffidi
Research Grants Manager



Ms Nicole Feast
Senior Research Grants
Officer

Financial Report

Raine Medical Research Foundation

Financial Summary as at 31 Dec 2021

INCOME STATEMENT

Income	2021	2020
Investment Income	6,926,949	2,629,030
Unrealised Investment Income	388,376	(519,685)
Donations and Bequests	1,545	3,530
Management Fees	115,971	79,971
Other Income	2,370	85,300
Total Income	7,435,210	2,278,146
Expenses		
Research Funding	2,828,732	741,151
Employment	273,952	262,006
Administration	122,326	37,404
Depreciation	2,983	3,044
Total Expenses	3,227,994	1,043,605
OPERATING SURPLUS / (DEFICIT)	4,207,216	1,234,541

Funds Under Administration

Income	3,123,025	1,229,033
Expenditure - Research Funding	1,703,793	1,267,321
OPERATING SURPLUS / (DEFICIT)	1,419,232	(38,288)

TOTAL OPERATING SURPLUS / (DEFICIT)	5,626,448	1,196,253
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INVESTMENT BALANCES

Investments	2021	2020
Corpus	36,178,813	32,318,350
Research Committee Capital	12,171,440	12,310,064
Research Committee Operations	382,276	276,990
Donations & Bequests	166,728	172,030
Total Pool Investments	48,899,257	45,077,434
Other Investments - Market Value		
24/95 Monash Avenue (Hollywood)	482,850	482,850
Dexus Property Group (DEXUS) Holdings	2,510,896	2,122,520
Dexus Property Group (DEXUS) Imputation Credit (Accrual)	4,411	4,411
Total Other Investment - Market Value	2,998,157	2,609,781
TOTAL ASSETS	51,897,414	47,687,215
Liabilities		
TOTAL LIABILITIES	49,627	33,718
TOTAL NET ASSETS	51,847,788	47,653,497

OTHER FUNDS

Administered by the Raine Research Committee

The Raine Research Committee administers research funding in partnership with the WA Department of Health (Clinician Research Fellowship program), the BrightSpark Foundation (including the Jon & Caro Stewart Family Foundation), the Healy Medical Research Foundation, and the EE Cockell bequest (UWA).

	2021	2020
Clinician Research Fellowship program (Raine and DoH)	2,590,714	1,253,571
BrightSpark Foundation	-	-
Healy Medical Research Foundation	238,609	169,091
EE Cockell bequest (UWA)	324,260	285,872
Total Other Funds	3,153,583	1,708,534

Suite 24, Hollywood Specialist Centre
95 Monash Avenue, Nedlands
WA 6009

+ 61 8 9386 9880
raine@rainefoundation.org.au
rainefoundation.org.au

