

# ANNUAL REPORT 2022



**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.



Government of Western Australia  
Department of Health



Western Australian  
Future Health Research  
& Innovation Fund



Charter Hall



THE UNIVERSITY OF  
WESTERN  
AUSTRALIA

COCKELL BEQUEST



**Strachan Bequest**

**KY Wong Family**

# About the Foundation

The Raine Medical Research Foundation was established by a generous bequest from Mary Raine, an astute businesswoman who made the decision to leave her wealth, which included a large portfolio of properties and hotels in Western Australia for the purpose of funding medical research. It was in August 1957, that Mary Raine signed the Deed of Trust bequeathing her property empire to the University of Western Australia.

In the Deed of Trust Mary Raine was explicit in her wishes “The net income of the Fund shall be applied towards seeking, diagnosing and investigating the nature, origin and causes of diseases in human beings, with the initial emphasis on arteriosclerosis and allied diseases, and the prevention, cure, alleviation and combating of such diseases”. Mary Raine’s desire to prevent terrible loss associated with human disease has had far reaching impact over the past 66-years.

The Foundation prides itself in supporting Western Australian medical early-career researchers, and particularly those looking to establish themselves as leaders in their field. We continuously develop and uphold robust, transparent, and equitable grant review processes to ensure that only the very best research is supported. Our processes to identify and support the next generation of research leaders 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 facilitate collaborative activities that allow our researchers to work and learn from internationally recognised research leaders.

Today, the Raine Foundation has allocated more than \$50 million towards medical research. Mary Raine’s vision to provide much needed funds to medical research, has had an extraordinary

impact in providing better health outcomes to the community and has also created opportunities for our early career researchers of which many are now world class medical research leaders.

## The Raine Foundation supports an array of programs which include:

**Priming Grants:** Grants for early-career researchers, particularly those who are progressing towards an independent research career, to pursue medical research projects and programs that advance health outcomes and their research careers.

**Clinician Research 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 skills transfer, travel to increase research collaboration opportunities across the globe, and conference attendance in Australia or internationally.

We also support other ventures and programs that align with our strategic goals, with established partner organisations, including:

**The Raine Study:** A world-leading longitudinal cohort study that enables researchers from around the globe to study health and medical questions throughout the whole life course. The Raine Foundation was the proud founder of this study commencing in 1989 and we continue to provide support as more data is collected over the life course of the cohort participants.



# 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 2022

51

applications



12

shortlisted



6

successful  
(11.7% success rate)

\$1,385,000

awarded



**Dr Syed Zulqarnain Gilani**  
(Raine/Robson Fellow)

Edith Cowan University  
*Explainable AI Frameworks  
for Automatic Detection  
and Localisation of Abdominal Aortic  
Calcification*

\$248,913



**Dr Kai Chen**

The University of Western Australia  
*Defining the nutrient substrates  
for bone remodelling*

\$224,788



**Dr Henry Hui**

The University of Western Australia  
*Next-Generation Single  
Cell Diagnostics of Blood Cancers*

\$224,649



**Dr Peter Lau**

Sir Charles Gairdner Hospital and Harry  
Perkins Institute of Medical Research  
*Exploring Novel Macrophage Markers  
& Inhibitors of Migration in Melanoma  
to Enhance Immunotherapy*

\$227,054



**Dr Archita Mishra**

Telethon Kids Institute and  
The University of Western Australia  
*Microbial-immune priming  
in early life: Implications in  
pre-term infections*

\$229,653

Co-funded by the Raine Foundation  
and the BrightSpark Foundation



**Dr Tao Wang**

Telethon Kids Institute and  
The University of Western Australia  
*Developing effective RNA-based cancer  
immunotherapy*

\$229,943

Co-funded by the Raine Foundation, the  
BrightSpark Foundation and Charter Hall







#### RAINE PRIMING GRANT

**Dr Belinda Guo**

University of  
Western Australia

**\$150,000  
2019-2022**

*Platelets as a novel blood biomarker for bone marrow fibrosis*

## Finding biomarkers for blood cancer progression

**Dr Belinda Guo's** Raine Priming Grant focused on developing novel methodologies for earlier detection of haematological malignancies using next-generation sequencing.

Myeloproliferative neoplasms (MPN) is a chronic cancer that affects approximately 30,000 Australians. There are two phases of disease state: a chronic phase which can last decades where too much blood is made; and an aggressive phase, in which the bone marrow is 'burnt out' and unable to make more blood. Patients in the aggressive phase have a poor outcome and are at higher risk of developing acute myeloid leukaemia. Survival is limited from just months to a few years. Every patient has up to 20% risk of progressing toward the aggressive disease phase, and there is currently no way to predict which patients will be affected. Dr Guo's research investigated whether changes occur in the bone marrow cells and its product, blood platelets which result in disease progression.

Dr Guo's project confirmed that there are specific genetic changes that occur in platelets and by identifying these changes one can distinguish between MPN patients in the chronic or aggressive phase of disease. Furthermore, these genetic changes were shown to be consistent with disease status and importantly these findings may have the capacity to be used as a blood test for monitoring disease progression. If we can detect progression before damage is done to the bone marrow, we may be able to improve outcomes for all patients living with MPN.

Dr Guo's Raine Priming Grant has had significant impact, as it has enabled Dr Guo and her team to validate their world-first discovery of how blood-based

markers can be used to identify disease progression in MPN. The ability to understand and detect disease progression is the goal of many researchers working in the field of MPN. Dr Guo's research has expanded our understanding of the disease and will create opportunities to improve outcomes for patients.

The support from the Raine Medical Research Foundation has allowed Dr Guo's team to generate data that has attracted additional funding from the Cancer Council Western Australia, as well as the MPN Research Foundation (USA) and the Ruby Red Foundation (Australia) which will expand Dr Guo's collaborative links with internationally recognised MPN experts from Mt Sinai Hospital in New York (USA) and the St Jude Children's Research Hospital (USA).

Dr Guo mentioned "This Raine Priming Grant has had a significant impact in allowing us to validate our world first discovery of blood-based markers for progression. It has supported us in growing our international and industry research collaborations which will become key to translating this workflow to the clinic".

Dr Guo reflected on the Raine Priming Grant outcomes, expressing that the grant has been extremely helpful and has enabled her to build her career as an independent researcher. It has also led to many opportunities including invitations to speak at national conferences, success with obtaining national and international grants, development of new research and industry collaborations, and being named the inaugural Gunn Family National Career Development Fellow in Haematology. Dr Guo said "I am extremely grateful for the support from the Raine Medical Research Foundation which has played a significant role in my career development".



*A novel role for sodium glucose co-transporter 2 in diabetic retinopathy and nephropathy*

## A drug to treat complications in diabetes

**Dr Lakshini Herat** is a Research Associate at the School of Biomedical Sciences and the Dobney Hypertension Centre at the University of Western Australia. She was awarded a Raine Priming Grant to evaluate the retinal and renoprotective effects of a drug use to treat diabetes, Empagliflozin, in a specific type of mice over a period of 8 or 16 weeks of treatment.

The increasing incidence of diabetes in society elevates the risk of diabetic complications and they are one of the most important current public health concerns nationally and internationally. Hence, this research investigated the beneficial effects of a new class of glucose-lowering drugs, SGLT2 inhibitors, on two of the most prevalent complications of diabetes: (i) diabetic eye disease (retinopathy) and (ii) kidney disease (nephropathy).

Dr Herat's team have carried out investigations using the SGLT2 inhibitor Empagliflozin in younger and older Akimba mice. They have conclusively shown that Empagliflozin decreased the development and progression of diabetic eye disease. In addition, they have shown for the first time that the Akimba mouse model that develops kidney disease due to diabetes may be reduced with the treatment of Empagliflozin.

Their research demonstrates the exciting future potential of SGLT2 inhibition using Empagliflozin as a therapy for diabetic retinopathy and should be further considered in human studies. This class of anti-diabetic agents can potentially provide early

intervention and prevention to those individuals who suffer from vision-threatening diabetic retinopathy and life-threatening diabetic nephropathy.

The results of this Raine Priming Grant has identified the role of SGLT2 inhibition in the context of diabetic retinopathy and diabetic nephropathy, which will be instrumental in the development of effective therapeutic interventions for both retinopathy and diabetic nephropathy in the clinical setting.

Dr Herat stated "Overall, our findings will aid to better tailor treatment options that have minimal side effects, better cost effectiveness and most importantly, greater therapeutic effect. Ultimately, our findings have the ability to enhance the quality of life of many patients suffering from diabetes and its complications and their families".

The Raine Priming Grant has provided Dr Herat with the opportunity to obtain further funding including securing a Fellowship from the Royal Perth Hospital foundation and she was also successful in obtaining research funding from Diabetes Research WA and The High Blood Pressure Research Council of Australia. The data generated from the Raine Priming Grant has led to three first authored publications and one senior authored publication. Dr Herat has also presented the results of her Raine Priming Grant at national and international conferences, and further fostered current collaborations and established new national and international collaborations.



**RAINE PRIMING  
GRANT**

**Dr Lakshini Herat**

School of  
Biomedical Sciences  
and Dobney  
Hypertension  
Centre-University of  
Western Australia

**\$99,865  
2020-2022**

# 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 2022



**Dr Anita Campbell**  
Department of Infectious Diseases,  
Perth Children's Hospital  
*SNAP-PY: Staphylococcus aureus  
Network Adaptive Platform trial for  
Paediatrics and Youth*  
\$442,351



**Clinical Associate Professor  
Kristina Rueter**  
Department of Immunology, Perth  
Children's Hospital  
*Promoting gut health with prebiotic fibre  
as a novel allergy prevention strategy*  
\$449,551



**Dr Robert Schutze**  
Department of Clinical Psychology,  
Royal Perth Hospital  
*Blended pain care: A novel hybrid  
service model for chronic pain  
and mental health support*  
\$212,824



**Dr Lydia Warburton**  
Department of Oncology,  
Fiona Stanley Hospital  
*Circulating Biomarkers of Response  
to Immune Checkpoint Blockade*  
\$323,836



Government of **Western Australia**  
Department of Health



Western Australian  
Future Health Research  
& Innovation Fund



**RAINE**  
MEDICAL RESEARCH FOUNDATION





*The use of electrophysiology to optimize hearing implants in hearing-impaired recipients*

## A tool to evaluate and guide the programming of hearing implants

**Dr Dayse Tavora-Vieira** is the Head of Audiology at Fiona Stanley Hospital and was awarded a Clinical Research Fellowship in 2019 to investigate the effectiveness of using auditory evoked brain waves as an objective tool to evaluate and guide the programming of hearing implants. The aim of this fellowship was to improve patient outcome and satisfaction, as well as reducing clinical costs.

Cochlear, middle ear, or bone conduction implants are a solution for people suffering from hearing loss that cannot be remediated using conventional hearing aids. Programming of hearing implants relies on a patient's subjective input, considerable programming, and rehabilitation time. Patient subjectivity often results in sub-optimal sound stimulation leading to poorer outcomes, reduced patient satisfaction, and an increase in cost of care.

The aim of Dr Tavora-Vieira's project was to investigate an objective tool to verify hearing implant fitting in people with profound deafness. Over the past three years, their results have demonstrated that approximately 50% of cochlear implant users were under-optimised due to the subjective nature of programming the device. Dr Tavora-Vieira's research further showed that ensuring activation of the auditory cortex through optimised electrical stimulation via a cochlear implant resulted in significant improvements in speech understanding.

The results of this study have led to the comprehensive integration of auditory evoked potential measures as a reliable tool for assessing cochlear implant outcomes by adult audiology services across the state. As a result, Sir Charles Gairdner Hospital and Royal Perth Hospital have adopted a protocol that mandates the referral of all implant recipients to Fiona Stanley Hospital for the purpose of verifying their cochlear implant. This is leading to better hearing outcomes for cochlear implant users and increasing patients' satisfaction.

Dr Tavora-Vieira's research is the first of its kind and has gained national and international recognition, with Western Australia leading the way in implementing hearing optimisation in a clinical setting. This project has already resulted in improved health outcomes for people with hearing loss by ensuring equality of care across the state-wide implant program.

Dr Tavora-Vieira said "The fellowship provided through an agreement between the Department of Health and the Raine Medical Research Foundation, has been crucial in supporting my translational clinical research project. Moreover, the fellowship has been instrumental in supporting my research career development, and it has opened up numerous opportunities for personal and professional growth, and I am grateful for the support it has provided".



**CLINICIAN  
RESEARCH  
FELLOWSHIP**

**Dr Dayse  
Tavora-Vieira**

Fiona Stanley  
Hospital

**\$198,134  
2020-2023**



*Long-term outcomes after lidocaine infusions for postoperative pain*

## Lidocaine infusions to treat postoperative pain



**CLINICIAN  
RESEARCH  
FELLOWSHIP**

**A/Prof Andrew  
Toner**

Royal Perth Hospital

**\$342,625  
2019-2022**

**Dr Toner** is an Academic Anaesthetist at Royal Perth Hospital and Associate Professor at the University of Western Australia. The award of a Clinician Research Fellowship in 2019 has enhanced Dr Toner's career horizon and has enabled him to assess the safety, effectiveness, and feasibility of perioperative lidocaine infusions in breast cancer surgery patients.

Chronic pain after surgery for breast cancer is common and contributes to disability, low quality of life and mood disturbance. Lidocaine, a drug used for many years as a local anaesthetic agent, may protect against the development of chronic post-surgical pain when it is administered steadily into the body as an infusion. Dr Toner's team conducted a pilot study in 150 patients and showed that lidocaine infusions can be delivered safely and effectively in breast cancer surgery patients.

This research has the great potential to support the development of clinical guidelines that allow widespread use of the lidocaine intervention if it is ultimately proven to be effective. "Local practice in the three WA hospitals that participated in this pilot study has already begun to change, with increasing use of lidocaine infusions intraoperatively and the addition of dedicated infusion programs to circulating theather pumps" Dr Toner said.

Thanks to this fellowship Dr Toner has received funding from the Medical Research Future Fund which has expanded this pilot study into a large international trial known as the LOLIPOP trial and will determine whether this treatment should be

implemented in the clinic by analysing a large cohort of patients. Dr Toner was also successful in acquiring a NHMRC Investigator Grant in 2022 which included the LOLIPOP trial.

Dr Toner has stated: "The Clinician Research Fellowship has assisted my research career in numerous ways. Primarily, it has strengthened my profile as an academic anaesthetist, in particular by improving my competitiveness for national level funding and university positions – this culminated in a NHMRC Investigator Grant and an Associate Professor position at the University of Western Australia. Finally, it has elevated my standing with the Australian and New Zealand College of Anaesthetists clinical trial network executive committee, paving the way for strong collaboration with other leaders of perioperative research in Australia"

Dr Toner believes that this fellowship has been the single most important factor in the progression of his career from an early career researcher to an international academic leader in anaesthesia and perioperative medicine. He has also stated that "The Clinician Research Fellowship is a fantastically effective resource and we are lucky to have it available in WA".

Dr Toner's research has also received media overage including appearances on 9 News WA and ABC radio and an article has also been published in the West Australian.

# Research Collaboration Awards

Connecting emerging and established research leaders across the globe

This program facilitates the development of new collaborations and projects with national and international partners, supporting skill development and knowledge transfer.

## Research Collaboration Awards allocated in 2022

14 applications



5 successful  
(35.7% success rate)



\$135,389  
awarded



### Dr Kefyalew Alene

Curtin University with  
Harvard University

Optimizing interventions to reduce  
the global burden of post-tuberculosis  
sequela

\$30,000

Funded by the Healy Foundation



### Dr Lisa Stinson

The University of Western Australia with  
Baker Heart and Diabetes Institute

Short chain fatty acids in human milk:  
Implications for infant health

\$27,039

Co-funded by the Raine Foundation,  
the Stan Perron Charitable Foundation,  
and the BrightSpark Foundation



### A/Prof Mark Boyes

Curtin University with University  
College London, Macquarie University  
& Dyslexia-SPELD Foundation

Language difficulties and child mental  
health: Priority-setting for development  
of a global research agenda

\$20,075

Funded by the Cockell Bequest



### Dr Amanuel Gebremedhin

Curtin University with Norwegian  
Institute of Public Health

Development of a New DNA Methylation-  
based Maternal Epigenetic Age Estimator  
as a Predictor for Perinatal Morbidity

\$29,607

Co-funded by the Raine Foundation,  
the Stan Perron Charitable Foundation,  
and the BrightSpark Foundation



### Dr Qi Fang

Harry Perkins Institute of  
Medical Research and UWA with  
Nicolaus Copernicus University, Poland

Ultrahigh-resolution and rapid breast  
tumour margin assessment using full-  
field optical coherence elastography

\$28,668

Funded by the Healy Foundation



COCKELL BEQUEST





**RAINE/  
BRIGHTSPARK  
RESEARCH  
COLLABORATION  
AWARD**

**Dr Henry Hui**

The University of  
Western Australia in  
collaboration with  
National University  
of Malaysia

**\$29,864  
Duration: 2022**

*An innovative diagnostic tool for children with high-risk leukaemia*

## Improving survival in childhood leukaemia

### **The Raine/BrightSpark Research Collaboration**

**Award has enabled Dr Henry Hui** to innovate a world-leading, WA-grown, cutting-edge diagnostic technology and has accelerated the capacity to advance the health outcomes of children with leukaemia. Specifically, this technology has helped to improve the diagnosis of children with Acute Lymphoblastic Leukaemia (ALL), especially in those with the "Philadelphia-like" ("Ph-like") subtype who have poor prognostic outcomes and survival.

Paediatric Acute Lymphoblastic Leukaemia is the most common childhood cancer and the leading cause of death in Australia. The death rates can be 3-fold higher in other countries such as Malaysia. Most patients in the high-risk subgroup have one specific subtype called "Ph-like ALL", which is correlated to the highest rate of treatment failure and has a 50% death rate from recurrence. The genomic defects in Ph-like ALL are most commonly due to chromosomal aberrations involving the *CRLF2* gene which lead to activated kinase signalling in leukaemic cells. Ph-like ALL patients generally respond to personalised therapies such as targeted kinase inhibitors and therefore early identification of these cases is crucial. However, diagnosis is generally difficult as current testing is complex, slow, and inaccurate, and in some countries such as Malaysia, not available at all. Dr Hui and collaborators wanted to address this key gap in clinical care by adapting their patented immuno-flow FISH cytogenomic methodology to assess Ph-like ALL in Australian and Malaysian patients.

This all-in-one technology enables high precision detection of Ph-like ALL genetic mutations by enabling

the analysis and visualisation of many thousands of cancer cells with their biomarkers and chromosomes at the same time. Preliminary data shows this technology is unmatched by others as it exceeds current clinical testing capabilities in accuracy, sensitivity, specificity, and speed. This world-first WA invention is now ready to be applied to patient cases, and in particular, children with high-risk Acute Lymphoblastic Leukaemia or poor prognostic features from Perth Children's Hospital and National University of Malaysia.

Dr Hui has mentioned that this research collaboration award was critical in initiating the collaboration between the National University of Malaysia and the University of Western Australia. Thanks to the work of this project, Dr Hui has captivated new collaborations locally and internationally which have provided his team with more clinical samples, multidisciplinary information, world-class resources, and expertise which have assisted in the development of this technology.

This novel invention will refine diagnosis and assist with the ongoing surveillance of cancer cells that may be hidden at diagnosis or emerge after treatment which may mean life or death for patients. Importantly, this technology may even identify patient-specific biological differences, novel disease biomarkers and may allow for more targeted therapies to be developed which will ultimately provide better health outcomes for children impacted by Acute Lymphoblastic Leukaemia.

Dr Hui said: "This world-first diagnostic frontier has the potential to fulfil an unmet need in standard-of-care that informs health policy and clinical practice blood cancer deaths worldwide".





*Uncovering the causes of perceptual inference deficits in patients with schizophrenia*

## Computational modelling of the neural deficits in schizophrenia

**Dr Zachary Howard** was awarded a Cockell Research Collaboration Award in 2021 which has connected Dr Howard with high profile researchers working at the University of Newcastle in the field of mental health research and has provided new technology to the University of Western Australia.

This research collaboration award was undertaken to identify whether similar neural mechanisms are apparent in schizophrenia patients and cannabis users, and to determine the key neural mechanisms related to first on-set of schizophrenia through to chronic disease state.

Schizophrenia is a devastating mental illness with enormous health and economic costs. Identifying biological causes of schizophrenia could provide avenues for novel treatments or screening tools to help manage these impacts. One important biomarker of schizophrenia is the Mismatch Negativity waveform, an electroencephalogram signature that reflects a reduced ability for schizophrenia patients to recognise environmental patterns. A similar neural deficit is identified in heavy users of cannabis. Given other connections between cannabis and schizophrenia (e.g., cannabis use can accelerate schizophrenia onset) Dr Howard mentioned that it is plausible that combining knowledge from these fields could improve our understanding of the disease.

This research collaboration award integrated researchers who specialise in schizophrenia with researchers who specialise in the neuroscience of cannabis use. Dr Howard performed sophisticated and innovative computational modelling to elucidate the neural deficits from existing data sets which had been collected from schizophrenia patients, and heavy cannabis users, and matched control groups. Despite surface-level similarities in cognitive impairment, the research showed that the underlying neural mechanisms leading to these impairments were fundamentally different between schizophrenia patients and cannabis users.

Importantly, Dr Howard and his collaborators have identified key neural mechanisms related to intrinsic neural connections and showed progression of these deficits from first-onset through chronic schizophrenia, which expands our understanding of this ailment and may pave the way for targeted treatments to be developed in future. These results have been published in *Schizophrenia Bulletin* and presented at several conferences.

Dr Howard said: "This grant has improved my standing as an early career researcher, connecting me with high profile collaborators and allowing me to work on projects with high impact that I would not have had access to otherwise".



**COCKELL  
RESEARCH  
COLLABORATION  
AWARD**

**Dr Zachary Howard**

The University of Western Australia in collaboration with The University of Newcastle, Australian National University and University of Pittsburgh

**\$16,500  
Duration: 2022**

# 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 2022



**Dr Gizachew Tessema**

**Curtin University**

*The COVID-19 pandemic and healthcare systems in Africa: a scoping review of preparedness, impact and response.*

Published in BMJ Global Health

**\$5,000**



**Dr Kieran Mulroney**

**The University of Western Australia**

*Same-day confirmation of infection and antimicrobial susceptibility profiling using flow cytometry*

Published in The Lancet eBiomedicine

**\$5,000**

*Funded by the Strachan Bequest*



**Dr Mary Abraham**

**Telethon Kids Institute, The University of Western Australia, Perth Children's Hospital**

*Effect of a Hybrid Closed-Loop System on Glycemic and Psychosocial Outcomes in Children and Adolescents With Type 1 Diabetes A Randomized Clinical Trial*

Published in JAMA Pediatrics

**\$5,000**

*Co-funded by the Raine Foundation and the BrightSpark Foundation*





*Cognitive deficits in obstructive sleep apnea: insights from a meta-review and comparison with deficits observed in COPD, insomnia, and sleep deprivation*

## Obstructive sleep apnea and its cognitive deficits

**Dr Michelle Olaithe** from The University of Western Australia was awarded a Strachan Publication Prize in 2021 for her publication entitled "Cognitive deficits in obstructive sleep apnea: insights from a meta-review and comparison with deficits observed in COPD, insomnia, and sleep deprivation" published in *Sleep Medicine reviews* in 2018. This published research showed that the cognitive deficits associated with untreated obstructive sleep apnea (OSA) are multidimensional, with different physiological disturbances responsible for differing cognitive problems.

Obstructive Sleep Apnoea (OSA) is a common and costly nocturnal breathing disorder that occurs in 9% of middle-aged women and 27% of middle-aged men, at a cost of \$AUD45B per annum. OSA impacts on immune function, mental health, work and education performance. Furthermore, OSA increases the risk of cognitive impairment and dementia in later life, making this sleep disorder a potentially modifiable risk factor for cognitive problems now and in the future.

The findings of Dr Olaithe's paper suggest that short-term sleep deprivation and blood-gas abnormalities are probably responsible for different types of cognitive difficulties in OSA. Short-term sleep disruption (as seen in sleep deprivation)

was associated with difficulties with attention and memory, whilst low blood oxygen (as in COPD) was associated with poorer executive function, slower thinking, and language difficulties. Further, visuospatial difficulties were present in OSA, but not found in the other disorders, so was of unknown cause. This suggests that the current treatments for OSA, which primarily address blood-gas abnormalities are appropriate, however interventions that are directed at deepening sleep, such as auditory stimulation need further investigation.

This paper was pitched to tackle two global epidemics: sleep disorders and cognitive-decline, providing new insights into their causal relationships. Elucidating these relationships will guide future interventions to improve sleep health.

The Prize funding was used for travel to attend a conference in Queensland where Dr Olaithe was an invited speaker and also presented a poster. This poster was awarded "best poster" for the Obstructive Sleep Apnea division. Furthermore, the award of this publication prize has enabled a collaboration on actigraphy assessment to validate a sleep intervention for university students with colleague Dr Cele Richardson.



**Publication Prize**

**Dr Michelle Olaithe**

The University of Western Australia

**\$5,000  
2021**



# The Raine Study



The Raine Medical Research Foundation awarded a major research grant in 1989 for the establishment of the West Australian Pregnancy Cohort Study. It was later named "The Raine Study" to acknowledge the original grant from the Raine Foundation and its founder Mary Raine. The Raine Medical Research Foundation continues to provide funding support for the Raine Study 32 years on.

The Raine Study is a longitudinal cohort study. It relies on the same group of genetically related family members originally recruited between 1989 and 1991 to participate in each follow-up. The longer the same people continue to take part in the study, the more valuable their data becomes.

Based in Perth, 2,900 pregnant women (Generation 1) were recruited to be part of the Raine Study between 1989 and 1991, giving birth to 2,868 children (Generation 2, the initial focus of the Raine Study). The Generation 2 participants are now in their early 30s and have taken part in a remarkable 17 follow-up studies since before they were born until now, each contributing over 30 million pieces of genetic data. Over 73% of our Generation 2 participants are still actively involved in Raine Study assessments. In addition to the original Generation 1 and Generation 2 participants, the Raine Study has recruited 109 grandmothers (Generation 0) of the original Raine Study children, and more than 750 babies (Generation 3) born to our now adult Generation 2 participants.

**The Raine Medical Research Foundation is one of its original and still longest-serving funding partners.**

- More than 30,000 pieces of data (and >30 million pieces of genetic information) have been collected on each of the Gen2 participants in the past 30 years
- Over 600 peer reviewed journal articles have been published on the Raine Study resources
- Over 750 babies, Generation 3 (Gen3), have been born to the Raine Study cohort participants (estimated to reach 1,500 babies within 10 years)



**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 2022

**\$2.05 mil**

was successfully secured in competitive grant and fellowship funding

**43**

new project applications were submitted utilising Raine Study data

**65**

new data access and biosample requests were submitted to the Raine Study

**44**

peer-reviewed papers were published, bringing the total to 687 published papers using Raine Study data since the commencement of the Raine Study



## 2022 Raine Medical Research Foundation Prize winners

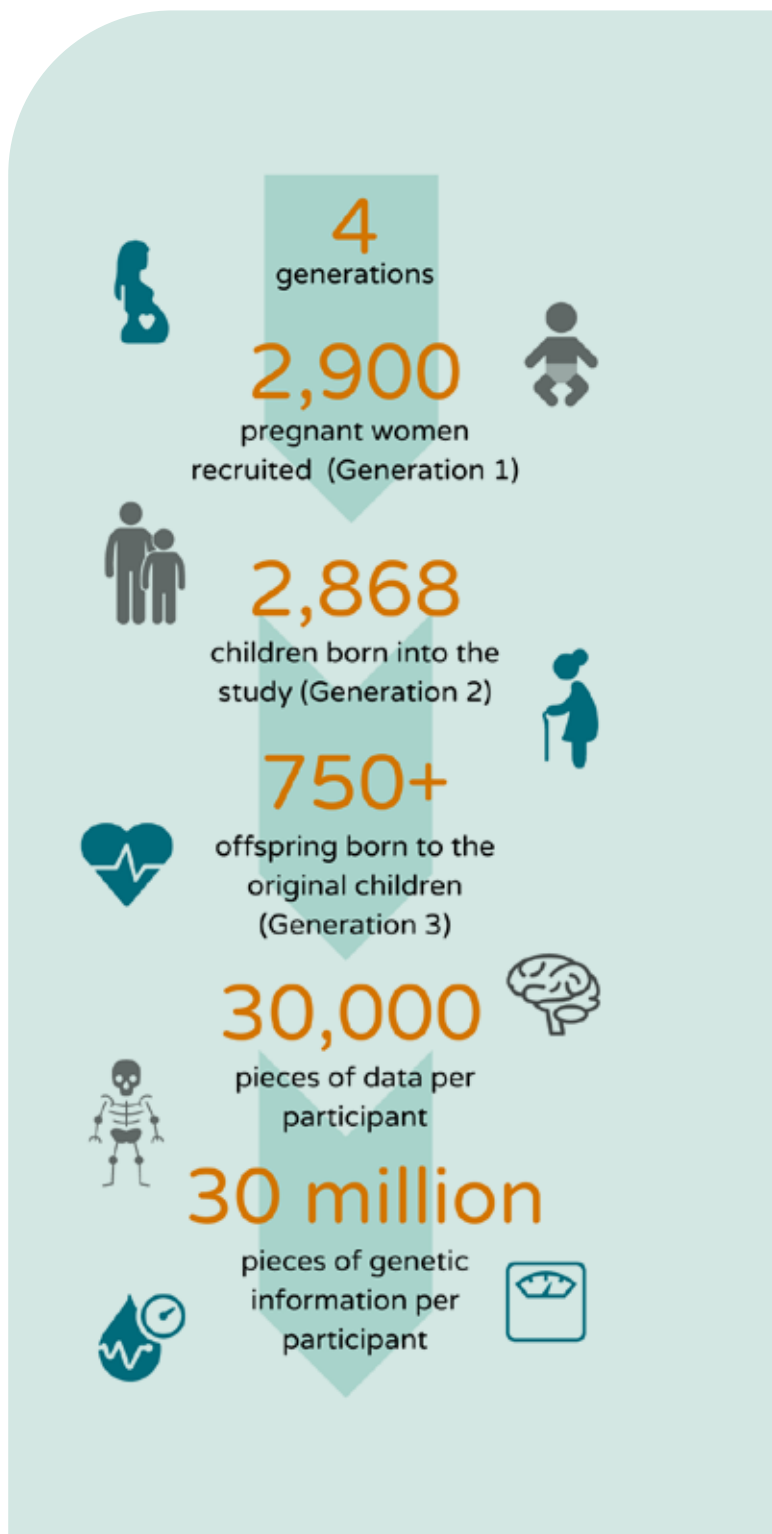
The Raine Foundation awarded two Prizes for the most outstanding research presentation by early-career researchers and students at the 2022 Raine Study Symposium held on 02 September 2022. They were awarded to:



**Ms Kelly Sansom** (The University of Western Australia) for her presentation entitled "Association between sleep irregularity, OSA and Hypertension in a middle-aged community population"; and



**A/Prof Jun Yang** (Monash University) who spoke about the "Effect of oral contraception on aldosterone, renin, aldosterone to renin ratio and blood pressure in young women: a 10-year longitudinal study".



# 2022 Raine Annual Awards Ceremony

Each year we celebrate the achievements of our past and present awardees at our breakfast awards ceremony. On the 1st of December 2022, we were honoured to welcome distinguished guests and alumni, including our guest speaker, Hon Stephen Noel Dawson, Minister for Emergency Services; Innovation and ICT; Medical Research; Volunteering Deputy Leader of the Government in the Legislative Council who spoke eloquently to a highly engaged audience about the opportunities that Medical Research and Innovation can offer to help improve the lives of Western Australian.

We had the opportunity to hear about the innovative research our Raine Priming Grant Recipient Dr Kai Chen will be conducting in bone remodelling which will help in predicting and preventing metabolic diseases that plague both young and aged populations. We also had the pleasure to hear from Dr Kristina Rueter our Clinician Research Fellowship Recipient who will be undertaking a world first research project, to determine whether promoting gut health with prebiotic fibres during pregnancy will prevent allergies, which would be a low cost, and easy to apply allergy prevention strategy.



Above: Hon Stephen Noel Dawson MLC, Dr Amanda Cleaver, Professor Amit Chakma



Above: Hon Stephen Noel Dawson MLC







**Above:** Clinician Research Fellowship Recipients



**Above:** Raine Priming Grant Recipients



**Above:** Research Collaboration Award Recipients



**Above:** Emeritus Professor Lawrence Beilin and Professor Romola Bucks



**Below:** Publication Award Recipients



**Below:** Mr Jim Litis, Dr Henry Hui, Emeritus Professor Wendy Erber



# Our People and Partners

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## 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 Medical Research Foundation. We thank our members for their generosity 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 provide our emerging researcher leaders feedback which they greatly benefit from.

Our Research and Advisory Committees also administer The Healy Medical Research Foundation which was established in 1970 through a generous bequest by the late Patrick Burselum and Mary Estelle Healy.

## 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 Peter Smith	Dr Amanda Cleaver (Director)	Professor Garry Allison	Dr Amanda Cleaver (Director)
Dr Bennie Ng	Professor Elizabeth Davis	Dr Aron Chakera	Dr Andrew Currie
Dr Amanda Cleaver (Director)	Dr Archa Fox	Dr Amanda Cleaver (Director)	Associate Professor Elin Gray
	Professor Shane Patman	Professor Jeff Hamdorf	Professor Gerard Hoyne
	Associate Professor Joshua Lewis	Professor Merrilee Needham	Professor David Joyce
	Professor Valerie Verhasselt	Professor Lisa Whitehead	Professor Nina Tirnitz-Parker
	Dr Sarah Rea	Professor Britta Regli-von Ungern-Sternberg	
	Professor Bronwyn Myers-Franchi		

## Raine Management Team



**Dr Amanda Cleaver**  
Director



**Dr Amelia Scaffidi**  
Research Grants Manager



**Dr Cristina Gamez**  
Project Officer

# Financial Report

## Raine Medical Research Foundation Financial Summary as at 31 Dec 2022

### INCOME STATEMENT

Income	2022	2021
Investment Income	(955,672)	6,926,949
Unrealised Investment Income	(760,946)	388,376
Donations and Bequests	21,446	1,545
Management Fees	105,000	115,971
Other Income	36,584	2,370
<b>Total Income</b>	<b>(1,553,588)</b>	<b>7,435,210</b>

Expenses		
Research Funding	1,566,603	2,828,732
Employment	319,726	273,952
Administration	77,172	122,326
Depreciation	2,924	2,983
Other Expenses		-
<b>Total Expenses</b>	<b>1,966,424</b>	<b>3,227,994</b>
<b>OPERATING SURPLUS / (DEFICIT)</b>	<b>(3,520,012)</b>	<b>4,207,216</b>

Funds Under Administration		
Income	2,607,769	3,123,025
Expenditure - Research Funding	1,139,243	1,703,793
<b>OPERATING SURPLUS / (DEFICIT)</b>	<b>1,468,527</b>	<b>1,419,232</b>
<b>TOTAL OPERATING SURPLUS / (DEFICIT)</b>	<b>(2,051,485)</b>	<b>5,626,448</b>

### INVESTMENT BALANCES

Investments	2022	2021
Corpus	33,657,907	36,178,813
Research Committee Capital	12,043,665	12,171,440
Research Committee Operations	266,022	382,276
Donations & Bequests	175,523	166,728
<b>Total Pool Investments</b>	<b>46,143,116</b>	<b>48,899,257</b>

#### Other Investments - Market Value

24/95 Monash Avenue (Hollywood)	482,850	482,850
Dexus Property Group (DEXUS) Holdings	1,749,950	2,510,896
Dexus Property Group (DEXUS) Imputation Credit (Accrual)	4,411	4,411
<b>Total Other Investment - Market Value</b>	<b>2,237,211</b>	<b>2,998,157</b>
<b>TOTAL ASSETS</b>	<b>48,380,327</b>	<b>51,897,414</b>
<b>Liabilities</b>		
Provision for leave	47,451	49,627
<b>TOTAL LIABILITIES</b>	<b>47,451</b>	<b>49,627</b>
<b>TOTAL NET ASSETS</b>	<b>48,332,876</b>	<b>51,847,788</b>

#### OTHER FUNDS

##### Administered by the Raine Research Committee

The Raine Medical Research Committee also administers the Clinician Research Fellowships Program, a joint funding agreement between the Department of Health and the University (via the Raine Medical Foundation) and the management of the awards for P B Healy and EE Cockell.

	2022	2021
Clinician Research Fellowship program	3,924,109	2,590,714
P B Healy	278,087	238,609
E E Cockell	419,914	324,260
<b>Total Other Funds</b>	<b>4,622,109</b>	<b>3,153,583</b>

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