CENTRE FOR
Eye Research
Australia

Creating the
future in sight

Annual Review 2025

Our story

At CERA we are creating the future in sight.

We are a world-leading medical research institute, with 30 years of combining clinical expertise with scientific innovation to accelerate breakthroughs and make the impossible possible.

Moving closer every day to a new world where no one ever has to accept vision loss.

Our focus on impact through innovation pushes the boundaries of what's possible in eye research and resulting patient care. We never accept blindness, rejecting the status quo when there is an opportunity to prevent vision loss and restore sight.

With the support of our donors, we are moving faster every day towards changing the future for all of us.

CENTRE FOR
Eye Research
Australia

← **COVER: Josephine and Helmut Weigold have been participating in clinical trials in CERA's Macular Research Unit for many years.**

THE UNIVERSITY OF MELBOURNE

the royal victorian
eye and ear
hospital

Contents

↑ In detail: (from left) Annie Yan Zhang, Associate Professor Luis Alarcon-Martinez and Mahmoud Haddara are investigating a recently discovered structure in the retina.

Chair and Managing Director's message

We are proud to share the stories of CERA's achievements in 2025 – and thank the many supporters and partners who have contributed to this progress.

As CERA gets set to celebrate our 30th anniversary in 2026, the theme of our 2025 Annual Review is *Creating the future in sight*, showcasing the advances of our research teams over the previous 12 months and also our relentless focus on the future.

Building on the legacy of our founder, Laureate Emeritus Professor Hugh Taylor AC, everyone at CERA remains determined to make a difference.

We do not accept that vision loss and blindness are inevitable – whether it is the result of ageing, genetics or poor access to eye care.

We will not accept the status quo if there is an opportunity to drive our research towards breakthroughs that prevent vision loss and restore sight.

30 years of transformation

As Professor Taylor explains in his generous introduction, eye care today is completely different from 30 years ago, and 30 years from now it will be different again.

Technology has transformed vision research – and with it our ability to make what was once considered impossible possible.

You will see many examples of how we are harnessing these cutting-edge technologies in our 2025 Annual Review including:

- Powerful imaging that allows us to view the eye in unprecedented detail, discover new structures and observe previously unknown interactions between nerves and cells – providing new clues about eye and brain conditions including glaucoma, stroke and dementia
- Cellular reprogramming technology that is moving one step closer to bringing a potential new treatment for retinitis pigmentosa to a first-in-human trial
- Advanced genomic sequencing which has underpinned a critical new discovery into the most high-risk forms of macular degeneration
- Gene engineering technologies – including CRISPR editing and advanced vector manufacture – which enable us to develop new gene therapies for incurable inherited retinal diseases including Usher syndrome and Stargardt's disease
- Artificial intelligence to speed up the detection of diabetic eye disease and bring screening technologies to more people in underserved communities.

Celebrating collaboration

CERA's focus on partnerships and putting people at the heart of our research has been a key to success over the past 30 years.

We know we can have a bigger impact when we work with others and are proud to partner with more than 100 other research organisations worldwide.

In 2025, we launched the Vision Science Innovation Alliance (VSIA) which will see us join the University of Melbourne, Cerulea Clinical Trials, Australian College of Optometry, National Vision Research Institute and The Royal Victorian Eye and Ear Hospital to create a new platform to accelerate vision research into real-world outcomes for patients.

Community volunteers play a vital role in our research. We are grateful to the thousands of people who have supported us by taking part in studies at CERA or through Cerulea, our new clinical trials centre.

Over three decades, more than 5800 people have joined Professor Robyn Guymer AM's world-leading natural history study for age-related macular degeneration, contributing to understanding AMD and major treatment breakthroughs.

More than 650 people with inherited retinal diseases are now part of the VENTURE Study – a joint research project with the University of Melbourne – which supports the development of new treatments and connects participants to clinical trials.

Meanwhile, our Consumer Program is going from strength to strength, and has more than 50 lived experience volunteers who are helping shape our research program.

CERA also benefits from the deep expertise of our volunteer board directors. Thank you to all of our directors, in particular Wendy Miller and Professor Peter Choong AO who finished their terms in 2025 after many years of dedicated service. We also welcome our new directors Ebru Davidson and Professor Sarath Ranganathan.

Power of philanthropy

Philanthropy was critical in the establishment of CERA in 1996. Thirty years later it remains an essential funding source.

Much of our research would simply not happen without the generosity of individual donors, trusts and foundations, and people who leave gifts in their wills to CERA.

We are incredibly grateful for this support which enables us to accelerate research to protect the future in sight.

Professor Keith Martin
Managing Director

Duncan Peppercorn
Chair

30 years of collaborative vision

I vividly remember my first day in 1990 at the Melbourne University Department of Ophthalmology. I sat in a huge office with five staff and thought, "What am I going to do?"

In addition to helping to train ophthalmologists, I wanted to build research capacity, support people through their masters and PhD programs, and secure funding through grants and philanthropy to improve eye care and stop vision loss.

After working within the university system for a few years, in 1996 I looked around at all the successful research organisations in Melbourne.

I believed that establishing an independent medical research institute focused on vision science would make my goal possible.

Thus, we created CERA.

Through the University of Melbourne, government support, collaborations with The Royal Victorian Eye and Ear Hospital, the Lions Clubs of Victoria, the Royal Victorian Institute for the Blind and the Association for the Blind – later to unite as Vision Australia – and the contributions of many generous philanthropic supporters, CERA was able to bring great people together to accelerate research.

After only a decade, I was amazed to see CERA listed among the top four eye research institutes in the world.

This remarkable achievement is thanks to everyone who came together in such an extraordinary and wonderful way.

CERA's success has always been built on collaboration between people committed to advancing research. We did extensive outreach to optometry, ophthalmology and other institutes to bring people together and build collective strength from individual expertise.

CERA Deputy Director Professor Robyn Guymer AM was one of our early recruits and has been doing terrific work from the beginning. In addition to her many accomplishments in age-related macular degeneration, her work with colleagues including Laureate Professor Colin Masters to detect dementia and Alzheimer's disease through retinal photography was truly forward-thinking.

Former CERA Managing Director Professor Tien Wong also made major contributions, particularly through collaborations investigating signs of cardiovascular disease in eye images – work that predated current approaches by 20 years.

Of course, there is the amazing work on glaucoma started by former Managing Director Professor Jonathan Crowston and continued and expanded by his successor Professor Keith Martin.

Also, the work on corneal transplantation through Dr Graeme Pollock OAM's leadership in the Lions Eye Donation Service, with the laboratory and clinical work of Professor Mark Daniell.

Some of CERA's greatest achievements have been translating research findings into real improvements in health care and public awareness.

This includes adding sunglasses to SunSmart campaigns, ensuring cigarette packets carry warnings about eye disease and promoting the importance of regular eye exams for people with diabetes.

I hope CERA continues to be one of the world's leading eye research institutes and provides strong leadership, particularly across the Asia–Pacific region.

It has been a World Health Organization Collaborating Centre for its entire existence, and I hope it continues to share its expertise on a global scale.

Eyecare today is completely different from what it was 30 years ago, and 30 years from now it will be different again. At CERA today, gene therapy and artificial intelligence research are transforming how we protect people's vision.

I hope CERA continues to stay at the cutting edge, inspiring and supporting young people with new ideas and supporting their research that leads to real, positive changes in people's sight and their lives.

Professor Hugh R Taylor AC

↑ **30 years: (from left) Professor Keith Martin and Professor Hugh R Taylor AC.**

2025 snapshot

$4.07M
IN DONATIONS AND BEQUESTS

$3.34M
IN PHILANTHROPIC GRANTS

226
RESEARCH PUBLICATIONS

CERA and Cerulea clinical research

3950
PARTICIPANTS

146
ACTIVE TRIALS AND CLINICAL RESEARCH STUDIES

88
STUDIES INVOLVING AN INTERVENTION OR INVESTIGATIONAL TREATMENT

$3.02M
IN GOVERNMENT GRANTS

Vision Science Innovation Alliance launched

Publication

OF CERA'S CONSUMER RESOURCES AUDIO AND VIDEO LIBRARY

NHMRC Investigator Grants

FOR PROFESSOR ROBYN GUYMER AM AND ASSOCIATE PROFESSOR LISA ZHUOTING ZHU

Lions Eye Donation Service

COORDINATED DONATIONS FROM 331 DONORS

FOR...

318

CORNEAL TRANSPLANTS

AND...

520

SCLERA SURGERIES

WITH ...

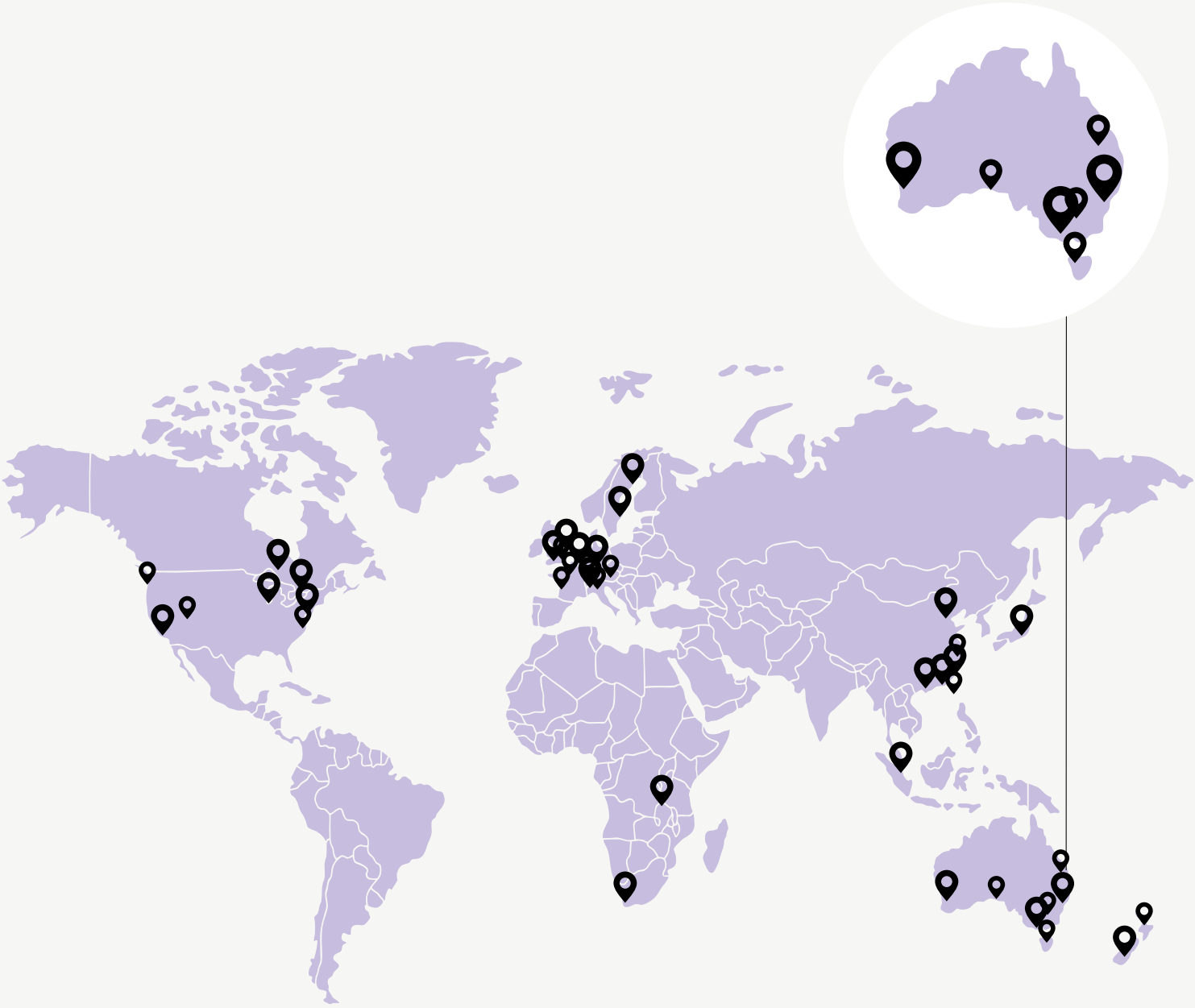
86

ALLOCATED TO RESEARCH AND TRAINING

$5.5M

IN SEED FUNDING FOR MIRUGEN

Our global partners



We forge collaborations with universities, businesses and research institutes from across the globe who share our mission of preventing vision loss and restoring sight.

Worldwide

Agency for Science, Technology and Research Singapore (Singapore)

Aier Eye Institute (China)

Anglia Ruskin University (UK)

University of Auckland (NZ)

University of Birmingham (UK)

University of Bonn (Germany)

University of Bordeaux (France)

Université de Bourgogne (France)

University of California (USA)

University of Cambridge (UK)

University of Cape Town (South Africa)

Capital Medical University (China)

Cardiff University (UK)

Cha University Bundang Medical Center (South Korea)

University of Chemistry and Technology, Prague (Czech Republic)

Cleveland Clinic (USA)

University of Cologne (Germany)

Columbia University (USA)

University College London (UK)

Complutense University of Madrid (Spain)

University of Copenhagen (Denmark)

Doheny Eye Institute (USA)

Duke University (USA)

University of Frankfurt (Germany)

Ghent University (Belgium)

Guangdong Academy of Medical Sciences (China)

Hadassah Medical Centre and the Hebrew University of Jerusalem (Israel)

Harvard University (USA)

University of Heidelberg (Germany)

Hong Kong Polytechnic University (Hong Kong)

The Institut national de la santé et de la recherche médicale (France)

Jinan University (China)

Johns Hopkins University (USA)

Kamuzu University of Health Sciences (Malawi)

Karolinska Institutet (Sweden)

King's College London (UK)

Kobe University (Japan)

KU Leuven (Belgium)

University of London (UK)

McMaster University (Canada)

Medical University of Vienna (Austria)

Michigan State University (USA)

University of Milan (Italy)

University of Montreal (Canada)

Moorfields Eye Hospital (UK)

University of Murcia (Spain)

Nanjing Medical University (China)

National Cheng Kung University (Taiwan)

National Eye Institute (USA)

National Taiwan University (Taiwan)

National University of Singapore (Singapore)

University of Otago (New Zealand)

University of Oxford (UK)

University of Pisa (Italy)

Queen's University Belfast (UK)

Radboud University Medical Center (The Netherlands)

Riken University (Japan)

Shanghai Jiao Tong University (China)

Singapore National Eye Centre (Singapore)

Southern Medical University China (China)

Stanford University (USA)

Stockholm University (Sweden)

Sun Yat-Sen University (China)

Taipei Medical University (Taiwan)

Thomas Jefferson University (USA)

University of Toronto (Canada)

Tsinghua University (China)

UMass Chan Medical School (USA)

Umeå University (Sweden)

Ulster University (UK)

University of Utah (USA)

University of Washington (USA)

Wayne State University (USA)

Weill Cornell (USA)

Zhongshan Ophthalmic Center (China)

...and more

Australia

University of Adelaide (SA)

Alfred Health (VIC)

Austin Health (VIC)

Australian National University (ACT)

Bionics Institute (VIC)

Flinders University (SA)

The Florey (VIC)

Garvan Institute (NSW)

Lions Eye Institute (WA)

University of Melbourne (VIC)

Menzies Institute for Medical Research (TAS)

Monash University (VIC)

University of New South Wales (NSW)

NSW Health (NSW)

QIMR Berghofer (QLD)

Queensland University of Technology (QLD)

Royal Melbourne Hospital (VIC)

The Royal Victorian Eye and Ear Hospital (VIC)

University of Sydney (NSW)

University of Tasmania (TAS)

WEHI (VIC)

University of Western Australia (WA)

University of Wollongong Australia (NSW)

...and more

Our research pipeline

The Centre for Eye Research Australia has a unique combination of skills, infrastructure and resources to take great ideas from the laboratory through to clinical trials. We do this alongside the right industry partners. Research programs at CERA are at every step of this journey.

Early discovery

Researchers discover more about diseases and the body to find new ways to spot and treat conditions.

Glaucoma research
Understanding tunneling nanotubes in early glaucoma

Design and proof of concept

Researchers have a great idea for a device or treatment and take the earliest steps to making it a reality.

Delivery device
Electrical stimulation device for enhancing retinal cell transduction

One Right Eye
Revolutionising ophthalmology patient education

Adara Bio
RNA editing for inherited retinal diseases

OcuSwitch
Eye-drop activated gene therapy

Research prototyping and validation

Researchers develop the earliest working version of the device and validate a drug's effectiveness.

Pilot trials and lead discovery

After refining their work, researchers test the earliest form of their device or drug in models.

Oculomics
AI-powered screening tool using retinal imaging

Enlighten Imaging
Retinal hyperspectral imaging to detect eye, brain and other diseases

Hygelix
Biodegradable hydrogel to aid corneal surgeries

Device prototype and preclinical development

Rigorous development of the device or treatment makes sure it is safe, effective and the best it can be.

Mirugen
Reprogramming Müller glial cells to regenerate photoreceptors

Clinical trials and development

After meeting the highest standards for safety and effectiveness, new treatments and devices are tested in clinical trials.

Retinal Thermofusion
A new method of retinal detachment repair

Oculo (sold to Revenio in 2021)
Teleophthalmology and clinical communications platform

Launch

New treatments are launched to make healthcare better.

Taking flight

"I'm blind, but I wish I could fly, that is my dream."

– Lani Dinh

Lani Dinh was diagnosed with glaucoma in her early 30s – just as her first son had turned two.

"My sight faded quietly," she says.

"Everything looked cloudy, like a thin curtain slowly being pulled across my world.

"I had to grieve the life I once knew, while learning to rebuild anew – a woman rediscovering my strength."

It revealed a resilience Lani didn't know she had. As well as continuing her career in tourism and advocating through social media, she has become competitive in low-vision tennis, basketball and golf, and is now working towards a skydiving licence.

"I'm blind, but I wish I could fly, that is my dream," she says. "I live with glaucoma, but I refuse to live small."

Lani became a member of CERA's Consumer Program to seek a deeper understanding of research. Her involvement has made her feel less alone.

"Research represents hope – not just for me, but for others who may face this diagnosis in the future."

← **Big dreams: Lani Dinh (left) is passionate about adventure, research and her children (from left) Henry and Ethan.**

Primed for success

Years of collaboration with CERA have led Professor Pete Williams to move to Melbourne to continue his pioneering research.

Current treatments for glaucoma focus on reducing elevated pressure placed on retinal ganglion cells – the cells in the eye that die off as the disease progresses. However, no current treatment directly supports the survival of these cells.

It's a challenge that Professor Pete Williams, founder of CERA's new Neuroprotection and Repair Unit, is working to change.

"It's very much like how healthy eating and exercise will reduce a person's risk of developing many diseases, but will not cure the disease directly," Professor Williams explains.

"Using eye drops or surgery to reduce pressure in the eye reduces the risk of cells in the eye dying, but this alone isn't enough to fully prevent their loss."

Professor Williams' research aims to transform the way glaucoma is managed and continues his already long-standing close collaboration with CERA.

Power boost

Professor Williams' work focuses on finding better ways to help retinal cells stay alive by supplying them with the energy they need to function.

In glaucoma, this led him to nicotinamide – a form of vitamin B3 that is crucial to the proper function of retinal ganglion cells.

Together with colleague Dr Flora Hui, he has spent several years investigating whether nicotinamide provided alongside current glaucoma treatments can support nerve cell function in the eye.

This extra energy that nicotinamide provides aims to gives cells a major boost and helps keep them alive alongside current glaucoma treatments to protect people's vision for longer.

Early research, including a 2020 study showing "significant improvement" in the visual function of glaucoma patients, has now progressed to a longer-term clinical trial at CERA. If successful, it could represent a major shift in how the condition is treated.

Beyond nicotinamide, Professor Williams' long-term goals include developing prescription medications for glaucoma and, eventually, gene therapies that can prevent vision loss at all stages of the disease.

His work may also have applications in other conditions where brain and nerve cells die including Alzheimer's, Parkinson's, and motor neurone disease.

Close ties

In 2025, Professor Williams announced he would relocate to CERA from Karolinska Institutet to establish the Neuroprotection and Repair Research Unit and take his research to the next stage.

He will continue studying the root causes of glaucoma and exploring new treatments that support the survival of retinal cells to protect vision.

Professor Williams is enthusiastic about what lies ahead.

"I think we're very close to having realistic drug therapies for glaucoma that don't just aim to lower pressure in the eye," he says.

"I also believe we are close to testing gene therapies that can protect the retina and optic nerve long term from a single injection.

"We're also finding new ways to do clinical trials much more quickly – I think ophthalmology research is going to really jump into the information age where things can go so much faster."

Professor Williams has collaborated with CERA researchers throughout his international career and is excited to continue this under the same roof.

"This is an excellent place to work closely alongside a wide array of researchers – all experts in their respective fields – and accelerate each other's work towards having an impact on the lives of people at risk of losing their vision," Professor Williams says.

"It's a fantastic environment where I can expedite findings from the bench to the clinic all in one house, the cherry on top being that I'm in a warm, sunny, friendly city."

Professor Williams' work is supported by the CERA Foundation.

↑ **Powering cells: Professor Pete Williams is finding ways to support cells to beat glaucoma.**

Saving sight after stroke

CERA scientists are investigating how to reverse permanent vision loss caused by stroke. Their work may, for the first time, offer a pathway to saving the sight of stroke survivors.

PhD student Jesse Gardner-Russell and his supervisor Associate Professor Luis Alarcon-Martinez in the Visual Neurovascular Unit are investigating the role blood flow through microscopic structures in the eye plays in stroke.

The tiny tubes, known as interpericyte tunnelling nanotubes, connect specialised cells in the eye.

They carry messages and proteins, plus share information which helps ensure that the neurons of the retina get enough energy to sustain vision.

When a stroke interrupts blood supply to the eye, these nanotubes rupture. Gardner-Russell's research aims to find out how to stop this, and if they can be regrown.

Restoring blood flow

Using laser scanning microscopy to image the living retinas of mice, Gardner-Russell demonstrated the impact changing blood flow to how these tubes function.

They found that if blood flow was restored after a 60-minute stroke, the nanotubes were able to regrow after one week.

More severe damage caused by transient stroke, was also able to be prevented.

But permanent loss of blood flow was catastrophic – and led to near total elimination of the nanotubes in the retina.

"How quickly blood flow returns is the critical factor," says Gardner-Russell.

"This is where our research intersects with the way stroke is managed."

Retinal energy

The retina is the most energy-consuming tissue in the human body relative to its size.

It must continuously convert light into electrical signals, pass them through complex neuronal circuits, and transmit the resulting information along the optic nerve to the brain.

"A huge amount of energy is required to constantly make this happen, but energy is a finite resource in our body," Gardner-Russell says.

"Mammals have developed an important mechanism, almost like an electricity grid. The body reallocates energy to where it's needed in real time. When you flash a light, the retina needs more blood, and nanotubes are what helps coordinate that response.

"After a stroke and these nanotubes rupture, that system is lost.

"Even though there's still blood flowing it's no longer getting dynamically allocated so over time, this can contribute to poor visual outcomes because the neurons are slowly starving.

"We hope this research can provide a way to help fix that mechanism after a stroke – and potentially promote better visual recovery."

This is part of a broader mission within the Visual Neurovascular Research lab, which is investigating how blood is distributed across the retina and what happens when that distribution breaks down.

The work spans conditions including glaucoma, diabetic retinopathy, age-related macular degeneration and ischaemic retinopathy – conditions that together affect over 800,000 Australians and 150 million people worldwide.

The potential applications of nanotube research reaches beyond the eye and has recently been identified in neurons in the brain as well.

"We want to understand what makes them grow, what makes them break and how many you might need," Gardner-Russell says.

"Initially we thought more would always be better – but we now think it's about having them in the right places, not just having more."

Gardner-Russell is committed to finding solutions, particularly after learning a former colleague had suffered a stroke.

Messages from stroke survivors and their families, many reaching out after hearing him speak about his research on the ABC, added further weight.

"It hit home that there are people out there living this and needing this research," he says. "It gives me extra motivation because it feels I am contributing to something bigger."

↑ **Tunnelling deeper: (from left) Associate Professor Luis Alarcon-Martinez and PhD student Jesse Gardner-Russell are working to preserve vision after a stroke.**

Lived experience meets innovation

Collaboration between researchers and consumers is aiming to transform diabetes screening nationwide.

Steffenie Langby has a common, early-stage form of diabetic eye disease, and is adamant that more needs to be done to bridge the access gap for people living in remote communities.

"We know that vision loss from diabetes is preventable with early detection and timely management, however screening rates for the disease remain low," she says.

As a member of CERA's Consumer Program, she is working alongside Associate Professor Lisa Zhuoting Zhu, CERA's Head of Ophthalmic Epidemiology, on the development of an artificial intelligence (AI)-powered camera that aims to predict the onset of diabetes and cardiovascular disease.

With Dr Wenyi Hu, Associate Professor Zhu is currently working towards implementing this innovative technology into GP and other primary care clinics where it could reduce the barriers to accessing care.

"Steffenie has generously served on our advisory board for this project, providing invaluable consumer-informed insights and is helping shape the long-term vision of the program," says Associate Professor Zhu.

"The beauty of incorporating a consumer voice like Steffenie's in a grant application is that it grounds the project in lived experience.

"It allows us to reframe the research around genuine unmet needs and real-world challenges, ensuring the proposal is not only scientifically rigorous but also meaningful and relevant to those it aims to serve."

Rural access

Steffenie hopes the technology will reduce the burden of diabetes across the country.

"Early identification of this condition could make a huge difference to outcomes for many people, I'm really committed to making this technology accessible for people in rural and underserved communities, as well as for those people that find the current testing cost a burden," says Steffenie.

So far, Steffenie has advised CERA on the remote use of technology where access to the internet could be difficult and supported the writing of a grant submission.

→ **Consumer view: From her Queensland home, Steffenie is making a valuable contribution to CERA research.**

Natural wonders

Several long-term research participants – Helmut and Josephine Weigold, Deirdre Casey and Rodney Bayley – have played crucial roles in advancing understanding of how age-related macular degeneration (AMD) progresses.

Together, they have contributed a combined 38 years with the Macular Research Unit, providing decades of data that have helped drive groundbreaking discoveries to improve outcomes for people with AMD.

Alongside the 5800 participants who have taken part in natural history studies of the condition at CERA since 1997, their contributions have transformed how AMD is understood and treated.

This has included treatments for the wet form of AMD, genetic links associated with the disease, and a greater understanding of risk factors associated with developing the disease.

Helmut and Josephine now think of the team at CERA as family after being involved in AMD research since 2014.

“After my wife Josephine was told she could have AMD by our optometrist, we were inspired to contact the team at CERA,” says Helmut.

Helmut says that they have been involved in various clinical trials – him initially as part of control groups and Josephine as part of treatment groups.

“For Josephine, the team at CERA picked up the very beginnings of bleeding in her retina which indicates wet AMD. This has now progressed to where she can no longer drive, which is a loss of freedom for her,” says Helmut.

Continued page 22

← **Legacy of impact: (from left) Josephine Weigold, Deirdre Casey, Rodney Bayley, Senior Trial Coordinator Emily Caruso and Helmut Weigold.**

From page 21

CERA has contributed to changing the future for people diagnosed with wet AMD. The first industry sponsored clinical trial conducted in the Macular Research Unit tested a first drug treatment for the condition.

After that initial study, others followed that led to the eventual approval of a drug that was transformative for patients who previously had no effective treatment options.

But for both Helmut and Josephine, being involved in AMD research is about helping others.

"We know that this research is important to help others. We have lost count of how many times we've participated, but we are always glad we do and always feel like we're part of something bigger than ourselves."

Deputy Director and Head of Macular Research Professor Robyn Guymer AM says people like Helmut and Josephine make better treatments possible.

"The time, generosity and willingness to participate in research is what makes it possible for us to study AMD, how it progresses and test new treatments," Professor Guymer says.

"The many people who have participated in research, particularly those who have come back year after year, have helped transform how the condition is managed for thousands all over the world."

Benefits for all

Deirdre Casey, who also has AMD, feels the same as Helmut after being involved in CERA's research for close to 20 years.

"My grandmother was blind, and my mother had sight issues. When my sister was diagnosed with wet AMD in 2005, I asked an ophthalmologist friend who I should see and he said Robyn Guymer – at that stage not even a professor," says Deirdre.

"Early on, Robyn asked if I would be interested in joining a clinical trial."

Deirdre has been involved with AMD research since then, and her late husband was also involved. He was a scientist and they both felt that supporting research was very important.

"From research comes improvement and benefits for all."

The technology used to monitor the condition has contributed to research.

OCT imaging provides a detailed view of the retina, enabling researchers to track disease progression.

Over the last 30 years these devices have gone from a groundbreaking invention offering an unprecedented view of the eye, to a standard tool of optometry, ophthalmology and research.

The device is fundamental to AMD research at CERA.

Deirdre continues to be excited to be involved in AMD research after all these years.

"It's so crucial, necessary and interesting," she says.

Rodney has been involved in AMD research for six years. After being diagnosed, his doctor suggested he might like to get involved in research trials.

"I decided to get involved, not for treatment, but to help others," says Rodney.

"What I love about being involved is the sense of community – coming in to see everyone. They always ask: 'how's your little granddaughter?'

"I remember when I started getting involved that we were rejoicing with now Senior Trial Coordinator Emily Caruso, that I was going to have a grandchild, and then Emily excitedly said to us, 'I'm pregnant too'.

"All of a sudden we were hugging each other," he says.

In 2025, the earliest treatments for the dry form of late-stage AMD were approved in Australia – another significant milestone in improving outcomes for people with vision loss and continuing the journey towards life-changing outcomes for people diagnosed with the condition.

Rodney has now retired after 50 years of working in retail, and has also retired from marathon running, but continues to run for mental health and fitness.

"My AMD has progressed in the last six months, so when I go for a run, I need to remember where the tree roots are to not fall over."

"But this research is much bigger than me. It's about helping someone down the track who needs it."

↑ **Partners in sight: Senior Trial Coordinator Emily Caruso and Rodney Bayley.**

Defining year for macular research

Important discoveries, landmark treatment approvals and new funding have made the past year one of the most significant yet for age-related macular degeneration research.

The global Synergy High Risk Age-related Macular Degeneration (AMD) Study – led by CERA's Head of Macular Research Professor Robyn Guymer AM – has pinpointed the specific genetic changes that increase the risk of severe, sight-threatening forms of AMD.

Results from the five-year project, with collaborators from WEHI and the University of Melbourne, are providing promising new targets for treatments for the most severe forms of macular degeneration including geographic atrophy.

The research revealed specific genetic factors linked to the presence of reticular pseudodrusen – deposits which drive vision loss and are found on the retina of up to 60 per cent of people with advanced AMD.

Published in the journal *Nature Communications*, their findings pinpointed a key difference in genetic changes that are associated with additional deposits of reticular pseudodrusen in a type of AMD – finding a strong link with genetic variations on Chromosome 10 but no link to other well-known AMD genes changes on Chromosome 1.

Professor Guymer said the results highlight that AMD is not a single disease but a group of related conditions potentially requiring tailored treatment approaches.

"Reticular pseudodrusen deposits, visible in eye scans, have been linked to worse visual function and poorer treatment outcomes," she says.

"Our research has now identified which of the genetic changes appear to be driving this more serious form of AMD.

"This discovery provides a crucial lead for developing new drugs that target these changes – potentially preventing vision loss before it begins."

The research collaboration which brought together researchers and clinicians from a wide array of disciplines – coordinating data from participants all over the world – was funded by a National Health and Medical Research Council (NHMRC) Synergy Grant.

Major steps

The year also marked a turning point for patients with geographic atrophy – the dry form of late AMD – after Australia's Therapeutic Goods Administration approved the first, then the second, treatment for the condition.

Professor Guymer led the Centre for Eye Research Australia's site of the international clinical trial into the first new drug and was on the global advisory committee for the pharmaceutical company Apellis.

The Phase 3 OAKS and Derby studies demonstrated that regular eye injections with pegcetacoplan slowed down the growth of lesions in which the retina's light-sensing photoreceptor cells die.

"The approval is a game changer for the treatment of geographic atrophy and brings hope to tens of thousands of Australians who have been waiting for a treatment," Professor Guymer says.

Professor Guymer says the approval is a positive first step, with scientists now hoping to continue research which aims to find ways of preventing damage before it occurs.

In 2025 Professor Guymer was also awarded a five-year Investigator Grant by the NHMRC – allowing her to further CERA's research into the early detection and treatment of AMD.

With this NHMRC investment, Professor Guymer aims to advance research focused on detecting and treating AMD in its earliest stages.

"This remains our goal – to stop AMD before it threatens sight. To do this we need to understand exactly what causes it and move to find new targets for future treatments."

↑ **Synergy team: (from left) Associate Professor Zhichao Wu, Professor Alice Pébay AM, Professor Robyn Guymer AM, Professor Erica Fletcher, Professor Melanie Bahlo AM, Dr Brendan Ansell and Associate Professor Carla Abbott.**

Boost for cell reprogramming

Mirugen, a biotech spin-out from CERA, has received new investment to bring a new treatment for retinitis pigmentosa closer to clinical trial.

The $4.5 million seed funding from a group of investors that includes the University of Melbourne's Genesis Pre-Seed Fund, Tin Alley Ventures and Brandon Capital, brings Mirugen's total investment up to $7 million.

Established in 2022 after participating in the federally funded CUREator incubator, Mirugen is developing a breakthrough cell reprogramming therapy designed to regenerate damaged photoreceptors in the retina.

The company was incubated at CERA by Professor Raymond Wong, Head of Cellular Reprogramming, and is using engineered viruses to activate the eye's own stem cells.

"Cellular reprogramming is a technology which allows you to control genes to determine how cells behave," Professor Wong says.

"Mirugen's research is using cutting-edge techniques to identify the optimum set of factors to ask one cell type in the eye to become another."

The approach is aiming to unlock the regenerative power of the retina's stem cells to reverse and prevent damage to the light-sensing photoreceptors in the eye.

The initial target for the new therapy will be the inherited retinal disease, retinitis pigmentosa, which affects more than 1.5 million people worldwide.

However, it could also benefit up to 190 million people living with other diseases caused by damage to photoreceptors such as age-related macular degeneration and Stargardt's disease.

Greater impact

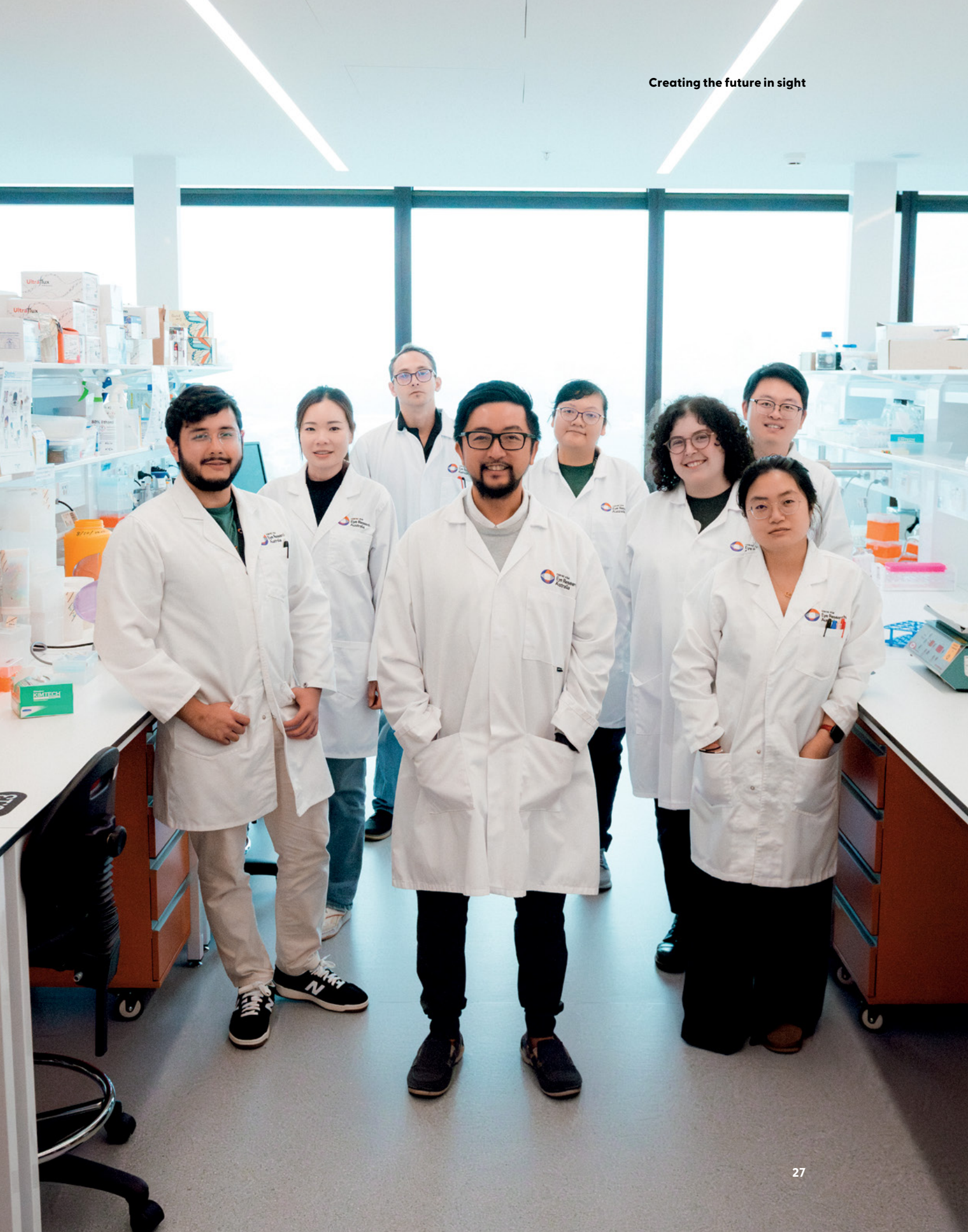
CERA's Managing Director Professor Keith Martin, who is also a co-founder of Mirugen, says the latest investment will help move the treatment towards the clinic.

"The latest funding round demonstrates the critical role of seed investors in supporting innovation in medical research and strengthening partnerships between industry and academic researchers."

He says partnering with industry was a key part of CERA's strategy to increase the impact of its research through innovation.

"We want to help our scientists move their research from the lab to the clinic where it can make a real difference for people with eye disease."

→ **Reprogramming cells: (from left) Dr Daniel Urrutia-Cabrera, Stephanie Chu, Pierre Wagstrom, Professor Raymond Wong, Stacy Cat Binh Nguy, Genevieve Huppert, Zach Wang and Jane Wu.**


Ultraflux
KIMTECH

Tiny particles transform treatments

An innovative project is exploring whether exosomes – tiny particles made by our own cells – could become powerful vehicles for delivering future treatments for macular diseases.

Getting treatments to the light-sensing retina is one of the biggest challenges in eye research.

For conditions such as macular telangiectasia (MacTel) type 2 and Stargardt's disease, this challenge is ever greater. Treatments must reach specific cells in the macula – the central region responsible for detailed vision – with high precision.

At CERA, Dr Sushma Anand is investigating whether the body's own communication systems can be harnessed to overcome this challenge.

Her work focuses on exosomes as a natural and adaptable delivery system capable of carrying a wide range of treatments directly to affected cells in the retina.

"Exosomes are natural – produced by every one of our cells throughout our body, including in our eyes," she says.

Although extremely small, exosomes can carry proteins, genetic material and other molecules from one cell to another.

Dr Anand describes exosomes as "a tiny delivery truck capable of transporting everything from small letters to large packages".

Exosomes already play a key role in normal cell to cell communication and are therefore well tolerated by the body.

In the laboratory, the team can also modify them to interact with specific cell types in the eye, making them a promising natural delivery system for treatments targeting the retina.

Destination macula

Dr Anand's research focuses on MacTel type 2 and Stargardt's disease – two macular conditions for which there are currently no approved treatments.

MacTel type 2 is a rare, progressive macular disease that usually develops in mid to later adulthood and affects both eyes.

It involves changes to Müller cells in the macula, and defective delivery of energy to retinal cells, leading to gradual damage of light-sensing retinal cells and loss of central vision over time.

Stargardt's disease is an inherited retinal disease that causes a gradual loss of central vision, often beginning in childhood or young adulthood.

It is caused by changes in genes that affect how retinal cells function, most commonly the ABCA4 gene, leading to progressive damage of the macula.

For people with MacTel, the retina has low levels of the amino acid serine, which is important for normal retinal cell function. In Stargardt's disease, vision loss is usually caused by genetic changes that can be difficult to address using some existing treatment approaches.

A single natural delivery system could therefore carry very different types of treatments – from small molecules such as serine to larger genetic material.

Dr Anand and her team have shown that exosomes can be prepared, produced and engineered in the laboratory to carry potential treatments.

"We're still at an early stage, but each step brings us closer to understanding how treatments might one day be delivered more effectively to the retina," Dr Anand says.

Although Dr Anand's research is focused on MacTel and Stargardt's disease, she says its potential application may extend beyond these conditions.

"As we learn more, this approach could eventually inform the development of treatments for other retinal diseases."

This work is supported by funding from the Macular Disease Foundation Australia.

↑ **Tiny messengers: Dr Sushma Anand is developing better ways to deliver treatments to the eye.**

Gift of research

When most people think about organ and tissue donation, they picture one person receiving a generous gift that saves or transforms their life.

But at CERA, an extraordinary program is redefining what it means to give, and the ripple effects are being felt by researchers and patients around the world.

The Lions Eye Donation Service (LEDS) has operated at CERA for decades. Cornea donation for transplant remains its primary purpose but its tissue banking program is an increasingly important option for donors and provides samples for eye researchers.

Dr Heather Machin heads LEDS, manages the Biobank, and works on her own research projects in tissue banking and nurse workforce development.

The Biobank, established in 2013 and upgraded in 2021, provides high-quality human samples from consented donors to ethics-approved researchers.

"If you donate your cornea to transplant, you help one person, which of course is amazing," Dr Machin says. "If you donate your eyes to research, you could help hundreds, thousands, or even millions of people in the future."

Transformative donations

Over the past year, the program has tightened its systems, built closer ties with researchers and expanded the reach of donated tissue across Australia and internationally.

LEDS recovers whole eyes, corneas and other eye tissue from donors at end of life, often within hours of death to preserve cellular integrity. The tissue goes into the Biobank – but often leaves within hours or days.

"Researchers frequently need fresh tissue before cells deteriorate, so many of our samples are quickly allocated to approved projects," Dr Machin says.

"A single eye donation can serve multiple purposes. The cornea might go to a corneal researcher, while the remainder goes to a retinal specialist. That same cornea, once a project concludes, may be reallocated to another study entirely, maximising the impact of every gift.

"We also store tissue from people with rare eye conditions for future research. Without the Biobank, many research projects at CERA and beyond simply wouldn't exist. And without human tissue, that research will never reach real people."

Behind the process is a team of donor coordinators who match tissue donations with projects.

"A researcher might need samples from 10 eyes, but five from donors with no eye disease and five from donors who had a particular condition, and then there may be age requirements as well," Dr Machin says.

"It can be quite complicated, so we encourage researchers to be as broad as possible in their criteria."

The team stays in touch with researchers, checking if they are still using the tissue and if it can be passed on to another project. Using donated tissue is also reducing reliance on animal models, something the sector is actively working towards.

The Biobank team is focused on improving data tracking and building greater community awareness that research donation is a powerful way to help others. The service is also exploring how to give donors and their families more visibility over where their gift travels and what it achieves.

"They recognise that at the end of life, helping someone else is one of the most meaningful things you can do," Dr Machin says.

"Many of our donors have lived with eye disease themselves or loved someone who did. Others just want to contribute to something bigger than themselves.

"We are eternally grateful for the contributions donors and their families make."

↑ **Care custodians: (from left) Terry Couper, Dr Heather Machin and Jenna Vartiainen operate the LEDS Biobank.**

Finding answers together

"The strength of a multidisciplinary team is that everyone brings a different perspective to a question."

– Professor Lauren Ayton AM

Understanding the wide variety of inherited retinal diseases (IRDs) requires hundreds of people working closely together.

Beyond researchers themselves – whose varied expertise spans from geneticists in the lab to clinicians – many people diagnosed with these rare conditions contribute to both discovering the genes that cause these conditions and learn how they progress.

The VENTURE Study – a partnership between CERA and the University of Melbourne – has now surpassed 700 people, with 50 unique genes included in the registry.

These people, who have rare conditions like retinitis pigmentosa, Usher syndrome and Stargardt's disease, and their family members – who may be genetic carriers – are together improving how IRDs are understood. This is helping others with these conditions receive an accurate diagnosis, and making it possible for new treatments to be trialled earlier.

CERA Deputy Director Professor Lauren Ayton AM, who leads the project alongside Head of Retinal Gene Therapy Research Dr Tom Edwards, says one of the most exciting things is how it has enabled an ecosystem of researchers to grow around the participants.

"VENTURE now has a genetic arm, called 'GenoVision', which involves geneticists, molecular biologists, variant curators, bioinformaticians and pathology collectors," Professor Ayton says.

Continued page 34

← **VENTURE team: (from left) Lea Lim, Livia Carvalho, Rebekah James, Ceecee Britten-Jones, Jay Dennis, Lauren Ayton, Maria Kolic, Ivan Volkov, Parker Truong, Elise Cichello, Jonah Marcantelli, Mindy Marcantelli, Lachlan Knight, Adelaide Marcantelli, Sena Gocuk, Gayatri Weeraratne, Bhaj Grewal and Sujani Thrimawithana.**

From page 33

"We work closely on projects for people with dual deaf-blindness, such as Usher syndrome, and so have strong collaborations with other health professions like audiology, speech pathology, neurology and physiotherapy.

"The strength of a multidisciplinary team is that everyone brings a different perspective to a question," says Professor Ayton.

"For example, the work led by Dr Ceecee Britten-Jones to find new IRD genes includes our clinical team, lab scientists, computer scientists and data analysts, all contributing their special skills and views to the project."

Understanding progress

Jonah Marcantelli likes sport, movies and video games – an ideal weekend for him is relaxing on the couch.

"I like Dune a whole lot, I can't wait for the third one," he says.

He was diagnosed with retinitis pigmentosa in 2024, a year after the family moved to Australia from the US, although the diagnosis wasn't completely unexpected.

Jonah's grandfather and great uncle both have retinitis pigmentosa and are legally blind, but the condition wasn't initially apparent among the women in the family.

"We were initially told there was a 50-50 chance of passing the condition onto our children, and we just went with the flow until my sister, who is two years younger than me, was diagnosed – that changed the trajectory of her life," Mindy, Jonah's mum, says.

Mindy has three other sisters who are confirmed carriers – one with severe symptoms and another who has a diagnosed son.

When her siblings were diagnosed, Mindy says there was little support available.

"We felt powerless back then – nobody was sitting us down and asking what we're going to do, how we're going to live our lives and make decisions about starting a family."

Today, the opportunities and information available are very different.

Under the VENTURE Study, Jonah is a part of research monitoring the progression of his condition and is eagerly awaiting the chance to participate in a clinical trial should a treatment become available.

Mindy is also in a carrier study, led by Dr Sena Gocuk, which is working to understand the perspectives of people who carry the genes associated with IRDs, to improve how they receive counselling and support.

The family have seen how diagnosis and monitoring of the condition has changed, and are looking forward to more opportunities on the horizon.

Jonah's sister Adelaide has been inspired by the research and doing work experience with Professor Ayton – she is now considering her own career in research.

"Having the work experience just really opened up my eyes, literally, to see what's really going on in my brother's and all these other people's eyes," Adelaide says.

"Seeing how these people are just trying to help minimise the disease, and after having a feel for it, I want to see how I can help."

Research perspective

Ivan Volkov has a biomedical engineering degree and works as a researcher at an organisation researching workplace mental health.

"I like research for the sake of research, it's interesting and fun to go investigate and explore."

He was only recently diagnosed with retinitis pigmentosa.

"I always had problems with my eyesight, but last year I found I really didn't have any peripheral vision," he says.

He was referred to ophthalmology from his optometrist. With no known family history of the condition, it was genetic testing that confirmed the diagnosis.

"I now know what is happening and what to expect later in life," Ivan says.

After being added to the VENTURE registry, he has also participated in genetic research projects.

"It's all been so fast, super quick and easy, and a lot of explanation along the way to what it all means. I did some clinical trials for my masters' project and it's like, wow, I'm the guinea pig now!"

He says that should a trial for his particular form of retinitis pigmentosa come up, he would take it right away.

"As a participant in the VENTURE Study, I would be notified if there was a trial, and why not? It couldn't hurt."

↑ **Looking for answers: Ivan Volkov is on the VENTURE registry.**

Community powers genetic research

A groundswell of support for inherited retinal disease research has helped establish a new research program led by Dr Jiang-Hui 'Sloan' Wang.

A record-breaking CERA Giving Day and the contributions of donors have brought unique, cutting-edge research back to Australia.

Dr Jiang-Hui (Sloan) Wang – who completed his University of Melbourne PhD at CERA – has returned to Australia from the United States, where he worked as a Senior Research Fellow at the Gene Therapy Center, University of Massachusetts Chan (UMass Chan) Medical School for three years.

Dr Wang now leads CERA's new Ocular Genetic Therapeutics research program aiming to develop new treatments to improve the delivery and efficiency of potential gene therapies for inherited retinal diseases (IRDs) including retinitis pigmentosa, Stargardt's disease and Usher syndrome.

"I'm honoured to be returning to CERA where my career as a vision scientist began," says Dr Wang.

Welcome back

IRDs are conditions caused by a faulty gene that causes cells to not work properly, leading to vision loss.

IRDs that are caused by faults in large genes, like Usher syndrome, were once considered untreatable, but gene therapies that can correct these genes to prevent vision loss are beginning to emerge.

These therapies often require delicate yet invasive injections of harmless viral vectors – known as adeno-associated viruses (AAVs) – to be delivered beneath the retina carrying the corrected gene.

However, there is a limit to how much AAVs can carry. Dr Wang's revolutionary approach uses a less invasive injection to deliver large genes into the eye.

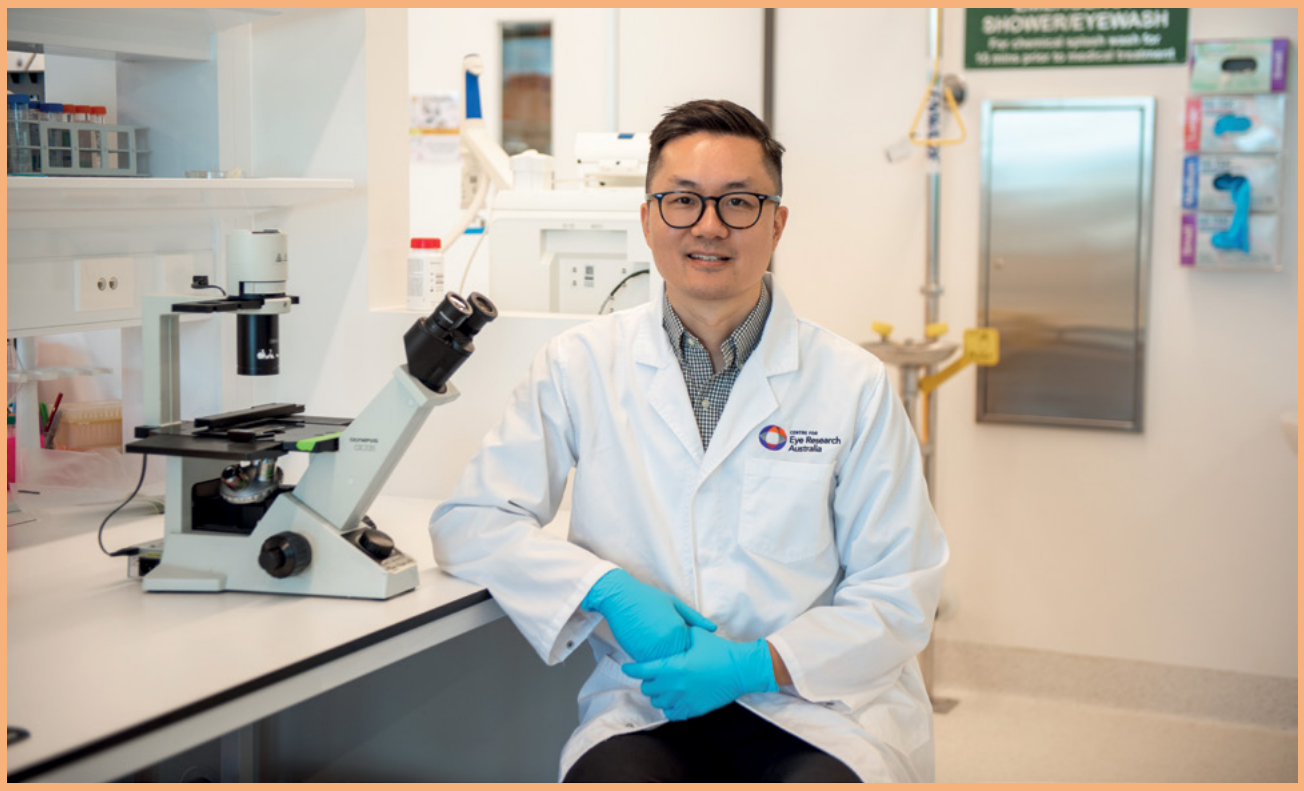
By splitting a large gene, reassembling it inside the retina and delivering it via a specially engineered AAV vector that outperforms those currently used, his aim is to reverse the effects of retinal disease.

Record breaking support

An early focus for Dr Wang this year is research into the development of dual vectors to deliver potential gene therapies to treat blindness in Usher syndrome 1B - an IRD that is characterised by the combination of hearing loss and vision loss.

It's a condition that both Olivia Depares and Louis Shepard have – two young people who both shared their stories and passion for research for CERA's annual Giving Day as advocates of Dr Wang's work.

Thanks to the generosity of an anonymous donor who matched donations on World Sight Day, over $200,000 was raised on the day to support Dr Wang's work.



Dr Wang's unique expertise will make CERA's genetic engineering laboratory one of only a handful worldwide with expertise in developing these next generation of viral vectors.

It is an integral part of efforts across CERA to develop treatments for more IRDs.

"Merging speed, precision and real-world relevance we will not just advance science, it will deliver tangible next generation solutions, turning today's lab innovations into tomorrow's sight-saving treatments," says Dr Wang.

Dr Wang's work is supported by Australian Vision Research, Retina Australia, the Macular Disease Foundation of Australia and the DHB Foundation.

↑ **Community support: Dr Jiang-Hui (Sloan) Wang is returning to CERA to continue his gene therapy research.**

→ **Winning the fight: Olivia Depares' advocacy for research rallied supporters.**

New alliance driving vision research

The Vision Science Innovation Alliance is bringing together vision research, clinical care and clinical trials within Melbourne's biomedical precinct to support the discovery and implementation of new treatments.

In vision research, the journey from laboratory discovery to patient care can be long and complex. The Vision Science Innovation Alliance (VSIA) was established to address this challenge by supporting vision science from idea to impact.

Working across four focus areas – collaborative research, translation and scale up of new technologies, partnerships with government and community leaders to support policy and health equity, and talent and training – the alliance connects expertise across the research and care pipeline.

VSIA links organisations with complementary strengths to reduce fragmentation, coordinate work and help research progress into clinical testing and patient care.

The alliance draws on vision science expertise within Melbourne's biomedical precinct, spanning discovery research, clinical insight, trials infrastructure, training and care.

These partners include CERA, Cerulea Clinical Trials, the University of Melbourne, The Australian College of Optometry / National Vision Research Institute and affiliate partner The Royal Victorian Eye and Ear Hospital.

More than 13 million Australians live with one or more chronic eye conditions, and over 500,000 experience vision impairment or blindness. While most vision loss is preventable or treatable, many people remain undiagnosed or without access to appropriate care.

VSIA works to remove barriers between research, clinical practice and trials by supporting coordination across research, trials and care.

Professor Keith Martin, Managing Director of CERA and Head of the University of Melbourne Department of Ophthalmology, chairs the alliance's steering committee.

"Vision research doesn't move forward in a single step," Professor Martin says.

"We have a concentration of vision science expertise within the biomedical precinct, covering discovery research, clinical care and trials.

"Bringing that capability together through the alliance makes it easier to move research into real-world application."

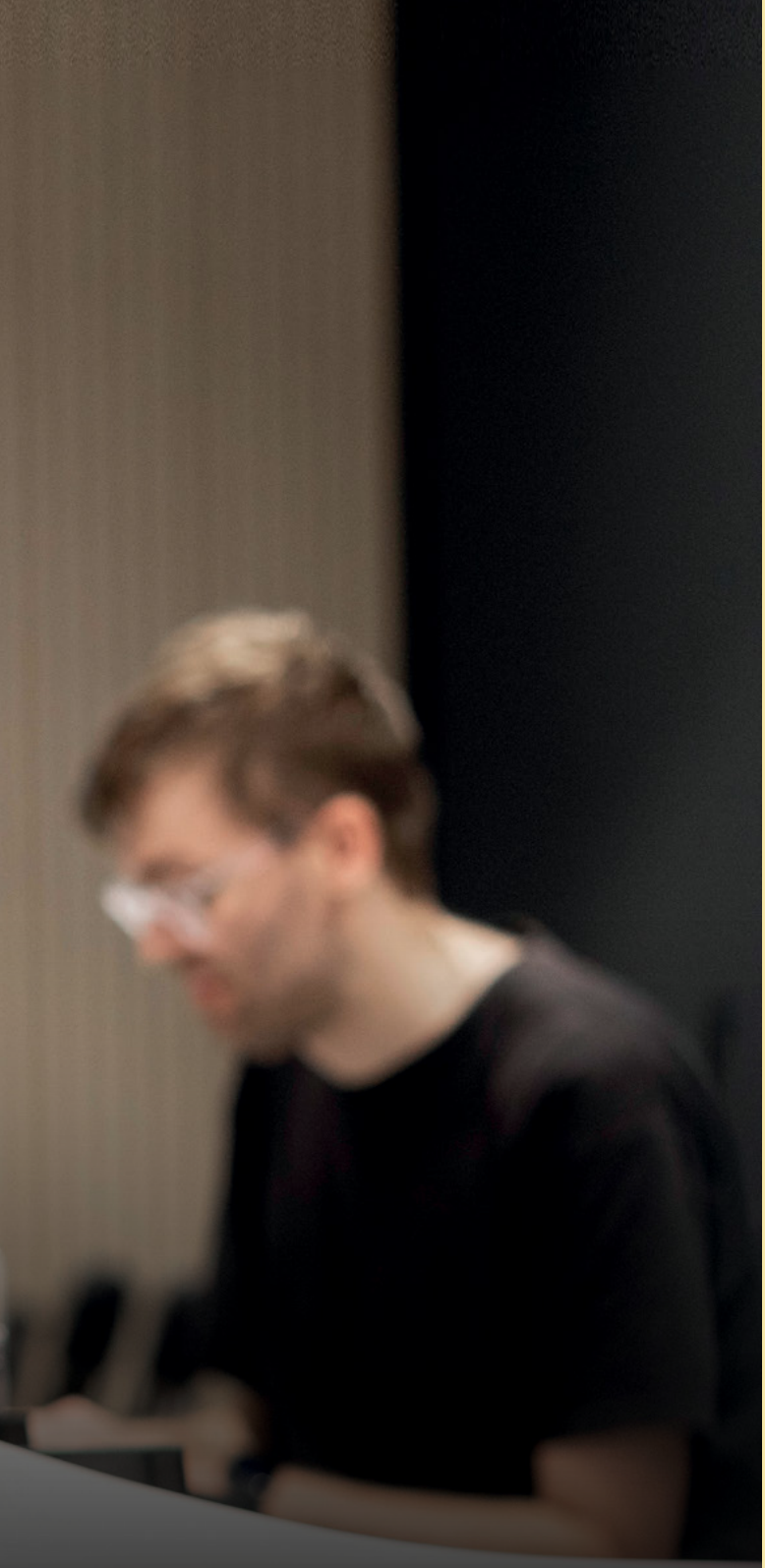
The alliance was launched in October 2025 at CERA's Vision Expo by the Hon. Danny Pearson, MP, former Victorian Minister for Economic Growth and Jobs. The event brought together researchers, clinicians and people with vision loss.

"This alliance puts patients at the heart of everything we do," says Professor Lauren Ayton AM, CERA Deputy Director and Associate Dean of Innovation and Enterprise at the University of Melbourne's Faculty of Medicine, Dentistry and Health Sciences.

"By working across research and clinical care, and informed by lived experience, we can focus on challenges that matter most."

↑ **L-R (back row) Duncan Peppercorn (Board Chair, Centre for Eye Research Australia), Pete Haydon (CEO, Australian College of Optometry), Emily Shepard (CEO, UsherKids Australia), Danny Pearson (then Victorian Minister for Economic Growth and Jobs), Louis Shepard, and L-R (front row): Mike McGuckin (Acting Dean, Faculty of Medicine, Dentistry and Health Sciences), Keith Martin (Managing Director, Centre for Eye Research Australia), Lauren Ayton (Associate Dean Innovation and Enterprise, Faculty of Medicine, Dentistry and Health Sciences), Adele Hosseini (former Interim CEO, Cerulea Clinical Trials), and Melanie Eagle (Board Chair, The Royal Victorian Eye and Ear Hospital).**

Seeing progress



"If someone could be in a trial, I think they would be happy if they tried it."

– Benny Zhou

Benny Zhou's vision loss came on suddenly at the worst possible time.

"I was driving on the road and suddenly I couldn't see," he says. "I had a very bad headache, and I was very upset."

After heading straight to hospital, Benny was diagnosed with vision loss associated with his diabetes and quickly put on a course of injections.

"I was told that they do testing of treatments at Cerulea Clinical Trials, and asked if I would like to contribute," he says. "I was happy to do that."

Since then, he has been coming into Cerulea at regular intervals as part of a clinical trial.

A fully owned, not-for-profit subsidiary of CERA, Cerulea continues to grow its footprint as a hub for ophthalmic clinical trials in Melbourne.

Study Coordinator at Cerulea Clinical Trials Lin Lin says people like Benny who participate in research make an invaluable contribution.

"Participants help researchers better understand the condition and how different patients respond to treatment," says Lin.

"Their involvement allows new therapies to be tested for safety and effectiveness, helping improve and develop better treatments for future patients."

Benny recommends that more people should participate in research. "Everyone is very friendly and nice – it makes me happy to be a part of," he says.

← **Better treatments: Trial participant Benny Zhou would recommend more people take part in research.**

Hand-in-hand with families

When vision loss happens suddenly – as it does with Leber hereditary optic neuropathy (LHON) – the impact can be profound.

This rare mitochondrial genetic condition that affects the optic nerve causes rapid, severe central vision loss, often in early adulthood. It leads to life-changing impacts on daily living, emotional wellbeing and independence.

Because LHON is inherited through the mothers' line and affects each carrier differently, families often face uncertainty about who may be impacted and when.

"There is a ripple effect with LHON," says Dr Sandra Staffieri AO, Research Fellow from the Clinical Genetics Unit at CERA.

"It not only impacts the person who experiences the sudden vision loss, but also the people around them – their partner, their mother who feels guilty they have passed the condition on, and their siblings who await potentially the same fate."

CERA's Dr Isabel Lopez Sanchez, Head of Mitochondrial Biology and Disease, says this unpredictability is at the heart of the LHON experience.

"The uncertainty of having the genetic risk creates great anxiety for families, but it also highlights why the researcher-family relationship is so crucial as we need initial detailed information and then follow-up data."

In Australia, this relationship is particularly strong. The national LHON Research Team– including CERA Honorary Professor David Mackey AO – has spent more than 35 years working with over 100 families. It includes CERA's Lisa Kearns, Dr Staffieri and Dr Lopez Sanchez.

Their deep partnership, involving more than 350 people led to their nomination for the Patients Australia Outstanding Patient Research Award for improving diagnosis, counselling and treatment.

"I first encountered a young man who had lost vision from LHON when I was a medical student in Hobart," says Professor Mackey.

"His story stuck with me so eight years later I chose to research the genetics and epidemiology of LHON in Australia as my doctorate thesis with the University of Melbourne."

Family values

Families play an active role in raising awareness and advocating for research, while researchers support them with accurate, contextual information – especially vital in an era where online searches often present confusing or alarming claims.

Recent Australian-led research has helped reshape the global understanding of LHON.

For decades, it was widely believed that half of all men and 10 per cent of women with a LHON genetic change would lose vision.

"Our seminal work showed the actual risk is much lower – one in six for men and one in 20 for women," Dr Lopez Sanchez says.

"The discovery has changed our understanding of LHON and how families are counselled worldwide, reducing fear and providing clarity."

In 2025, the team published two papers emphasising how important accurate genetic counselling can be for families affected by LHON. Their work also aimed to raise awareness of LHON among health professionals and to challenge misconceptions, as the condition can sometimes be mistaken for other eye diseases.

A significant new development is mitochondrial donation, an emerging reproductive technology which can help women with mitochondrial disease have genetically related children with a far lower chance of passing on the condition.

"This technology offers new opportunities for families, and genetic counselling helps them explore their options and feel supported in making family planning decisions that are right for them," Ms Kearns says.

The LHON research team is working closely with Australia's mitoHOPE pilot program, which will begin recruiting participants in late 2026.

↑ **Greater support: (from left) Dr Sandra Staffieri AO, Lisa Kearns and Dr Isabel Lopez Sanchez.**

Reinventing treatment delivery

The eye may be one of the most accessible organs in the body, but getting medicine to where it's needed remains one of medical science's toughest challenges.

A team led by Professor Guei-Sheung (Rick) Liu is working to change that – developing delivery systems that could transform how a wide range of eye diseases are treated.

In 2025, Professor Liu's Genetic Engineering Research Unit became the first to use a tiny particle extracted from blood to deliver medicine directly into a preclinical model of the cornea.

This could pave the way for faster, more effective treatment of corneal injuries.

Corneal injuries – whether caused by trauma, chemical exposure or burns – require immediate treatment to preserve vision and reduce scarring.

Anti-inflammatory drugs delivered via eye drop are a critical first step but are far from ideal.

"When you use an eye drop, less than five per cent of the medicine actually stays in the eye – the rest runs out – so it is not as effective as it could be," Professor Liu says.

To improve this his team looked at platelets – cells in the blood that clump together to heal cuts and prevent bleeding.

When healing wounds, platelets release platelet-derived extracellular vesicles (PEVs) – tiny particles that help with this process.

Professor Liu and his team took these PEVs and loaded them with an anti-inflammatory drug – successfully using them to reduce inflammation.

"They are very small particles that are easily absorbed into the cornea, they naturally occur in the body so won't trigger the immune system, and because they come from blood they are very easy to source," Professor Liu says.

"We also found that platelet-derived extracellular vesicles also help reduce inflammation and promote tissue repair a little just on their own, so they are beneficial in many ways."

While corneal injuries are a start, the team's future research will look at more treatments that could potentially be delivered.

Next-generation

This research is alongside Professor Liu's team's ongoing work to develop a host of ways to deliver new treatments to the eye.

This includes a method of replacing regular eye injections for wet age-related macular degeneration with an eye drop.

His team is also continuing to develop a method of editing RNA – the chemical in the body that ferries instructions from DNA to cells.

This has the potential to treat inherited retinal diseases caused by faults in larger genes – like Usher syndrome – that would otherwise be too large for typical gene delivery.

"Finding treatments and cures for inherited retinal diseases, like Usher syndrome, caused by large-sized gene defects, is urgent and at the forefront of our advancement in the field of research," says Professor Liu.

"With over 300 genes known to be associated with inherited retinal diseases, affecting over two million people worldwide, customised gene editing that achieves safe and effective treatment to prevent vision loss is our priority."

"When you use an eye drop, less than five percent of the medicine actually stays in the eye."

– Professor Guei-Sheung (Rick) Liu

↑ **Urgent delivery: Professor Guei-Sheung (Rick) Liu is finding better ways to deliver drugs and genes through the eye.**

Living legacy to eye research

Peter and Jo Manger have valued community service and always looked to how they can make a meaningful difference in people's lives.

They are now seeing the impact of their legacy after generously transferring a bequest in their will to a living gift to CERA.

The pair came from modest homes, with Peter being the first in his family to go to university, and Jo qualifying as an occupational therapist.

As well as being a stay-at-home mother raising their four children, Jo helped with Meals on Wheels and was an audio reader for the news at Vision Australia for 20 years.

"I became a consulting engineer, then a director for 21 years and a managing director of a large company for six years," says Peter.

He was the project coordinator for the construction of the MCG's light towers and the Great Southern Stand, an ocean yachtsman, and a Rotarian.

As a member of the Rotary Club, Peter volunteered to build a roofing factory in Timor-Leste.

"We also became the largest supplier of water tanks and manufactured several thousand 200 litre tanks to hold grain and prevent losses by vermin. Many of these tanks were gifted to the community," says Peter.

The Manger's giving resulted in the opening of the Manger Laser Room at Cerulea Clinical Trials – which houses two sophisticated lasers used in trials supporting new treatments for age-related macular degeneration (AMD) and choroidal melanoma.

The retinal rejuvenation therapy laser, specifically designed to treat people with AMD, is a unique piece of equipment, made by Australian-owned laser manufacturing company Nova Eye in South Australia.

Currently AMD is the most common cause of vision loss among older people, affecting 1 in 7 people over 50. While methods are available for treating the later stages of the disease to slow vision loss, there is not yet a way to slow progression from the early stages to these late, vision-threatening stages of AMD.

The laser was designed specifically to address this need, with trials delivering a very short and targeted pulse of energy which stimulates an important layer in the retina responsible for keeping photoreceptors alive – the cells required to see.

After first making a bequest in their will to CERA, Peter and Jo then realised that it would be much more satisfying to be able to talk to the recipients and understand the range of projects which need funding.

"Jo had poor eyesight from the age of 10. With cataract surgery in 2021 Jo's eyesight dramatically improved with 20/20 vision in her right eye and she was able to discard her glasses. But her left eye had AMD and she needs regular injections," says Peter.

"It was when we met CERA's impressive Head of Macular Research, Professor Robyn Guymer AM, and understood her important research that we believed our donation to CERA would be well utilised."

Peter and Jo decided to donate now instead of leaving their money to CERA in their will as they can witness their implementation and see the benefits.

"We also receive tax benefits which enables us to give more," says Peter.

"After raising four children Jo and I had enough assets to consider bequests in our wills, and we both strongly believe that those who can do so have a duty to be philanthropic."

↑ **Bright legacy: Peter and Jo Manger see their donations come to life through CERA's laser eye treatments and research rooms.**

Lead researchers

Associate Professor Luis Alarcon- Martinez
Visual Neurovascular Research
BSc, MSc, PhD

Associate Professor Penny Allen
Bionic Eye Project
MBBS, FRANZCO

Professor Lauren Ayton AM
Retinal Gene Therapy and VENTURE Study
BOptom, PhD, FAAO, FACO, GCOT

Professor Michael Coote
Surgical Glaucoma Research
MBBS, MS, FRANZCO, FRACS

Professor Mark Daniell
Corneal Research
MBBS, MS, FRANZCO, FRACS

Dr Thomas Edwards
Retinal Gene Therapy Research
MBBS, PhD, FRANZCO

Dr Jennifer Fan Gaskin
Ocular Fibrosis Research
MBChB, MD, FRANZCO

Professor Robyn Guymer AM
Macular Research
MBBS, PhD, FRANZCO, FAHMS

Dr Xavier Hadoux
Ophthalmic Neuroscience
BSc, MSc, Meng, PhD

Professor Alex Hewitt
Clinical Genetics
BMedSci (Hons), MBBS, PhD

Associate Professor Jwu Jin Khong
Oculoplatic and Thyroid Eye Disease Research
PhD, MMed, MBBS (Hons), FRANZCO, FANZSOPS

Professor Lyndell Lim
Uveitis and Retinal Vascular Disease Research; Chief Medical Officer Cerulea Clinical Trials
MBBS, DMedSci, FRANZCO

Professor Guei-Sheung (Rick) Liu
Genetic Engineering Research
BMedSci, PhD

Dr Isabel Lopez Sanchez
Mitochondrial Biology and Disease
BSc, PhD

Professor Keith Martin
Glaucoma Research
MA, BM, BCh, DM, MRCP, FRCOphth, FRANZCO, FARVO, ALCM

Dr Rod O'Day
Ocular Oncology (Honorary)
MBBS, LLB, BSc, FRANZCO

Associate Professor Ian Trounce
Mitochondria and Neurodegeneration
BSc, PhD

Dr Anna Wang
Visual Neuroscience
BSc(Adv)(Hons), PhD

Professor Raymond Wong
Cellular Reprogramming
B. Biomed Sci (Hons), PhD

Associate Professor Zhichao Wu
Clinical Biomarkers
BAppSc(Optom), PhD, FAAO

Associate Professor Lisa Zhuoting Zhu
Ophthalmic Epidemiology
MD, PhD

For more details about our researchers visit cera.org.au

Our Board

We extend the deepest appreciation to our Board members who give their time and expertise to provide strategic direction and governance to CERA.

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University of Melbourne representative
MBBS, MD FRACS, FAOrthA, FAAHMS, MAICD

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BMedSci, MBBS, PhD, FAA, FTSE, FAHMS

Ebru Davidson
(From September 2025)
BSc, JD (Hons), AGAI, GAICD

Suwanee Dharmalingam
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Nuala Kilgallon
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Professor Keith Martin
MA, BM, BCh, DM, MRCP, FRCOphth, FRANZCO, FARVO, FAAPPO, ALCM

Wendy Miller
(Until August 2025)
BA, LLB (Hons)

Dr Serge Scrofani
BSc (Hons), PhD, MBA, MAICD

Alternate Directors

Professor Robyn Guymer AM
MBBS, PhD, FRANZCO, FAHMS (for Professor Keith Martin from August 2024)

Professor Jenny Wilkinson-Berka
BSc (Hons), PhD (for Professor Peter Choong)

Dr Susan Sdrinis
MBBS, FRACMA, MPH, MHSM, GAICD
(for Simon Brewin)

CERA Executive team

Professor Lauren Ayton AM

Deputy Director

Head of the Vision Optimisation Unit, University of Melbourne

Associate Dean Innovation and Enterprise, MDHS, University of Melbourne

BOptom, PhD, FAAO, FACO, GAICD

Leah Borsboom

Co-Chief Operating Officer and Company Secretary

LLB (Hons), GAICD

Tena Cheng

Co-Chief Operating Officer

LLB, BSc

Fiona George

Executive Manager, Finance

BBus (Acc), CPA, GAICD

Professor Robyn Guymer AM

Deputy Director

Head of Macular Research

Professor of Surgery (Ophthalmology)

University of Melbourne

MBBS, PhD, FRANZCO, FAHMS

Professor Lyndell Lim

(Until October 2025)

Head of Clinical Trials Research

Principal Research Fellow (Ophthalmology), University of Melbourne

MBBS, DMedSci, FRANZCO

Professor Keith Martin

CERA Managing Director, Head of Glaucoma Research

Ringland Anderson Professor of Ophthalmology, University of Melbourne

MA, BM, BCh, DM, MRCP, FRCOphth, FRANZCO, FARVO, ALCM

Rowan Neilson

(Until December 2025)

Executive Manager, Commercialisation and Legal

BSc/LLB (Hons)

Janine Sim-Jones

Executive Manager, Communications, Fundraising and Advocacy

BA (Journ) GradDipPR, GAICD

Abridged financials

CONSOLIDATED STATEMENT OF FINANCIAL POSITION

as at 31 December 2025

	2025 $'000	2024 $'000
ASSETS		
CURRENT ASSETS		
Cash and cash equivalents	1,154	509
Trade and other receivables	2,660	3,844
Other assets	367	458
TOTAL CURRENT ASSETS	**4,181**	**4,811**
NON-CURRENT ASSETS		
Financial assets	26,580	27,989
Property, plant and equipment	13,080	13,454
Right-of-use assets	13,453	13,302
TOTAL NON-CURRENT ASSETS	**53,113**	**54,745**
TOTAL ASSETS	**57,294**	**59,556**
LIABILITIES		
CURRENT LIABILITIES		
Trade and other payables	2,691	3,529
Employee benefits	2,549	2,285
Lease liability	1,376	1,119
TOTAL CURRENT LIABILITIES	**6,616**	**6,933**
NON-CURRENT LIABILITIES		
Lease liability	13,498	13,137
Borrowings	11,079	10,495
Employee benefits	250	272
TOTAL NON-CURRENT LIABILITIES	**24,827**	**23,904**
TOTAL LIABILITIES	**31,443**	**30,837**
NET ASSETS	**25,851**	**28,719**
EQUITY		
Reserves	14,662	21,791
Retained earnings	11,189	6,928
TOTAL EQUITY	**25,851**	**28,719**

CONSOLIDATED STATEMENT OF PROFIT OR LOSS AND OTHER COMPREHENSIVE INCOME

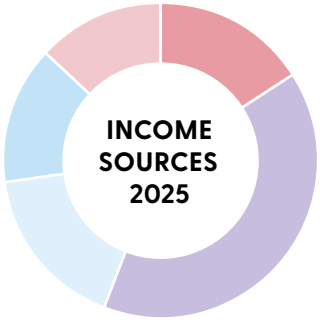
for the year ended 31 December 2025

	2025 $'000	2024 $'000
REVENUE		
Federal and State Government grants	3,016	5,050
Clinical trials and contract research	9,499	8,224
Donations and bequests	4,074	4,181
Philanthropic and other grants	3,335	3,745
Investment and other income	3,047	4,002
TOTAL REVENUE	**22,971**	**25,202**
EXPENSES		
Research expenses	(12,394)	(13,803)
Research support expenses	(8,117)	(7,923)
Occupancy expenses	(624)	(508)
Depreciation	(3,131)	(2,726)
Finance expenses	(1,573)	(1,625)
TOTAL EXPENSES	**(25,839)**	**(26,585)**
NET SURPLUS/(DEFICIT)	**(2,868)**	**(1,383)**

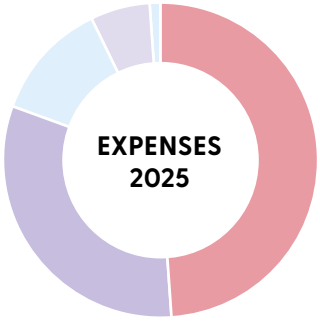
These abridged audited Financial Statements have been extracted from the full audited Financial Statements for CERA and its controlled entities. The full audited Financial Statements can be extracted from the ACNC (Australian Charities and Not-for-profits Commission) website.

CERA operates as a not-for-profit organisation. Accordingly, accumulated surpluses are held as reserves to support future research projects and operations.

Consecutive annual deficits reflect a period of strategic growth, including investment in our not-for-profit clinical trials company, alongside a challenging funding environment for medical research. The Group is actively managing these pressures, with a clear pathway to return to surplus by 2027.



41% Clinical trials and contract research
13% Federal and State Government grants
18% Donations and bequests
15% Philanthropic and other grants
13% Investment and other income



48% Research expenses
31% Research support expenses
12% Depreciation
6% Finance expenses
1% Occupancy expenses

Supporters and acknowledgements

The following generous people and organisations have supported CERA to work towards a world free from vision loss and blindness.

We are grateful for the many generous contributions to our research made by individual donors, along with the support of philanthropic trusts and foundations, industry, government and our member organisations.

Major gifts ($10,000+)

Dorothy Baylis

Peto Bros Pty Ltd

Renate Daniell

Ronald Dennis

Alexandra and Fred Grimwade

Peter Lemon

Sherrill Muir

Fairlie and Dennis Nassau

Sally and Justin O'Day

Jane and Julian Rait, OAM

We also pay tribute to donors who wish for their contributions to remain anonymous.

Trusts and foundations ($10,000+)

The A & E Finkel Foundation Trust

Australian Vision Research

The Angior Family Foundation

APS Foundation

Betty Brenda Spinks Charitable Trust

BrightFocus Foundation

The CASS Foundation

Cuthbertson Family Fund

The Danny Wallis Philanthropic Foundation

DHB Foundation

EQT Foundation

The Felton Bequest

The Glaucoma Foundation

GRAS Foundation

The Harold Mitchell Foundation

H & L Hecht Trust

HCF Research Foundation

The Jack Brockhoff Foundation

Lions 201V3 Ride for Sight

Macular Disease Foundation Australia

Marjorie M Kingston Charitable Trust

Michelmore Foundation

The Millar Foundation

The Peggy and Leslie Cranbourne Foundation

Retina Australia

Ruth Marie Sampson Foundation

Victorian Lions Foundation Inc

Bequests ($10,000+)

Estate of Mavis Mary Ford

Estate of Otto Kohn *to honour the members of the Otto Kohn family who perished in the Holocaust in 1944.*

Estate of Harold Raymond Muir

Estate of Joan Palmer

Estate of Marjorie Roberts

Estate of Edith Taylor

Corporate supporters

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Endowments

We gratefully acknowledge the support of the University of Melbourne in the ongoing management and direction of the following endowed funds to support our research:

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Louisa Jean de Bretteville Bequest

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Ringland Anderson Chair of Ophthalmology Fund

Winifred Hallam Monds Bequest

Government

Breakthrough Victoria

CUREator+ Medical Research Future Fund

Medical Research Future Fund

National Health and Medical Research Council

Victorian Medical Research Accelerator Fund

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Royal Australian and New Zealand College of Ophthalmologists (RANZCO)

The Royal Victorian Eye and Ear Hospital

University of Melbourne

Victorian Lions Foundation

Vision Australia

Partnerships and associations

Aikenhead Centre for Medical Discovery

Association of Australian Medical Research Institutes (AAMRI)

Brandon Capital

International Agency for the Prevention of Blindness

Medical Research Commercialisation Fund

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Melbourne Academic Centre for Health

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Tin Alley Ventures

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The Advanced Genomics Collaboration (TAGC)

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↑ **Improving treatment deliveries: (from left) Ester Eso, Dr Sumudu Amarasekera, and Professor Guei-Sheung (Rick) Liu.**

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With your support, we can continue our world-leading research and accomplish scientific breakthroughs previously deemed unattainable. Please visit donate.cera.org.au

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Make a gift in your will and leave a lasting legacy. Please visit cera.org.au/gifts-in-wills

Partnership and funding opportunities

As true innovators, our scientists are on the brink of new discoveries every day. For a confidential discussion about how you can partner with our researchers to help them discover new ways to prevent vision loss, contact CERA on philanthropy@cera.org.au

Register for a clinical trial

Be part of clinical research by registering at ceruleaclinicaltrials.org.au/take-part-in-research/register-your-interest

Join our Consumer Program

Help shape the future of eye research by sharing your lived experience of eye conditions or vision loss. Please visit cera.org.au/consumer-program

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