

# **The Big Picture**

Annual Review 2018



# About us

The Centre for Eye Research Australia (CERA) is an international leader in eye research with real-world impact.

We are an independent medical research institute closely affiliated with the University of Melbourne and co-located with the discipline of Ophthalmology in the Department of Surgery, Melbourne Medical School at the Royal Victorian Eye and Ear Hospital.

Our researchers are working to understand the causes of eye disease, to inform disease prevention and to improve the diagnosis and treatment of disease. Together we aim to save and restore sight.

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**The Royal Victorian Eye and Ear Hospital**  
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Australia



## Cover photograph

Golda Hough has participated in CERA's nanosecond laser trial for more than three years. Read her story on page 26. Photo by Anna Carlile.

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# Chair and Interim Managing Director's message



## Thank you

We extend our heartfelt thanks to the many individual donors and philanthropic trusts and foundations who so generously supported our research in 2018.

We are grateful for the ongoing support of our Patron, the Governor of Victoria, the Hon Linda Dessau.

We thank CERA staff and students. The passion to make life better for people experiencing vision loss and reduce the global burden of blindness makes CERA a vibrant and stimulating place to work.

We also thank our valued partners at the University of Melbourne and the Royal Victorian Eye and Ear Hospital.

Being based at the Royal Victorian Eye and Ear Hospital is a constant reminder of why eye research matters. Thank you to all of the people experiencing vision loss and blindness who we meet around the hospital and who take part in our clinical trials. You inspire our work every day.

### **Our vision is precious.**

When someone loses their sight – whether an older person mourning the slow loss of vision or a family dealing with the crisis of sudden blindness caused by a genetic disease – the impact is profound.

Their personal stories become part of a broader narrative about the global impact of vision loss and blindness.

Worldwide an estimated 1.3 billion people suffer from impaired vision, including 36 million people who are blind.

With an ageing global population, diseases like glaucoma and age-related macular degeneration are now the world's leading causes of irreversible blindness – and millions are at the risk of preventable blindness from the complications of diabetes.

That's why our research at the Centre for Eye Research Australia – to discover the causes of eye disease, find new ways to detect and prevent vision loss, and develop new treatments to save and restore sight – is so important.

The theme of our 2018 Annual Review is The Big Picture. It recognises how our daily work – in the lab or clinical trials – is tackling urgent global health problems and making a difference to people's lives.

It also charts the journey from 'bench to bedside' and our ability to translate what we discover in the lab into new treatments for patients.

In 2018 CERA continued to deliver world-class science. We produced 184 publications, attracted \$8.2 million in government and philanthropic grants, bequests and donations, and maintained our No. 4 ranking for eye research.

Our work on the Bionic Eye Project, in partnership with Bionic Vision Technologies, successfully restored a sense of sight in four people.

Our research into artificial intelligence to detect blinding eye diseases and hyperspectral imaging to identify people at early risk of Alzheimer's disease gained momentum.

The Laser Intervention in Early Age-Related Macular Degeneration (LEAD) study showed promising signs in halting vision loss in some patients with early stage age-related macular degeneration.

Our advocacy for a national eye screening program for the 1.3 million Australians with diabetes led to the Commonwealth Government committing funds to the KeepSight program.

It was also a year of renewal and regeneration. We farewelled long-serving Managing Director Professor Jonathan Crowston. We thank Jonathan for his outstanding contributions to CERA.

We were thrilled to announce the appointment of world-leading glaucoma researcher Professor Keith Martin, from the University of Cambridge, as our new Managing Director.

We welcomed Professor Martin in early 2019 and look forward to an exciting new era under his leadership.



**Associate Professor Peter van Wijngaarden,**  
Interim Managing Director



**Olivia Hilton,** Chairperson

## 2018 Year at a glance

**184**

publications in  
peer-reviewed  
journals

**\$3m**

in government  
grants



**291**

eyes donated  
to the Lions Eye  
Donation Service  
leading to **476**  
corneal transplants

**\$2m**

in philanthropic  
grants

**Associate  
Professor Mark  
Daniell** wins a  
HealthTech award  
for his corneal  
research



**Dr Stuart Keel**  
receives Juvenile  
Diabetes Research  
Foundation  
funding

Lions Ride for  
Sight raised  
**\$65,000**

CERA and  
the University of  
Melbourne ranked  
**No.4**  
for Ophthalmology  
in World University  
Rankings

Long serving  
**MD Professor**  
**Jonathan Crowston**  
stands down after

**10 years**



### Queen's Birthday Honours

CERA Deputy Director  
**Professor Robyn  
Guymer** and Lions Eye  
Donation Service Director  
**Dr Graeme Pollock**  
honoured

**\$3.2m**  
raised in  
donations and  
bequests



Cambridge clinician-  
scientist **Professor**  
**Keith Martin** appointed  
CERA Managing  
Director and Ringland  
Anderson Chair of  
Ophthalmology at  
the University of  
Melbourne

**Associate  
Professor Ian  
Trounce** receives  
NHMRC Grant for  
mitochondrial  
research



### **6 student completions**

**Frank Billson** – DMedSci  
**Elisabeth De Smit** – PhD  
**Joshua Foreman** – PhD  
**Grace Lidgerwood** – PhD  
**Moeen Riaz** – PhD  
**Sloan Wang** – PhD



**1000+**  
patients in  
**21**  
clinical trials



Our scientists are at the frontline of research to discover the origins of eye disease at a genetic and cellular level. Whether it is developing a genetic map of the retina, the study of mitochondria - the batteries that power our cells - or identifying genes that cause inherited conditions, our research has the potential to drive breakthroughs in the detection, prevention and treatment of eye disease.

→ CERA's Principal Investigator in Cellular Reprogramming Dr Raymond Wong.  
Photo by Anna Carlile.

# Discovery





## Robert's precious gift

**For much of his adult life, Robert Van der Heiden lived with the devastating impact of Leber's Hereditary Optic Neuropathy (LHON), a mitochondrial genetic disease that causes blindness.**

When Robert died last year from an unrelated illness, his family wanted to donate his eyes to support research and create a legacy. Robert's consultant ophthalmologist Professor David Mackey linked the family with CERA, where orthoptist Lisa Kearns helped make this wish come true.

The donation to the Mitochondria and Neurodegeneration Group at CERA will provide researchers there and at partner Duke University, Singapore, with an extremely rare and valuable opportunity to study the eye tissue of a patient with the disease.

Currently, there is only one scientific study from Italy that has published research using an eye donated from someone who had LHON.

CERA Research Fellow Dr Isabel Lopez Sanchez says the donation will be critical in helping scientists understand why some people with LHON lose their vision while others do not.

"We are extremely grateful to Robert and his family for the crucial contribution they have made to LHON research and we hope that our work will help other patients and prevent blindness in the future," she says.

"A better understanding of why some people with LHON mutations go blind could not only help this disease but also other much more common eye diseases such as glaucoma, which affects more than 60 million people worldwide."

LHON is caused by mutations in mitochondrial DNA, which is passed on through the maternal line. It affects about 1 in 50,000 people, although not all people with the mutation lose their sight. Sixty families in Australia are known to be carrying the mutation.

At Robert's funeral, his sister Marg Wade urged families to have open conversations about organ donation for scientific research.

"Age is no barrier for this and Rob's contribution will assist others in Australia and all over the world for generations to come," she said.

"Without him realising, Rob's world just got enormously bigger."

### **Where mitochondrial genes and glaucoma fit**

New research at CERA will explore the link between changes in mitochondrial DNA inherited from your maternal line and optic nerve diseases such as glaucoma.

CERA Principal Investigator Associate Professor Ian Trounce (pictured above right with Research Fellow Isabel Lopez Sanchez) has been awarded a National Health and Medical Research Council grant to investigate the impact of faulty mitochondria on the health of the optic nerve.

The study will be conducted over four years with 1000 Australian patients.

"We have new evidence that the mitochondria, which provide energy for the cell, are defective in glaucoma," he says.

"Our research may lead to new approaches to slowing vision loss for some patients."





## Seeing the world in full colour

**By the age of 40, many people with retinitis pigmentosa will have profound vision loss. They can detect the presence of light, but not much more.**

CERA researchers are testing an emerging technology – cell reprogramming – that could regenerate patients' lost retinal cells and ultimately, restore their vision to a functional level.

Associate Professor Chi Luu and Dr Raymond Wong (pictured above) are leading this research, which involves turning the retina's Müller glia cells to become photoreceptors – the light-detecting cells that are lost in patients with retinitis pigmentosa.

To design the cell reprogramming strategy, Dr Wong sourced genomic information from the 'retinal gene atlas' – another CERA project he helped lead.

"By switching on a particular set of genes we can turn the Müller glia cells into photoreceptors," he says. "We have promising data showing that we can reprogram these cells in the lab."

The ultimate goal is to improve on current sight restoration technologies, which allow patients to achieve only rudimentary black and white vision.

"The exciting thing is the potential to achieve high resolution vision greater than 1500 pixels – enough to read text, recognise faces and attain colour vision," says Associate Professor Luu.

"This technology has the potential to make an enormous impact on the quality of life of patients with retinitis pigmentosa. It is a long road that we're excited to be taking."

Dr Wong's work is generously supported by the Kel and Rosie Day Foundation.





## Gene atlas maps the retina

**Dr Raymond Wong and a team of researchers across the globe have cracked the genetic code of the human retina, a thin layer of cells at the back of the eye that sense light.**

The two-year project has produced the world's first human retinal gene atlas at a single cell level. This is a map of all the cells in the retina and the genes they 'express' for normal retinal functioning.

Genes are the cell's instructions, so understanding how certain cells express particular sets of genes can give us important information that can help us understand what goes wrong in disease.

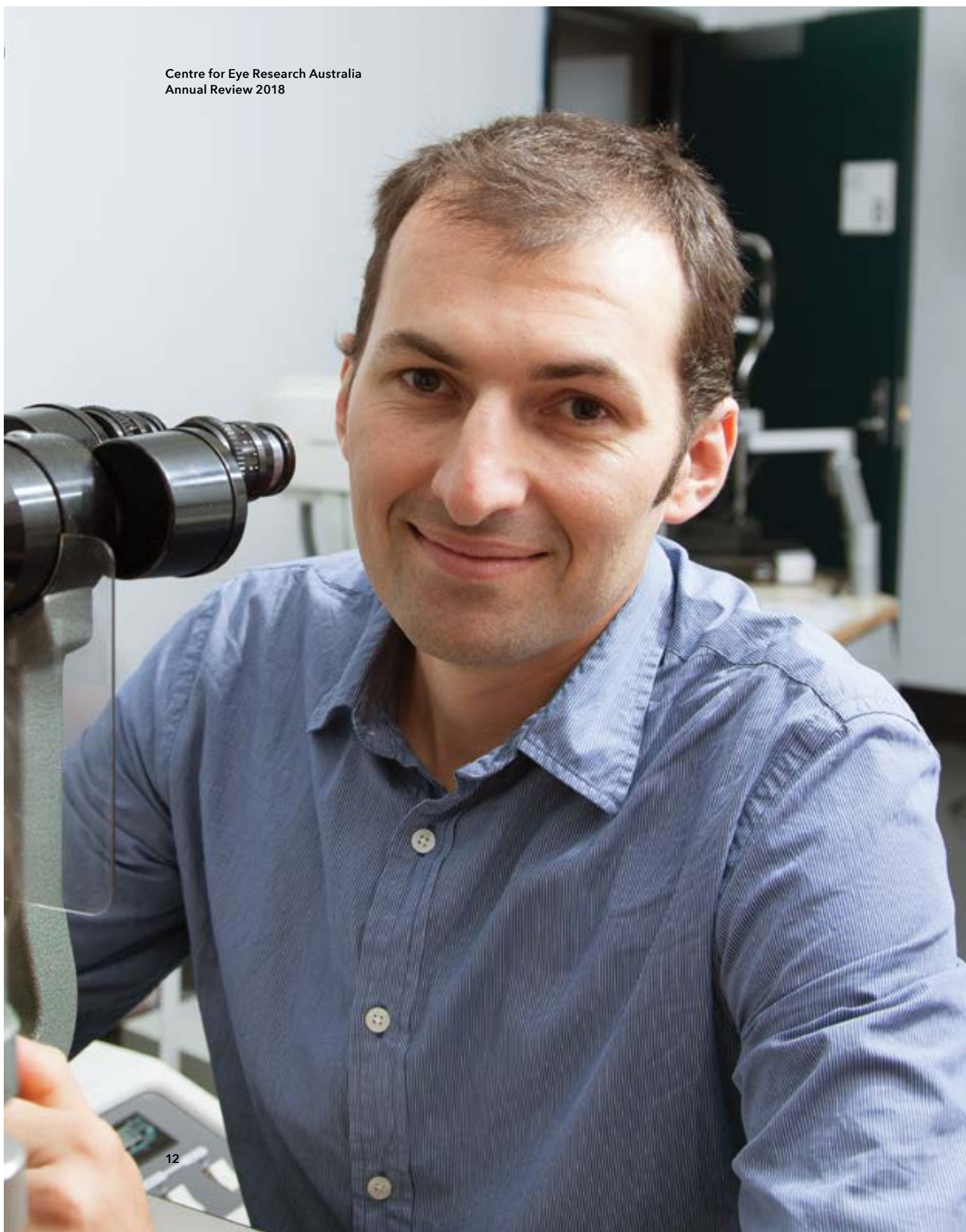
"The underlying idea is if you can map what's happening at the gene expression level in a healthy retina, then you can start comparing

and understanding what's wrong with a diseased retina and which genetic signals are dysfunctional," says Dr Wong, Principal Investigator in Cellular Reprogramming.

It is hoped this will ultimately identify new targets for treating inherited retinal disorders.

In 2018, Dr Wong co-founded the Australia and New Zealand Human Eye Cell Atlas Consortium to continue building the collection of cellular-level eye maps. The consortium comprises 48 members from 17 institutes across Australia, New Zealand, China and the UK.

"Through the consortium we're now looking to map all parts of the eye, including the cornea and the outer retina," he says.



## Managing glaucoma risk through early detection

**CERA has collaborated with scientists across Australia to identify several new genes associated with glaucoma, giving hope to the promise of early detection. This discovery brings researchers one step closer to being able to predict who will develop the disease.**

"Approximately half the people in our community who will develop glaucoma don't know that they will," says Professor Alex Hewitt, Principal Investigator in Clinical Genetics at CERA (pictured left).

Family history plays a key role; first degree relatives of people with glaucoma have a ten-fold increased risk of developing the disease.

Glaucoma progresses slowly and may not be obvious until vision loss is advanced and irreversible.

Vision impairment occurs because the nerve cells that transmit signals from the eye to brain are damaged and die. High eye pressure is a risk factor for the disease and the main target for treatment.

But until now, little was known about what causes the disease at a molecular level.

The new research has dramatically increased our understanding of which genes cause glaucoma. Professor Hewitt and his team plan to use this knowledge to develop a predictive test for the disease.

"We're extending this work with the aim of identifying other genes related to glaucoma," he says. "We can then incorporate this information into a risk score that could identify people who may develop the disease."

This advance could mean earlier diagnosis and treatment for the estimated 150,000 Australians who don't yet know they are at risk.



It's estimated that 85 per cent of all cases of blindness are preventable, so early detection and getting treatment to the people most at risk is critical.

With an ageing population and the growing prevalence of diseases like diabetes, our work to better detect and prevent vision loss is tackling a major global health burden.

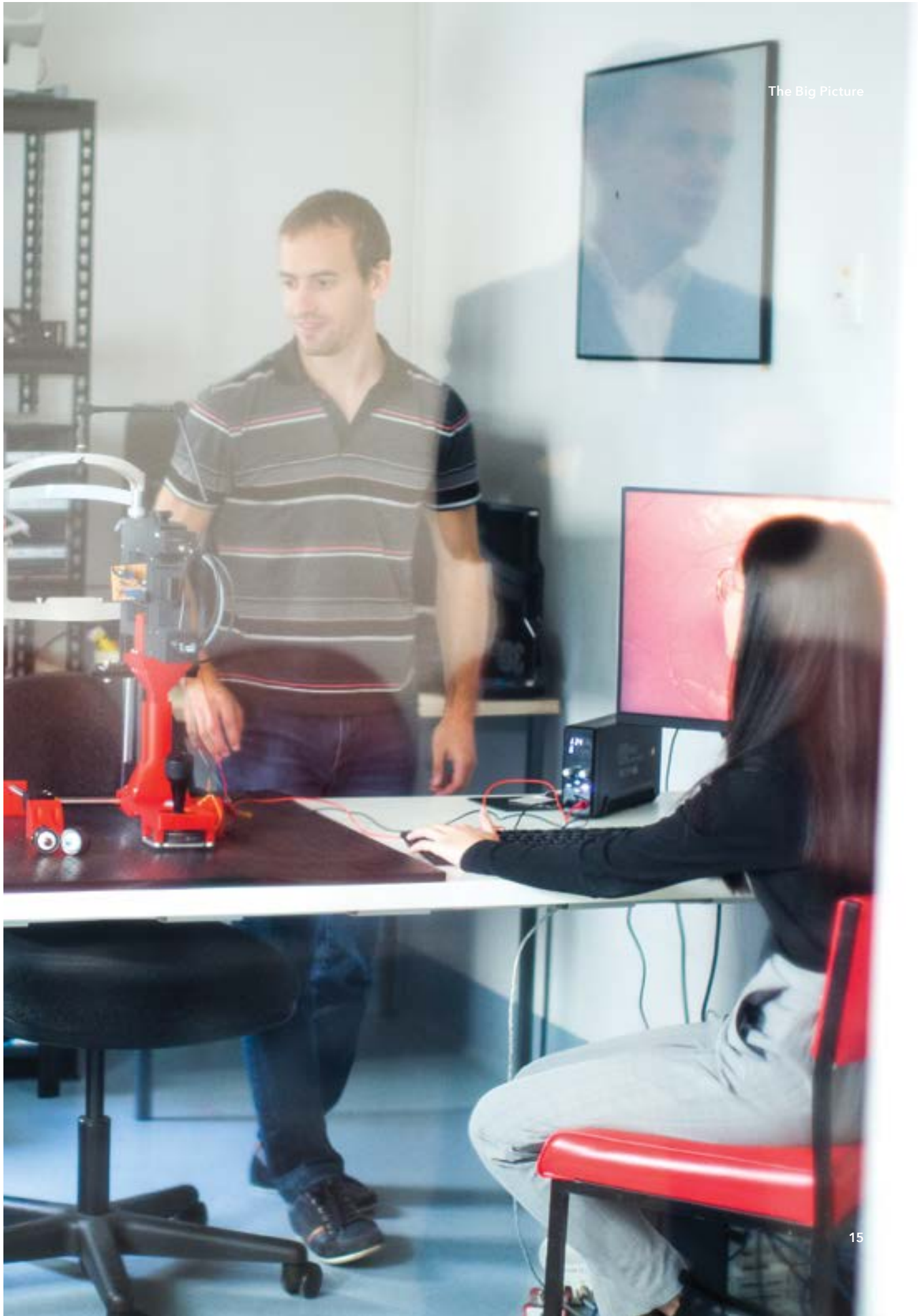
And as the eye is the window to the body and the brain, our research is expanding into areas such as Alzheimer's disease.

→ CERA researchers (from left) Dr Xavier Hadoux, Maxime Jannaud and Darvy Dang work on the hyperspectral imaging project. Associate Professor Peter van Wijngaarden is pictured in the reflection. Photo by Anna Carlile.

# Detection and prevention







## Star power explores Alzheimer's disease

**An astronomer can pick out one star from a cluster of thousands. It is a huge mathematical challenge that requires absolute precision.**

A similar approach is now being applied in the field of ophthalmology to help CERA's researchers develop a non-invasive eye test to detect the early signs of Alzheimer's disease.

Associate Professor Peter van Wijngaarden and Dr Xavier Hadoux (pictured on opposite page) are leading work with a retinal camera that uses imaging technology similar to that used by NASA satellites. With this novel approach, they have been able to detect abnormal deposits of a protein known as amyloid-beta at the back of the eye.

The protein, which can be identified by the way it scatters light, accumulates between 10 and 20 years before the onset of Alzheimer's disease. Identifying it earlier could be the first step in the development of targeted treatments for those most at risk.

"Hyperspectral imaging gives us unparalleled insights into the eye, enabling us to detect changes that we cannot see with other imaging technologies," says Associate Professor van Wijngaarden.

"The eye is the window to the brain and this new technology will give us a huge amount

of additional information about diseases such as Alzheimer's which we hope to use to improve clinical care."

To help CERA's team better understand the vast amount of information generated with this approach, they have joined forces with astrophysicists from the Centre for Astrophysics and Supercomputing at Swinburne University and OzGrav.

They will collaborate with Associate Professor Christopher Fluke and his team to apply the same big data analysis used by astronomers in their study of far-off galaxies to the intricate images captured in eye scans.

This is an exciting meeting of the minds from different disciplines of science that is already yielding new insights into longstanding problems. It will lead to faster and earlier diagnoses of diseases such as Alzheimer's, and also other conditions that affect the optic nerve such as glaucoma.

The project is generously supported by Baillieu Myer and Samantha Baillieu and the Yulgibar Alzheimer's Research Program, Joan Margaret Ponting Trust and Coopers Brewery Trust. Funding from the H&L Hecht Trust and the Anne and Eldon Foote Trust is also provided through the Royal Victorian Eye and Ear Hospital. Dr Steve Frisken, CEO of Cylite, supports the Swinburne team partnership.

### **A global epidemic**

An estimated 60 million people worldwide have Alzheimer's disease or a mild cognitive impairment.

The prevalence of disease is growing at about 10 per cent a year and the global economic cost is estimated to be \$1 trillion annually.

Currently there are a lack of appropriate tests. Two common ways of diagnosing the disease, PET scans and spinal taps, are expensive, invasive and inaccessible, and offered too late for disease-modifying treatment.

Developing a reliable, affordable and accessible test is a major first step in altering the progression of the disease.

## Artificial intelligence: The new frontier of eye screening

**Diabetic retinopathy is one of the most common complications of diabetes. It damages the retina's blood vessels, which can lead to blindness if untreated. While early diagnosis and treatment can prevent almost all vision loss, about half of all cases are undiagnosed.**

GPs are ideally placed to undertake diabetic retinopathy screening.

"But the challenge is that many GPs don't have the technical confidence to examine the retina - the back of the eye," says Professor Mingguang He, Principal Investigator in Ophthalmic Epidemiology at CERA.

A new artificial intelligence (AI) screening tool, invented by Professor He, aims to bridge this gap by assisting GPs or endocrinologists to detect diabetic retinopathy.

The tool works by using a trained technician to take a photo of the patient's retina and upload it to the AI system. Within a few seconds the program provides a report on whether the patient needs to be referred to a specialist for further assessment and treatment.

The AI tool also has the potential to extend screening to other eye diseases, such as glaucoma and age-related macular degeneration.

Professor He is working with research fellows Dr Stuart Keel and Dr Jane Scheetz to test the clinical integration of the AI screening tool in GP, endocrinology and Indigenous health settings.

"We're looking at the impact and cost-effectiveness of this system in real-world settings," says Dr Keel.

This work has inspired Professor He to design a fully automated, operator-free version of the screening tool as the exciting next phase of the study.

"In the future, screening of eye diseases could be as easy as taking a portrait in a photo booth," he says.

The hope is that this technology will increase access to diabetic retinopathy screening for all Australians, leading to earlier diagnosis and treatment.

"We're really trying to capture those people who are currently falling through the cracks as early detection is the key to preventing vision loss and blindness," says Dr Keel.



### How artificial intelligence works

AI technology uses computer algorithms and software to analyse complex data and draw conclusions without direct human input.

Increases in computing power in recent years have enabled the development of sophisticated 'deep learning algorithms'. By applying this algorithm, an AI system can be trained to predict an outcome,

such as a medical diagnosis, with a high degree of accuracy and speed.

Professor He (pictured above with Dr Stuart Keel) and his team used 70,000 images of the retina to train the AI screening tool to identify four main eye diseases, diabetic retinopathy, glaucoma, late age-related macular degeneration and cataracts.



## Biomarkers to show the path

**A new project at CERA is aiming to identify new biomarkers to predict progression of age-related macular degeneration (AMD). The project will use the extensive imaging that came out of the nanosecond laser project.**

A biomarker is a substance, structure or process that can be objectively measured in the body to indicate how it is functioning.

"We saw the opportunity to tease out who amongst the large group of people with the early signs of macular degeneration would progress to the later stages of the disease," says Research Fellow Dr Zhichao Wu (pictured above).

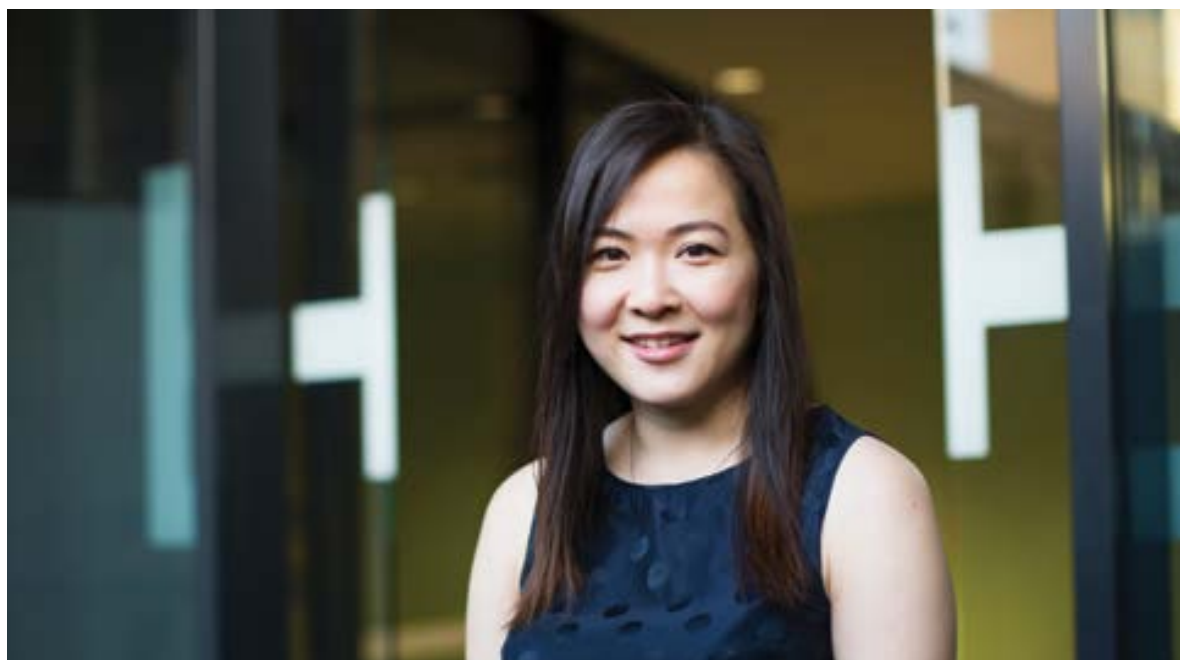
One in seven Australians over the age of 50 have the early signs of AMD, with about one in six going on to develop later complications within three years, says Dr Wu.

These include 'wet' macular degeneration (named for the bleeding within or beneath the retina) which can be treated if caught early, and 'dry' macular degeneration, for which there is no treatment.

CERA is collaborating with international partners to use artificial intelligence (AI) to analyse the imaging data.

"AI helps discover things that we potentially – as humans – might not pick up, or may not have previously thought of," says Dr Wu.

But human expertise is still crucial, as the most promising biomarkers identified so far have been based on careful scrutiny of new imaging technologies. Dr Wu hopes these new biomarkers will help identify high-risk individuals for extra monitoring and inclusion in new treatment studies.



## Catching the silent thief of sight

**A new clinical study is exploring whether a daily dose of vitamin B3 can protect damaged nerve cells in the retina.**

This world-first clinical trial, instigated by former CERA Managing Director Professor Jonathan Crowston, involves patients with varying severities of glaucoma taking vitamin B3 (nicotinamide) and having their vision tested every six weeks.

It's hoped the trial will prove that therapeutic use of a high dose of the vitamin could be used to support existing therapies for glaucoma, such as daily eye drops or in severe cases, surgery.

"We are exploring if there is a way to protect nerve cells from further damage in glaucoma and also whether this treatment can support sick nerve cells to help them work better," says Research Fellow Dr Flora Hui (pictured above).

"Our study hopes to confirm that vitamin B3 can protect nerve cells from dying, in a similar way that adding oil to a faulty car engine can still allow it to run more smoothly."

Glaucoma, known as the 'silent thief of sight', can otherwise only be managed by lowering the eye pressure, says Dr Hui.

"Essentially, we want to limit the damage done by this disease."

Dr Hui's research is generously supported by the Jean Miller Foundation, Jack Brockhoff Foundation, the Marian and E.H. Flack Trust, and the Ophthalmic Research Institute of Australia (ORIA).

Through our research, our clinical trials and collaboration with others we develop world-leading treatments and products.

We want to get new and effective treatments out to as many people as possible and improve the quality of life for those with vision impairment.

→ CERA's Bionic Eye Project team (from left), Elizabeth Baglin, Maria Kolic (obscured), Associate Professor Penny Allen and Dr Carla Abbott. Photo by Anna Carlile.

# Treatments, trials and translation





## Regaining a sense of sight

**A new bionic eye prototype has restored a sense of vision in four blind people who are using the device in their everyday lives.**

The four patients, aged 42 to 65, are part of a clinical trial funded by the National Health and Medical Research Council and commercial partner Bionic Vision Technologies. All have a degenerative genetic condition called retinitis pigmentosa.

This progressive, presently untreatable condition, is one of the most common causes of blindness in working-age people in the developed world, and it has life-changing consequences.

"People lose their ability to work because of their vision," says CERA Principal Investigator Associate Professor Penny Allen.

The bionic eye prototype is permanent, portable and stable, improving on the useability, size and function of an earlier 2012 version. Now being tested outside the laboratory, it is getting very close to clinical translation, says Associate Professor Allen.

Before using the device at home, the four patients undertook several months of training in the lab to learn how to interpret the visual information provided by the bionic eye and to have the software fine-tuned (see 'How the bionic eye works').

"Our hypothesis was that if the patients used the device more, and in particular at home, they would get more benefit from it," says Associate Professor Allen.

Each patient has their own wish list of what they would like to achieve, such as visiting the neighbours or the local shopping centre, or sorting washing, and they are making tangible progress.

"These are essentially independence and navigational tasks," says Associate Professor Allen, "and they are going well."

Importantly, the surgery to implant the device is an uncomplicated procedure, with an electrode array inserted into a small pocket between the wall of the eye and the retina.

"We designed the surgery to be straightforward, because the more straightforward it is, the less risky it is," says Associate Professor Allen.

This is extraordinary science, but it is only possible because of the bravery and altruism of the patients who participate in trials, says Associate Professor Allen.

"They are all very inspiring."

\* The CERA team working on the bionic eye project (pictured on the opposite page from left to right) are Elizabeth Baglin, Dr Carla Abbott, Associate Professor Penny Allen, Associate Professor Chi Luu, Maria Kolic. Photo by Anna Carlile.

### How the bionic eye works

The bionic eye mimics the function of the retina. It works by taking images from a tiny camera on the person's glasses and converting them into electrical signals that travel to electrodes in the eye.

Electrical impulses stimulate residual cells in the retina that connect to the optic nerve

to create 'visual information' that the brain interprets as an image.

This provides 'a sense of sight' for a person to discern shapes, movement, faces, shade or light and to navigate the everyday world.





### **'I feel so lucky'**

At the age of 70, Golda Hough learned she had mid-stage age-related macular degeneration and that she qualified for a new trial at CERA.

For more than three years, Golda (pictured above with Professor Robyn Guymer) has been attending the clinic every six months for nanosecond laser treatment.

"I feel so lucky and privileged that I got onto this trial, and that it might help my condition," she says. Golda is hopeful that the data collected will help establish treatments to protect people's sight.

"My experience has been absolutely fabulous," she says. "Professor Guymer keeps saying thank you so much for participating. I say thank you so much for having me."



## World-first laser treatment opens new frontier

**A highly anticipated trial using nanosecond laser technology to slow the progression of age-related macular degeneration (AMD) has yielded promising results.**

The Laser Intervention in Early Age-Related Macular Degeneration (LEAD) trial studied 300 people with AMD and compared the disease progression of those treated with the laser with those who were not.

The study, led by Principal Investigator in Macular Research Professor Robyn Guymer AM, found different groups of patients responded differently to the treatment.

Those with less severe disease at the beginning of the trial showed a four-fold decrease in the progression of their disease compared to those who were not treated. However, those who had more severe signs of the disease showed a doubling of their progression.

"The nanosecond laser results are extremely promising, but it is essential that the study is repeated, with these different types of AMD randomised from the outset, so that the results can be validated," says Professor Guymer.

"Whilst this new laser isn't a cure, and it would not be suitable for all people with early AMD, it's an important first step in finding a new treatment that could potentially reduce the progression of the disease.

"If our findings are validated, this treatment will be a huge advance for AMD."

While laser treatment to slow progression of macular degeneration has been explored before, the new laser technology, designed and built in Australia by Ellex in Adelaide, ensures that there is no thermal, or heat, damage to the retina.

This is because the 2RT laser is applied for only three nanoseconds, delivering about a 1000th of the dose used in conventional laser treatments for other retinal diseases.

"This laser works differently, and it delivers the potentially good effects but without any of the unwanted effects of a normal laser," says Professor Guymer. "Cases have shown that it doesn't damage the neural retina that we want to save."

In preparing for this trial, the CERA team achieved another significant milestone that has immediate application.

Researchers used the first identifiable signs of cell death as an 'endpoint' of the trial, to determine whether their treatment has been effective. This is at a much earlier point than traditional AMD trials and could accelerate the testing of drugs or treatments to slow the disease.



## Treatment in sight for inherited retinal degenerations

**Progressive and irreversible vision loss is inevitable for the estimated 1 in 3000 Australians born with inherited retinal disease (IRD).**

There is currently no treatment available, but an innovative research project at CERA could change that.

Principal Investigator in Retinal Gene Therapy Research Dr Thomas Edwards (pictured on opposite page) and his team are investigating how to treat a particular IRD by replacing the abnormal gene that causes the disorder.

Dr Edwards was involved in a world-first gene therapy trial at Oxford University and he is now bringing that experience to CERA.

"We're looking at one particular gene and developing a strategy to introduce the correct copy of that gene into retinal cells," he says.

"This is gene therapy in its simplest form – rather than trying to fix the gene we're replacing it.

"We've had some successes delivering our gene of interest into cells grown in the lab. It's giving us plenty of encouragement.

"For people with this particular gene affected, the overall goal is a treatment that halts the further degeneration of the retina and consequent loss of vision, or even partially reverses the damage.

"We hope to establish Melbourne as a centre for ocular gene therapy research, and to attract gene therapy clinical trials that target other IRDs or indeed more common diseases with a genetic basis, such as age-related macular degeneration or glaucoma.

"This would give Australians access to cutting-edge treatments not currently available in our country."





## Invention to advance corneal transplant surgery

**In 2018, researchers from CERA and the University of Melbourne won the HealthTech Innovation Challenge for inventing a hydrogel film that will make sight-restoring corneal transplants simpler and more effective.**

In corneal transplant surgery, the diseased or damaged section of the cornea (the clear window at the front of the eye) is replaced with healthy donor tissue.

The most common surgery involves cutting all the way through the cornea to remove the affected area, but a newer technique replaces only the back layer (the endothelium) leaving the front sections intact.

While this latter procedure generally has better results and a quicker recovery time, it's more challenging for surgeons to perform.

The fragile endothelium is easily damaged and is difficult to insert into the eye as it rolls up into a scroll during transfer.

The invention of the hydrogel film - CorGel - overcomes these challenges by helping the

donated tissue unfold without the need for excessive handling from the surgeon.

"CorGel will make corneal surgery safer, quicker and better," says Associate Professor Mark Daniell, Principal Investigator in Corneal Research at CERA (pictured on opposite page).

The team are now looking to translate their research into a commercial product, and they have secured industry backing to help them make the leap.

"The Eversight partnership will help us develop the product, as well as investigate the regulatory and financial feasibility of bringing this innovative research to the clinic to help our patients," says Associate Professor Daniell.



## Finding new pathways to prevent scarring

**In 2018, CERA continued its strong collaboration with Melbourne-based biopharmaceutical company OccuRx, which focuses on developing new therapies to treat ocular conditions driven by inflammation and fibrosis, or scarring.**

The team ran a series of preclinical studies to test the effectiveness of the new drugs taken orally for glaucoma. Current therapies are typically delivered directly into the eye using eye drops, but it is well known that this method leads to poor patient compliance.

The results of these studies showed that taking the medication orally was effective.

"We were able to show that oral delivery was effective in the eye, and this gives us confidence to go into clinical trials in 2019,"

says Professor Darren Kelly, Chief Executive Officer of OccuRx and CERA's Director of Enterprise and Innovation (pictured above).

OccuRx also completed the groundwork for a new drug for diabetic retinopathy and age-related macular degeneration, with clinical trials to also take place in 2019.

"We want to prevent the formation of scar tissue in the retina," says Professor Kelly.

After two years of preclinical studies, both new therapies are now ready to be tested in patients.

"It's really important that our research turns into a product that is going to have a clinical benefit," says Professor Kelly. "That is the cornerstone of great translational research."



## Setting new standard for diabetic cataract care

**Patients with diabetes can now undergo cataract surgery with more confidence and avoid previously common sight-threatening complications, thanks to a CERA trial that ended in 2018.**

Historically, people with diabetes were counselled against cataract surgery because it caused or accelerated diabetic macular edema (DME) and there were no effective treatments, says Principal Investigator in Clinical Trials Research, Associate Professor Lyndell Lim (pictured above).

While cataract occurs in almost half of the population over 50 years of age, patients with diabetes develop it more frequently and at an earlier age.

Over three years, the team at CERA tested and compared two treatments injected into the eye of patients with DME undergoing cataract surgery.

These two treatments, the steroid triamcinolone and the anti-VEGF agent bevacizumab, were then given as required for up to 12 months after surgery.

The DiMECat trial was able to prove that both treatments reduced the development or progression of DME after cataract surgery, with good visual outcomes.

These results will set a new standard of care around the world, particularly in developing countries where the steroid triamcinolone is more readily available than anti-VEGF agents like bevacizumab.

“Clinicians now know that it is relatively safe to proceed to cataract surgery in this group of patients, so long as one of these two treatments is given at the time of surgery and repeated post-operatively,” says Associate Professor Lim.

At CERA, we deeply value our relationships with other research institutions, universities, teaching hospitals, clinical practitioners and the wider community.

We have a global outlook, and we want to contribute to reducing the burden of blinding eye disease and make life better for people experiencing vision loss.

Our brilliant staff, our inspiring patients, our generous donors and philanthropic partners make this work possible.

→ WILD program co-founder Dr Lauren Giorgio and program participant Dr Silvia Alvaraz-Diaz.  
Photo by Anna Carlile.

# People and partnerships





## Introducing Professor Keith Martin

**As a clinician-scientist Professor Keith Martin has achieved many firsts – and now he is bringing his pioneering approach to research and treating patients to the Centre for Eye Research Australia.**

Professor Martin was first Professor of Ophthalmology at the University of Cambridge, and when appointed was the youngest full professor in the University's Medical School.

Professor Martin's research to develop new therapies for people with glaucoma has drawn attention from around the globe. In 2010, he won the coveted Association for Research in Vision and Ophthalmology Translational Research Award. This international prize is awarded to a researcher under 50 whose research has potential to lead to major breakthroughs.

Professor Martin later co-founded Quethera, a Cambridge-based gene therapy company that has developed a gene therapy for glaucoma that is currently progressing towards human clinical trials.

The opportunity to lead CERA and also become the University of Melbourne's Ringland Anderson Chair of Ophthalmology is a perfect fit, he says.

"CERA covers all of the bases, from understanding the fundamental basic science of eye diseases through to

developing new diagnostic and therapeutic approaches and finding better ways to quantify the impact of these treatments," says Professor Martin.

"One of our great strengths at CERA is that we have a lot of clinician-scientists and that helps to focus our questions on what will really make a difference to the lives of patients.

"We also have people with a range of skills in biotechnology and industry, and great leadership from our Board."

Professor Martin started his new role in 2019, replacing long-serving Professor Jonathan Crowston, who stepped down mid-2018.

Professor Martin is keen to build on the strong relationships between CERA and the Royal Victorian Eye and Ear Hospital and University of Melbourne. He's also looking forward to meeting CERA's many donors and the people who take part in clinical trials.

He's eager to get his own research projects up and running in Melbourne.

"I have a real interest in looking at how we can repair the optic nerve and restore vision, particularly using new therapies such as gene and stem cell therapy.

"Between 10 and 15 per cent of people with glaucoma currently develop severe visual loss despite treatment."

**'It is my dream that our research at CERA will revolutionise the care of people with vision loss and greatly improve their quality of life in the future.'**

### **Professor Keith Martin**

- Specialises in medical and surgical management of complex glaucoma
- Is developing new treatments using stem cells, gene therapy and other techniques
- Was formerly Head of Ophthalmology at the University of Cambridge, Deputy Director of the University's John van Geest Centre for Brain Repair and an Affiliate Principal Investigator at the Wellcome Trust - MRC Cambridge Stem Cell Institute
- Graduated from the University of Cambridge with a 'Triple First' in Medical Sciences and Neuroscience
- Completed clinical training at Oxford University Clinical School, Ophthalmology Residency in Cambridge and Clinical and Research Fellowships in Glaucoma at Moorfields Eye Hospital in London and the Wilmer Eye Institute in Baltimore
- Is the current President of the World Glaucoma Association.



## Eyes and ethics

**In 2018, CERA staff collaborated with the global ophthalmic community to develop a world-first agreement on the ethical use of donated human tissue for ocular transplants, research and future technologies.**

The agreement (known as the Barcelona Principles) builds on a number of existing ethical principles including the Declaration of Istanbul that covers organ donation, the Helsinki Accord that relates to human research, and the Charter of Human Rights.

"The difference with the Barcelona Principles is that it specifically addresses ocular tissue," says Dr Graeme Pollock OAM, Director of the Lions Eye Donation Service at CERA.

"Unlike many of the existing ethical principles that focus on the actual donation, the Barcelona Principles extend to how this

tissue is used for transplantation as well as research."

It's a timely measure as concerns are deepening that greater privatisation of healthcare services and widespread shortage of eye tissue may lead to the commercialisation of donations, either legally or through the black market. The Barcelona Principles agree that these actions are unethical.

"At the heart of the Barcelona Principles is the belief that eye donations belong to the community, not an individual or organisation," says Dr Pollock.

The guidelines also inform the donor consent process, the allocation of donations to transplant recipients, and the way researchers receive and use this tissue.





## Preserving vision with KeepSight

**In 2013, CERA Deputy Director Associate Professor Peter van Wijngaarden returned from a fellowship in England where he had seen firsthand how effective the national screening program for diabetic retinopathy had been.**

“In my first few clinics back in Melbourne I was surprised to see people presenting for their first eye checks with very late stage diabetic retinopathy,” he says. “I was convinced we could do better.”

He met with Diabetes Australia to discuss the issue, sparking a collaboration between the two organisations, along with Vision 2020 Australia, the Royal Australian and New Zealand College of Ophthalmologists and Optometry Australia, to design a national program for Australia.

In 2016, the National Eye Health Survey from CERA and Vision 2020 showed that many Australians with diabetes weren’t having eye checks and further highlighted the need for the scheme.

In 2018, the Commonwealth Government announced it would fund KeepSight, a national eye screening program to be led by Diabetes Australia and Vision 2020.

Funding from Specsavers and Bayer was also instrumental in achieving Commonwealth Government support.

Oculo, a cloud-based clinical communications network founded by CERA in 2015 and today used by 2300 optometrists and 650 ophthalmologists across Australia and New Zealand, serves as the technology partner for the program.

The program will serve as a recall and reminder system for the 1.3 million Australians with diabetes, to reduce the chance of people forgetting to have their eye checks. Associate Professor van Wijngaarden (pictured above with Diabetes Australia CEO Professor Greg Johnson) is proud to be clinical director and steering committee member for KeepSight.

## Growing female leadership

**An innovative program supported by CERA is helping women accelerate their careers and take on leadership roles in science, technology, engineering and maths (STEM).**

Launched in 2018, the Women in Leadership Development (WILD) program helps build the qualifications, skills and confidence of early to mid-career women seeking senior roles and company directorships.

The 20 successful participants attend the Australian Institute of Company Directors' five-day intensive course and a two-day leadership retreat and are each mentored by a leader in STEM.

"There are a number of barriers to attracting women to leadership positions," says WILD program co-founder Dr Lauren Giorgio, who is also CERA's Innovation and Enterprise Manager.

"Some of these require long-term cultural change, but our program aims to remove barriers related to costs of training and finding a mentor."

In the longer term, the program's goal is to see more women on boards and leading companies.

"We know that diverse boards and organisations offer greater depth and breadth of insight, perspective and experience that drive good decision-making," says Dr Giorgio.

The WILD program is open to women with post-graduate qualifications in STEM and at least three years of non-academic experience.

There has been a nation-wide demand for the program, with the project team considering ways of making it sustainable for future years.

"We want to grow Australia's pool of female STEM leaders," says Dr Giorgio.

CERA has been an early and vocal supporter of the program.

"We're committed to gender equity and driving a diverse and inclusive culture for the Australian STEM sector," she says.



### **'A great opportunity'**

CERA's Research Funding and Operations Manager Dr Silvia Alvarez-Diaz (pictured above left with Dr Lauren Giorgio) was selected from a field of more than 70 applicants for the inaugural Women in Leadership Development program.

"This is a great opportunity to help women in STEM develop leadership capabilities," says Dr Alvarez-Diaz.

After completing her PhD and working in postdoctoral research, Dr Alvarez-Diaz moved into professional services to combine her knowledge of academic research with effective administration. "I want to help the researchers achieve their goals," she says.

"I'm learning a lot and it is interesting to see the medical sector from a different perspective. I feel I understand what researchers need."





## Achieving our dreams

### **CERA contributes to developing the next generation of innovators in eye research through supervision and mentoring.**

In 2018, CERA's senior scientists supported six PhD and doctoral students to complete their degrees, and supervised a number of others working towards completion.

Dr Rose Tan was working towards her PhD in 2018, evaluating a marker to track the progression of age-related macular degeneration.

Dr Tan is measuring how well people can see in the dark and uses this to track the progress of the common, and complex, eye disease age-related macular degeneration.

Using a new dark adaptive chromatic (DAC) perimeter device, Dr Tan has been able to evaluate the progression of the disease by looking at rod functional changes over 12 months.

The device was designed in Victoria by Medmont, through a grant from the Beckman Initiative in Macular Research (USA).

"It's a novel way of assessing dark adaptation in the early stages of age-related macular degeneration," she says.

For Dr Tan, undertaking her PhD with the University of Melbourne through CERA has given her access to resources and the best in the field, including supervisors Professor

Robyn Guymer AM and Associate Professor Chi Luu.

"It was a pleasure to supervise and mentor Rose during her PhD, and all the participants loved her cheery attitude," says Professor Robyn Guymer. "Her project was quite arduous for both patient and tester, as it meant sitting in the dark for more than an hour, and several hours overall with each patient on more than one occasion."

From here, Dr Tan plans to do further post-doctoral research in the United States.

"For me, CERA is a fantastic organisation that allows researchers to achieve their dreams," she says.

### **Congratulations to the students who completed in 2018**

Frank Billson - DMedSci  
Elisabeth De Smit - PhD  
Joshua Foreman - PhD  
Grace Lidgerwood - PhD  
Moeen Riaz - PhD  
Sloan Wang - PhD

Congratulations also to our biostatistician Dr Myra McGuinness, who completed her PhD in the University of Melbourne School of Population Health in 2018 and Dr Jane Scheetz who completed her PhD at La Trobe University.

## 'We have in mind the future'

**Judith and Brian Gilpin regularly travel into Melbourne's CBD from their outer eastern home to hear about CERA's latest breakthroughs and developments in eye health research.**

For Judith, a former kindergarten teacher, and Brian, a retired engineer, now great-grandparents 14 times over, the community information forums are deeply personal.

Six years ago, Judith was diagnosed with age-related macular degeneration (AMD). Now 86, Judith no longer drives, as distance is hard to gauge, and she has had to give up a beloved, but visually demanding, hobby of single-thread needlework. But she is otherwise well and able to read, "with a good light". Standard AMD treatment is keeping the disease at bay.

"I've been having injections. Just the left eye to begin with, and both eyes now for a couple of years," she says.

Brian, aged 93, was diagnosed with glaucoma some years ago but still enjoys good eyesight and is able to drive.

For the Gilpins the future is on their mind.

"Both AMD and glaucoma are hereditary," says Judith. "We're really interested in what's going to happen to our grandchildren, and our great-grandchildren," she says.

"Are they going to inherit our eye disease?"

They both value that CERA is at the frontier of eye disease research and is recognised as one of the top four research centres in the world. "This is an incredible achievement," says Brian. "We are just so fortunate."

The Gilpins have donated to CERA since 2003 and urge others to do the same, no matter the amount.

"We're quite fascinated by the work they're doing," says Brian. "We have in mind the future. Hopefully, lots of things will be preventable by then."

And back home, the Gilpins encourage the family to test their eyesight regularly using a simple Amsler grid that hangs on a door.

"This little grid gives you warning if there's a problem," says Brian. "It's important."





## CERA alumna helps children talk and play

**When her daughter Grace was late to start talking, Dr Annie McAuley used her STEM skills to develop a world-first technology that uses an interactive toy to help children learn to talk.**

The former CERA PhD graduate and Research Fellow translated research into practice to develop TalkiPlay. It is aimed at pre-schoolers like Grace, whose language development delay can affect literacy and social confidence.

The educational app helps children's speech by using repetition, gameplay and music while they engage with their physical environment. It can also teach a foreign language.

Dr McAuley has a unique insight into language acquisition tools after losing her

speech and having to relearn it following a skiing accident when she was 18.

She taught herself to code while developing TalkiPlay, which has attracted seed funding.

Dr McAuley's journey has taken some unexpected turns, but she has no regrets.

"I saw myself as a clinical researcher," she says. "But I couldn't let the opportunity go to make an impact. That's why I became a researcher – to make an impact."

"I want to enable parents with a platform to empower and motivate their children to learn language. When you give that empowerment ... it then becomes self-directed. They feel like they did it themselves."





## CERA graduate keeps an eye on kids' device use

**Dr Mo Dirani has combined his passion for children's eye health with his research experience to develop new ways of managing smart device use and myopia in children worldwide.**

As founding Managing Director of plano, Dr Dirani works with more than 25 staff in multiple countries to address growing concerns about device use and children's eye health. They promote responsible use, encourage regular eye tests and use data analytics and artificial intelligence to better manage myopia.

Among plano's innovative projects are the plano app that helps monitor device use and detect myopia, and The Plano Adventures book series.

Established in late 2017, the Singapore-based startup is attracting the interest of major industry players. CERA's former Managing

Director, Professor Jonathan Crowston, is a Board Director.

Dr Dirani is a University of Melbourne graduate and completed his PhD, the world's largest twin study to investigate genetic and environmental risk factors of myopia, with CERA.

He holds Honorary Principal Investigator appointments at CERA and the Singapore Eye Research Institute (SERI). He also continues to publish academic papers and hopes to build on plano's health service delivery and business models.

"My career as a full-time researcher helped me realise the need for translating our research into real-life solutions," Dr Dirani says. "I look forward to empowering my teammates to truly realise plano's vision, which is to 'Save Sight, Empower Lives'."

## Lead Researchers



**Associate Professor  
Penny Allen**  
Bionic Eye Project

Associate Professor Penny Allen leads the bionic eye research at CERA. Her team has developed a next generation bionic eye implant which is now in trial and has been implanted in four patients. It offers the patients the possibility of using the device at home and creates a sense of sight. Associate Professor Allen is also working on new trials for patients with poor vision due to inherited disease.



**Professor Paul Baird**  
Ocular Genetics

Professor Paul Baird's research team uses genomics together with bioinformatics, high-level computing and artificial intelligence to focus on the identification of genes and risk factors involved in several major eye diseases, including age-related macular degeneration, myopia and keratoconus, for precision medicine.



**Associate Professor  
Michael Coote**  
Surgical Glaucoma Research

Associate Professor Coote is the lead clinician on a project to develop a simple tele-ophthalmology system. This is a joint government, industry and hospital innovation, and it has developed the EyeConnect device (a remote-operated slit lamp, operating through the web) as well as a disposable tonometer, which is a device to measure eye pressure.

**'I find our patients inspiring, I like to feel that I make a positive impact on our community and my family is very encouraging.'**

Associate Professor Penny Allen



**Professor Jonathan Crowston**  
Glaucoma Research and  
CERA Managing Director  
(until July 2018)

Professor Jonathan Crowston was Managing Director of CERA until July 2018. His research focused on ageing and rejuvenation of the optic nerve. In particular, his work examined the role played by mitochondrial dysfunction in glaucoma.



**Associate Professor Mark Daniell**  
Corneal Research

Associate Professor Mark Daniell's research interests are in cornea and external disease, and surgery of the cornea and lens. He is developing a tissue-engineered cornea. He has a particular focus on keratoconus, evaluating new treatments and looking for the underlying causes.



**Dr Thomas Edwards**  
Retinal Gene Therapy  
Research

Dr Thomas Edwards' research looks at the potential of gene therapy to cure inherited retinal diseases. His research aims to establish the infrastructure and knowledge base necessary to develop treatments that may halt or partially reverse some inherited causes of blindness.



**Professor Robyn  
Guymer AM**  
Macular Research and  
Deputy Director of CERA

Professor Robyn Guymer and her team primarily investigate the causes and treatments of age-related macular degeneration (AMD). They aim to identify novel biomarkers to better detect and monitor disease, and they work both independently, and with industry partners, to find better ways of preventing and treating vision-threatening AMD complications.



**Professor Mingguang He**  
Ophthalmic Epidemiology  
at the University of  
Melbourne

Professor Mingguang He is a world leader in the fields of clinical and epidemiological research, randomised clinical trials, twin studies and imaging technology in ophthalmology. His group is developing and testing artificial intelligence systems to support the early detection of eye diseases.



**Professor Alex Hewitt**  
Clinical Genetics

Professor Alex Hewitt's group is focussed on the clinical and genetic analysis of inherited eye diseases, including glaucoma, retinitis pigmentosa and other rare hereditary eye diseases. The team is actively involved in research into gene therapy, stem cell biology and gene editing approaches.



**'I'm inspired to help reduce the impact of AMD as it seems a worthwhile pursuit that could benefit countless individuals now and into the future.'**

Professor Robyn Guymer



**Associate Professor  
Wilson Heriot**  
Vitreoretinal Research

Associate Professor Wilson Heriot is a Principal Investigator in vitreoretinal surgery at CERA, conducting a translational project to bring his method of improved retinal detachment repair into routine clinical care. This project was awarded a United States Government Congressionally Awarded Grant of \$1.48 million and is being conducted in collaboration with researchers in the Department of Optometry and Vision Sciences, University of Melbourne.



**Professor Darren Kelly**  
Director of Enterprise  
and Innovation

Professor Darren Kelly is the Director of Enterprise and Innovation at CERA, the Associate Dean (Innovation and Enterprise, Medicine Dentristry Health Sciences) and the Director of Biomedical Research, Department of Medicine, University of Melbourne. He is the CEO of Certa Therapeutics and OccuRx, and Venture Partner (Entrepreneur in Residence) at Brandon Capital.



**Dr Nathan Kerr**  
Clinical Lead for Glaucoma  
Surgical Trials

Dr Nathan Kerr is motivated to help people with glaucoma save their sight by finding better treatments. Utilising new methods of medication delivery and microscopic devices, Dr Kerr is investigating a new implant that may replace daily eye drops as well as safer surgical procedures to treat glaucoma.



**Associate Professor  
Lyndell Lim**  
Clinical Trials Research

Associate Professor Lyndell Lim's main research interests are clinical studies in uveitis, ocular immunology and diabetic retinopathy. Her Clinical Trial Research Centre runs both investigator-initiated and commercially sponsored clinical trials that aim to investigate new treatments, as well as the mechanism of action and effectiveness of current treatments.



**Associate Professor  
Chi Luu**  
Macular Research

Associate Professor Chi Luu works on preclinical models to better understand the causes and progression of age-related macular degeneration, and to evaluate safety and efficacy of new interventions. He also investigates novel approaches for vision restoration and neuroprotection of retinal cells. He is excited that his research has the potential to restore high acuity and colour vision for those with inherited retinal degenerative conditions.



**Professor Alice Pébay**  
Neuroregeneration

Professor Alice Pébay's group utilises human pluripotent stem cells to improve our understanding of diseases of the eye and brain, and to identify new treatment approaches. The team are working at the cutting edge of stem cell science.

**'The search for the cause, and ultimately the cure, for uveitis that affects both young and old is what challenges and inspires me in my work every day.'**

Associate Professor Lyndell Lim



**Associate Professor  
Ian Trounce**  
Mitochondria and  
Neurodegeneration

Associate Professor Ian Trounce's research focus is on mitochondria and how genetic defects in this cellular power generator contribute to age-related neurodegenerative diseases, including diseases of the optic nerve.



**Associate Professor  
Peter van Wijngaarden**  
Ophthalmic Neuroscience  
and Deputy Director of  
CERA

The group conducts research in three main areas: the development and testing of novel retinal imaging technologies to detect early markers of eye and central nervous system diseases, including Alzheimer's disease; understanding the role played by support cells in the optic nerve and their importance in glaucoma; and understanding the impact of diabetic retinopathy in Australia and the effectiveness of the recently launched KeepSight program in reducing vision loss from the disease.



**Dr Raymond Wong**  
Cellular Reprogramming

Dr Raymond Wong is a stem cell biologist specialising in cellular reprogramming with 16 years of research experience. Dr Wong's research focuses on understanding the genetic signals that define retinal cells, and using cell reprogramming and stem cell technologies to study and treat retinal diseases.



Our skills-based Board provides CERA with deep expertise in business, finance, law, health services, science, research and philanthropy. Board Directors generously volunteer their time and professional knowledge to help CERA achieve its goal to save sight and change lives. They provide strategic direction and governance, oversee financial and risk management and ensure our organisation remains sustainable and continues to drive partnerships that strengthen our capacity and the impact of our research.

We thank all of our 2018 Board members (from left).

**Peter Larsen**  
*BSC (Optometry)*

**Olivia Hilton**  
**Chairperson**  
*BBus (Mkt) Hons*

**Peter van Wijngaarden**  
**Interim Managing Director**  
**- from 24 July 2018**  
*MBBS (Hons), PhD,  
FRANZCO*

**Andrew Cuthbertson AO**  
*BMedSci, MBBS, PhD,  
FTSE FAHMS*

**Christine Edwards AO**  
*B App Sc, Post Grad Cert  
Public Sector Management,  
M Health Admin, GAICD*

**Llewellyn Prain**  
**Alternate - representing  
the Royal Victorian Eye  
and Ear Hospital**  
*BA (Hons), LLB (Hons),  
GAICD*

**Wendy Miller**  
*BA, LLB (Hons)*

**Simon Brewin**  
**Royal Victorian Eye and Ear  
Hospital representative**  
*B Bus, Grad Dip HSM,  
MBL, GAICD*





Absent

**Andrew Cowlshaw**  
*BComm (Accounting  
& Finance), ACA*

**Jonathan Crowston -  
until 24 July 2018**  
*BSc, MBBS, PhD,  
FRCOphth, FRANZCO*

**Geoffrey McColl**  
**Representing the  
University of Melbourne -  
until 31 May 2018**  
*B.Med.Sci, MBBS,  
FRACP, PhD, Med*

**Fabienne Mackay**  
**Alternate - representing the  
University of Melbourne -  
until 31 May 2018**  
*PhD, FAHMS*

**Brigitte Smith -  
until 21 January 2018**  
*B Chem Eng (Hon),  
MBA (Hon), MALD*

**CERA Executive Team** - as of December 2018

**Interim Managing Director -**  
Peter van Wijngaarden

**Interim COO and Head  
of People Development -**  
Leah Borsboom

**Deputy Director -**  
Robyn Guymer AM

**Director of Enterprise  
and Innovation -**  
Darren Kelly

Two key members of the  
Executive team - **Managing  
Director** Jonathan Crowston  
and **Chief Operating Officer**  
Jacinta Mackey - left the  
organisation during 2018.  
We thank them for their  
service.

For full details of our Board of Directors please visit  
[www.cera.org.au/about/our-board](http://www.cera.org.au/about/our-board)

# Abridged Financials

## CONSOLIDATED STATEMENT OF FINANCIAL POSITION as at 31 December 2018

	2018 \$'000	2017 \$'000
<b>ASSETS</b>		
<b>CURRENT ASSETS</b>		
Cash and cash equivalents	2,740	1,468
Trade and other receivables	727	1,273
Other assets	52	37
<b>TOTAL CURRENT ASSETS</b>	<b>3,519</b>	<b>2,778</b>
<b>NON-CURRENT ASSETS</b>		
Financial assets	21,590	22,256
Property, plant and equipment	850	1,105
<b>TOTAL NON-CURRENT ASSETS</b>	<b>22,440</b>	<b>23,361</b>
<b>TOTAL ASSETS</b>	<b>25,959</b>	<b>26,139</b>
<b>LIABILITIES</b>		
<b>CURRENT LIABILITIES</b>		
Trade and other payables	3,138	3,414
Provisions	1,133	1,250
<b>TOTAL CURRENT LIABILITIES</b>	<b>4,271</b>	<b>4,664</b>
<b>NON-CURRENT LIABILITIES</b>		
Provisions	178	139
<b>TOTAL NON-CURRENT LIABILITIES</b>	<b>178</b>	<b>139</b>
<b>TOTAL LIABILITIES</b>	<b>4,449</b>	<b>4,803</b>
<b>NET ASSETS</b>	<b>21,510</b>	<b>21,336</b>
<b>EQUITY</b>		
Reserves	8,325	9,164
Retained earnings	13,185	12,172
<b>TOTAL EQUITY</b>	<b>21,510</b>	<b>21,336</b>

## CONSOLIDATED STATEMENT OF PROFIT OR LOSS AND OTHER COMPREHENSIVE INCOME for the year ended 31 December 2018

REVENUE	2018 \$'000	2017 \$'000
Federal and State Government grants	3,317,720	4,118,935
Clinical trials and contract research	5,873,437	4,252,998
Donations and bequests	3,205,406	7,028,162
Philanthropic and other grants	2,046,102	2,258,557
Investment and other income	2,342,106	1,956,332
<b>TOTAL REVENUE</b>	<b>16,784,771</b>	<b>19,614,984</b>
<b>EXPENSES</b>		
Research expenses	10,081,624	11,718,395
Research support expenses	3,924,047	3,486,782
Occupancy expenses	688,091	485,246
Depreciation and amortisation	500,559	718,221
Finance costs and other expenses	714,755	360,987
<b>TOTAL EXPENSES</b>	<b>15,909,076</b>	<b>16,769,631</b>
<b>NET SURPLUS</b>	<b>875,695</b>	<b>2,845,353</b>

These abridged audited Financial Statements have been extracted from the full audited Financial Statements for CERA and its controlled entity. 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.

### The Big Picture



- 35% Clinical trials and contract research
- 20% Federal and State Government grants
- 19% Donations and bequests
- 14% Investment and other income
- 12% Philanthropic and other grants



- 63% Research expenses
- 25% Research support expenses
- 5% Finance costs and other expenses
- 4% Occupancy expenses
- 3% Depreciation and amortisation

## 2018 Supporters and acknowledgements

We are extremely thankful to all of the individual donors for their generous contributions to our research, along with the support of philanthropic trusts and foundations, industry and government and our member organisations.

Without this invaluable support our work to save sight and changes lives would not be possible. We thank all who are supporting us in our journey to prevent vision loss and restore sight.

### Major Gifts (10,000+)

Andrew Cuthbertson AO  
Ainslie M Cummins  
Renate Daniell  
Steve Frisken  
Connie and Craig Kimberley  
Andrew G Michelmores AO  
Dennis and Fairlie Nassau  
Loris Peggie  
Margaret S Ross AM  
L A Wilson  
The Macular Vision Loss Support Society of Australia Inc

*We would also like to acknowledge the support of a number of other donors who wish to remain anonymous.*

### Bequests (10,000+)

Estate of Ruth Victoria Chitty  
Estate of Joyce Elizabeth Larkin  
Estate of Lawrel Lola McCaffrey

Estate of Betty Brenda Spinks

Estate of Albert Ullin

### Trusts and Foundations

Baillieu Myer and Samantha Baillieu and a network of generous donors through their support of the Yulgibar Alzheimer's Research Program

BrightFocus Foundation

CASS Foundation

Coopers Brewery Foundation

Gras Foundation

Gwenneth Nancy Head Foundation

Harold Mitchell Trust

Jack Brockhoff Foundation

Joan and Peter Clemenger Trust

Juvenile Diabetes Research Foundation

Kel and Rosie Day Foundation



Lions Ride for Sight – Nina Blyth and Lions District 201V3

Peggie and Leslie Cranbourne Foundation

Perpetual Trustees

The Lionel and Yvonne Spencer Foundation

The Macular Disease Foundation of Australia

The Miller Foundation

The Murray R and Rodney A Brownless Charitable Trust

The Norman Johns Trust

The Pratt Foundation

William Angliss (Victoria) Charitable Fund

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Brandon Capital Partners

Google Australia Ltd

Allergan Australia Pty Ltd

Bupa Health Foundation

### Endowments

Centre for Eye Research Australia Foundation

Joan Margaret Ponting Charitable Trust

Margery M Kingston Charitable Trust

*We acknowledge the support of the University of Melbourne in the ongoing management and direction of the following endowed funds to support the Centre for Eye Research Australia:*

Dorothy Adele Edols Research Fund (managed by Perpetual Ltd)

Hazel Jean Eastham Bequest

Louisa Jean de Bretteville Bequest

Maurice Cantlon Memorial Fund

The Annemarie Mankiewicz Zelkin Fellowship Fund

The Mavis and Ivan Rowe Prize for Retinal Diseases Research

The Ringland Anderson Chair of Ophthalmology Fund

Wiseman Trust

Winifred Hallam Monds Bequest

### Government

Commonwealth Government

Department of Industry, Innovation and Science

National Health and Medical Research Council

Victorian Government

### Members

CBM Australia

Diabetes Australia

Glaucoma Australia

The Royal Australian and New Zealand College of Ophthalmologists

The Royal Victorian Eye and Ear Hospital

The University of Melbourne

The Victorian Lions Foundation

Vision Australia

### Partnerships

Medical Research Commercialisation Fund

The Actuator

The Baker Heart and Diabetes Institute

World Health Organisation

### Honorary Governors

Brian L Ansell

Peter Clemenger AO and Joan Clemenger AO

Andrew Fairley AM

Professor John Funder AC

The Hon Dr Barry Jones AC

Charles Macek

Tina McMeckan

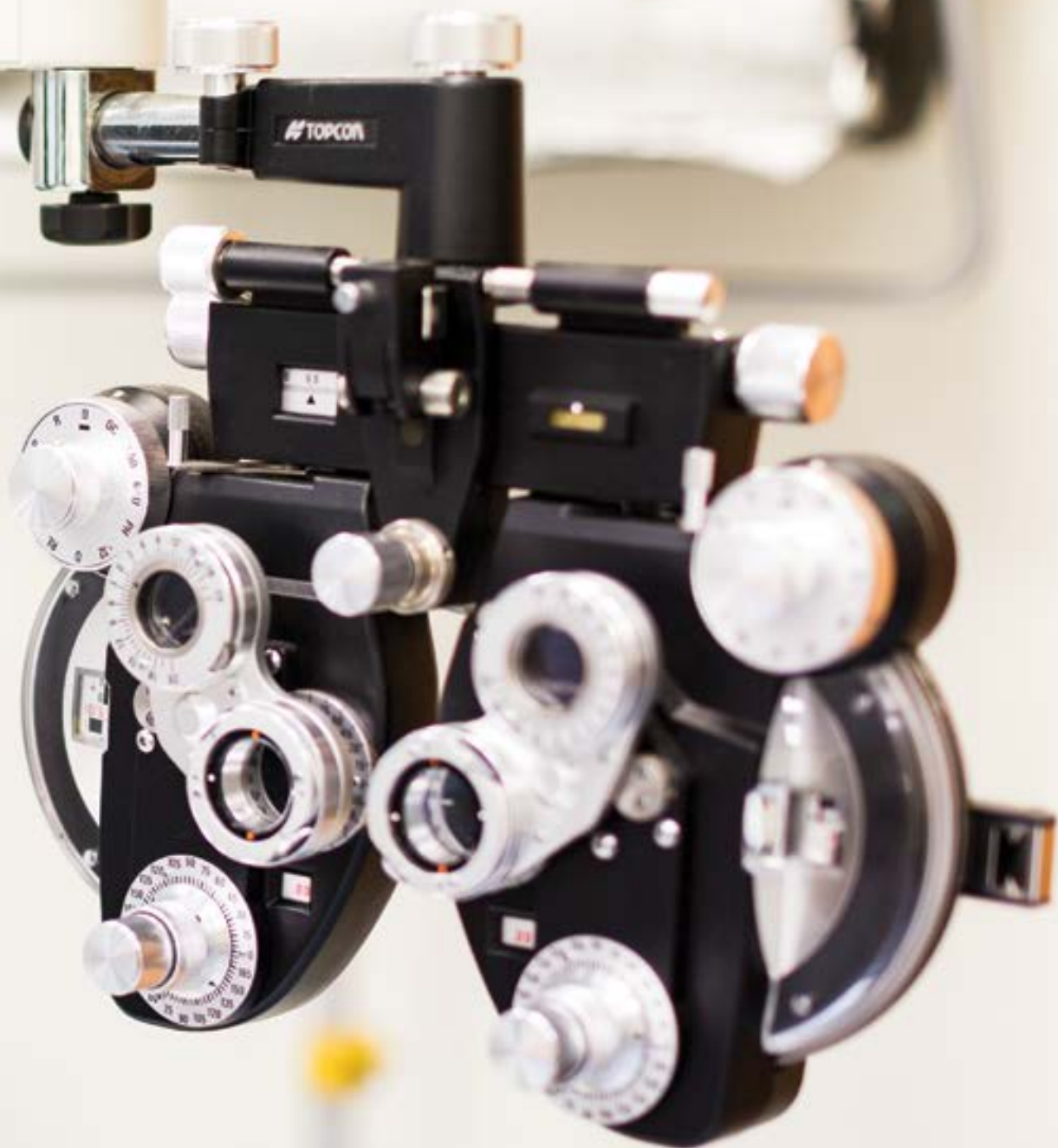
Andrew G Michelmores AO

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