Autumn 2025

visionary

Hope in sight®

Lesley paints a vibrant vision

Transforming detection and treatment

Solving glaucoma's biggest challenges

CENTRE FOR
Eye Research
Australia

World Glaucoma Week
9-15 March 2025

The challenges of glaucoma

Three factors make glaucoma hard to treat: it's often detected late, it takes time to measure disease progression, and there's no treatment that works for everyone.

Solving these challenges would allow us to find those most at risk of losing their vision from glaucoma and providing them with the right treatment before their vision is lost.

Researchers at CERA are making progress towards solving all three of these problems.

In the laboratory, we're looking closely at the eye to learn more about the cells that are affected in glaucoma which we hope will point us towards new treatments to prevent vision loss.

In the clinic, we're looking at how advanced imaging can measure the progress of vision loss from glaucoma quicker than current methods, giving eye care professionals the information they need to make the best decision about which treatments to use.

All of this is also speeding up how clinical trials for new treatments are performed – bringing new treatments for the disease to more people.

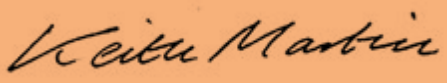
This World Glaucoma Week, I'd like to ask you for two things.

First, next time you see your eye care professional check to see if you are at risk of developing the disease, especially if there is a history of it in your family.

The second is to consider donating to our Glaucoma Appeal so we can continue all the research you'll read about in this edition of *Visionary*.

Thank you for your ongoing support.

Kind regards,



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Shared goal: Lesley and Sandy in the clinic.

Lesley's vibrant vision

Artist and great grandmother Lesley Hunter hopes to help others see by taking part in glaucoma research.

Lesley Hunter's vibrant view of the world shines through all the mediums she paints in – except watercolor.

"I'm a colourist and a very messy painter," she explains.

"I've got a studio where I throw paint around and you can't do that if you paint watercolor – you have to be very neat and tidy.

"I'm big and bold in my work. I've got paint on me, paint on the floor, paint on the dog, paint on everything else."

Her studio is in Beaufort – a small town in Victoria's west between Ararat and Ballarat.

She established her studio after years of extensive travelling with her late husband Bill, who in his retirement was a volunteer aid worker.

Together they lived throughout Africa and Southeast Asia – including Rwanda and Thailand.

"Since coming back to Australia in 1996, I've always had a studio," Lesley says.

"I have a gallery and do a lot of work locally and even with eyesight that hasn't failed yet, though I curse it a bit, glaucoma doesn't stop me doing what I want with paint."

(Continued Page 4)

History of giving

Lesley has lived with glaucoma for a decade now.

"It just kind of popped up out of nowhere," she says.

"I believe my parents may have had it, but that is something that I've never been able to confirm."

Lesley's condition is well managed and she hasn't let it get in the way of her living her life – though her eyes do get tired after reading a book for a while.

She has also recently returned from a trip to Morocco – and is aware just how important vision is for her travelling.

"Morocco was mostly sand, so if you fell on your nose it doesn't really matter," she says.

"I would not feel so secure in very rough terrain – but I don't consider myself disadvantaged and I certainly don't let it stop me from doing anything."

Every six months or so Lesley takes the train from Beaufort into Melbourne to take part in the research currently underway at the Centre for Eye Research Australia.

She was first referred to CERA in 2020 by her eye specialist and CERA Research Fellow Dr Amy Cohn.

The referral came after she was diagnosed with glaucoma, but her connection to CERA started a few years earlier through Bill.

← *Bright sight: Lesley with her painting titled Living Carefree.*

Bill was a registered organ and tissue donor, and when he passed away in 2017 his corneas went to CERA's Lions Eye Donation Service to restore the sight of others.

"Bill felt very strongly about giving, and this was a natural thing for him to do. His donation came from his very giving spirit," says Lesley.

In the same generosity of spirit, Lesley is also currently contributing towards putting good vision in reach of more people.

"It's corny, but if the research team learns something from me that can help someone else see, that's everything I can hope for," she says.

Looking together

Sandy Rezk is an optometrist and Clinical Research Coordinator at CERA and first met Lesley in June 2023.

"Since then Lesley has attended six appointments, travelling over two hours each way and reliably completing 17 visual fields tests for us," she says.

A visual field test measures the range of a person's vision.

While it is painless and simple to perform – a person just needs to press a button when they see a light – it requires a lot of concentration for a long time.

"She has also done extensive imaging, all at the age of 80 and always with a positive attitude and a great big smile," says Sandy.

"There's so much I can say about Lesley's commitment and passion which has been truly meaningful and inspirational."

Lesley says Sandy has been a wonderful guide through the experience of research.

"Every time I go into that clinic with Sandy and I look at that machinery I think, 'Oh my goodness, this doesn't happen in a little bush optometrist – I'm very fortunate'."

"If the research team learns something from me that can help someone else see, that's everything I can hope for."

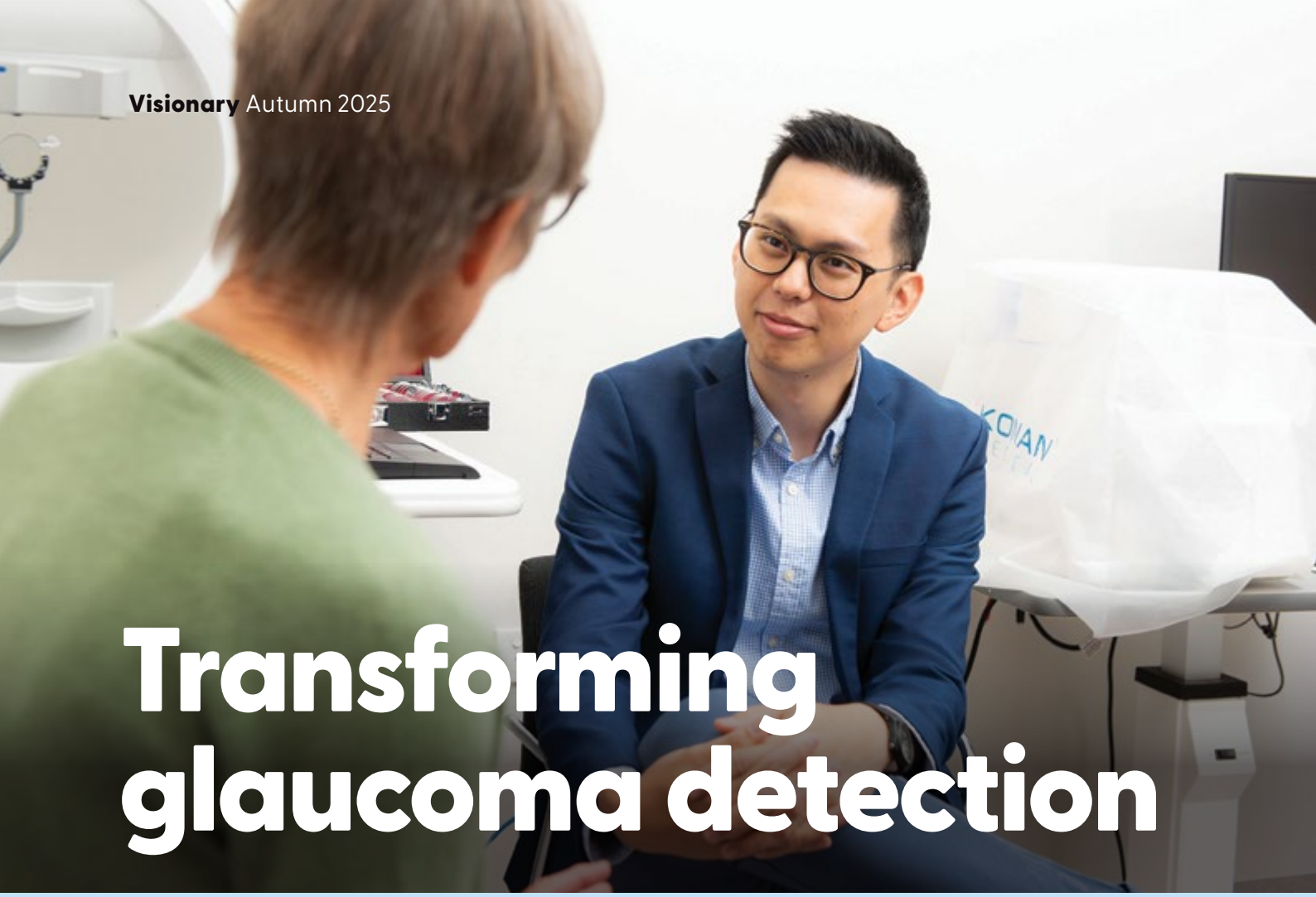
– Lesley Hunter

"And I love going down there and having a chat to Sandy."

Lesley hopes that her efforts will contribute to new ways to understand and treat glaucoma.

"It's a bit of a cliché, but if I'm just one more figure on the graph and the research team can learn something from everything they have, that's what it means to be on the cutting edge," says Lesley.

"If I can help them achieve that, it's everything I can hope for."



Transforming glaucoma detection

Associate Professor Zhichao Wu's project to improve glaucoma diagnosis and treatment has been recognised as one of the nation's best.

Glaucoma is often referred to as the 'silent thief of sight' because many people don't realise they have it until their vision has already been lost.

CERA Head of Clinical Biomarkers Research Associate Professor Zhichao Wu was working as a graduate optometrist when he first fully appreciated its impact.

"I found myself detecting eye disease that had already caused irreversible vision loss in people who had just come in for their routine eye test," he says.

"It was terrible to me that we didn't have better tools to catch it early."

This motivated him to pursue glaucoma research with the goal of detecting the condition before significant irreversible vision loss happens.

While current glaucoma treatments are effective for many, around one third of people diagnosed with the disease still go on to lose vision.

This is because it is hard to accurately measure when the disease is worsening and to know when stronger treatments are needed.

The most common way to measure vision loss from glaucoma is a visual field test, which has a patient press a button when they see lights flash to find the edge of their sight.

However, it often takes multiple tests over years to measure just how quickly a person's vision is decreasing.

"We ultimately want to help clinicians provide more personalised management

← *Better outcomes: Associate Professor Zhichao Wu is working to find glaucoma earlier.*

of patients by developing better ways of detecting glaucoma progression," says Associate Professor Wu.

"These tools are also critical for facilitating the discovery of treatments in glaucoma."

In 2024, the National Health and Medical Research Council (NHMRC) selected his research for their 10 of the Best Research Projects publication, which celebrates Australia's top health and medical researchers.

New approaches for tackling glaucoma

Associate Professor Wu's research received a boost in 2016 when he was awarded the prestigious NHMRC Early Career Fellowship.

Biomarkers are measures of biological processes that help diagnose conditions, understand the way diseases work, predict disease progression and evaluate treatment effectiveness.

His research sought to identify new biomarkers in glaucoma to improve how vision loss is prevented – and new treatments are developed – using advanced imaging and functional assessment techniques.

His research during the scholarship has made progress towards detecting glaucoma progression earlier and finding better methods of identifying those at highest risk of progression, which also supports personalised management of this condition.

Associate Professor Wu is collaborating with CERA's Ophthalmic Neuroscience team to further his research.

They're harnessing the power of an advanced hyperspectral camera – that uses a spectrum of coloured light to image the eye – to help clinicians identify biomarkers of cells at risk of degeneration.

If these 'high-risk' patients can be identified, clinicians can then monitor them more carefully and get them the best treatment at the right time.

This research could also improve how clinical trials are run and bring new treatments to people quickly.

Because glaucoma typically progresses slowly, previous clinical trials have needed thousands of people over many years. However, Associate Professor Wu has managed to reduce the sample sizes of participants required for clinical trials by up to 20-fold using new methods and designs.

He is now extending this work by exploiting new technologies.

"By combining state-of-the-art OCT imaging with AI techniques, we aim to make glaucoma clinical trials even shorter and less costly to perform," Associate Professor Wu says.

Associate Professor Wu and his team are working hard to ensure these research innovations can be translated into meaningful improvements for people living with glaucoma.

"Through earlier diagnosis, faster identification of disease progression and paving the way for therapeutic innovation, we hope to make blindness from glaucoma a thing of the past," he says.

Photo: Anna Carlile

Shedding light on glaucoma's secrets

Pioneering CERA research is shedding light on new cell types that may hold clues for the future of glaucoma treatments.

For many years, glaucoma has been treated by lowering eye pressure through medication and surgery to prevent further vision loss.

CERA Head of Visual Neuroscience Dr Anna Wang says while this approach is life-changing for many, for others the disease continues to progress.

"While lowering eye pressure is essential, we know that a significant proportion of patients still experience vision loss despite this treatment. So, it's important to investigate what other factors are contributing to cell death."

Dr Wang is taking a deeper look at the retina at the back of the eye to identify the cells directly affected by glaucoma.

"We've found that certain cell types are more vulnerable to the damage caused by glaucoma. If we can identify the specific cells affected, and understand why they are more susceptible, it could lead to new ways to detect the disease earlier and even develop treatments that target these cells directly," she says.

Identifying new cells

The retina is a thin layer of light-sensitive nerve tissue made up of several different cell types, arranged in layers.

"You could picture it like a layer cake," Dr Wang says. "The cells on the top layer convert light into electrical signals that reach the retinal ganglion cells at the bottom layer."

← *New sights: Dr Anna Wang is looking for new cells in the eye.*

Retinal ganglion cells send information to the brain through long axons, which make up the optic nerve.

In glaucoma, retinal ganglion cells die, disrupting this vital communication and eventually leading to vision loss.

Humans have up to 12 different types of retinal ganglion cells – each processing different aspects of our vision, such as contrast, colour and even edges.

But we don't yet understand all of these cells and how they are affected in glaucoma. Studying the special roles of different retinal ganglion cell types could reveal clues that one day help doctors diagnose the disease.

Pioneering discovery

Dr Wang made her first significant discovery at the University of California, Berkeley, before joining CERA.

She found a certain retinal ganglion cell type in primates, including humans, that was previously thought to be absent.

These ON-type direction-selective ganglion cells play a crucial role in stabilising moving images on the retina – a function that could potentially be disrupted in glaucoma.

"Without this function, our eyes would have repetitive uncontrolled movements, resulting in blurry vision, dizziness and loss of balance," Dr Wang says.

"We don't know how vulnerable this cell type is in glaucoma, but it opens up new avenues for investigation."

Dr Wang is now harnessing the same powerful imaging technique used at Berkeley, two-photon microscopy, to look at retinal ganglion cells in new detail.

"The setup allows us to better understand the properties of different cell types and test different treatments in a controlled environment," she says.

Dr Wang is also using this technology in a new collaboration with CERA Head of Visual Neurovascular Research Dr Luis Alarcon-Martinez – investigating the connection between blood flow in the eye and the loss of retinal ganglion cells in glaucoma.

"We can see how different cell types behave when pressure is increased in a living eye – and how they are affected by the regulation of blood flow," she says.

Looking ahead

Dr Wang's research understanding the unique vulnerabilities of different retinal ganglion cell types could pave the way for more personalised approaches to glaucoma management, like treatment strategies tailored to individual patients.

"Our ultimate goal is getting to the root of what's causing vision loss in glaucoma, not just treat the symptoms," Dr Wang says.

"By exploring alternative pathways, like boosting the strength of certain retinal ganglion cell types, we may eventually develop more targeted treatments that protect the optic nerve and help save vision."

Dr Wang's research is supported by the DHB Foundation Equity Fellowship and a grant in partnership between The Jack Brockhoff Foundation, and Peter Griffin and Terry Swann.

Implant's journey from idea to clinic

After starting as an idea on a whiteboard in Melbourne, the VividFlo glaucoma implant is now part of a landmark local clinical trial.

An innovative solution to protect the sight of people with moderate to severe glaucoma, designed by Melbourne company VividWhite, is now part of a large Australian clinical trial to determine its effectiveness and safety.

The VividFlo implant, designed by CERA Principal Investigator of Glaucoma Surgical Research Professor Michael Coote, represents a whole new way of managing glaucoma and a step towards improving how vision might be protected in the future.

"It has been incredibly rewarding to take this from an idea to a clinical trial, especially one that is so close to home," says Professor Coote.

Managing options

For people whose glaucoma cannot be controlled through eye drops, surgery to reduce the pressure of fluid in their eye can become a necessary step to protect their sight.

There are several options to do this, from using a laser to improve the eye's natural drainage pathways to using surgery to create additional paths for fluid to drain, but they are not effective for everyone.

Professor Coote's work to find a new way started in 2010 when he pioneered a research project to better understand how fluid can leave the eye.

Seven years later, he founded VividWhite with experienced medtech executive Andrew Batty. VividWhite set about developing a device to meet a set of specific requirements and created the first prototypes for the VividFlo implant.

The implant is designed to create an additional channel in the eye through which fluid can drain to reduce pressure, and then

← *Breakthrough device: The VividFlo implant has been designed as a new option in glaucoma treatment.*

disperse it gently through a series of over 150 exit channels spread out over the back of the eye.

This innovative design incorporates micro fluidics and nanofabrication to release fluid in a controlled and consistent fashion to protect the rest of the eye and potentially improve how glaucoma is managed long term.

Following the successful feasibility study in 2022, private investment and $1 million in funding from MTP Connect – the Australian Government's Life Sciences Innovation Accelerator – the device is now part of a large, multi-centre study.

The trial is currently underway at both CERA's Cerulea Clinical Trials and several other sites across the country.

Local benefit

CERA Managing Director Professor Keith Martin is one of the surgeons involved with the clinical trial, and said it's been exciting to see a locally designed device come to trial.

"There are not many cases where a small team, without assistance from a major medical device or pharmaceutical company, have taken an idea like this all the way from the drawing board to clinical trial," says Professor Martin.

"It's quite a privilege to be part of this trial, based on such fantastic research and a design that has been entirely locally created."

Professor Michael Coote (top), Professor Keith Martin and Dr Jennifer Fan Gaskin.

CERA researcher Dr Jennifer Fan Gaskin is the principal investigator at Cerulea coordinating the clinical trial and is also excited to be a part of it.

"As a surgeon, we're always looking for better options to help patients manage their glaucoma and seeing this come to trial we hope we'll soon have another."

Professor Coote hopes that the device will improve the lives of the approximately 300,000 Australians affected by glaucoma.

"We're aiming for the VividFlo implant to play a critical role in the suite of ways we can protect people's sight from glaucoma."

Giving hope to the next generation

Ian Crump has searched for scientific answers his entire life and is still supporting research in every way he can.

Ian Crump wishes he were 50 years younger.

"I trained as a biologist and geneticist in the 1960s – and I would just love to be able to join CERA researchers in their exciting work in their labs today," he says.

Now retired, Ian who is 77, graduated with a Bachelor of Science and a Diploma of Education and worked for a decade at the CSIRO in Melbourne.

"I was part of a small team introducing computerised literature searching to CSIRO and other Australian scientists in the 1970s and 1980s," Ian says.

"We developed techniques to search large databases and were possibly some of the first people in Australia to use the internet."

Ian, who lives in Apollo Bay with his wife Chris, is keenly interested in the work of CERA researchers but not only because of his science background.

Ian also lives with retinitis pigmentosa and is involved with CERA projects.

Retinitis pigmentosa is a group of rare eye diseases that affect the retina – the light-sensitive layer of tissue in the back of the eye.

Retinitis pigmentosa is caused by a change or 'mistake' in one or more genes.

Cells in the retina do not work as they are supposed to and over time you lose vision.

Around 70 genes are known to cause different types of retinitis pigmentosa. There are many more genes, but they have not been discovered yet.

"My family has had retinitis pigmentosa for at least three generations, but we are lucky that it doesn't start to affect us until our thirties and then gradually progresses," Ian says.

Value of research: Ian Crump is passionate about supporting research.

"My grandmother, father and two of his siblings, and my older brother and I have all maintained some central vision throughout our whole lives.

"My grandmother was good at covering up her vision problems, but she would bump into things, then my father did the same.

"My two sons have not shown any signs of the disease, so maybe they have won the genetic lottery."

Supporting research

Ian, who also has chronic fatigue syndrome, which led him to leaving the workforce early, grew up knowing retinitis pigmentosa would probably affect his vision later in life.

"Every time I went to the optometrist, I asked whether I had any granules, and when they did start appearing, it didn't really cause problems until my night vision went, which is a classic sign of retinitis pigmentosa," he says.

"Eventually I couldn't line up things properly in my amateur screen printing.

"I had to stop playing cricket about age 45, and when playing golf, I always needed a partner behind me watching as the ball would disappear from my limited peripheral vision and I had no idea where it went.

"I also started to be known for bumping into displays and people at the local supermarket, which wasn't too good."

Ian surrendered his driving licence at the age of 70.

"We used to take our caravan to Queensland every winter – but when my licence came up for renewal, I ticked yes to the eye condition question," he says.

"That was difficult because my chronic fatigue means I can't walk very far without tiring, and I started feeling depressed about both conditions."

Happily, Ian has since increased his mobility by using a scooter and sometimes a visibility cane.

Ian began his connection with CERA several years ago after seeing an article about research. He generously donates once a month.

"I provided my DNA to the VENTURE study but no gene match was found," he says.

"I always knew it was unlikely something would happen for me given my age but who knows? The amount and the speed of discoveries is so exciting.

"And I wish I were 50 years younger! I would have loved to do research alongside CERA scientists.

"The hope is there, and the results are coming."

Power of giving

CERA's new Head of Philanthropy is passionate about helping people transform the lives of others.

CERA's new Head of Philanthropy Maree Apolloni-Dhongdue is inspired by the impact individuals can have through giving.

It's a power she has witnessed throughout her career, where she has worked with organisations as varied as the Lort Smith Animal Hospital, the Great Barrier Reef Foundation and Australian National University.

She joined CERA in late 2024 with a personal connection – both of her parents had Type 2 diabetes which carries the risk of vision loss, and her great-grandfather lost his sight from likely the same condition.

"I have seen the effects of vision loss on family members and have an empathy for those dealing with impacts on their sight – it's one of the reasons that I'm so enthusiastic about being at CERA," she says.

Maree says being a part of every stage of vision research – from the earliest discovery research in the laboratory to clinical trials of treatments – is inspiring.

"CERA is a unique research organisation where clinicians, researchers and academics work side by side," she explains.

"There is the rigour of academia alongside the nimbleness of a not-for profit, driven by a network of supporters who are passionate about transforming the lives of people living with vision loss around the world."

Making a difference: Maree helps people transform lives.

Throughout 2025 she'll be sharing opportunities for people to transform the lives of people living with vision loss and blindness.

"I'm looking forward to meeting all the people in the CERA community who donate – from regular donors, supporters of individual campaigns and bequestors – and sharing the magnitude of their impact on the lives of people with low vision by allowing us to pursue cutting-edge research."

To get in touch with Maree and find out more about the many ways you can have an impact, email mapolloni-dhongdue@cera.org.au or call 1300 737 757.

Be a star that shines on

By leaving a gift in your will, no matter the size, your generosity helps protect future generations from vision loss and blindness.

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