



CENTRE FOR
Eye Research
Australia
1996-2016

visionary

SPRING 2016

Saving sight. Changing lives.



National Eye Health Survey launch

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receive top honours





5 minutes with... A/Prof Alice Pébay

A/Prof Pébay's, Head of Neurogeneration Research at CERA, work examines human pluripotent stem cells that have the potential to develop into any type of cell in the body.

What are you working on now?

We are working on using patient's own stem cells to model eye diseases. We take the patient's skin cells and turn them into "pluripotent" stem cells, cells that can become any cell of the body, and guide them to become an eye cell.

Why is it important to use a patient's own skin cell in your research?

Using a patient's own skin cell, turned stem cell, we can obtain eye cells without doing a biopsy at the back of the eye. One of the major benefits of human stem cells is that they can provide an endless supply of other cells to study in the laboratory—in our case, eye cells.

Why are stem cells important when studying eye diseases?

The causes of many common and rare eye diseases or their progression are unknown. If we know what goes wrong in a cell that is sick, we can fix it and find new treatments and drugs for eye diseases. This is what we aim to establish with the use of stem cells, using them to model specific eye diseases, in order to identify what goes wrong in specific diseases and how to then stop or alter the progression of the conditions.

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Letter from the MD

The last few months have brought about some outstanding work and accomplishments for CERA. By working together with our various local and international partners, we are able to translate our research to change the lives of people struggling with eye disease in the local community and beyond.

In the midst of all the important and exciting work, I would like to take the time to acknowledge and celebrate our people at CERA.

Congratulations to Professor Greg Disting, Associate Professor Alex Hewitt, and Professor Robyn Guymmer who were recognised by the medical research community for their outstanding contributions to science. We also celebrated the 25th anniversary of the Lions Eye Donation Service this past July—read about the impact of their work on page 10.

As a designated WHO Collaborating Centre for the Prevention of Blindness, the only such centre in Australia, CERA researchers Professor Mingguang He and Dr Andreas Mueller, work together to foster a multidisciplinary approach to the promotion of eye health. Learn more about their ground-breaking work and new project on page 3.

After a year-long effort, Dr Mohamed Dirani and his team of researchers wrapped up the National Eye Health Survey, conducting a final eye test in Kalamunda, Western Australia. Look forward to future issues of Visionary where we will share the findings of this ambitious survey.

CERA is working on many exciting developments and projects that are truly making a difference in people's lives—all of which are made possible by your ongoing and generous contributions. Keep in touch and be sure to take note of the back cover for our upcoming annual Crock Lecture on 19 October—hope to see you there!

Sincerely,

Jonathan Crowston, Managing Director, Centre for Eye Research Australia



Developing eye research capacity in China

A new project to accelerate research development in China, under the guidance of Australian experts, kicked off in Guangzhou this past April.

The Australia-China Research Accelerator (ACRA) program is a research platform development project led by the Centre for Eye Research Australia (CERA) and Professor Mingguang He. The program will standardise a data collection system and train Chinese hospital staff to conduct clinical research and collect data. This will allow hospitals to run multi-centred trials and encourage more investigator-initiated trials, as well as enable researchers to study rare eye diseases.

There are currently ten Chinese hospitals signed up to participate in the program with hopes that number will increase to 50 next year.

Since its commencement in 2015, the program has succeeded in laying the basic groundwork including an electronic data management system, a standardised training course, and a hospital research capacity-development curriculum. In April, the project launched an inauguration ceremony and held a workshop for the first ten partner hospitals.

"China, as the world's second largest economy and most populous nation, has an increasing demand for quality health services and medical research. Australia is an international pioneer of biomedical research and innovative research studies. ACRA facilitates a bridge between China and Australia and makes use of the advantages from both sides, to promote and accelerate the research development of this region," says Prof He.

The project is currently in its early stages but stakeholders are invested in long term growth, anticipating more hospital enrolments in the near future.

"We hope to build research infrastructure and elevate each hospital's research quality and volume. More importantly, we aim to work together with them to develop a larger research network and platform, upon which large medical studies can be conducted. This will provide us with greater evidence and data to answer the key questions affecting human health and medical services globally," says Prof He.



ACRA Inaugural Workshop in April



National Eye Health Survey testing concludes in Western Australia

The National Eye Health Survey is the first representative nationwide study of the burden of eye disease in Australia. Survey data will provide up-to-date prevalence rates on blindness and low vision for both Indigenous and non-Indigenous Australians. Current data on vision loss is over twenty years old. Data from the NEHS will assist in the planning of future eye health and vision care programs (*Vision 2020 Australia*).

Eye health professionals conducted a final eye test in Kalamunda in April, marking the end of a year-long pioneering national research study mapping the eye health of Australians.

The Western Australian suburb of Kalamunda is one of nine testing sites in the state where eye health professionals have been collecting information for the National Eye Health Survey.

The survey, which is being undertaken by the Centre for Eye Research Australia (CERA) and Vision 2020 Australia, began rolling out across the country in March last year. It is the first survey of its kind to map the prevalence of vision impairment and blindness in both Indigenous and non-Indigenous Australians.

Vision 2020 Australia CEO, Jennifer Gersbeck, said the results from the testing in Western Australia will form an important part of the research and help deliver a clearer picture of the state of Australian eye health.

“As Australia’s population ages, we expect to see an increase in the number of people with conditions such as macular degeneration, glaucoma, cataract, diabetic retinopathy and refractive error. Being armed with accurate data will help us to manage these conditions efficiently and effectively,” says Gersbeck.

To mark the completion of the survey, eye health professionals and researchers were joined in Kalamunda by the Assistant Minister for Health and Aged Care and Member for Hasluck, the Honourable Ken Wyatt AM.

Principal Investigator and Head of Health Services and Evaluative Research at CERA, Dr Mohamed Dirani, comments that current interventions and programs are planned and implemented on 20 year old data. The National Eye Health Survey provides an up-to-date, evidence-based picture of the prevalence and causes of vision impairment in Australia.

“The results of the survey will also provide invaluable follow up data for the National Indigenous Eye Health Survey conducted in 2008, where the effects of interventions since then can be assessed and specific eye health strategies for the Indigenous community can be better guided,” says Dirani.

The National Eye Health Survey was conducted in partnership with Vision 2020 Australia and was supported by funding from the Australian Government under the Chronic Disease Prevention and Service Improvement Fund, with other contributions coming from CERA, OPSM, Novartis, Zeiss, Brien Holden Vision Institute, Optometry Australia, National Aboriginal Community Controlled Health Organisation and the Royal Flying Doctor Service.



Indigenous Australians at greater risk of blindness

Did you know Indigenous Australians are eight times more likely to have diabetes compared to the rest of the population? Or that one in three Indigenous Australians with diabetes have diabetic eye disease, which puts them at risk of losing their sight?

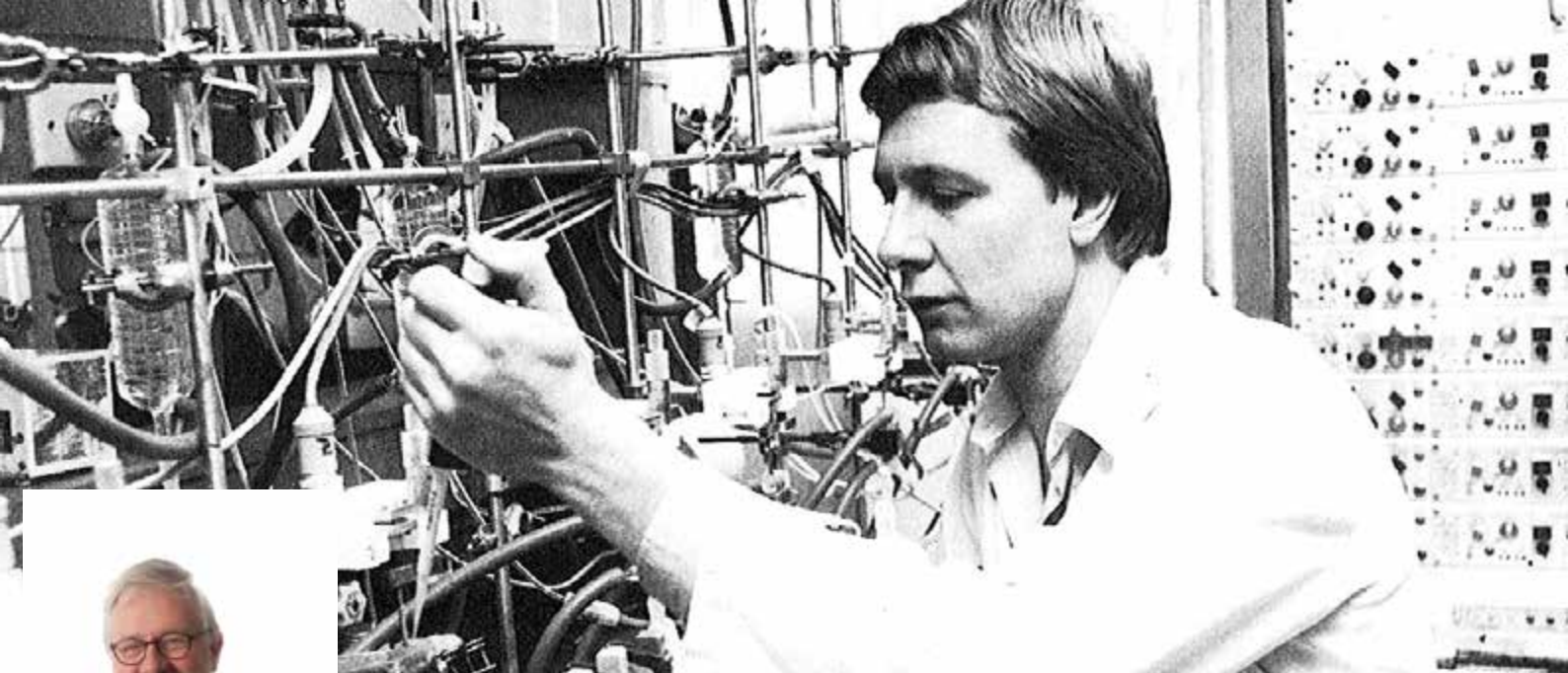
"We need earlier screening and treatment for diabetic retinopathy in Indigenous communities. A 2011 study showed that just over half of those with clinically significant diabetic macular oedema (an advanced form of diabetic retinopathy) and less than 40% of those with the early signs of diabetic retinopathy consulted a health care provider in the preceding year," says Dr Mohamed Dirani, Head of Health Services and Evaluative Research at CERA.

Dr Dirani led the recent National Eye Health Survey which included 1,738 Indigenous Australians aged 40 years or older from all over the country. Preliminary data shows there is still a substantial gap between

the eye health of Indigenous and non-Indigenous Australians. "There are some promising signs that eye health services are reaching our Indigenous communities, but there is a significant amount of work yet to be done," says Dirani.



Dr Mohamed Dirani performing an eye examination



Professor Greg Dusting recognised with Lifetime Research Award

Congratulations to Professor Greg Dusting who was awarded a Heart Foundation Research Medal for Lifetime Contribution to Cardiovascular Research, in recognition of decades of research in cardiovascular pharmacology.

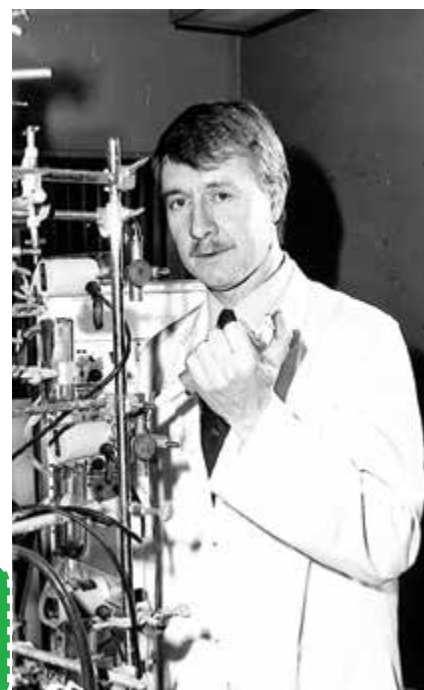
Prof Dusting spent his early career studying the lining of arteries and heart drugs that affect it, and received his first Heart Foundation grant over 40 years ago. The grant supported a fellowship at the pharmaceutical company Wellcome in the UK, where Prof Dusting and his collaborators discovered a new, naturally occurring compound they called 'prostacyclin' which inhibited blood clotting. This discovery led to a Nobel Prize for his mentor—Sir John Vane—and the development of new drugs for the clinical management of pulmonary hypertension, commonly used in patients waiting for a heart-lung transplant.

Over the subsequent decades, Prof Dusting received significant financial support for his research from the Heart Foundation and he was also appointed the first Senior Research Fellow of the Foundation. This support was critical to Prof Dusting's research success as it allowed him to pursue innovative research.

"How do you move forward without trying new things? The Heart Foundation really made a difference to fill a gap in cardiovascular research funding and enabled a lot of young researchers like me to get started," says Prof Dusting.

In 2012, Prof Dusting moved his research team to the Centre for Eye Research Australia (CERA). "Many people wonder what the heart and eyes have in common, but the answer is a lot!" says Prof Dusting. "A lot of eye problems are caused by blood vessels at the back of the eye, in the retina," he explains.

"My team looks at the signalling in blood vessels, which is important because this is what goes wrong with diseases like macular degeneration and diabetic retinopathy. Both of these diseases can lead to leaky vessels and are a major cause of blindness."





Positive public support for life-saving genetic intervention

A survey conducted by researchers from the Centre for Eye Research Australia (CERA), the University of Melbourne, the Menzies Institute for Medical Research, the University of Tasmania and Monash University has found that approximately two out of three people support an intervention known as 'gene editing' to cure life-threatening or debilitating diseases.

Gene editing uses a naturally occurring phenomenon known as CRISPR/Cas to effectively cut and paste DNA inside living cells. This technique, which is still in its experimental stages, could enable researchers to edit a person's genetic code, deleting faulty genes and potentially replacing them with new correct versions, thereby preventing an individual from developing deadly or debilitating diseases.

Led by Associate Professor Alex Hewitt and Associate Professor Alice Pébay, the results of the survey were published in *Cell Stem Cell*. Data were collected from over 12,000 people across 185 countries. Results showed that 59% of respondents agreed with the use of gene editing to cure life-threatening or debilitating disease, with 10% disagreeing with this application.

Gene editing could also be used for non-health related purposes. For instance, to genetically alter an individual's characteristics such as physical appearance or athletic ability. Under a third of respondents agreed with using the technology for this purpose, with 30% being unsure or neutral and 43% disagreeing.

Gene editing could be undertaken in adults or children, but it could also be possible to genetically

edit embryos during in vitro fertilisation (IVF). Editing the genetic code of an embryo would mean the changes would be passed on to the next generation. "Some scientists have raised ethical concerns with embryonic editing, because they believe it is medically unnecessary and raises the prospect of 'designer babies'," explains A/Prof Pébay. "Interestingly, our survey respondents did not show a marked difference in their levels of support for editing an adult or child versus an embryo."

The survey was conducted via social media and attracted participants from all over the world. The average age of the respondents was 24 years old. Previous public opinion surveys that have included an older demographic have shown less support for gene editing, suggesting that younger people may be more open-minded when it comes to embracing emerging scientific technologies.

"We believe that scientists, regulators and the public must to be involved in this conversation. The technology is developing faster than we could have imagined. It's not a matter of if these things will be possible, but when," says A/Prof Hewitt. "The application of this technology will affect all of humankind. The public needs to understand the risks and potential benefits of different applications of gene editing in a way that allows everyone to make an informed opinion. Our study was an initial attempt to engage people globally on what is shaping up as this century's most exciting development in biology."

A free, PDF copy of the research paper *A Global Social Media Survey of Attitudes to Human Genome Editing*, can be found on the *Cell Stem Cell* website.



Learn more about A/Prof Alice Pébay and A/Prof Alex Hewitt's current research: cera.org.au/about/principal-investigators

CERA scoops the awards pool at leading international conference

Three senior investigators from the Centre for Eye Research Australia (CERA) received awards at the annual meeting of the Association for Research in Vision and Ophthalmology (ARVO) in Seattle, US. ARVO is the largest and most respected eye and vision research organisation in the world.



Professor Paul Baird received a grant from the BrightFocus Foundation to support his work on the genetics of age-related macular degeneration (AMD). Prof Baird's research will apply a novel statistical algorithm to identify gene interactions and biological pathways that delineate the two advanced subtypes of AMD.



Professor Robyn Guymer was delighted to receive the Carolyn K. McGillvray Award for Macular Degeneration Research from the BrightFocus Foundation. The award will allow Prof Guymer to study the underlying mechanisms by which debris accumulates in the retina in AMD. Understanding this process may lead to novel treatments for early AMD. Prof Guymer was among five innovative vision scientists who received named awards from the Foundation.



CERA's Managing Director Professor Jonathan Crowston was honoured to receive the inaugural David L. Epstein award for mentorship of an early career glaucoma researcher. CERA's Dr Peter van Wijngaarden, will be Jonathan's mentee, and will investigate energy transport from oligodendrocytes (the support cells of the central nervous system) to retinal ganglion cells (the nerve cells that degenerate in glaucoma) and determine how this impacts the retinal ganglion cell response to advancing age and physical and metabolic stress.

What is AMD?

Age-related macular degeneration is the leading cause of vision impairment in people over the age of 50 in Australia. It affects the part of the eye we use for central vision, or straight ahead sight, for activities such as reading, writing and colour.



Learn more about CERA's research on glaucoma and macular degeneration at:
cera.org.au/research/

Eye researchers awarded top Australian research fellowships

Two researchers from the Centre for Eye Research Australia (CERA) received top honours from the National Health and Medical Research Council (NHMRC) in Canberra.

Deputy Director, CERA and Head, Macular Research, Professor Robyn Guymer, was awarded a prestigious NHMRC Elizabeth Blackburn Fellowship to support her research into Age-related Macular Degeneration (AMD), whilst Associate Professor and Head, Clinical Genetics, Alex Hewitt, has been recognised as the top-ranked NHMRC Practitioner Fellowship applicant.

The Elizabeth Blackburn Fellowships are awarded annually to the highest ranked female applicant in each of the biomedical, clinical and public health pillars of the NHMRC's Research Fellowship scheme. Prof Guymer received the award for the Clinical Science and Medicine category.

Prof Robyn Guymer is a clinician-researcher focusing almost exclusively on AMD, the leading cause of vision loss and legal blindness in Australians over 50 years of age. Prof Guymer's research over the past two decades has looked at all aspects of this disease, from better understanding the pathological causes and risk factors of AMD, defining the clinical signs and severity of the disease in a living eye, to testing of novel treatments for every stage of the disease.



Prof Guymer receiving the Elizabeth Blackburn Fellowship award

"This fellowship will enable me to continue expanding the AMD research field by collaborating with basic scientists to address underlying mechanisms of the disease and then take our research findings into the clinic," says Prof Guymer.

She was honoured to receive the Elizabeth Blackburn Fellowship, which is specifically designed to support female scientists at the top of their field. "Like many women, I have to balance my family commitments with my career. I have to make choices every day—do I attend a networking event or a junior soccer match? We have come some way in trying to recognise and account for the impact of having children on a women's career, but it is also important to acknowledge the ongoing impact of family commitments on careers (mainly women's) as the children grow up."



A/Prof Hewitt receiving his award

A/Prof Alex Hewitt received a Research Excellence Award as the top ranked NHMRC Practitioner Fellowship applicant for his work on patient-specific stem cell lines and emerging gene-editing techniques. A/Prof Hewitt's research aims to understand the precise molecular mechanisms leading to blinding disease and develop novel therapies for these diseases.

"The overarching goal is to ensure that through targeted, evidence-based intervention, the next generation of people genetically predisposed to blinding ocular diseases have a dramatically different natural history to their forebears," says A/Prof Hewitt.

NHMRC Practitioner Fellowships are designed to support research that results in the translation of evidence into improved clinical practice and health policy, delivering improvements in health and healthcare to Australians.



Shah family with Dr Pollock and Ms Rogan



Giving the gift of sight for 25 years

Melbourne's Lions Eye Donation Service celebrated its 25th anniversary this past July with a celebration attended by donor families and recipients, as well as the Governor of Victoria, the Honourable Linda Dessau AM.

Since 1991, the Lions Eye Donation Service has facilitated over 7,500 corneal transplants from over 4,600 donors. "At that time, there were 180 people waiting for a corneal transplant in Victoria," says Dr Graeme Pollock, Director of the Lions Eye Donation Service. "Today we are proud to say that most patients referred to us for a corneal transplant will receive a new cornea within weeks."

The cornea is the clear surface at the front of the eye and is the main focusing element. If the cornea becomes cloudy from disease, injury, infection or any other cause, vision will be dramatically reduced. A corneal transplant is a surgical procedure which replaces a disc-shaped segment of an impaired cornea with a similarly shaped piece of a healthy donor cornea.

The Honourable Linda Dessau AM, Governor of Victoria and Patron of the Centre for Eye Research Australia (CERA) was a special guest at the event, along with her husband His Honour Judge Anthony Howard. The Governor expressed her deep admiration for the work of the Service over the past 25 years and enjoyed a tour of the CERA's laboratories.

A highlight of the event was the heartfelt words from Ms Anne Rogan, whose late partner Christine Walsh donated her corneas last year. "Chris was such a kind, generous person. It makes me so happy to know that somewhere out there is a young man who can see again thanks to her gift."



Honourable Linda Dessau AM

Greg and Alison Shah know full well the impact of such a gift. Their seven year-old daughter Sienna received a corneal transplant two years ago.

Mr Shah described the excitement Sienna felt when she received her 'new eye'. "She still has limited vision in her right eye but that doesn't stop her from reading, climbing on play equipment and jumping on the trampoline." When asked what she wants to be when she grows up, Sienna already has a good idea. "An eye doctor!" she exclaims.

The Lions Eye Donation Service is a joint venture between the Lions Clubs of Victoria and Southern New South Wales, the Centre for Eye Research Australia, the University of Melbourne and the Royal Victorian Eye and Ear Hospital. It routinely provides corneas and sclera for transplantation and research across Victoria and Tasmania. Learn more at www.cera.org.au/community/lions-eye-donation-service/

New patented corneal film treatment

A new patented treatment could have the potential to restore eyesight for people with corneal disease. The cornea is the transparent layer at the front of the eye that controls and focuses the entry of light into the eye.

Dr Berkay Ozcelik, a recent Victorian winner of Fresh Science—a national program for early-career researchers—was part of a team of researchers at the University of Melbourne who developed a technique to grow corneal cells in the lab that can be transplanted into the eye. The technique will help grow patient's own corneal cells which minimises the risks that occur during transplantation.

CERA's Associate Professor Mark Daniell, Head, Corneal Research, spoke to media about the implications of this treatment for corneal transplantation.

"The main problem we've had with corneal transplants is cell rejection," he says. "You couldn't get rejection if they were your own cells."

Dr Ozcelik developed the synthetic film used to culture new corneal cells at the Polymer Science Group (the University of Melbourne), working with the Centre for Eye Research Australia. They have successfully restored vision in animal trials. The next phase of the study will be to trial the treatment in human clinical trials.

With more than 2,000 corneal transplants conducted in Australia, and a worldwide shortage, this breakthrough discovery has many implications for corneal donors and potential benefits to people with corneal disease world-wide.

Fresh Science is supported by Museum Victoria, CSIRO, Deakin University, Monash University, RMIT University, Swinburne University of Technology, the University of Melbourne and New Scientist.



The study is currently not recruiting patients for the clinical trials of this corneal treatment. Stay up to date with the study's progress by subscribing to our newsletter Eye-news. Sign up at www.cera.org.au

Oculo helping independent optometrists improve patient care

Independent optometrists will now have access to the Oculo communication platform, enabling better quality eye care for thousands more patients across Australia.



CERA's spin-out company, Oculo, announced a new partnership with Monkey Software, makers of the leading optometry practice management system, Optomate. The partnership will enable a secure link between the Oculo and Optomate software platforms to streamline and enhance clinical communications between ophthalmologists and optometrists.

"We want to ensure that Oculo is an inclusive system that facilitates quality care for as many eye patients as possible. We want to make it easy for independent optometrists to join the Oculo network, which already exceeds 1,000 users, 215 ophthalmologists and 400 practices across Australia," says Oculo's CEO Dr Kate Taylor.

"Communications through Oculo will also help our optometrist users connect with general practitioners and other medical specialists," says Mr Chris Monks, Director of Monkey Software. "This is important for both patient care and to promote the central role of optometry in primary eye care."

Oculo provides eye care professionals with an innovative way to share clinical information across a secure web-based system (*Oculo, 2016*). Learn more about how this innovative platform leads to better patient care at www.connect.oculo.com.au

2016



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What's on at CERA?

Please save these dates in your diary.

19
Oct

2016 Gerard Crock Lecture

5.15pm

29
Nov

Keratoconus Information Forum

6.00pm

All are welcome at our community events, aimed at a general audience. We appreciate your gold coin donation to help cover the cost of running our information forums.

Phone: 1300 737 757

| Email: cera-rsvp@unimelb.edu.au

| Website: www.cera.org.au

2016 Gerard Crock Lecture – Wednesday 19 October

We are pleased to invite you to this annual public lecture that honours the memory and contributions of Gerard Crock AO, Australia's first Professor of Ophthalmology at the University of Melbourne and pioneer in the field of eye research.

Join us at this year's event along with guest speaker Emeritus Professor Doug Coster, AO, clinician-scientist and artist.

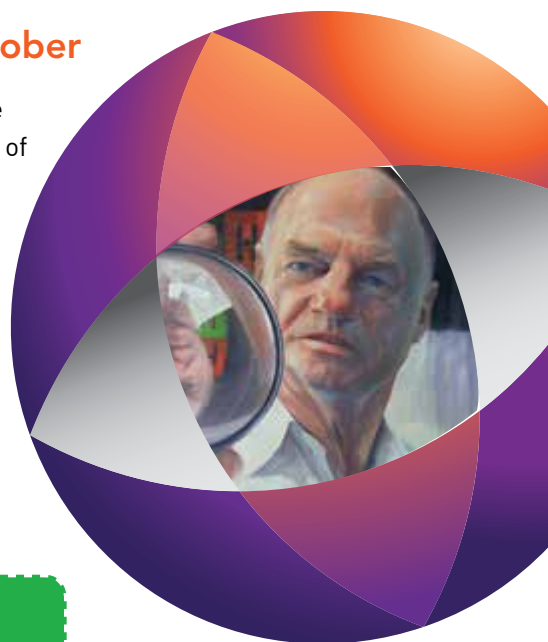
Please book your place by **Friday 14 October**

Email: cera-rsvp@unimelb.edu.au

Phone: 03 9929 8360



For more information, visit cera.org.au/events/2016-gerard-crock-lecture/



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