

ANNUAL REVIEW 2013

## transformation

Saving sight. Changing lives.

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Throughout this review, you will see QR ("Quick Response") codes. Scanning the code with an imaging device, such as a smart phone, will take you directly to our website for more information.

Cover: Vision-impaired teenager Austin O'Connor-Stubbs is participating in a research trial studying Leber's Hereditary Optic Neuropathy.





# **\$2.2 million in** support

full text articles published



million in competitive grant funding

**250** research trial participants

to support the research. If my contribution helps one person, it will be worthwhile."

nd CERA supporter.



### Our vision: To give more people with eye disease a chance to save their sight.

Our mission: To conduct eye research with real-life impact. We are unravelling the causes of diseases, preventing blindness through earlier diagnosis and better treatments, and restoring sight.

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### Transforming the lives of our patients

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### Marathon effort by blind teen

Vision-impaired teenager Austin O'Connor-Stubbs from country Victoria swapped his footy boots for runners to take part in the Melbourne Marathon festival on October 13, 2013.

Austin first noticed something was wrong with his vision in mid-2012.

"I was setting up to take a mark at footy. When the ball was four metres away from me, it suddenly disappeared. Next thing I knew, it had flown past my shoulder," he recalls.

"We went to the optometrist and he said straight away that I had a massive blind spot – it was a huge shock."

Further testing revealed that Austin had Leber's Hereditary Optic Neuropathy (LHON); a rare and untreatable form of blindness that affects mostly adolescent males.

Within a matter of weeks, the sports-mad teenager had completely lost his central vision, and was legally blind.

"I still have 15% of my vision but it's only the periphery; I can't see anything in the centre," he explains. "It's super frustrating, especially losing my hand-eye coordination."

Despite his vision loss, Austin is still playing football and competed in the half-marathon event at the 2013 Melbourne Marathon festival. Running unassisted, he raised over \$1,000 for CERA, where he is volunteering in a research study.

"We are delighted that Austin decided to join the CERA team for the Melbourne Marathon festival," said Managing Director and fellow runner, Professor Jonathan Crowston.

"Donations are an essential funding source for medical research. In the case of LHON, philanthropic funding will allow us to increase our research effort in this rare but potentially blinding disease."

CERA is one of only a few groups worldwide conducting research into LHON. "With the support of patients like Austin, we can move closer to finding a cure for this and other devastating eye diseases," says Professor Crowston.

At only seventeen years old, Austin was amongst the youngest entrants in the half-marathon, but his parents say he has shown enormous maturity since the diagnosis.

"In some ways I'm glad it happened," says Austin. "It's changed my attitude a lot; I'm a lot less negative now and I try to focus on the positives in life."

Mum Maureen O'Connor sums it up well. "He's amazing. We're so proud of how well he's coped - he's been fantastic."



### A farmer's gift of sight

Philip George Neal, a dairy farmer from South Gippsland, in Victoria, made an extremely generous bequest to support stem cell research at the Centre for Eye Research Australia.

"I am overwhelmed by the generosity shown by Philip and wish I had the chance to thank him during his lifetime," said Managing Director Professor Jonathan Crowston.

Born in 1950 in Buffalo, Victoria, Philip was interested in animals and farming from a young age. He worked as a herd tester from 1968 to 1975, when he bought a herd of dairy cows and took over a farm at Fish Creek.

In December 1980, Philip suddenly found it very hard to read a telephone book. He went to the local doctor who referred him to a specialist in Melbourne. Philip had developed Optic Atrophy. the same eye condition as his sister, causing a sudden degeneration of the optic nerve.

In 1983, despite his limited vision, he began a tertiary course in a Diploma of Applied Science in Agriculture as a mature age student, earning him the nickname "Gramps" from his fellow students. With the use of adaptive technology, Philip developed keen computer skills and began investing in the share market.

According to his cousin Bob Neal, Philip was a fiercely independent man and always made the most of his situation in life, despite his very limited vision.

Before he died, Philip made the generous decision to begueath the greater portion of his estate to benefit medical research in specific areas, namely heart research, cancer research and eye stem cell research.

Professor Crowston said he was extremely grateful to Mr Neal for his gift, which will allow stem cell research at CERA to continue to grow.



Visit www.cera.org.au/community for more information about leaving a gift in your will.

### Imagine going blind overnight

### Sudden, pitch black, irreversible blindness. This is what happened to Bonnie Patterson.

Being an active and healthy sixty-three year old, Bonnie was enjoying her retirement and looking forward to the arrival of grandchildren. Similar to many people, she had never thought she could go blind. Why would she? There was no history of eye disease in her family, and she was otherwise healthy.

But that changed six years ago when Bonnie was holidaying in South Australia.

"I woke up and it was like someone had pulled a curtain over a third of my left eye," Bonnie recalls. "I rubbed at it; I thought there was something in my eye...a day later that curtain had completely drawn over. I was blind."

Bonnie was diagnosed with Giant Cell Arteritis (GCA). GCA is a disorder that affects the large blood vessels in the head and neck. People go blind when the blood vessels to their eyes become inflamed and narrow or close.

It is the most common cause of vasculitis (inflammation of the blood vessels) in people over the age of 50.





People interested in participating in a study at CERA should speak to their ophthalmologist for a referral or visit the Clinical Trials section of the CERA website for more information.

"It's very scary, not knowing why this happened or what caused it," she says. "The doctors told me I was lucky I'd only gone blind in one eye. Not everyone with giant cell arteritis is that fortunate."

Bonnie now volunteers as a research participant for genetic studies at CERA.

Dr Alex Hewitt is Principal Investigator, Clinical Genetics at CERA. "Genetic research starts with a sample from a patient, usually a blood sample," he explains. "We use these samples to look for the genetic markers of eye disease. The key to tracing genetic variations that make someone vulnerable to disease lies in comparing many samples from many people – with and without a particular eye disease."

Bonnie hopes that by contributing to Dr Hewitt's research, she will help save others from losing their sight. "I don't want my grandchildren – or anyone else – to go through this, to experience the struggles or disappointment I did when I went blind," says Bonnie.



### A pioneer in children's eye health

### Hector Maclean (1937-2013)

**Ophthalmologist Associate Professor Hector** Maclean was one of Australia's pioneers in low vision research and services for children. He served in the University of Melbourne Department of Ophthalmology for over 20 years, many as Deputy Head, and led the department from 1986-89.

Born in Edinburgh, Scotland, Hector trained as an ophthalmologist at Dundee Royal Infirmary. He came to Melbourne in 1973 at the invitation of Professor Gerard Crock, Australia's first Professor of Ophthalmology.

In the late 1980s, Hector was appointed to a Health Department clinic examining children reported as being blind or visually impaired. There, he met teacher Jill Keeffe, who took on a PhD under Hector's supervision and later became Head of Population Health at CERA.

Working with vision impaired children became a lifelong passion for Hector. He watched and monitored their growth and development, testing their vision with Smarties or Hundreds and Thousands and rewarding them with chocolate frogs. Hundreds of parents credit Hector with enabling their children to lead independent lives, thanks to his untiring dedication and determination.

Hector was a gifted teacher who trained a generation of ophthalmologists, and a problemsolver who improved clinical practice wherever he saw a need. His lifelong contribution to teaching was commemorated by the establishment of the Hector Maclean Scholarship Fund in 2003, which supports research students in the Department of Ophthalmology. Hector also left a bequest in his will to add to the scholarship fund named in his honour.

Infection control was another passion of Hector's and he ran this program for the Royal Victorian Eye and Ear Hospital for years. The post-operative infection rates for eye surgery were consistently ten times less than most other hospitals in Melbourne or around the world. His attention to detail and the development of sound protocols and procedures saved many from unnecessary loss of vision.

Hector retired fully from clinical practice in 2010. He remained an honorary member of staff at the University and was one of the most generous supporters of the work of CERA, the Ophthalmology Department's affiliated research institute.

Hector was invited to become an Honorary Governor of CERA, in recognition for his outstanding contribution. Sadly, he died in August 2013 so this honour was bestowed on him posthumously.

### Transforming **CERA** from the inside out





### Chair and Managing Director's report

'Eye Research for Impact' is the title of our new strategic plan for the Centre for Eye Research Australia (CERA), adopted by the Board in 2013. The plan sets our sights on ensuring that our research is applied to transforming clinical practice for the benefit of patients. It will require a great deal of challenging work over the coming years to achieve this. Yet it is inspiring to be part of an organisation that commits to such an important and ambitious goal.

Ms Olivia Hilton was appointed as a new director to the Board in 2013. We thank Olivia for the important role she played in the development of the new strategic plan and we acknowledge with thanks all our fellow directors' hard work, support and commitment.

Two new member organisations, Glaucoma Australia and Diabetes Australia – Victoria, were formally admitted to membership at the Annual General Meeting in April 2013. Partnering with these new members reflects the evolution of our research priorities towards a more outcomefocused and patient-centred approach: CERA's work aims to save sight and change lives.

An international expert panel chaired by Professor Sir Peng Khaw of Moorfields Eye Hospital in London visited CERA late in 2013 to conduct a high level review of our research. The review has provided the CERA Board and senior management with a constructive assessment of our performance and strategy, and invaluable insights to help us aim for the highest international standards in what we do. In the briefing for our international reviewers, we were able to present evidence of CERA's continuing growth and improvement in 2013: our researchers contributed over 250 scientific papers in peer-reviewed journals and more than a third (34%) of their grant applications were successful, well above the national average for grant success. Staff and student numbers also grew, as did overall income. Publicity for CERA's work included over 600 media items during the year.

Community support reached a new level last year with significant growth in donations, a number of exceptionally generous gifts, and nearly \$1.5 million received from bequests. Some of our supporters' stories feature in this annual review. We are enormously grateful to all our donors who provide vital additional resources for research.

CERA's capacity for outstanding research evolved in 2013 through various staff movements. Dr Alex Hewitt, Dr Peter van Wijngaarden and Dr Mo Dirani re-joined CERA after respective absences as new principal investigators. New responsibilities were assigned to Dr Lyndell Lim who was appointed head of the clinical trials research team and Dr Robert Finger who started taking a greater role in population health research in the second half of the year.

Professor Jill Keeffe OAM completed her appointment as head of population health research on 30 June. Jill was one of the longest serving staff members at CERA and the University Department with a distinguished record of research achievement.



The University of Melbourne Department of Ophthalmology marked its 50th anniversary in 2013, the oldest of its kind in Australia and the historic forerunner of CERA. Since CERA was founded, the two entities have worked closely together and developed alongside each other, transforming a fledgling research organisation into the leading ophthalmology research group in Australia in less than two decades.

At the anniversary celebration, one of the speakers likened the relationship between the University, CERA and the Royal Victorian Eye and Ear Hospital to a three-legged stool: it is a partnership where each party makes an essential contribution and none of the parties can function properly without the others.

Peter Nankivell, Chairman



Professor Jonathan Crowston

Our experience of interconnectedness with the University and the Hospital was heightened over the past year in the context of the Hospital redevelopment project. CERA and the University formalised parallel relationship agreements with the Hospital in 2013, an important step that will help ensure that the close partnership between our organisations can continue to develop on a sound footing into the future for the ultimate benefit of the community.

Saving sight and changing lives is what we do at CERA. The patient stories featured in this review illustrate that point.

Thank you for your interest in CERA and our work and for your vital support. We could not do this without you.

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Jonathan Crowston, Managing Director

### Governance

#### Finance and Risk Committee

The Finance and Risk Committee reviews the financial planning and management of the company, financial reporting and statutory compliance obligations, and oversees risk management, investments and commercialisation activities.

Mr James Joughin, Treasurer (Chair) Professor Jonathan Crowston Mr Peter Larsen

Mr Peter Nankivell

#### Nominations and Appointments Committee

The Nominations and Appointments Committee advises on succession planning and new appointments to the Board, senior researchers and senior management staff. Mr Peter Nankivell (Chair) Professor Jonathan Crowston

#### Mr James Joughin

Professor Terry Nolan

#### **Research Advisory Committee**

The CERA Constitution requires the company to have a Research Advisory Committee of not less than five members. The Research Advisory Committee reviews and advises on CERA research plans and evaluation of research results.

Professor Robert Williamson AO (Chair) Professor Mark Cook Dr Mirella Dottori Dr Michelle Dunstone Professor Jonathan Crowston Professor John Hopper AM Professor Terry Nolan Professor Ravi Savarirayan Dr Ehud Zamir



#### 2013 CERA Board of Directors

Back (L-R): Dr Catherine Green, Mr Peter Larsen, Dr Malcolm Brown, Professor Terry Nolan, Mr Alfred Hawken Front (L-R): Professor Jonathan Crowston, Mr Peter Nankivell, Mr James Joughin, Ms Olivia Hilton. Absent: Professor Robert Williamson AO

#### Board

Ms Olivia Hilton was appointed to the Board of Directors at the start of 2013. Ms Hilton is a Partner at Social Ventures Australia (SVA) Consulting. She has deep experience working with organisations that are driving social change in relation to strategy, planning, measurement and evaluation and governance.

14 The University of Melbourne Department of Ophthalmology

### **CERA Members' Forum**

The role of the Members' Forum is to foster active engagement of the Company's Members in the life and work of CERA. Two new organisations were formally admitted to Membership at CERA Annual General Meeting in April 2013: Glaucoma Australia and Diabetes Australia - Victoria.

The seven voting Members that nominate representatives to the Forum are:

- The Kathleen and Lloyd Ansell Ophthalmology Foundation
- CBM Australia
- Diabetes Australia Victoria
- Glaucoma Australia
- Royal Australian and New Zealand College of Ophthalmology (RANZCO) – Victorian branch
- The Victorian Lions Foundation
- Vision Australia

These Members jointly nominate two candidates for appointment as directors to the CERA Board.

The University of Melbourne and the Royal Victorian Eye and Ear Hospital are also Members of CERA; they each nominate a director to the CERA Board.





Professor Miller and her husband with the Crock family

Professor Sir Peng Khaw

### International experts review CERA

CERA was very pleased to host Professor Sir Peng Khaw of Moorfields Eye Hospital and University College London, and Professor Joan Miller of Harvard University and Massachusetts Eye & Ear Infirmary late in 2013, to undertake an International Review of the organisation.

"Professors Khaw and Miller are two of the most outstanding leaders in ophthalmology research and clinical practice today. They generously shared their expertise with us in a constructively critical assessment of our research programs and strategy," said Managing Director Professor Jonathan Crowston.

The review kicked off on 31 October with CERA's major public event for the year, the Gerard Crock Lecture. Presented by Professor Miller, the lecture entitled "Macular Degeneration: Piecing together the Puzzle", looked at the various factors that play a part in the progression of macular degeneration and its treatment. The Gerard Crock Lecture is held in honour of Australia's first Professor of Ophthalmology, Professor Gerard Crock, who founded the University of Melbourne Department of Ophthalmology. Professor Crock's wife Mrs Jacqueline Crock and his twin brother Dr Harry Crock, as well as many members of the extended family, attended the event.

In the days following the lecture, the Review Panel met with CERA's principal investigators, early career researchers and students. Two local experts from the medical research sector, Professor Mark Cooper and Mr David Lloyd of the Baker IDI Heart and Diabetes Research Institute in Melbourne, provided the Australian perspective on the panel.

"The review has provided the CERA Board and senior management with invaluable insights to help us continuously improve and strive for the highest international standards in what we do," said Professor Crowston.

### Transforming our understanding of eye disease





Photo courtesy of National Stem Cell Foundation of Australia

### **Neuroregeneration**

#### Principal Investigator: Dr Alice Pébay

The Neuroregeneration Research team, led by Dr Alice Pébay, uses stem cells for modelling diseases and regeneration. Stem cells have the potential to develop into any cell in the body (they are pluripotent) and may be a useful way to study the mechanism behind eye diseases which are not yet fully understood, such as age-related macular degeneration, glaucoma and rare genetic diseases such as Leber's Hereditary Optic Neuropathy (LHON) and Friedreich's Ataxia. The team is also aiming to identify pathways to improve outcomes of neurotrauma.

#### 2013 research highlights

2013 was a year of tremendous growth for the team, with three new research fellows returning to Australia to join Dr Pébay's group.

With support from the National Stem Cell Foundation of Australia, Dr Kathryn Davidson returned to Melbourne at the start of 2013 to take up a Research Fellow position. Dr Davidson is attempting to use induced pluripotent stem cells to model age-related macular degeneration.

Dr Raymond Wong joined the team in March 2013, thanks to a fellowship from the Cranbourne Foundation. Dr Wong is an expert at growing induced pluripotent stem cells from patients' hair and skin samples. He is aiming to grow retinal ganglion cells to model diseases such as LHON and glaucoma.

The team also welcomed Research Fellow Dr Sandy Hung, who is working closely with Dr Bryony Nayagam to investigate the use of stem cell transplantation for treating auditory nerve diseases. It is hoped that this work may be transferrable to eye diseases in the future.

#### Presentations and achievements

- NHMRC Project grant awarded to Dr Alice Pébay, Professor Robyn Guymer and Professor Martin Pera.
- Optic Nerve Degeneration and Ageing Conference, Obergurgl, Austria - Invited lecture by Dr Alice Pébay and presentation by Dr Raymond Wong.
- Asia-ARVO, New Delhi, India Invited presentation by Dr Raymond Wong.
- World Glaucoma Congress, Vancouver, Canada - Chair and talk by Dr Alice Pébay.
- Therapeutic potential of stem cells: promises and pitfalls. University of Melbourne and Bio21 symposium - Invited Talk by Dr Alice Pébay.
- Dr Raymond Wong and Dr Kathryn Davidson both obtained Early Career Awards from the University of Melbourne.
- Students Duncan Crombie awarded the NHMRC Gustav Nossal Postgraduate Scholarship and Katie Gill an Australian Postgraduate Award.

### **Mitochondria and Neurodegeneration**

#### Principal Investigator: Associate Professor Ian Trounce

Associate Professor Trounce began the year on a high note with the award of a second term of the Wagstaff Senior Fellowship in Ophthalmology from the Royal Victorian Eye and Ear Hospital, underlying the close working relationship between CERA and hospital.

His team achieved solid funding success in 2013, led by the award of a new three year National Health and Medical Research (NHMRC) Project grant in October to study the underlying mitochondrial mechanisms of vision preservation in carriers of Leber Hereditary Optic Neuropathy (LHON) mitochondrial DNA mutations. Ian aims to understand why most carriers do not progress to lose their vision, while a minority do. In collaboration with Professors David Mackey and Jonathan Crowston, Ian's team will investigate how the mitochondria in unaffected carriers maintain energy production and avoid optic nerve loss.

In a grant obtained from the Jack Brockhoff Foundation, the team will collaborate with Dr Alice Pébay to create genetically corrected LHON patient cells. A grant from Ophthalmic Research Institute of Australia will fund collaboration with Dr Matthew McKenzie at Monash Institute of Medical Research to create a new mouse model of mitochondrial DNA-linked optic nerve disease.

Two other grants awarded in 2013 will allow the group to look at the linkage between eye and brain disease. The Mason Foundation funded a project due to commence in 2014 that will further investigate the ability of a protein linked to Alzheimer's disease to protect the ageing optic nerve. A grant from the DBH Foundation (ANZ Trustees) will enable an expansion of Ian's work investigating mitochondrial DNA effects in both glaucoma and Parkinson's disease. This has allowed Ian to renew collaboration with his former mentor Professor Doug Wallace of the University of Pennsylvania, examining the complex genetics of glaucoma from a mitochondrial perspective.

From April to October 2013, the laboratory hosted Czech postdoctoral fellow Jana Hroudová, funded by the highly competitive Group of Eight visiting fellowship scheme. Jana was an engaging and productive member of the team, who completed work on projects investigating mitochondrial function in ageing brain.

In early 2013, Associate Professor Trounce was invited to present preliminary findings on a unique Parkinson's disease model to the Michael J. Fox Foundation for Parksinon's disease in New York. In 2014, he will complete work funded by the MJFox Foundation and hopes to engage the Foundation for further collaborative funding.





### **Glaucoma Research**

#### Principal Investigator: Professor Jonathan Crowston

Led by glaucoma specialist Professor Jonathan Crowston, the Glaucoma Research team focuses on translational research; from the cell and molecular level through to animal models and clinical trials.

Professor Crowston's basic science work aims to increase understanding of why ageing predisposes to glaucoma and from this, to develop new therapeutic targets for protecting the optic nerve. The team collaborates closely with Associate Professor Ian Trounce on mitochondria and neurodegeneration research.

The Glaucoma Research team's clinical work aims to improve diagnosis and optimise patient management by improving the delivery of current treatments and translating new therapies into clinical practice.

#### 2013 research highlights

The team's major research achievement for 2013 was the first published evidence that exercise can protect the optic nerve against injury. Dr Vicki Chrysostomou spent the past three years investigating the relationship between forced exercise and recovery of the optic nerve after injury in an animal model. She found that older animals who have undergone a regular exercise regime and then underwent an injury to the optic nerve were able to recover in a similar timeframe as younger animals – suggesting that exercise may reverse the effects of ageing and offering potential new ways to protect against neurodegenerative diseases such as glaucoma.

#### **Presentations and achievements**

- Professor Crowston was chair, convenor or speaker at the American Academy of Ophthalmology (US), Optic Nerve Degeneration and Ageing (Austria), Australasian Ophthalmic & Vision Science Meeting (Australia), European Vision & Eye Research (France), Deutsche Ophthalmologische Gesellschaft (Germany), 5th World Glaucoma Association Congress (Canada), Association for Research in Vision and Ophthalmology (US), Alliance for European Ophthalmic Treatment Advances (Aurora) IV (Belgium) and 29th Malaysia-Singapore Joint Ophthalmic Congress (Malaysia).
- Professor Crowston received a grant from the Ophthalmic Research Institute of Australia (ORIA).
- Dr Vicki Chrysostomou's paper on the protective effects of exercise on the optic nerve was published in *Neurobiology of Aging*. She presented her findings at the Association for Research in Vision and Ophthalmology meeting (US), and at the Optic Nerve Degeneration and Ageing meeting (Austria).

- Together with Ian Trounce, the team demonstrated a deficiency in complex I in open angle glaucoma patients.
- Dr Nicole Van Bergen was awarded an ORIA project grant for her work on mitochondrial dysfunction in glaucoma and a University of Melbourne Early Career Award. She presented at the 2013 Australian Ophthalmic and Visual Sciences Meeting in December.
- Student Dr Eamonn Fahy was awarded an NHMRC scholarship and a National University of Ireland Travelling Studentship in Ophthalmology.
- Student Dr Craig Ross was awarded Best Presentation by a Trainee at the Australian and New Zealand Glaucoma Interest Group (ANZGIG).
- Associate Professor Michael Coote developed new approaches for measuring post-operative scarring in experimental glaucoma surgery. The aim here is to use this to inform development of a new glaucoma drainage device.

### Diabetic Retinopathy and Neuroglial Interactions

#### Principal Investigator: Dr Peter van Wijngaarden

Dr Peter van Wijngaarden is an ophthalmologist and research fellow with an interest in retinal diseases and multiple sclerosis.

He returned to CERA in 2013 following a two-year post-doctoral fellowship at the University of Cambridge, UK, where he was investigating the potential of stem cells in the nervous system to help repair damaged nerves in people with multiple sclerosis.

At CERA, Dr van Wijngaarden continues to work in this field, as well as examining the role of glial cells in glaucoma and retinal disease. He is also continuing research into blood vessel growth and dysfunction in diabetes with the aim of developing and testing new therapies for diabetic eye disease.

Dr van Wijngaarden is committed to improving early detection and timely treatment of diabetic eye disease and pending future funding, will be pursuing research into models of a national screening program for diabetic retinopathy (pending funding support), in conjunction with a large group of researchers, including Dr Dirani from CERA. • Associate Professor Coote toether with Drs Edwards, Sarossy and Goodfellow provided further evidence for recovery of retinal ganglion cells in glaucoma patients after eye pressure lowering.



Associate Professor Michael Coote

- Dr van Wijngaarden received a grant from the Myra Stoicesco Charitable Fund
- Dr van Winjgaarden was an invited speaker and session moderator at the Association for Research in Vision and Ophthalmology Optic Nerve Meeting, Obergurgl, Austria.
- Dr van Wijngaarden was a co-author of papers published in *Nature Neuroscience* and *Development*.





### **Cytoprotection Pharmacology**

#### Principal Investigator: Professor Gregory Dusting

The Cytoprotection Pharmacology team, led by Professor Gregory Dusting, explores cellular signalling that regulates cell survival, proliferation (where cells divide and multiply) and differentiation (where a cell develops into a more specialised cell).

Angiogenesis (growth of new blood vessels) is a particular focus, both for exploring its potential in tissue regeneration, and treating diseases in the retina and cornea. By understanding the underlying mechanisms, they aim to develop new approaches for the treatment of vision threatening diseases such as age-related macular degeneration, diabetic retinopathy, retinopathy of prematurity and ocular tumours, all of which result at least partly from pathological neovascularisation (excessive blood vessel growth).

### 2013 research highlights

CERA's Cytoprotection Pharmacology researchers discovered a new role for a well-known drug in 2013. The proliferation of new blood vessels (neovascularisation) in the retina is a leading cause of vision impairment. NADPH oxidase is known to play a role in cell signalling for treating pulmonary hypertension but its role in retinal neovascularisation is unclear. Professor Dusting and his team investigated the Nox2 form of NAPDH oxidase and found that it is associated with neovascularisation in an animal model. Turning off the gene that produces Nox2 resulted in less neovascularisation. The team believes that therapies targeting Nox2 could be of value to treat eye diseases such as retinopathy of prematurity, diabetic retinopathy and other disease processes driven by the blood vessel growth promoter VEGF.

#### **Presentations and achievements**

- Professor Greg Dusting ran a symposium at the Tissue Engineering and Regenerative Medicine International Society (TERMIS) in Shanghai, China.
- Dr Hitesh Peshavariya was invited to Co-Chair the 2014 NOX Family NADPH Oxidases Gordon Research Seminar. He was also awarded a travel grant from the Ian Potter Foundation.
- Dr Guei-Sheung (Rick) Liu received the Zhongshan Ophthalmic Center and the State Key Laboratory of Ophthalmology Award and a travel grant from the CASS Foundation. Dr Liu also presented the TERMIS meeting in China.

### **Ocular Genetics**

#### Principal Investigator: Associate Professor Paul Baird

The Ocular Genetics team focusses predominantly on genetic studies of age-related macular degeneration (AMD), refractive error and keratoconus. The group looks at how genes influence these diseases and their interaction with the environment. This helps explain the causes of eye disease, as well as helping to predict those at risk of eye disease. The aim of this research is to translate findings into improved patient care, to slow progression of disease or prevent disease onset with the ultimate aim of personalising treatment.

### 2013 research highlights

Associate Professor Paul Baird was part of the international AMD Gene Consortium that identified seven new gene loci associated with increased risk of AMD. The consortium looked at data from more than 17,000 people with the most advanced and severe forms of AMD, which were compared to data from more than 60,000 people without AMD.

Additionally, Associate Professor Baird was part of an international team that used sequencing to identify rare variants playing a role in AMD in a study of almost 10,000 people. He was also involved in an international study of refractive error of 37,000 individuals of European and Asian ancestry which identified 16 new loci for refractive error. Finally, he led an international consortium study examining data from over 25,000 individuals from 18 different cohorts to identify nine novel genes associated with axial length of the eye.



### **Presentations and achievements**

• Associate Professor Baird was a symposium chair and speaker at Asia-Pacific Academy of Ophthalmology (APAO) in India, and a symposium speaker at the Association for Research in Vision & Ophthalmology (ARVO), USA, the American Association of Pediatrics, Ophthalmology and Strabismus (AAPOS), Singapore, and Asia ARVO, India. Associate Professor Baird was also on the International Scientific Advisory Committee for Asia ARVO. • Three PhD students graduated in 2013: Dr Madeleine Adams was accepted into the Queensland Ophthalmology program, Dr Srujana Sahebjada was made a postdoctoral fellow at CERA and Dr Stuart Cantsilieris was awarded a National Health and Medical Research Council Early Career Fellowship. Farshad Abedi graduated with a DMedSci.

• Associate Professor Baird was a guest speaker at the National Institute of Biomedical Genomics, LV Prasad Eye Institute and Aravind Eye Hospital in India.

• Associate Professor Baird is on the editorial board of The Scientific World Journal and BioMed Research International. He was also co-author on three separate papers published in *Nature Genetics*.

### Transforming health care





### Clinical Trials Research

### Principal Investigator: Dr Lyndell Lim

Clinical trials and translation of research to improve patient care has long been an integral part of CERA's research program. To strengthen coordination of this work, a dedicated Clinical Trials Research team was formed in April 2013, led by retinal specialist and clinician-researcher Dr Lyndell Lim.

The team manages more than 20 clinical trials in diabetic eye disease, age-related macular degeneration (AMD), glaucoma, uveitis and other retinal diseases, involving over 250 patients. These include studies designed and performed by CERA, studies in which CERA is a collaborator in multi-center trials, and pharmaceutical industry sponsored studies.

The Clinical Trials group also includes the Retinal Vascular Imaging Centre, which provides retinal image screening and grading services internally and to external collaborators across many studies.

#### 2013 research highlights

Five new trials commenced in 2013, including a study to determine the best treatment regimen for patients with AMD.

The team also began a trial comparing two treatments for chronic uveitis as part of an international collaboration funded by the National Eye Institute in the United States.

Funding was also secured for a large audit of patients who have undergone treatment for diabetic macular oedema so that we can better understand the changing treatment patterns of this disease and the impact on hospital resources.



### Health Services Research

### Principal Investigator: Associate Professor Ecosse Lamoureux

The Health Services Research team, led by Associate Professor Ecosse Lamoureux, is focused on clinical health services research with patient-centred outcomes. The unit has four interrelated research platforms which aim to:

- Investigate the prevalence, incidence, and risk factors associated with suboptimal eye disease/risk management; and implement evidence-based interventions to improve management.
- Develop new quantitative measurement tools to help CERA understand the impact of eye diseases on patients and use these tools to evaluate the effect of health interventions on quality of life.
- Design clinical and randomised controlled trials to improve health outcomes in patients with, or at risk of, eye diseases.
- Work with eye care providers to translate research findings into practice.

#### **Presentations and achievements**

• Dr Jonathan Noonan and Associate Professor Ecosse Lamoureux received a grant from the Juvenile Diabetes Research Foundation to investigate 'Retinal vascular function during hyperglycaemia and the role of vitamin C'.

### **Macular Research**

### Principal Investigator: Professor Robyn Guymer

Professor Robyn Guymer leads the Macular Research team at CERA. The group aims to improve understanding of the disease processes and treatment options for age-related macular degeneration (AMD), the leading cause of central vision loss in Australia.

In particular, the group's research focuses on determining risk factors for progression from early AMD to advanced, the genetics of AMD; environmental associations with AMD, and biomarkers of AMD. The team also carries out a wide range of clinical trials into new treatments for retinal disease, and is a core partner in the Bionic Vision Australia project, leading the clinical and surgical research program.

### 2013 research highlights

The Laser in Early Age-related Macular Degeneration (LEAD) study is now in its second year and sites have been established in Melbourne, Sydney, Perth and shortly, in Adelaide, as well as overseas. Over 100 patients have been recruited so far for the trial to test an Australian-designed nanosecond laser for treating early AMD. CERA is collaborating with the Department of Anatomy and Neuroscience at the University of Melbourne to better understand the mechanisms of action of the laser.

The Macular Research team is also investigating AMD biomarkers and functional test development. The aim of this research is to develop anatomical and functional biomarkers of early disease that can be monitored over time and could be used to monitor progression in the earliest stages of AMD. These markers are needed to allow studies that intervene at an early stage when visual acuity is still normal.

### **Presentations and achievements**

- Dr Chi Luu received the BrightFocus Foundation Research Grant and the CERA Award for Excellence in Teaching and Training.
- Dr Robert Finger was awarded the Annemarie Mankiewicz-Zelkin Fellowship by the University of Melbourne and Clinical Investigatorship from the Sylvia and Charles Viertel Charitable Foundation.
- Dr Lauren Ayton was awarded the prestigious Hugh Rogers Fellowship from the Melbourne Boston Sister Cities Association. She also received the CERA Award for Community Engagement and Knowledge Transfer.
- Zhichao Wu received the Sir Robert Menzies Memorial Research Scholarship in Allied Health.
- The Bionic Eye research team were finalists in the Eureka Prize for Interdisciplinary Scientific Research.





### Diabetic Macular Oedema (DMO)

Associate Professor Wilson Heriot is a retinal specialist and part-time researcher at CERA. He is currently testing the nanosecond laser for the treatment of diabetic macular oedema.

"This new laser treatment emits a dramatically shorter energy dose that does not damage the retina. It is painless, easy to administer and appears to be as effective as thermal photocoagulation in treating the swelling and poor vision associated with DMO," said Associate Professor Heriot.



### **Clinical Genetics**

### Principal Investigator: Dr Alex Hewitt

Dr Alex Hewitt's Clinical Genetics team specialises in the clinical and genetic analysis of inherited eye diseases, including glaucoma, Leber's Hereditary Optic Neuropathy (LHON), Autosomal Dominant Optic Atrophy, retinal dystrophies, cataracts, Giant Cell Arteritis (GCA) and strabismus, as well as raising awareness for Retinoblastoma, a rare childhood eye cancer.

#### 2013 research highlights

A significant grant from the National Health and Medical Research Council (NHMRC) enabled the establishment of the Global Giant Cell Arteritis (GCA) Genomics Consortium, including researchers from Australia, the UK, New Zealand and Spain.

PhD student Dr Elisabeth De Smit also received a scholarship from the NHMRC to support her study in GCA, a devastating disorder that causes patients to become blind virtually overnight.

Another highlight in 2013 was the Strabismus Inheritance Study, conducted in collaboration with the Lions Eye Institute in Perth and the Children's Hospital Boston in the US. Sometimes called 'lazy', 'turned', or 'crossed' eye, strabismus is the most common eye condition in children, affecting approximately 5% of Australians. The study is investigating the possible genes involved in the development of strabismus and associated eye conditions. CERA researchers collected over 700 DNA samples to contribute to this international collaboration.

- Dr Hewitt was part of an International consortium whose work was published in *Nature Genetics* and *PLoS One*.
- Dr Hewitt received Project grants from the NHMRC and ORIA, and was a co-investigator on a grant from the Jack Brockhoff Foundation.
- Dr Hewitt was an invited speaker at the 5th World Glaucoma Congress, (Canada) and the Association for Research in Vision and Ophthalmology (US). He also commenced a new role as Visiting Professor at Shen Zhen Eye Hospital, China.
- PhD student Annie McAuley was awarded the Young Scientist Research Prize (Biomedical Science) by the Royal Society of Victoria.
- PhD student Dr Elisabeth De Smit was awarded an NHMRC scholarship.
- Lisa Kearns and Sandra Staffieri attended and presented at the International Society of Genetic Eye Research meeting (Ghent, Belgium).

### **Drug Delivery Research**

### Principal Investigator: Dr Hong Zhang

Dr Hong Zhang is an ophthalmologist and lead researcher in Drug Delivery Research at CERA. Dr Zhang's team is investigating non-invasive and targeted tools, treatment options and technologies for vision threatening diseases such as endophthalmitis, age-related macular degeneration, glaucoma and diabetic retinopathy.

### 2013 research highlights

The Sonoeye project aims to test a new needleless method for administering drugs developed by Australian company Seagull Technology Pty Ltd. The device delivers drugs via ultrasound waves and is a potential alternative to regular intravitreal injections of drugs for patients with wet age-related macular degeneration.

Dr Zhang and her team have proven that Sonoeye can deliver exisiting medication non-invasively into the eye using an animal model. A clinical trial on three human patients is currently underway. The next stage of the research will aim to prove the efficacy of the medication delivered.

#### **Presentations and achievements**

- Dr Zhang was panel/session Chair at 2013 Harbin International Forum of Ophthalmology (HIFO) and the BIT's 3rd Annual Symposium of Drug Delivery System 2013. She also presented at the 2013 ARVO Annual Meeting.
- Dr Zhang published two articles in *Tissue Engineering.*
- Dr Zhang gave a keynote speech at the 5th Chinese Congress of Research in Vision and Ophthalmology (CCRVO).





### **Behavioural Research in Ophthalmology**

### Principal Investigator: Dr Gwyneth Rees

The Behavioural Research in Ophthalmology team focuses on the role of behavioural and psychological factors in eye disease and improving patient-centred outcomes. The research focuses on: investigating the behavioural and psychological factors that contribute to the prevention and management of eye disease; developing and evaluating novel interventions or models of care to improve patient-centred outcomes for people with eye conditions; and conducting high quality implementation research to translate evidencebased interventions into eye care services.

### 2013 research highlights

As part of an Australian Research Council Linkage project grant with Vision Australia and *beyondblue*, Dr Rees and her team trained staff at Vision Australia to deliver problem-solving therapy to clients who screen positive for depressive symptoms. This is the first time world-wide that an evidence-based psychological therapy has been integrated into low vision rehabilitation services in this way.

The researchers have also developed a new model of personalised consultations for patients with diabetic retinopathy (DR) who are struggling to maintain optimal glycaemic control, putting them at risk of vision loss. The researchers combined feedback of retinal images with evidence-based strategies for behaviour change in order to improve understanding of DR and its progression and to motivate behaviour change. Dr Rees will commence a randomised controlled trial to evaluate patient outcomes in 2014.

- Dr Rees gave an invited presentation at the 2013 Symposium for Behavioural Research in Diabetes.
- Dr Rees received a National Health and Medical Research Council (NHMRC) Career Development Fellowship: *Behavioural and health services research in ophthalmology: gaining and implementing evidence to improve patient outcomes.*
- Dr Eva Fenwick was awarded an NHMRC Early Career Fellowship: Validation and implementation of a diabetic retinopathy quality of life item bank. Dr Fenwick also received a University of Melbourne Early Career Researcher Award: Development and validation of the Diabetic Retinopathy Health Literacy Scale.
- Dr Rees, Dr Bonnie Sturrock, Edith Holloway and Michael Kienhuis received the CERA Excellence in Research Award for their work in implementing problem-solving therapy within Vision Australia services.

### **Corneal Research**

### **Principal Investigator:** Associate Professor Mark Daniell

Corneal research at CERA is led by Associate Professor Mark Daniell. The main research themes are improving corneal transplantation through development of a tissue engineered cornea and investigations into new and more effective therapies for corneal diseases such as microbial keratitis. keratoconus and ocular surface disorders.

The corneal researchers also conduct clinical trials into the efficacy and safety of surgical therapies such as corneal transplants, cataract surgery and laser surgery. The ultimate aim of corneal transplantation research is to develop a tissue engineered cornea. By growing corneal cells in the laboratory and transferring them to the patient, problems such as rejection can be avoided. The team is also looking at cellular responses to infection in the cornea.

Keratoconus research includes development of quality of life surveys, identification of potential risk factors for poor outcomes (including genetics), and assessment of new treatments including collagen crosslinking.

### 2013 research highlights

Major research highlights for 2013 included the publication of articles on genetics of keratoconus and a guality of life survey for keratoconus patients. The team also developed a novel contact lens delivery system for treatment of limbal stem cell deficiency.

### **Presentations and achievements**

- Associate Professor Daniell was co-author on publications in Tissue Engineering Part A, Investigative Ophthalmology and Visual Science, Clinical and Experimental Ophthalmology and Acta Biomaterialia.
- Associate Professor Daniell presented at the Association for Research in Vision and Ophthalmology and the Royal Australian and New Zealand College of Ophthalmology Annual Conference.





### **Lions Eye Donation Service**

### Director: Dr Graeme Pollock

The Lions Eye Donation Service (LEDS) 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 is responsible for all deceased eve donation in the States of Victoria and Tasmania and the allocation of corneas and sclera for transplantation and eyes for research purposes. It is licensed by the Therapeutic Goods Administration for these purposes.

Its services include medical assessment of donors, consent to donation, surgery of donation, processing and preservation of corneas for transplantation, testing and evaluation of donors and tissue, and allocation of corneas and sclera for transplantation. It is responsible for follow-up and correspondence with donor families and liaison and consultation with ophthalmic surgeons. It also provides eyes and tissues for research purposes and other ancillary services for ophthalmic research.

#### 2013 highlights

2013 was the busiest and most successful year to date in terms of donor numbers, transplant numbers and eyes provided for research. The Service worked with 221 donors and their generous donor families to provide 379 corneas for transplant, primarily in Victoria, but also across Australia and New Zealand. In addition, 171 sclera were used for oculo-plastic and glaucoma surgery during 2013 and more than 60 eyes were provided for research purposes. All recipients (except for urgent cases performed within 24 hours) were provided with scheduled operations with none being cancelled in the past 3 years. The recipient wait time is no longer influenced by the availability of a donor cornea.

In 2013, staff performed newer techniques of endothelial lamellar transplantation and donor tissue preparation (Ultrathin DSAEK and DMEK transplantation), both firsts in the Southern Hemisphere. New and advanced equipment was also purchased to help ensure the best possible quality and safety of the donor tissue and transplants were both maintained and improved. A new eve banking staff competency framework. developed within LEDS will be adopted by eye banks across Australia and New Zealand to continue the development of expertise and professionalism across this donation sector.

LEDS also act as the convenors and coordinators of the Eye Banking Association of Australia and New Zealand and the Global Alliance of Eye Bank Associations. The later seeks to unite the eye banks of the world in the sharing of medical standards, best-practice guidelines and education, all within a world-wide ethical framework. Already the Alliance has membership of Eye Banks in more than 50 countries which represent more than 150,000 transplants a year.

- Dr Prema Finn was awarded a Senior Fellowship by the European Eye Bank Association and made an Honorary Fellow of the University of Bristol.
- Dr Graeme Pollock gave an invited talk on "The Role of a Graft Registry" at the World Eve Banking Symposium, Rio De Janeiro, Brazil.
- Dr Pollock was co-author on two publications: 'Storage of donor cornea for penetrating and lamellar transplantation' in Corneal Disease: Recent Developments in Diagnosis and Therapy and 'The influence of Australian eye banking practices on corneal graft survival' in the Medical Journal of Australia.

### Transforming the big picture





### **Population Health**

### Principal Investigators: Professor Jill Keeffe OAM and Dr Robert Finger

Professor Jill Keeffe joined the Department of Ophthalmology in 1988 as a PhD student and later became both Head of Population Health Research at CERA and Director of the World Health Organization (WHO) Collaborating Centre for Prevention of Blindness, the only such Centre in Australia.

Professor Keeffe stepped down as Head of Population Health in June 2013. She maintains an honorary appointment with the Department of Ophthalmology.

From August 2013, Dr Robert Finger commenced as Principal Investigator in Population Health Research. Dr Finger is a clinician-scientist with a PhD from the University of Bonn, Germany, in clinical research in ophthalmology, and a PhD from the University of Melbourne, Australia, in health economics in ophthalmology.

His current research is focused on assessing treatment outcomes (patient and physician reported), developing novel outcome measures, investigating eye health services and assessing cost-effectiveness, employing a variety of statistical and decision analysis modelling.



### 2013 highlights

Dr Rahul Chakrabarti developed a new assessment tool to help low resource countries in Africa, the Middle East and Asia-Pacific regions integrate eye care into broader health management systems.

Dr Chakrabarti trialled the assessment tool in the Philippines in May 2013 and based on the success of this pilot, the assessment tool will be used in seven other low-resource countries across four WHO regions.

- PhD student Lil Deverell was awarded the CERA Award for Outstanding Contribution of a Student.
- Dr Rahul Chakrabarti came equal second in the University of Melbourne's 3-Minute Thesis Competition.
- Dr Robert Finger was the fourth recipient of the prestigious Annemarie Mankiewicz-Zelkin Fellowship awarded by the University of Melbourne. He was also awarded a Clinical Investigatorship from the Sylvia and Charles Viertel Charitable Foundation.
- Professor Keeffe was co-author on a paper published in *The Lancet* which found that the prevalence of blindness and vision loss is decreasing in most parts of the world.

### **Health Services and Evaluative Research**



#### Principal Investigator: Dr Mohamed Dirani

Dr Mohamed Dirani is a research fellow working on major epidemiological studies that investigate the key barriers to optimal diabetes care and diabetic eye disease in Australian adults, with a focus on eye service delivery and evaluative research.

### 2013 highlights

Dr Dirani was the lead author of *Out of Sight* - A report into diabetic eye disease in Australia, a joint project between the Centre for Eye Research Australia and the Baker IDI Heart and Diabetes Institute. The report was the first public document to look at the impact of diabetic eye disease in our country and what we can do to combat this leading cause of irreversible blindness.

*Out of Sight* was sponsored by an unrestricted educational grant provided by Novartis Pharmaceuticals Australia.

Media coverage at the launch of the report included:

- Afternoon and evening news coverage on Channel 7/Prime news, syndicated to regional stations nationally.
- Print coverage in Adelaide Advertiser, Hobart Mercury, Townsville Bulletin, North West Star and Mivision.
- Radio interviews syndicated to over 200 community radio stations.



### **Clinical Diagnostics Research**

Dr Ehud Zamir is developing computerised algorithms for ophthalmological clinical diagnostics, a project funded by a grant from the Lord Mayor's Charitable Foundation.

"We expect this program to assist primary care givers such as general practitioners, nurses and emergency physicians in providing urgent treatment for acute ophthalmic problems. It will also help them determine which patients require urgent referrals and which do not," said Dr Zamir.

# Transforming ophthalmology in Australia



Centre for Eye Research Australia

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Mrs Giuseppina Failli and her son Pietro present CERA Chair Mr Peter Nankivell with a generous donation.



Some of CERA's Principal Investigators with special guest, the Hon David Davis (second from left).



CERA researchers Dr Vicki Chrysostomou and Dr Mo Dirani discuss their work with visionimpaired supporter Lola Stewart.

### **Ophthalmology at Melbourne turns 50**

Fifty years ago, ophthalmology research was virtually non-existent in Australia. All that changed in 1963, when 34-year old ophthalmologist Gerard Crock was appointed as Australia's first Professor of Ophthalmology at the University of Melbourne.

Professor Crock was a pioneer in the field of eye research and led the Department of Ophthalmology into the age of microsurgery. His skills as a surgeon, and the inventions of his team, saved the sight of thousands. With Bernard O'Brien, one of Australia's pioneering microsurgeons, Professor Crock developed microsutures – needles and threads so fine that veins the size of a pin's head could be repaired or joined.

When he retired, Professor Crock passed the baton to Hugh Taylor. A friend and colleague of Fred Hollows, Professor Taylor has had a longstanding passion for improving the eye health of Australia's Indigenous people which he brought to his new appointment.

In 1996, Hugh Taylor established CERA as a spin-off research institute to the Department of Ophthalmology. The Department and CERA have been working in close harmony ever since and have grown together into Australia's leading ophthalmic research group, ranked today among the top five in the world in terms of scientific publication output.

Previous page: Portrait of Professor Gerard Crock AO

Since 2009, clinician-scientist Professor Jonathan Crowston has been at the helm as Head of the University Department of Ophthalmology and Managing Director of CERA. Under his leadership, the Department and CERA are extending their work in basic science and clinical, translational research.

The Vision Regeneration research program, started in 2012, is tackling a new frontier in eye health research. Stem cell researchers, geneticists, bionics and cytoprotection pharmacology experts are working together towards a common goal: to restore vision for people who have lost their sight.

"It's an ambitious goal" says Professor Crowston, "and we are the people best placed to pursue this dream. The depth of research talent in our organisation is exceptional, and the integration of our research with the Royal Victorian Eye & Ear Hospital and the University of Melbourne puts us in a unique position. The University's motto 'dream large' fits ophthalmology perfectly as it comes of age in its 50th year."

#### **50th Anniversary celebration**

Friends and supporters of eye research celebrated 50 years of ophthalmology at Melbourne with a cocktail reception at the Australian Centre for Contemporary Art on 21 November 2013.

Special guests included Victorian Health Minister David Davis and Deputy Dean Professor Geoff McColl, along with over 150 staff, students, alumni and friends.

### **Community engagement**



2013 Macular Degeneration information forum

#### **Benefactor event**

In April 2013, we hosted a special event to celebrate the generous philanthropy that has supported ophthalmology at Melbourne over the past 50 years.

It was a wonderful opportunity for our staff, students and alumni to thank the many benefactors and their families who have supported eye research by sponsoring a scholarship or fellowship, or by leaving a bequest in their will.



### Community information forums

CERA's free annual community information forums attracted record audiences in 2013 with well over 100 attendees at the sessions on Glaucoma and Macular Degeneration research.

We also held a session on Diabetic Retinopathy and for the first time in recent years, a session on Living with Low Vision, which included guest speakers from Guide Dogs Victoria and Vision Australia.



Professor Hugh Taylor with guests Robyn and Stephan Ross. Mr Ross' mother left a gift in her will to establish the Annemarie Mankiewicz-Zelkin Fellowship within the Department of Ophthalmology.

### Alumni network

Approximately 40 past students and staff returned to CERA for the launch of the CERA/Department of Ophthalmology Alumni Network in August 2013. To join this active community, visit the Alumni Hub on the CERA website.



http://www.cera.org.au/community/alumni/

# Transforming the future



### **CERA student receives prestigious Gustav Nossal Scholarship**

CERA student Duncan Crombie was awarded the prestigious Gustav Nossal Scholarship from the National Health and Medical Research Council (NHMRC) for his critical research into the genetic disease Friedreich's Ataxia (FRDA).

Duncan uses stem cells generated in the laboratory from FRDA patients' own skin, to grow certain types of cells found in the heart and eye. These cells will be used to better understand the pathology of FRDA, to conduct basic research on the disease and to test new drugs, prior to conducting clinical trials. Ind Scl Bic and imi Na Du to r Th and ain hea I w

## Early career researchers win NHMRC fellowships

Two of CERA's rising research stars, a behavioural research expert and a genetics researcher, were awarded NHMRC Early Career Fellowships in 2013.

Dr Eva Fenwick (Behavioural Research in Ophthalmology) and Dr Stuart Cantsillieris (Ocular Genetics) graduated with their PhDs in 2013.

Dr Fenwick's work looks at quality of life in people with diabetic retinopathy. She is developing and testing a new way to assess the impact of treatments, from the patient's perspective. Dr Fenwick hopes her work will help inform other researchers, clinicians and policy planners, allowing them to better allocate funding and resources.

Left: CERA PhD student Duncan Crombie

The NHMRC Gustav Nossal Postgraduate Scholarship is awarded to the top ranked Biomedical scholarship applicant in Australia and is named after Sir Gustav Nossal, eminent immunologist and one of Australia's Living National treasures.

Duncan said he was extremely honoured to receive the Gustav Nossal Scholarship. "This award will both kick-start my career and more importantly, support my research aimed at understanding the pathology behind heart and eye dysfunction in Friedreich's Ataxia. I would not have had this opportunity without the support of CERA, the quality expertise found within the research teams and excellent guidance from my supervisors."

Dr Cantsillieris' research will analyse genetic variations to see if they play a role in complex and poorly understood diseases. Using the debilitating autoimmune disease, Systemic Lupus Erythematosus (SLE) as a model, his research will use next generation sequencing and state of the art bioinformatic approaches to determine if the number of copies of a gene contributes to an individual's susceptibility to the disease.

CERA congratulates Eva and Stuart on their success.



Gillian Cochrane, PhD



Madeleine Adams, PhD



Hayley Waugh, PhD



Eva Fenwick, PhD



Heather Connor, PhD







Farshad Abedi, DMedSc



Stuart Cantsilieris, PhD



Robert Finger, PhD

### Class of 2013

Students enrolled through the University of Melbourne Department of Ophthalmology complete their study at the Centre for Eye Research Australia.

2013 was a record year for students completing their research higher degree, with nine students graduating.

### Congratulations to the following students who graduated in 2013:

#### Gillian Cochrane, PhD

Quality of life for children with vision impairment in Australia: the development and validation of a paediatric vision-specific quality of life instrument (the IVI\_C).

#### Eva Fenwick, PhD

Development of an 'item bank' to assess the impact of diabetic retinopathy on quality of life (The RetBank project).

#### Farshad Abedi, DMedSc

Predictors of outcome of anti-VEGF treatment in neovascular age-related macular degeneration.

#### Madeleine Adams, PhD

Assessment of environmental and genetic risk factors for age-related macular degeneration.

#### Heather Connor, PhD

Functional and structural changes in the visual pathway associated with ageing and glaucoma.

### Stuart Cantsilieris, PhD

Investigation and assessment of copy number variation in age-related macular degeneration.

### Hayley Waugh, PhD

Amyloid percursor protein-mediated neuroprotection and processing in the aged retina.

### Srujana Sahebjada, PhD

Keratoconus, its characteristics and implications.

#### Robert Finger, PhD

Modelling cost effectiveness of current routine treatments for neovascular age-related macular degeneration from a healthcare payer's perspective.

### **Research support**

#### New grants awarded in 2013

FUNDING BODY	SCHEME	INVESTIGATOR
AN7 Trustees	Judith Jane Mason & Harold Stannett	lan Trounce
	Williams Memorial Foundation	
ANZ Trustees	Private Donor	Alex Hewitt
ANZ Trustees	Private Donor	lan Trounce
ANZ Trustees	Sylvia & Charles Viertel Foundation Charitable Foundation – Clinical Investigatorship	Robert Finger
CASS Foundation	Travel Grant	Rick Liu
Diabetes Australia Research Trust	Research Grants	Alex Hewitt
Equity Trustees	Equity Trustees Foundation	Gwyneth Rees
Equity Trustees	Harold and Cora Brennen Trust	Robyn Guymer
Equity Trustees	Lynne Quayle Charitable Trust Fund	Paul Baird
Equity Trustees	Myra Stoicesco Charitable Trust	Peter van Wijngaarden
Group of Eight	European Fellowship	lan Trounce
Harold Mitchell Foundation	Travel Grant	Robert Finger
Harold Mitchell Foundation	Travel Grant	Rick Liu
lan Potter Foundation	Equipment grant	Multi-group
Ian Potter Foundation	Travel Grant	Hitesh Peshavariya
Jack Brockhoff Foundation	Pilot Research Study	lan Trounce
Joan & Peter Clemenger Foundation	Equipment Grant	Alice Pébay Alex Hewitt
Juvenile Diabetes Research Foundation	Australian T1D Clinical Research Network Pilot & Feasibility Grant	Ecosse Lamoureux
Lord Mayor's Charitable Foundation	Exploration Grant	Ehud Zamir
Macular Vision Loss Support Society of Australia	Equipment Grant	Robyn Guymer
Melbourne Boston Sister Cities Association	Hugh Rogers Fellowship	Lauren Ayton
National Stem Cell Foundation of Australia	Research Support Grant	Kathryn Davidson
NHMRC	Career Development Fellowship	Gwyneth Rees
NHMRC	Early Career Fellowship	Eva Fenwick
NHMRC	Early Career Fellowship	Stuart Cantsilieris
NHMRC	Postgraduate scholarship	Eamonn Fahy
NHMRC	Postgraduate Scholarship	Elisabeth De Smit
NHMRC	Project Grant	Alex Hewitt
NHMRC	Project Grant	Alice Pébay
NHMRC	Project Grant	Greg Dusting
NHMRC	Project Grant	lan Trounce
ORIA	Research Grant	Alex Hewitt
ORIA	Research Grant	lan Trounce

#### New grants awarded in 2013 (continued)

FUNDING BODY	SCHEME	INVESTIGATOR
ORIA	Research Grant	Jonathan Crowston
ORIA	Research Grant	Raymond Wong
Peggy & Leslie Cranbourne Foundation	Cranbourne Fellowship	Raymond Wong
Perpetual Trustees	Gwenneth Nancy Head Foundation	CERA
Perpetual Trustees	Lionel and Yvonne Spencer Trust	Eva Fenwick
Perpetual Trustees	Dorothy Adele Edols Charitable Trust	Jonathan Crowston
Pierce Armstrong Foundation		Jill Keeffe
Retina Australia	Research Grant	Lauren Ayton
Sir Robert Menzies Memorial Foundation	Allied Health Sciences Research Scholarship	Zhichao Wu
University of Melbourne	Annemarie Mankiewicz-Zelkin Fellowship	Robert Finger
University of Melbourne	Early Career Research Award	Eva Fenwick
University of Melbourne	Early Career Research Award	Kathryn Davidson
University of Melbourne	Early Career Research Award	Lauren Ayton
University of Melbourne	Early Career Research Award	Raymond Wong
University of Melbourne	Researchers @ Melbourne	Jonathan Crowston
William Angliss (Victoria) Charitable Fund		Gwyneth Rees

### **Research output**

Medical researchers share their findings through publication of their work so that everyone working in the field can benefit from advances in knowledge. Peer review of papers ensures scientific rigour.

Publications benchmarking data shows that CERA and the University Department lead ophthalmology research in Australia and are among the top five eye institutes in the world.



Journal of Lipid Research Neuroregeneration team



Nature Neuroscience & Development Dr Peter van Wijngaarden

A total of 252 papers were published in 2013 by CERA and the University of Melbourne Department of Ophthalmology researchers, including research papers, reviews, book chapters, editorials and letters.

Journal covers reprinted with permission of Macmillian Publishers Ltd, (Nature Genetics and Nature Neuroscience), the American Society for Biochemistry and Molecular Biology (Journal of Lipid Research) and the American Diabetes Association (Diabetes).



**Nature Genetics** Professor Robyn Guymer and Associate Professor Paul Baird



Diabetes Professor Jie Jin Wang and Associate Professor Ecosse Lamoureux



Sandra Staffieri and Dr Alex Hewitt present Richard Le with a certificate

### **Fundraising**

Our donors are instrumental in funding CERA's sight saving, life changing work. Their generous gifts support research into eliminating the major eye diseases that affect so many people.

With the help of these caring individuals and groups, CERA researchers can concentrate on their work: investigating the causes of eye diseases, improving treatments and finding solutions to these diseases.

Our donors are part of the CERA family and we are very grateful to have them beside us.

### Direct mail appeals

Direct mail appeals are the backbone of CERA's fundraising program. Appeals provide vital funding and keep supporters informed about research projects, initiative and activities.

A huge thank you to our wonderful donors, who responded generously to our major mid-year appeal, raising over \$230,000 for macular degeneration research.

Congratulations to eight-year-old Richard Le on winning our donor Christmas card drawing competition and highlighting the devastating condition of retinoblastoma, a form of eye cancer.

The 2013 Christmas appeal raised vital funds and the profile of giant cell arteritis, a true medical emergency which can lead to sudden, irreversible vision loss.



For a complete list of 2013 publications, please go to http://www.cera.org.au/about/publications

In September we mailed a Supporter Survey – the first since 2009 – and it exceeded our expectations: over 26 per cent of donors completed the survey, providing valuable feedback and insights. Thank you to everyone who responded.

### Bequests and estates

Perhaps the most generous thing someone can do for eye research is to include a gift in their will to CERA. Large or small, every bequest plays a fundamental role in saving the sight of future generations and ensuring research into eye disease can continue.

In 2013, the estates of eight supporters contributed over \$1.4 million to eye research. We are deeply appreciative of these legacies and have installed an Honour Roll in our reception area to acknowledge these generous gifts.

### Community fundraising

Community events are a popular way for CERA supporters, staff and students to participate and raise much-needed money for our research.

In 2013, our generous sponsors and over 50 participants raised close to \$60,000 for eve research – a fantastic result! Events included Sydney's City2Surf, Lions Ride for Sight (which celebrated its 20th year: thank you Gippsland Lions!). Run Melbourne and Melbourne Marathon.

We extend our deepest thanks to all who donned running or cycling gear, raised money and had some fun in the process - you are making a difference.

### **Abridged audited financial statement**

The Centre for Eye Research Australia (ABN: 72 076 481 984)

for the year ended 31 December 2013

STATEMENT OF COMPREHENSIVE INCOME	2013	2012
Revenue		
Federal Government	5,436,663	4,642,853
State Government	905,103	1,244,409
Charitable Contributions & Other Income	7,371,707	7,062,813
Total Revenue from operating activities	13,713,473	12,950,075
Less Expenditure on operating activities	14,452,602	14,077,430
(Deficit) / Surplus on operating activities	(\$739,129)	(\$1,127,355)
Net Financial income	1,027,092	628,706
Capital Grants	-	-
(Deficit) / Net Surplus *	\$287,963	(\$498,649)

STATEMENT OF FINANCIAL POSITION		
Current Assets	8,693,861	8,291,837
Non-Current Assets	1,842,327	2,208,042
Total Assets	10,536,188	10,499,879
Current Liabilities		
Trade and other payables	538,859	962,644
Employee benefits	716,892	981,095
Other	1,433,007	954,709
Total Current Liabilities	2,688,758	2,898,448
Non-Current Liabilities	216,417	258,381
Total Liabilities	2,905,175	3,156,829
Net Assets	7,631,013	7,343,050
Asset Replacement Reserve	5,000,000	5,000,000
Accumulated funds	2,631,013	2,343,050
Total Equity	7,631,013	7,343,050

**INCOME 2013** 



Federal Government Vision CRC	380,679	3%
Federal Government NHMRC & ARC	4,964,780	34%
Federal Government Aus AID	91,204	1%
State Government Operational Infrastructure Support	897,248	6%
Clinical Trials	1,069,200	7%
Donations/Sponsorship	2,349,214	16%
Research Foundations	1,442,889	10%
Other Income	3,593,934	24%
	14,789,148	100%

CERA receives Operational Infrastructure Support funding from the Victorian Government.

\* The Centre for Eye Research Australia Limited is operated as a not for profit organisation. Accordingly, accumulated surpluses are held in the form of working capital and fixed assets to support committed and planned research projects.

### **EXPENSES 2013**



Research Salaries	8,336,370	57%
Other Research Costs	2,618,720	18%
Administration Salaries	1,519,190	10%
Other Support costs	468,530	3%
Building & Facilities costs	1,558,375	11%
	14,501,185	100%
RESEARCH COSTS		
Research Salaries	8,336,370	57%
Research Collaborations	866,517	6%
Research Travel	514,223	4%
Research Laboratory & consumable costs	1,237,980	9%
ADMINISTRATION COSTS		
Administration Salaries	1,519,190	10%
Other Support costs	468,530	3%
BUILDING COSTS		
Depreciation	719,732	5%
Other building & equipment costs	838,643	6%
	14,501,185	100%

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