



Annual Report 2015

**prevent
& cure
blindness
& eye
disease**

Contents

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A digital version of this report is
available on our website:

www.lei.org.au

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Vision

**To prevent
and cure
blindness
and eye
disease**



Mission

To achieve leadership in scientific research and clinical practice in the prevention of blindness and eye disease through:

- global leadership in scientific research
- translation of research into community outcomes
- a commitment to growing the reach of our research capabilities and clinical services
- development and training of outstanding eye care professionals and researchers
- community engagement and education to build awareness, maintain a high reputation and increase funding

Treatment puts Ray

back in the driver's seat



Ray Watson risked losing not only his livelihood but his passion when his eyesight began deteriorating dramatically in 2014.

He spent his working life as a mechanic and design engineer, and in semi-retirement had set up a one-man business restoring classic Sports and GT cars.

“In 2014, my health began to deteriorate and the most dramatic effect was on my eyes,” he said.

“Within a few months my left eye was so bad that I could not focus at all.”

Unable to get a doctor's appointment immediately, Ray went to emergency

at Royal Perth Hospital, where he was sent to the eye clinic.

A referral was made to Dr Fred Chen at the LEI, who diagnosed the wet form of age-related macular degeneration.

“After some consultation and discussion, he asked me to come on his clinical trial into treatment of AMD,” Ray said.

“He explained the injection into the eye and all of the procedures involved, saying he felt there was a very definite chance of reversing the problem with my left eye, and returning a good percentage of my sight in the left eye.

“To me this was a very reassuring thing as the problem - if it got any worse - meant I would not be able

to continue with my workshop and would have to rely on a pension.

“All of my work is very hands-on and requires very good eyesight to ensure the quality of the finished product.”

While the treatment was unpleasant, Ray said the progress with his sight had been fantastic.

He is able to drive confidently at night again and has returned to the intricate work on the classic cars he loves so much.

ABOVE
Ray Watson

Chairman & Managing Director's Report

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Stephen Pearce

through The University of Western Australia and the LEI.

In late 2015 a campaign was started to fund, in perpetuity, this professorial chair, a post-doctoral fellowship and a continuous PhD scholarship program.

The AFPB (WA) started the campaign with a generous donation, and Dr Sjakon Tahija of Jakarta, Indonesia has accepted the role of International Ambassador for the ongoing campaign.

This exciting new chair in research will boost the scientific capabilities of the LEI and promote new scientific developments of international importance to eye care.

During the year, one of the world's most prominent medical journals, The Lancet, reported on the one-year follow-up of the human gene therapy research for wet age-related macular degeneration.

The Lancet publication was the first in the LEI's history and underscores the significance of this research: conceived, executed and written by our Molecular Ophthalmology group.

The Physiology and Pharmacology group achieved a major translational achievement with a new treatment for glaucoma.

The start-up company commercialising the technology was purchased by the multi-national pharmaceutical company Allergan, ensuring the world-wide marketing of this technology.

Clinical trials are already demonstrating significant advantages of the procedure compared to conventional surgery and it is very likely that the advanced technology developed at the LEI will be used worldwide.

LEI researchers were also part of two major international genetics studies that identified new genes involved in aged-related macular degeneration and glaucoma – the two leading causes of blindness in Australia. The findings were published in Nature Genetics.

The Genetics and Epidemiology Group continued its research work into the Asian myopia epidemic, the Western Australian Eye Protection Study, the Kidskin Eye Health Study and WA Pregnancy Cohort (Raine) Eye Health Study.

The Ocular Tissue and Engineering group continued to investigate the causes of - and develop new treatments for – age-related macular degeneration and inherited retinal diseases.

The Division of Immunology is working on a number of research projects focused on understanding how common viral infection affects vision.

During 2015 many advances have been made by the group on establishing new in vivo models that closely mimic the natural history of human eye infections.

It was a landmark year for Lions Outback Vision (LOV), which secured \$5.1 million to build a new mobile health clinic. Once on the road in 2016, the LOV Van will travel more than 24,000km each year offering comprehensive optometry and ophthalmology care for up to 200 patients each week in remote and regional locations around the State.

With the commissioning of the van, LOV continues a long and proud tradition of providing ophthalmic services in regional and remote Western Australia that began with the first mass glaucoma screenings in the 1960s.

2015 once again highlighted the commitment of our people, with Lions Eye Institute staff delivering excellence in research, clinical services, teaching and training.

We continue to strive to achieve our vision to prevent and cure blindness and eye disease. 2015 was a year in which we moved a step closer to realising our goal.

To celebrate the outstanding contribution to ophthalmic science and clinical practice by Professor Ian Constable for more than 40 years, the Australian Foundation for Prevention of Blindness, Western Australia AFPB (WA) has decided to establish The Ian Constable Chair in Discovery and Translational Ophthalmic Science

LEI's Clinical Services continued to grow significantly in 2015, with a new record of just under 60,000 patients treated throughout the year. Significant planning toward the expansion and relocation of clinical services was completed with construction beginning in 2016. This work will ensure the LEI can continue to meet patient demand as it grows over the years to come.

The LEI has generated a financial surplus for 2015 of \$4.5 million on revenue of \$18.3 million. Key contributors to this result were \$1.9 million in donations which will be used to endow the Professorial Chair at UWA, and an increase of \$2.4 million in the market value of shares that the LEI owns in a US gene therapy company. While these are shown as part of our surplus they are one-off in nature, and we are pleased that the LEI's underlying operations broke even financially despite the inevitable cost pressures.

A major highlight of the year was the visit by Nobel Laureate Professor Elizabeth Blackburn.

Professor Blackburn delivered the 2015 Ian Constable Lecture on her ground-breaking discovery of how chromosomes are protected by telomeres and telomerase – thus solving a major problem in biology and

throwing light on our understanding of the cell and disease mechanisms.

LEI researchers were delighted to spend time with Professor Blackburn and were inspired by her enthusiasm and generosity.

On a much sadder note, our long-time Patron Sir James Cruthers passed away in October after a long illness. Sir James played a central role in the original fundraising campaign to build a stand-alone facility for the LEI.

Sir James and his wife Lady Sheila were long-term, passionate supporters who contributed enormously to the LEI's reputation and we remember them for their many years of dedicated service.

At a Board level, the activities of the LEI were again expertly assisted by a mix of highly skilled professionals.

Dr Stephanie Allen resigned from the Board in 2015 and we sincerely thank her for an excellent contribution over several years.

Following Dr Allen's departure, we look forward to welcoming Margaret Crowley to the Board in 2016.

Dr Crowley has been CEO of the Australian Association for the Blind for the past 15 years and worked

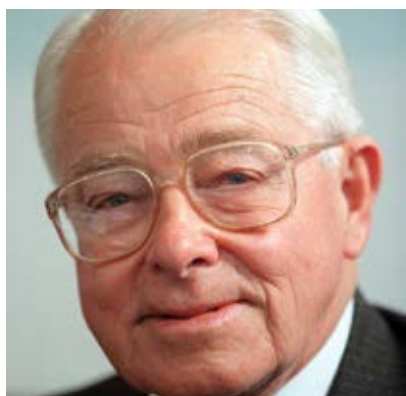
collaboratively with the business sector in research, social innovation and philanthropy.

She has a passion for strengthening links between the public sector and business community and will be an exciting addition to our suite of skills and experience at Board level.

Over the course of 2015, the LEI continued to implement the organisational goals identified in a strategic review of operations. These are focused on growing and improving our research capabilities, clinical services, teaching and training, community engagement and financial sustainability – none of which can be achieved without the passion and commitment of our people.

We thank all staff for your dedication to achieving our vision and acknowledge those many organisations and individuals – the Lions Save-Sight Foundation, Australian Foundation for the Prevention of Blindness, donors, institutional partners, trusts, foundations, and bequestors – whose support sustains and drives our commitment to saving sight.

Stephen Pearce
CHAIRMAN
Professor David Mackey
MANAGING DIRECTOR



▲ Vale Sir James... we said goodbye to our long standing Patron Sir James Cruthers in 2015



▲ Nobel Laureate Professor Elizabeth Blackburn with some of the LEI's female staff

Board of Directors



Stephen Pearce joined the Board in 2012 and was appointed Chairman in 2014.

He is Chief Financial Officer of Fortescue Metals Group Limited and has nearly 30 years' experience in senior management roles in the mining, oil and gas and utilities industries. Prior to joining Fortescue, Mr Pearce held the position of Managing Director and CEO of Southern Cross Electrical Engineering Limited and before that was Chief Financial Officer with Alinta Limited. He also served as a member of the Western Australian Business and Industry Committee of the Salvation Army for seven years and is currently a Non-Executive Director of Cedar Woods Limited. Mr Pearce received a Bachelor of Business from the Royal Melbourne Institute of Technology and a Graduate Diploma in Company Secretarial Practice. He is a Fellow of the Institute of Chartered Accountants, a Chartered Secretary and Member of the Australian Institute of Company Directors.



David Mackey was appointed Managing Director of the LEI and Professor of Ophthalmology at UWA in March 2009.

He heads UWA's Centre for Ophthalmology and Visual Science. Professor Mackey studied medicine at the University of Tasmania and trained in ophthalmology at the Royal Victorian Eye and Ear Hospital in Melbourne, subsequently doing a fellowship in paediatric and genetic eye diseases at the Royal Children's Hospital in Melbourne. After fellowships at the Johns Hopkins Centre for Hereditary Eye Diseases in Baltimore and the Great Ormond Street Hospital for Sick Children in London, he returned to Australia to specialise in genetic eye diseases. He is past president of the International Society for Genetic Eye Disease and Retinoblastoma, a member of the Board of the Ophthalmic Research Institute of Australia and Chair of the ORIA Scientific Advisory Committee, Australian representative on the Council of the Asia Pacific Academy of Ophthalmology and an executive committee member of the Glaucoma Research Society. He is a fellow of the Australian Academy of Health and Medical Sciences and a fellow of the Association for Research in Vision and Ophthalmology. Professor Mackey is a member of the Board's Investment Committee.



Rudolf Brunovs joined the Board in 2005.

He is a Fellow of the Institute of Chartered Accountants and the Australian Institute of Company Directors and holds a Masters of Business Administration. Mr Brunovs retired as a partner of the chartered accounting firm Ernst & Young after 27 years as a partner in a number of their offices. He is currently a Director and the Principal of Mainstay Consulting Pty Ltd and Chairman of Deep Yellow Limited.



Tony Joyner joined the Board in 2013.

He has 30 years' experience as a commercial and corporate lawyer. Mr Joyner is Managing Partner of the Perth office of the international law firm of Herbert Smith Freehills, and Head of the firm's Technology, Media and Telecommunications Practice. He sits on the firm's Board. He is also the Chair of Scitech, and a Board member of the WA Chamber of Commerce. He has a broad commercial practice, but has particular interest in the fields of technology, data, health and infrastructure.



Ian McAllister joined the Board in 2011.

He studied medicine at UWA, completed his ophthalmological training in hospitals in Western Australia and a fellowship in vitreoretinal disorders at the Cleveland Clinic Foundation in Cleveland, Ohio. He has been with the LEI since 1988 providing vitreoretinal services to metropolitan hospitals and has also been involved in research into disorders affecting the retina. Professor McAllister holds a number of NHMRC grants as well as numerous minor grants and has published more than 120 papers in scientific journals. He has also been awarded an American Academy of Ophthalmology Achievement award for distinguished service to ophthalmology. He has recently been awarded a Doctorate in Medicine by UWA. Professor McAllister is the Director of Clinical Services at the LEI and has extensive experience in research and eye health care. He is a consultant ophthalmologist at RPH and SCGH.



Peter Forbes joined the Board in 2014.

A chartered accountant, he is a former CEO of specialist medical indemnity mutual MDA National and former Managing Director of its wholly owned insurer, MDA National Insurance Pty Ltd. He is Chair of Victorian health fund provider Transport Health. Mr Forbes was a founding partner and former Managing Director of the WA branch chartered accountants' HLB Mann Judd. He was also director of LawCover, the NSW statutory insurer for NSW solicitors, from 2004 to 2010.



Stephanie Allen joined the Board in 2012.

She resigned in October 2015 to take on the leadership role of Deloitte Australia's Health and Human Services consulting practice, based in Sydney. Prior to that, she was a health consulting leader for PwC in both the UK and Australia, with an extensive background across the primary, aged care and disability sectors. She holds a PhD from the University of Oxford and has written several books on the impact of social policy.

Scientific advisory committee



Professor Lyn Beazley



Emeritus Professor Lawrie Beilin



Professor Shaun Collin



Professor Sarah Dunlop



Professor Peter Klinken

The Scientific Advisory Committee was created to advise the LEI's Managing Director on the implementation of research strategy and to offer assistance in achieving external, State and Commonwealth support and collaboration towards these ends.

Members of the LEI Scientific Advisory Committee are past Chief Scientist of Western Australia, Professor Lyn Beazley, Emeritus Professor of Medicine and Pharmacology Professor Lawrie Beilin, Acting Director of the UWA

Oceans Institute Professor Shaun Collin, Head of the School of Animal Biology Professor Sarah Dunlop and Current Chief Scientist of Western Australia Professor Peter Klinken.

During 2015, the committee participated in an LEI Pitch Your Project session, where researchers presented ideas for new research grant applications.

They also reviewed most of the LEI grant submissions to the NHMRC as part of the UWA internal peer review process.

The committee's advice will become increasingly important as new researchers are recruited to the LEI.

Genetics & Population Health

Our researchers contributed to two major international genetics studies that identified new genes involved in age-related macular degeneration and in glaucoma – the two leading causes of blindness in Australia.

The study results bring us closer to providing testing to predict which individuals are at higher risk of developing these diseases. The results also help us better understand the molecular pathways involved in these diseases and open the possibility of new treatments.

The findings were published online in Nature Genetics in December 2015. Also during the year, Genetics and Population Health Director Professor David Mackey was awarded a Churchill Fellowship to examine barriers to Australians participating in

gene therapy trials for specific rare eye diseases.

Several trials have begun in Europe and the United States. Although there are some people in Australia who would be eligible to participate, we usually find there are too few in one area to justify an independent arm of these trials.

The aim of his fellowship is to learn how Australians might participate in future studies of these rare diseases and what barriers exist to patients having the treatment overseas but then being monitored in Australia, as part of a truly international study.

In 2015, Professor Mackey was appointed to the role of Associate Dean (Research) with The University of Western Australia's Faculty of Medicine, Dentistry and Health Sciences.

He also won a \$72,000 grant from the Perpetual IMPACT Philanthropy

Program to investigate whether changing time spent outdoors during childhood affects myopia (short-sightedness) in early adulthood.

Also in 2015, Postdoctoral Research Fellow Seyhan Yazar was awarded a 4-year NHMRC early career fellowship after she passed her PhD for her thesis exploring genetic and environmental influences on eye measurements in healthy young adults. Seyhan will spend two years in Scotland before returning to Australia for the final two years.

Dr Charlotte McKnight completed a Master of Medical Science for her research into sun damage to the eyes of young adults in Western Australia.

As part of the LEI's ongoing commitment to translation of research, Research Fellow Annette Hoskin participated in a review of the Australian sunglasses standard AS/NZS 1067.



▲ Professor David Mackey receives his Churchill Fellowship from WA Governor Kerry Sanderson AO

Research projects

The Western Australian Eye Protection Study

Outdoor sports involve exposure to sun, which has both beneficial and potentially harmful effects on eye sight. For example, outdoor exposure seems to protect adolescents from developing short-sightedness (myopia) but excess UV exposure increases the risk of damage to the front of the eye, causing pterygium. Wearing hats and sunglasses is practical for some sports but less so for others. Researchers at LEI continue to investigate the optimal balance of sun exposure that can reduce the risk of sun-related eye disease while also preventing short-sightedness.

Rates of myopia in Asian students

The Genetics and Population Health group is examining the rise in rates of blindness from pathological myopia, retinal detachment, myopic maculopathy and glaucoma. Worldwide, there is an epidemic of myopia – most evident in East Asian cities where 90 per cent of high school graduates are myopic.

The environmental factors that contribute to myopia, including lack of outdoor activity and higher levels of education, have their effect during childhood.

Major international research collaborations are identifying genetic pathways involved in myopia. Understanding genetic risk factors and how they interact with environmental risk factors will allow us to predict which children are at the highest risk for developing myopia and to target new interventions.

Preventing and managing myopia will soon be the primary area of work for paediatric ophthalmologists.

A staggering 95 per cent of Chinese medical students we examined during a winter school in WA were myopic, compared to 45 per cent of WA-born Chinese 20-year-olds and 23 per cent

of WA-born Caucasian 20-year-olds in the Raine Study.

As part of our international collaborations with the Consortium for Refractive Error and Myopia (CREAM) group, we hope to identify the specific risk factor differences between East



▲ Senator Chris Back has his eyes checked for sun damage

Asian and Australian myopia rates such as time outdoors, levels of light or levels of study. We hope this will identify interventions that can be implemented in China and Singapore.

This project is focused on research that is likely to highlight the health and lifestyle benefits for families, and students in particular, who travel to WA to live or study. If we could demonstrate reduced myopia progression in students who come to WA to study, for example, an Australian education may be an attractive option for Chinese parents.

The LEI aims to recruit Chinese students studying in schools and universities in WA for a baseline refraction and test them every six months for four years to assess progression in their myopia, axial length, vitamin D levels and conjunctival autofluorescence. We will compare age and education-matched students remaining in Singapore, Shanghai and Wenzhou.

Colour Discrimination

Colour vision deficiency (CVD) or colour blindness (CB) is usually considered to be a mild disability. However, in a world where colour is now widely used in both printed and digital information systems, employment opportunities for people with CVD have become increasingly restricted.

Nevertheless, this trait has been preserved in the population (eight per cent of males). This suggests there may be circumstances where CVD conveys some level of biological advantage, e.g. in seeing through camouflage.

Our study will compare the speed and accuracy of normal-sighted males with CVD males to detect and identify objects in a variety of complex textured settings.

The LEI and UWA launched a Crowdfunding campaign in November 2015 seeking community support to finance the study.

Raine Eye Health Study

The Raine Study is a longitudinal study that is one of the world's largest and most successful studies of the influences of genetics, pregnancy, childhood and adolescence on subsequent health and developmental outcomes. The 20-year-old follow-up of 1350 cohort participants had a major focus on eye health and was one of the first studies of eye health and diseases in young adults. Data from this study have been shared with two international consortia that have identified genes involved in variation of many eye measures between individuals and risk factors for eye diseases such as refractive error and keratoconus. Several studies exploring the environmental factors influencing eye health of young adults have also been published.

Western Australian Strabismus Inheritance Study

Strabismus (misalignment of the eyes) affects about five per cent of the general population. It is often associated with amblyopia, a failure of normal visual development (otherwise known as a lazy eye) and reduced or absent binocular (stereoscopic) vision. Thus early diagnosis and treatment enables optimal visual outcomes.

As part of parallel NEI and NHMRC funding we have been collaborating with the Engle laboratory at the Children's Hospital, Boston, affiliated with the Harvard Medical School, since 2003 as part of the Strabismus Inheritance Studies in Tasmania and Western Australia with a primary focus a common type of strabismus – esotropia. Professor Engle was a Raine Visiting Professor to Perth in 2013.



- ▲ Eight in 100 men and one in 100 women are colour blind for red and green, affecting the way they see the world

Busselton Healthy Ageing Study

The Busselton Study is well known as a major population health study that has been ongoing since the 1960s. In 2010, the Busselton Population Medical Research Foundation started a study to explore why some people are able to remain healthy and active throughout their senior years, whilst others suffer ongoing illness and infirmity – the Busselton Healthy Ageing Study. There is an eye component within this study, for which the LEI, through Professor David Mackey is providing financial and equipment support. We now have data on 5000 baby boomers and are continuing our analysis.

Eye Injury Epidemiology and Injury Prevention

This project is funded by the Joyce Henderson Paediatric Ophthalmology Bequest Fund. Significant progress has been made in determining the incidence and nature of paediatric ocular trauma in Western Australia. A retrospective review of children's eye injuries presenting to Princess Margaret Hospital for Children was conducted by the Joyce Henderson Research Fellow. The data analyses included eye injuries from 2002 to the end of 2014. Information about the nature of injuries will be fundamental for developing strategies to prevent eye injury.

Eye protection is known to reduce the incidence of eye injuries in sport. Currently in Australia a standard exists for sports eye protection for squash and face shields for cricket. The LEI was instrumental in developing a Sport's Eye Protection proposal approved by Standards Australia and initiated in 2015. The LEI continues to actively participate on the International Organization for Standards (ISO) and Standards Australia (SA) committees to develop eye protection and sunglass standards.

Grants / Funding

- Channel 7 Telethon Trust
- National Health and Medical Research Council

Staff

- Professor David Mackey (Group leader)
- Ms Tracey Dickens (Research team manager)
- Ms Lisa Booth (Research Assistant)
- Ms Julie Crewe (Research Assistant)
- Mr George Gooden (Research Assistant)
- Ms Emily Hunyh (Research Assistant)
- Mr Kashif Syed (Data Management Officer)
- Ms Kate Hanman (Research Assistant)
- Dr Anne-Marie Yardley (Joyce Henderson Research Fellow to Feb 2015)
- Dr Kate Barnes (Joyce Henderson Research Fellow to Aug 2015)
- Mr Alex Burton (Research Assistant)
- Ms Annette Hoskins (Research Fellow)
- Ms Carole Collins (Research Fellow)
- Ms Jordan Fitz-Gerald (Research Fellow)
- Dr Alex Hewitt PhD (NHMRC Research Fellow)
- Dr Justin Sherwin (Research Associate)
- Mr Paul Sanfilippo (Research Associate)

Students

- Ms Seyhan Yazar (PhD)
- Dr Hannah Forward (Masters by research)
- Dr Charlotte McKnight (Masters by research)

Researcher wants to bridge the gap

between dreams and reality



The intricate world of eye genetics is the stamping ground of LEI Postdoctoral Research Fellow Seyhan Yazar.

Seyhan has worked in the Genetics and Population Health research group since 2010.

“My work is very satisfying,” she said. “I know it is the hope of many patients suffering from various debilitating eye diseases and with every new discovery we are closing a small gap between a dream and a reality.”

Seyhan’s main research focus is the genetic and environmental factors in common, complex eye diseases, including myopia, corneal astigmatism, keratoconus and glaucoma. She performs statistical data analysis, interprets the results and prepares publications.

“I am a trainee working in an apprenticeship mode in preparation to be an independent scientist,” she said.

“One of my main responsibilities is to oversee the projects in our unit with Professor Mackey and learn how to manage projects and a laboratory.

“Where possible using my orthoptic skills, I help our team with examinations of the participants in our clinical research projects. I also co-supervise medical students and postgraduate students in their research projects.”

Seyhan said if scientists were to prevent and cure blindness and eye disease, a better understanding of the disease and ageing process was needed.

In her postdoctoral studies, she has explored the genetic and

environmental influences on eye disease development in a group of young people from the 20-year eye health review of the Western Australian Pregnancy Cohort (Raine) Study and provided a benchmark for the relatively “normal” range of eye parameters.

“Now, taking this to the next step, I aim to work on disease networks and identify new therapeutic targets at the molecular level using highly specialised computer programs,” she said.



ABOVE

Seyhan Yazar is working to better understand eye disease and ageing

Immunology

The Division of Immunology comprises four research groups: Ocular Immunology and Autoimmunity led by Professor John Forrester, Cell Signalling and Apoptosis led by Assistant Professor Chris Andoniou, Viral Immunology led by Dr Jerome Coudert and Experimental Immunology led by Professor Mariapia Degli-Esposti.

One of the Division's main research projects focuses on understanding how a common viral infection affects vision. The viral pathogen of interest is cytomegalovirus. This virus causes a persisting infection that can lead to significant systemic disease, as well as severe ocular complications, especially in individuals whose immune systems are compromised or not fully functional. One such group are babies.

Cytomegalovirus is the most common cause of congenital infection, occurring in 0.2 per cent to 2.4 per cent of all live births. Five to 10 per cent of babies with congenital CMV infection are symptomatic. Babies with symptomatic CMV infection at birth have a wide spectrum of clinical disease, including visual impairment and hearing loss. These problems most often occur as part of a more general sensorineural loss, with other symptoms comprising microcephaly, motor defects and mental retardation. Indeed, visual problems caused by congenital CMV infection can be due to either cortical visual impairment and/or optical visual impairment. Ophthalmological abnormalities are reported in a high percentage of

babies with symptomatic congenital CMV and include chorioretinitis, strabismus and optic atrophy. Up to one third of babies born with symptomatic congenital CMV infection develop strabismus. In addition, macular scars may lead to loss of vision.

Understanding how cytomegalovirus causes disease, how the immune system responds to this infection, and why the virus is not completely cleared, is essential to designing preventative and curative therapies for this infection. Using a model of human cytomegalovirus (HCMV) infection in the mouse, the Immunology division is addressing these questions.

During 2015 many advances have been made on establishing new in vivo models that closely mimic the natural history of human eye infections. In these physiological models of viral eye infection there is reduced access of the virus to the eye, however there are profound changes in most eye compartments, including the neural retina. How these changes affect vision, and whether these effects are temporary or long-term, is being investigated.

An additional focus of our immunology research is inflammatory ocular disease or uveitis. Uveitis is an inflammatory disease that affects the eye, damaging the retina and causing blindness. Uveitis mainly occurs in the 20-50 year age group, and can affect one or both eyes. Uveitis is an important problem and accounts for 10 per cent of blindness in people of working age in the western world. Little is known about the cause of uveitis and it remains one of the most important unsolved problems in ophthalmology. Professor John Forrester and Dr Valentina Voigt are investigating the development of

uveitis, both in the setting of infection and autoimmunity.

Dr Iona Schuster, Assistant Professor Chris Andoniou and Professor Degli-Esposti are assessing the impact of viral infections on the triggering or exacerbation of autoimmune diseases. This work has demonstrated the role of viral infection in the development of a Sjogren's like Syndrome. Sjogren's Syndrome is the second most common autoimmune disease in humans, affecting up to three per cent of the population or three quarter of a million people in Australia. In its "mildest" form SS affects the production of tears and saliva, so people with the disease have constantly dry eyes, which are sore, often sensitive to light, itchy, red and feeling as though they have sand in them. In work published in the prestigious international journal *Immunity*, research completed to date described how natural killer (NK) cells regulate CD4 T cell responses to limit the development of autoimmunity. This study has made a number of important discoveries; it has proven a link between chronic viral infection and autoimmune disease, has generated a model of the second most common autoimmune disease in humans, and has provided critical insights into immune pathways that might be targeted to improve treatments for a common and debilitating human condition.

Dancing with death: Host/Viral interactions

Apoptosis is an important physiological process and dysregulation in apoptotic pathways can lead to a number of degenerative disorders, including many which affect the eye. Therefore, a better understanding of the processes that regulate apoptosis is critical to improve the treatment of these diseases, including for example retinal

degenerative disorders. Assistant Professor Chris Andoniou and Mr Peter Fleming have made significant discoveries in the area of programmed cell death or apoptosis. One of their major on-going studies aims to investigate the interplay between viral and host proteins which regulate the sensitivity of specific cell populations to apoptotic death.

In related work published in the influential journal Plos Pathogen, Assistant Professor Andoniou and Professor Degli-Esposti showed the deleterious consequences of possessing a natural variant of a gene encoding a protein involved in cell killing. These studies showed that mice possessing a naturally occurring variant to granzyme B are highly susceptible to infection with MCMV and develop a fulminant pathology. In collaboration with colleagues at the Peter MacCallum Cancer Centre, work is continuing to assess the mechanism that underlies the deleterious pathology that results from ineffective apoptotic responses.

Viral escape from NK mediated immunity

Dr Jerome Coudert leads a research program aimed at better understanding how NK cells, a key cell population of early immune responses,

function and are regulated in normal and pathologic conditions.

Dr Coudert has reported novel interactions of the murine cytomegalovirus (MCMV) immunoevasin m157 with multiple receptors (both with activating and inhibitory functions) expressed by NK cells. As a result of collaborative work with two groups located in Melbourne, this work has uncovered an unusual mode to engage NK cell receptors. The role of other viral immunoevasins in interfering with anti-viral protection mediated by NK cells is currently under investigation. In addition, using a set of genetically recombinant mice previously generated by his group, Dr Coudert achieved a more precise understanding of the molecular interactions that regulates NK cell development, differentiation and functions. Since NK cells are critical for the control of viral infections and malignancies in all mammalian species, these studies have uncovered information that pave the way to manipulating NK cell function for therapeutic purposes.

Investigating the profound effects of Graft Versus Host Disease

With our collaborators at the QIMR Berghofer Medical Research Institute,

we have established a program to investigate complications that occur during bone marrow transplantation (BMT) and have developed unique mouse models. One common complication following BMT is ocular graft versus host disease (ocular GVHD). Symptoms of ocular GVHD include blurry vision, severe light sensitivity, chronic conjunctivitis (pink eye), dry eyes, burning sensation and general eye pain. In severe cases, ocular surface disease with corneal perforation can ensue. Our studies are addressing whether immune-mediated mechanisms participate in the pathology of ocular GVHD, and whether this complication is exacerbated by concomitant viral infection. Ultimately, we aim to develop improved therapies for this important ocular condition.

Immunology Division

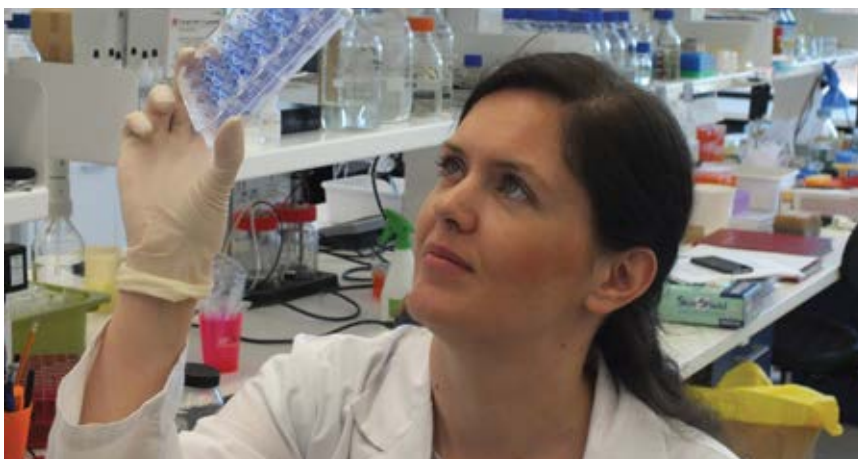
- Head of Division: Professor Mariapia Degli-Esposti

Group Leaders

- Professor Mariapia Degli-Esposti
- Professor John Forrester
- Assistant Professor Christopher Andoniou
- Dr Jerome Coudert

Research Staff

- Dr Valentina Voigt
- Dr Iona Schuster
- Dr Monique Ong
- Dr Serani van Dommelen
- Dr Andrew Lucas
- Peter Fleming
- Slavica Pervan
- Tom Casey



▲ Dr Iona Schuster in the laboratory

Molecular Ophthalmology

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The Human Gene Therapy Trial is the culmination of the basic research work by the Molecular Ophthalmology group.

In December 2015, the results for the rAAV.sFlt-1 Phase 1 clinical trial were published in *The Lancet*, one of the oldest, best known and most prestigious medical journals in the world.

The paper reported on the results of a one-year follow-up on the new therapy for wet age-related macular degeneration (wet AMD).

This is the first time that work conceived, executed and written by an LEI team has been published in *The Lancet*.

Outcomes

The Molecular Ophthalmology team completed the first year data collection for the rAAV.sFlt-1 Phase 2a trial for an additional 32 patients and data analysis and reporting has started.

Staff

- Professor P. Elizabeth Rakoczy
- Associate Professor May Lai
- Dr Aaron Magno

- ▲ Members of the Human Gene Therapy team – Professor Elizabeth Rakoczy, Director Dr Aaron Magno and Associate Professor May Lai

Articles

Gene therapy with recombinant adeno-associated vectors for neovascular age-related macular degeneration: 1 year follow-up of a phase 1 randomised clinical trial

Elizabeth P Rakoczy, Chooi-May Lai, Aaron L Magno, Matthew E Wikstrom, Martyn A French, Cora M Pierce, Steven D Schwartz, Mark S Blumenkrantz, Thomas W Chalberg, Mariapia A Degli-Esposti, Ian J Constable

Summary
Background Neovascular, or wet, age-related macular degeneration causes central vision loss and represents a major health problem in elderly people, and is currently treated with frequent intraocular injections of anti-VEGF protein. Gene therapy might enable long-term anti-VEGF therapy from a single treatment. We tested the safety of rAAV.sFLT-1 in treatment of wet age-related macular degeneration with a single subretinal injection.

Methods In this single-centre, phase 1, randomised controlled trial, we enrolled patients with wet age-related macular degeneration at the Lions Eye Institute and the Sir Charles Gairdner Hospital (Nedlands, WA, Australia). Eligible patients had to be aged 65 years or older, have age-related macular degeneration secondary to active subfoveal choroidal neovascularisation, with best corrected visual acuity (BCVA) of 3/60–6/24 and 6/60 or better in the other eye. Patients were randomly assigned (3:1) to receive either 1×10^{10} vector genomes (vg; low-dose rAAV.sFLT-1 group) or 1×10^{11} vg (high-dose rAAV.sFLT-1 group), or no gene-therapy treatment (control group). Randomisation was done by sequential group assignment. All patients and investigators were unmasked. Staff doing the assessments were masked to the study group at study visits. All patients received ranibizumab at baseline and week 4, and rescue treatment during follow-up based on prespecified criteria including BCVA measured on the Early Treatment Diabetic Retinopathy Study (EDTRS) scale, optical coherence tomography, and fluorescein angiography. The primary endpoint was ocular and systemic safety. This trial is registered with ClinicalTrials.gov, number NCT01494805.

Findings From Dec 16, 2011, to April 5, 2012, we enrolled nine patients of whom eight were randomly assigned to receive either intervention (three patients in the low-dose rAAV.sFLT-1 group and three patients in the high-dose rAAV.sFLT-1 group) or no treatment (two patients in the control group). Subretinal injection of rAAV.sFLT-1 was highly reproducible. No drug-related adverse events were noted; procedure-related adverse events (subconjunctival or subretinal haemorrhage and mild cell debris in the anterior vitreous) were generally mild and self-resolving. There was no evidence of choriorretinal atrophy. Clinical laboratory assessments generally remained unchanged from baseline. Four (67%) of six patients in the treatment group required zero rescue injections, and the other two (33%) required only one rescue injection each.

Interpretation rAAV.sFLT-1 was safe and well tolerated. These results support ocular gene therapy as a potential long-term treatment option for wet age-related macular degeneration.

Funding National Health and Medical Research Council of Australia, Richard Pearce Bequest, Lions Save Sight

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 Centre for Ophthalmology and Visual Science
 (Prof E P Rakoczy PhD, C M Pierce PhD, M E Wikstrom PhD, Prof J Constable); University of California, Los Angeles, CA, USA (Prof S D Schwartz MD); Stanford University, Palo Alto, CA, USA (Prof M S Blumenkrantz MD); Avalanche Biotechnologies, Inc, Menlo Park, CA, USA (T W Chalberg PhD); and Sir Charles Gairdner Hospital, Nedlands, WA, Australia (Prof I Constable)
 Correspondence to: Prof Elizabeth P Rakoczy, Lions

- ▲ Lancet paper

New gene therapy

offers June hope



June Walker was one of the first people in the world to participate in trials of a revolutionary gene therapy treatment for wet age-related macular degeneration (wet AMD).

The science behind the treatment began more than 20 years ago when Professor Ian Constable recruited molecular ophthalmologist Elizabeth Rakoczy to the LEI.

It was the first research in Australia using gene therapy in ophthalmology or any other medical field and was named by the NHMRC in its 10 of the best national research projects in 2005.

Wet AMD occurs when there is an overproduction of the protein vascular endothelial growth factor (VEGF) in the retina. VEGF helps

support oxygen supply to tissue when circulation is inadequate. When too much VEGF is produced it can cause disease, including blood vessel disease in the eye.

Current treatment for wet AMD is intensive and intrusive – involving monthly injections of anti-VEGF drugs that limit production of the protein. The gene therapy involves a single injection of a modified and harmless version of a virus containing a specific gene that stimulates supply of a protein which then blocks over-production of VEGF.

June told Channel 9 in a national report aired in October, 2015, that her loss of vision resulted in a crushing loss of confidence.

“I lost all my courage. I didn’t want to go out,” she said.

Her participation in the trial has led to improvement in her vision and

she is able to do day-today tasks once again, like making a cup of tea and preparing breakfast.

“There’s a lot of improvement,” she said.

“I can see a lot better than I could do but I [still] can’t drive the car and I can’t read,” she said.

“I can see things that I couldn’t see before, and I can see the TV, which is good, but I can’t read the letters on it.”

June was a special guest at a morning tea held to thank supporters of the LEI during 2015.

ABOVE
June Walker

Physiology & Pharmacology

During 2015, the Physiology and Pharmacology group achieved a major translational achievement with a new treatment for glaucoma.

The US-based start-up company commercialising the technology was purchased by the multi-national pharmaceutical company Allergan. This ensures the world-wide marketing of this technology and clinical trials are already demonstrating significant advantages of the procedure compared to conventional surgery. It is very likely that the advanced technology developed by our team will be used worldwide.

Research into ultrafine intraocular surgery has also progressed well. This involves a laser-based technique for cutting a micron level target tissue from the eye. Currently most intraocular surgeries use mechanical instruments which have less precision and could potentially cause unwanted damage to normal tissue.

Professor Ian McAllister, Professor Dao-Yi Yu and their collaborators are working on a new treatment for branch retinal vein occlusion. Initial results are looking encouraging. This project is a fine example of translation of laboratory-based research into a clinical setting. New imaging technologies that can measure blood flow in the eye are being used to assess the improvement in blood flow following treatment.

Professor William Morgan is being assisted by Professor Yu and his team to develop new methods of analysing pulsation of the retinal vein near the optic disk. This is proving to be a new diagnostic technique for predicting glaucoma progression.

It is also proving to be useful in the non-invasive assessment of intracranial pressure, an important issue in traumatic brain injury patients.

The Physiology and Pharmacology group and collaborating clinicians have published 13 papers in the ophthalmic literature.

During the year Professor Yu accepted an invitation to join the Editorial Board of the highest ranked journal in ophthalmology, *Progress in Retinal and Eye Research*. He has been appointed for five years.

Professor Yu also presented the highly prestigious "Ida Mann Lecture" at the Australia and New Zealand College of Ophthalmology meeting in Wellington.

The group completed the re-establishment of its laboratories after relocating to allow works on a ground floor clinical facility to commence.

We continued with our collaborative project with a team in Canada looking at a new form of ocular coherence tomography which can view the human retinal vasculature at the capillary level. We were able to demonstrate that the entire vascular tree can be imaged in real time and non-invasively using low level

lasers. New areas of research looking at the auto-regulatory capacity of blood vessels in the eye have been established.

2015 also saw the expansion of our translational research using new imaging techniques to monitor improved retinal blood flow in patients undergoing a new treatment for occlusive retinal vascular disease.

Preliminary work was completed in preparation for four NHMRC grant applications in 2016.

Staff

- Professor Dao-Yi Yu – Director
- Professor Ian McAllister
- Professor Stephen Cringle
- Professor William Morgan
- Associate Professor Er-Ning Su
- Associate Professor Paula Yu
- Associate Professor Sarojini Vijayasekaran
- Dean Darcey
- Kathryn Morgan
- Dr Chandra Balaratnasingam
- Graeme Hewitt
- Fraser Cringle



▲ The Physiology and Pharmacology team

Ophthalmic world seeks Professor Yu's expertise

In 2015, Professor Dao-Yi Yu accepted an invitation to join the Editorial Board of the highest ranked journal in ophthalmology Progress in Retinal and Eye Research.

The aim of the journal is to publish high impact review articles in ophthalmology/eye research written by experts from around the world.

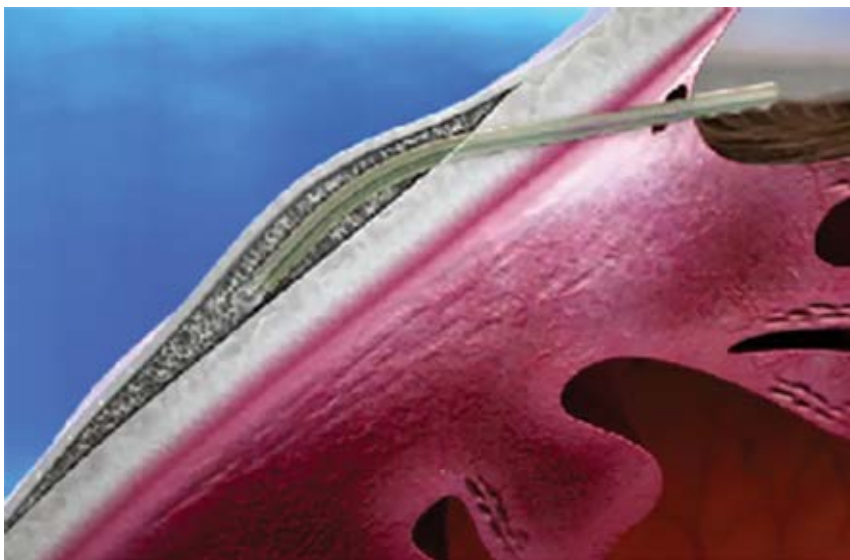
Cutting edge eye research that is likely to find a clinical application is particularly welcomed by this highly prestigious journal.

Professor Yu was in the spotlight in another way during the year when he delivered the Ida Mann Lecture at the RANZCO annual scientific meeting in Wellington, New Zealand.

His lecture Research discoveries to clinical application: developing a new glaucoma filtration surgery outlined the development of the Xen glaucoma tube.

There was considerable interest in this device when it was presented by Aquesys at the World Glaucoma Conference in June.

This lecture is named after Ida Mann, who was the first female professor at Oxford University before immigrating to Western Australia where she established a notable career as an ophthalmologist and was an advocate for improved health care among Indigenous people.



◀ This image, used by Professor Yu during his Ida Mann Lecture, is a schematic diagram of the tiny drainage tube which lowers the pressure in the eyes of glaucoma patients. The tube drains excess fluid from the inside of the eye



The eye

“amazing and delicate”

After more than 20 years at the LEI, the eye still holds great fascination for Paula Yu.

Paula joined the LEI in 1993 and now works as a Senior Research Fellow (Research Associate Professor) with The University of Western Australia. Within the LEI, she is attached to the Physiology and Pharmacology Group.

The opportunity to work with “wonderful and good people” has given Paula great work satisfaction.

“I have many reasons to love what I do - the chance to be invigorated and encouraged by bright minds, the opportunity to apply my knowledge to further understanding of this amazing and delicate organ and the opportunity to realise the vastness in variations between one micro-region to another,” she said.

Paula’s research investigates the function and structure of ocular vascular endothelium and microvasculature in normal and disease states.

The main technique used for structural studies are histology and confocal microscopy while functional studies are done using isolated eye perfusion technique.

In collaboration with colleagues, she is also involved in studies that use isolated vessel perfusion and laser ablation techniques. Investigations involving animal eyes and human donor eyes have also lead to a greater understanding of the structure and function of the ocular microvasculature.

“Many of the blinding diseases carry a vascular component,” Paula said.

“If we have a more comprehensive understanding of the fundamental variation that exists normally, how different cell types adapt in response to environmental (macro and micro) stresses, we have a better chance of understanding the disease processes and knowing how to approach the development of treatment strategies.

“It is my hope to contribute to bettering the lives of others through research.”



ABOVE
Dr Paula Yu

Ocular Tissue Engineering Laboratory

Since its inception five years ago, the LEI's Ocular Tissue Engineering Laboratory (OTEL) has continued to investigate the causes of - and develop new treatments for - the most common blinding diseases in Australia: age-related macular degeneration and inherited retinal diseases.

Our research streams include stem cell therapy, disease modelling, analyses of new structural retinal imaging modalities (no-dye angiography and cone cell imaging) and functional imaging of the retina (autofluorescence and microperimetry).

Research projects:

Stem cell therapy for macular degeneration

Age-related macular degeneration (AMD) is the most common cause of blindness in the Western world. A common final pathway in AMD is the degeneration of specialised layers of support cells and extracellular matrix situated between the retina and the choroid; consisting of the retinal pigment epithelium (RPE), Bruch's membrane (BrM) and capillary network of the choroid. Our aim is to develop a cure for AMD by replacing these structures using the patient's own cells.

With a focus on clinical translation, we examined potential sources of autologous (patient's own) retinal pigment epithelial (RPE) cells, such as the induced pluripotent stem cells (iPSC) and human limbal stem cells for RPE patch engineering. In addition, we have been developing methods for direct reprogramming of RPE cells from patient cells using retinal transcription factors. Finally, we have tested novel carrier substrates for RPE patch engineering, including bioengineered Bruch's-like membrane and a primitive microvasculature capable of integrating with the host choroid.

Although not at clinical trial stage yet, we are excited by the potential prospect of being able to generate RPE cells from the patient's own cells on the cornea. Further testing and validation work is ongoing.

Disease modelling of inherited retinal diseases

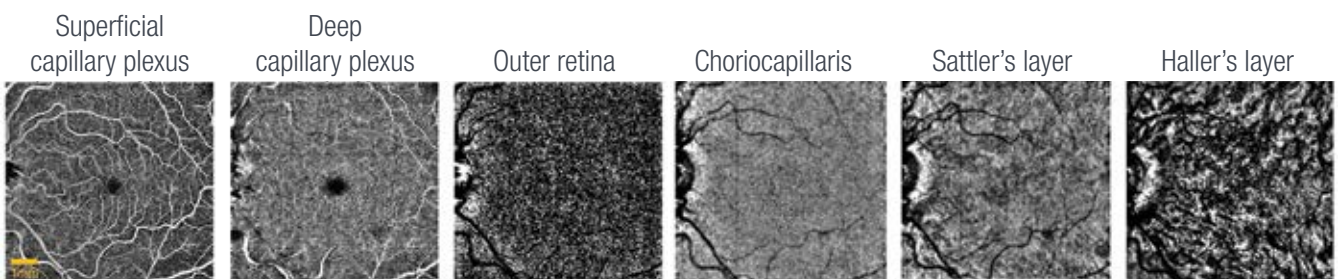
Inherited retinal disease (IRD), such as retinitis pigmentosa and Stargardts disease, is the most common cause of blindness in the working age group in Australia. In 2015, we started a prospective trial called the Western Australian Retinal Degeneration Study to investigate the use of patient skin cells to model their eye disease. The stem cells generated from skin cells can be used for examining the effect of gene mutation on retina development and cell survival. Personalised treatment can be developed by using these cells to screen for potentially effective drugs and test the new gene editing

technology that can remove the mutation from retinal cells. These treatments will be unique for each patient as there are over 4000 different types of mutations in 260 genes that cause IRD.

Our laboratory is currently banking patient tissue samples harbouring a wide range of known and potential retinal disease causing mutations. These patients are also tracked six-monthly to allow us to measure their disease progression accurately using advanced retinal imaging devices.

No-dye angiography and cone cell imaging

The retina clinic acquired a state-of-the-art adaptive optics retinal camera that can allow us to see individual cone cells within the retina of a patient. Using technology borrowed from the Hubble telescope, optical imperfection of the human eye is measured and corrected instantaneously to improve resolution down to three micrometres. Our imaging team has developed and validated a novel circle detection algorithm that can improve on current automated methods of cone counting. We have also developed a classification system for describing image artefacts in non-invasive vascular imaging of the retinal blood vessels using optical coherence tomography angiography. This type of imaging technique does not require dye injection for visualisation of blood vessels.



▲ Examples of no-dye angiography

Microperimetry and autofluorescence imaging

In 2015, we published several technical reports of using microperimetry, a specialised form of visual field test, to describe features of unusual clinical conditions such as torpedo maculopathy, accidental laser injury and posterior cortical atrophy masquerading as glaucoma. Our validation study of microperimetry has been completed and variability of the device was published. We also started examining patients with distortion and blind spots in their central vision using the adaptive optics retinal camera to explore the relationship between cone cell mosaic and these symptoms. We showed that near infrared light may be more useful than blue light autofluorescence imaging in the assessment and monitoring of progression in dry macular degeneration. As a result of this study, we purchased a dedicated near infrared light retinal camera that will enable IRD and AMD patients to be monitored more comfortably and accurately for their disease progression and treatment response.

Invited talks and presentations:

International

- ARVO conference, Denver, USA, May 2015
- APVRS Annual Congress, Sydney, Jul 2015
- UWA-UMGU-UCL Collaborative Research Meeting, Perth, Nov 2015
- RANZCO Annual Congress, Wellington, Nov 2015

National and State

- Optometrist Association Australia (WA), Perth, Feb 2015
- RANZCO ophthalmological colloquium, Mar 2015
- Centre for Cell Therapy and Regenerative Medicine, Symposium, Perth, Apr 2015

- ANZSRS Congress, Sydney, Jul 2015
- Retina Australia National Congress, Melbourne, Oct 2015
- Annual Medicines update, Pharmaceutical Society of Australia, Oct 2015
- Lions Club District Convention, Perth, Oct 2015

Research Team

Staff

- Dr Fred Chen (Director)
- Dr Samuel McLenachan (Senior Scientist)
- Dr Dana Zhang (Senior Scientist)
- Dr Xiao Zhang (Research Associate)
- Dr Danuta Bukowska (Post-doctoral Research Fellow)
- Dr Evan Wong (Research Associate)
- Dr Avenell Chew (Research Associate)
- Ms Ivy Tang (Research Orthoptist)
- Ms Jade Knapp (Research Administrator)

Visiting researchers and doctors

- Dr Ling Zhang (Post-doctoral research fellow)
- Dr Erwei Hao (Post-doctoral research fellow)
- Dr Jinping Wang (Post-doctoral research fellow)
- Dr Wei Chen (Post-doctoral research fellow)

Visiting Professor and Speakers

- Dr Peter Van Wijngaarden, Centre for Eye Research Australia

Research collaborators

International

- Professor Lyndon Da Cruz, Moorfields Eye Hospital, London - Vision Eye Institute
- Dr Michael Edel, Research Institute of Hospital Val d Hebron, Barcelona, Spain
- Dr Robert Johnston, Cheltenham General Hospital, Cheltenham, UK

Local/national

- Professor Rod Dilley, Ear Sciences Centre, School of Surgery, UWA
- Professor Robyn Guymmer, Centre for Eye Research Australia, University of Melbourne
- Professor Mel Ziman, Edith Cowan University, Perth
- A/Prof Aron Chakera, Department of Nephrology, Sir Charles Gairdner Hospital, Perth
- A/Prof Seng Khee Gan, Department of Endocrinology, Royal Perth Hospital, Perth
- A/Prof Damien Harkin, School of Biomedical Sciences, Faculty of Health, QUT and Queensland Eye Institute
- Dr Elin Gray, Edith Cowan University, Perth
- Dr Kristen Nowak, Perkins Institute, Perth
- Dr John De Roach, Australian Inherited Retinal Disease Registry, Perth

Prizes

- High Flyers Think Tanks Award, Australian Academy of Science. 2015
- Delegate at the Think Tank: The Stem Cell Revolution: Lesson and Imperative for Australia
- Chen FK (travel and accommodation expenses)
- Lions Eye Institute, Perth Australia
- Infrastructure Grant, Health Department of Western Australia, Australia. 2015
- Cone counting software development to analyse retinal images from adaptive optics camera
- Chen FK (AUD \$10,000)
- Lions Eye Institute, Perth Australia

Donations in 2015

- Miocevich Family, Autoimmune retinopathy fellowship
- Saleeba Family, Disease modelling using iPSC and CRISPR technology
- Other donations were gratefully received from the Hogg, Penny, Reid and Taylor families.



Miocevich Fellowship

LEI researchers are investigating one of the rarest and most baffling eye disorders, Auto-immune Retinopathy or AIR, thanks to the support of Perth's Miocevich family.

Still controversial and difficult to diagnose, it is believed that antibodies generated by the body to fight an unrelated infection or illness attack and damage the retina, resulting in rapid vision loss.

The research is being inspired and financially supported by Brad and Carolyn Miocevich. Mrs Miocevich was in her 30s when she began to lose her eyesight.

The couple's support saw the creation of the position of Miocevich Retinal Fellow in 2015.

"She went from being able to read to the point where she couldn't drive, then walk without assistance. It was a dramatic change," Mr Miocevich said.

"It is our wish that this new research, which will be conducted within Dr Fred Chen's OTEL group, will help others who may be affected by this disorder now and in the future."

ABOVE

Dr Fred Chen examines Carolyn Miocevich's eyes while her husband Brad looks on



Eye care delivered

... rain, hail or shine

When your office is the outback, you have to be prepared for anything.

Lions Outback Vision optometrist Stephen Copeland delivers eye care to more than 20 regional and remote communities across the Pilbara and Kimberley.

While he usually confines more ambitious journeys to the dry season, there are times when a foray into the wet is unavoidable. One trip to the Tanami communities south of Halls Creek saw Stephen hitch a ride on the mail plane from Kununurra.

“We climbed and manoeuvred around bulging clouds that were foreshadowing what was to come,” he said.

“I looked out the port-side window of the Cessna 208B Caravan to see the rim of Wolf Creek Crater in the distance as we started descending into Billiluna.

“After buzzing the community we arced over Sturt Creek, its banks bleeding milo-coloured water over the landscape. I saw the bridge standing proud of the water. It was



▲ The Lions Outback Vision Van being fitted out in Brisbane



my sign that I should disembark in Billi. I started my optometry clinic as planned.”

In the early afternoon, the heavens opened and it rained for three hours.

“The ground around the clinic was now a moving sheet of water,” he said. “I learned through hearing the nurse in the next room singing ‘there were 3 in the bed’ that I would have to overnight in Billiliuna because my ride from Balgo was no longer able to get through.”

The next day, Stephen set off for Balgo by car – a drive he said was more suited to an amphibious vehicle. He saw diabetic and post-operative patients who had been treated for cataracts during a “surgery blitz” in Kununurra in October 2015.

The next day involved a drive to the Mulan Community for another clinic before a scheduled charter flight back to Broome. “A flowing creek forced me to stop,” he said. “It was the first time I’d ever had to remove my shoes and socks to check a stream before going to work.

“I continued to Mulan but not before negotiating a section of road that could have passed for a rice-paddy.”



The weather prevented the plane from landing so it was back to Balgo by car for a Broome flight the next day.

“The pilot weaved around storm cells with the skill of a Skywalker and landed us safely in Broome,” Stephen said.

“It had been a memorable few days in the north where the Kimberley had turned on a show.”



ABOVE

Stephen Copeland back at LOV in Perth

Our Vision

To eliminate preventable blindness and vision loss in people living in regional and remote Western Australia

Our mission

To achieve leadership in clinical practice and scientific research in the prevention of blindness and vision loss through:

- delivering equitable, timely and cost effective outreach services so that West Australians can enjoy better health outcomes irrespective of where they live
- providing a coordinated eye health service integrating retinal screening, optometry and ophthalmology services
- improving access to best practice eye health services in regional and remote WA
- translating best clinical practice into scientific research

Activities

In 2015, Lions Outback Vision (LOV) saw continued growth in terms of staff and service delivery.

In 2014, LOV treated 5969 patients. In 2015, this grew to 6965 patients. Of this, 1203 were for retinal screening, 1861 for optometry appointments, 3335 for ophthalmology consults and 566 for telehealth consultations.

Highlights

In 2015, LOV secured funding to design, construct and fit-out a new mobile eye health clinic – the Lions Outback Vision Van (LOVV). The Van will be launched in 2016 and will visit 16 sites throughout regional and remote Western Australia.

The LOV Van will be the first mobile clinic to showcase the protocols and principles developed by the Aboriginal Health Council of Western Australia for outback service delivery. It will have the capacity to treat 200 patients per week providing comprehensive optometry and ophthalmology care for cataracts, refractive error, trachoma, glaucoma and diabetic retinopathy.

In June 2015, LOV Director Associate Professor Angus Turner was appointed inaugural McCusker Director, Lions Outback Vision.

The position is an appointment of The University of Western Australia and is the first academic role within the University to specifically focus on reducing high rates of preventable blindness and vision loss in the Indigenous population. Associate Professor Turner was also named "first among equals" in the 2015 40Under40 awards.

New projects in 2016

Does real time tele-ophthalmology provide comparable accuracy to face-to-face consultations for the diagnosis and recommended treatment for common eye health conditions?

How accurate is a new visual field iPad application in visual field testing in patients with glaucoma and neuro-ophthalmic diseases?

Grants and Funding

- Lions Eye Institute
- The University of Western Australia
- McCusker Charitable Foundation
- The RANZCO Eye Foundation
- The Fred Hollows Foundation

Lions Outback Vision Van supporters

- State Government of Western Australia
- Lotterywest
- Commonwealth Government
- Lions Eye Institute
- Device Technologies
- Telstra

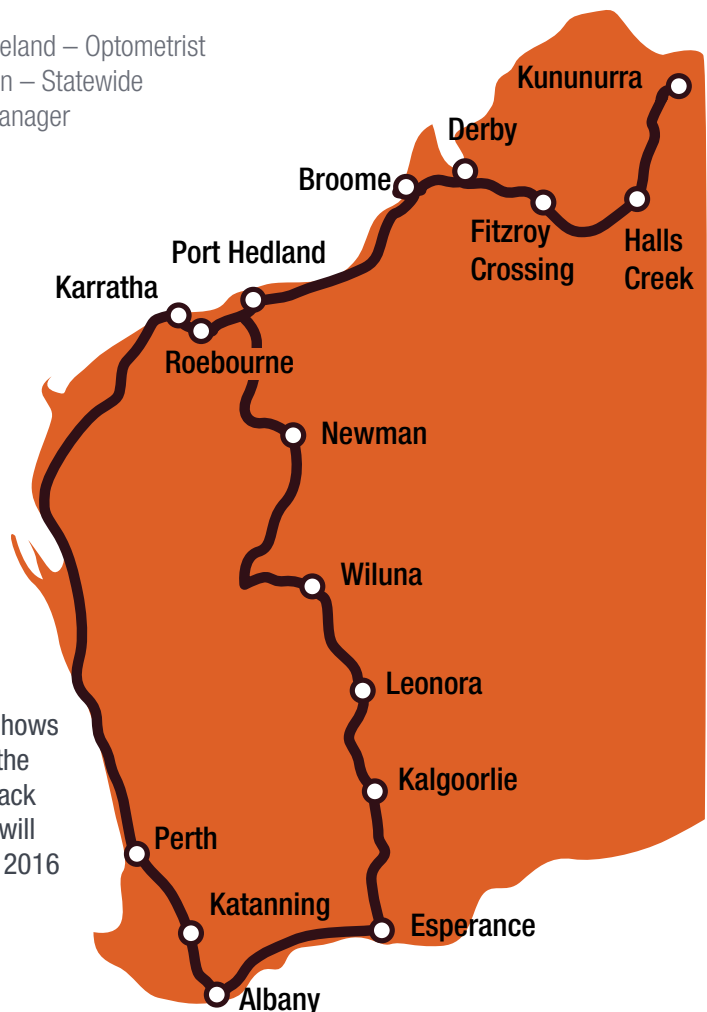
- Terri Leverty – Lions Outback Vision Van Logistics Manager
- Alex Ramirez – Pilbara Diabetic Eye Health Coordinator
- Kitty Shakur – resident
- Ben Host - resident
- Verity Moynihn – DR screening
- Veronica Harvey – Administration Assistant

Staff

- McCusker Director Associate Professor Angus Turner
- Josephine Muir – Manager
- Julie Maiolo – Outreach Administrator
- Chathri Amaratunge – Fred Hollows Foundation Fellow
- Helen Wright – Optometry Coordinator
- Stephen Copeland – Optometrist
- Angela Aicken – Statewide Telehealth Manager

Students

- Richard O'Halloran



▶ This map shows the towns the Lions Outback Vision Van will travel to in 2016



Outback work accords

with Veronica's vision

There is a reason Veronica Harvey's face is so familiar to many. She has worked in a range of roles across the LEI, from ground floor receptionist to positions in the Glaucoma and Oculoplastics clinics.

Now, she has taken on the role of administrative assistant with Lions Outback Vision – the LEI's outreach arm which delivers crucial eye health services to some of the most remote parts of Western Australia.

Veronica supports the coordination of clinics all over the State. Regular consultations are also conducted via Telehealth and she is responsible

for chasing up referrals, Medicare details, booking theatre dates with patients, typing letters, making appointments and other general office duties.

Having lived in the Kimberley, Veronica finds her new role very satisfying.

"I know how important it is to have access to specialist health care so it is extremely rewarding to be part of a team that aims to provide an excellent level of care within the community whenever possible," Veronica said.

"Outback Vision has given me an opportunity to assist in the work that is being done to bring eye care services to people in the outback and regional country areas.

This will hopefully ensure problems are identified earlier and help to prevent issues that may cause long term vision damage.

"I have worked at the LEI for four years and I know the staff here are continually working toward providing an efficient, friendly and professional service to those who have issues with their sight.

"The aim is always to do what is best for the patient."



ABOVE

Veronica Harvey... understands the importance of delivering services where people live

Clinical Trials

The LEI Clinical Trials Department continues to grow with over 40 studies currently underway and is one of the largest ophthalmological clinical trials research centres in the world.

We conduct a wide range of clinical trials, including the testing of new drugs or devices, the collection of information from patients to better understand a particular ophthalmic condition and audits of patient medical notes to establish treatment outcomes and ways in which patient outcomes may be improved.

Our approach enables patients with specific eye disorders, or previously untreatable eye conditions, access to new treatments and therapeutic approaches well before they are available to the general public.

All trials run by the group are subject to the approval of a Human Research Ethics Committee and comply with stringent national and international regulations and guidelines.

New therapies for retinal conditions, especially dry AMD were the main focus of clinical trials during 2015, but we are also developing studies investigating new approaches for glaucoma.

Novel treatments for dry AMD

Age-related macular degeneration (AMD) is a leading cause of vision loss in older people. There are two types of the disease – dry and wet AMD. Dry AMD is the most common type of macular degeneration, affecting 90 per cent of people with the condition.

There is currently no proven therapy for dry AMD but the LEI is trialling both laser-based and novel drug based approaches.

Dry AMD may progress to wet AMD, which is currently treated with an anti-VEGF (Vascular Endothelial Growth Factor) therapy. Science has made great steps in this area and we are currently looking at improved therapeutic approaches and novel compounds for AMD treatment.

Retinal Vein Occlusion

Retinal vascular diseases such as vein occlusions can cause significant visual impairment. In Central Retinal Vein Occlusion (CRVO), there is a build-up of fluid and leakage from the affected blood vessel resulting in the distortion of the central vision. Branch Retinal Vein Occlusion (BRVO) can also result in leakage of fluid and visual disturbances are in the region of retina supplied by the affected vessel. The LEI is involved in ongoing trials for both CRVO and BRVO, refining treatment protocols and regimes.

Ocular Inflammatory Disease

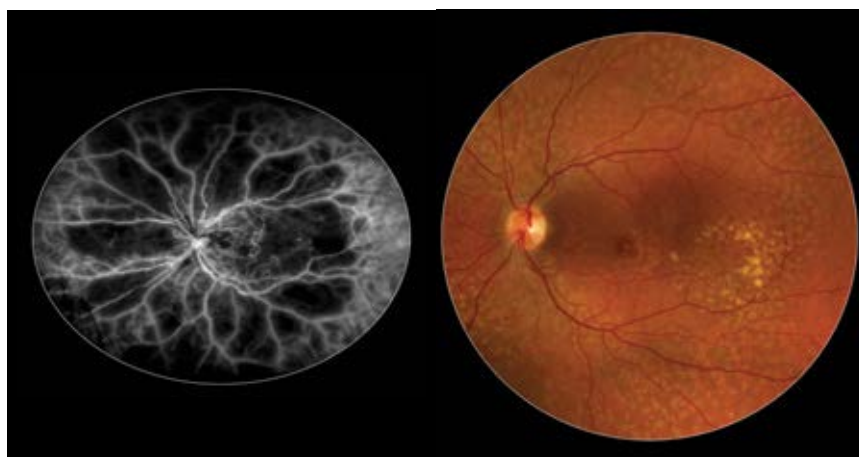
Ocular inflammatory diseases, such as uveitis, usually involve inflammation affecting the structures in the eye.

The inflammation may affect only one eye, but in many cases, both eyes are involved and symptoms may include decreased vision, eye pain, ocular redness, tearing, photophobia (pain and/or sensitivity to light), elevated intraocular pressure, intraocular scarring, macular oedema, and even vessel occlusion. Uveitis can lead to vision loss.

We are currently investigating the impact of novel anti-TNF monoclonal antibodies alone or in combination with high-dose corticosteroids for active or inactive non-infectious intermediate, posterior, or pan-uveitis.

Glaucoma and Ocular hypertension

Open angle glaucoma is an eye condition in which the pressure in the eye results in damage to the optic nerve and loss of vision. Ocular hypertension results when pressure in the eye is abnormally high and there is a risk of the development of glaucoma. Treatments for both conditions aim to lower the pressure in the eye. At the LEI we are hoping to identify new medications which are more effective at treating both glaucoma and ocular hypertension and also easier to use.



▲ TCentral Retinal Vein Occlusion (vascular block)

▲ Drusen in the retina

Non-treatable Eye Diseases

We continue to study Macular telangiectasia type 2 (MacTel), a rare degenerative condition of the macula that may cause progressive loss of vision. Currently, there is no effective treatment for MacTel.

The continued success of Clinical Research at the LEI is only made possible by the study participants who volunteer their time and are happy to take part in our studies and the dedication and professionalism of our clinicians, nurses, coordinators and staff.

The Clinical Trials team

Clinical Research Manager

- Tracey-Anne Dickens

Clinical Trial Coordinators

- Holly Brown
- Toni Busby
- Amelia Jason
- Gareth Lingham
- Rachel Matthews
- Richard McKeone
- Cora Pierce
- Lynne Smithies
- Jordanna Wilson

Clinical Trials Administration

Diana Bowman
Dedicated contact line
(08) 9381 0750

More information

- clinicalresearch@lei.org.au



‘Golden patients’

why Cora’s work is so rewarding

Getting a new treatment or even cure for an eye disease from the laboratory bench to the bedside involves many people.

Not least of those are the people who participate in clinical trials. Without them, medical researchers could never prove a new therapy is safe and effective.

That is the reason why the LEI’s clinical trial coordinator/research nurse Cora Pierce calls such people “golden patients.”

After joining the LEI in 2011, she began recruiting patients for the LEI’s landmark gene therapy trial for wet Aged Related Macular Degeneration (AMD).

Wet AMD is the most common cause of blindness in the developed world, causing rapid and devastating vision loss. Its social and economic costs

has driven medical researchers at the LEI to seek new treatments.

Cora’s job involves guiding patients with wet AMD through the trial process.

“The most rewarding part of my job is that all 40 of my patients see me as a friend who is looking after their best interests,” she said.

“I know all the intricate details of their day-to-day lives and although the job has been the most demanding work that I have ever had to do, it is also the most rewarding.

“Research patients are ‘golden patients’ and I like to think that my interactions with them are indicative of that.”

The human gene therapy trial has involved the injection of a gene therapy into the eyes of patients with wet AMD, a procedure done at Sir Charles Gairdner Hospital.

Cora’s role has also involved liaison with the theatres and clinics, taking bloods, doing fluorescein angiograms and ECGs, family and GP liaison. She must ensure the trial follows the strict guidelines set up by the Gene Technology Regulator of Australia.

Cora also works at Royal Perth Hospital trauma theatres on night shifts.

As well as bringing passion to her work, Cora brings considerable experience.

Trained at the renowned Moorfields Eye Hospital in London as an ophthalmic nurse, she became its first vitreoretinal research coordinator in the late 1990s.



LEFT
Cora with a patient

Publications

Genetics and Population Health

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Experimental Immunology

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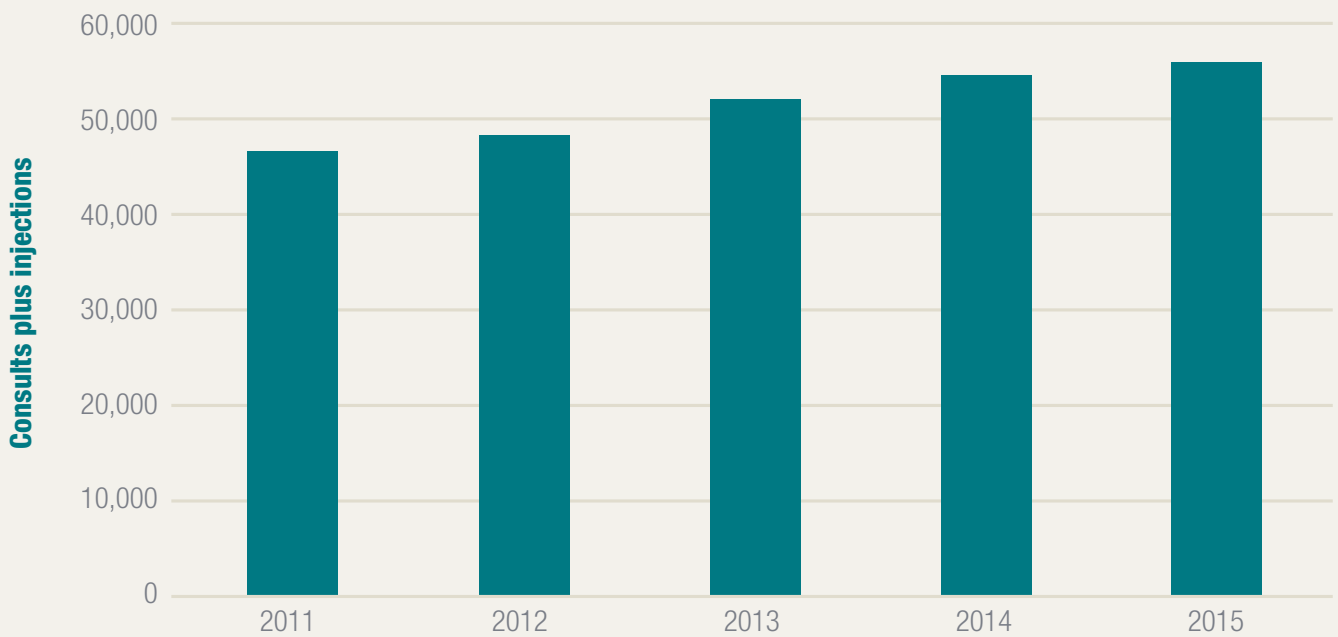
Clinical Services Report

51

Clinical services provided treatment to just under 60,000 patients in 2015.

This was our busiest year on record and consistent with recent patterns of growth. The Elsie Gadd Clinic treated 56,000 patients. Throughput at our Murdoch rooms continues to rise and increased 10 per cent in 2015.

Clinical Services Throughput 2011 - 2015



The first stage of the AA Block renovation was successfully completed with the installation of a larger more reliable lift. Extensive planning and marketing of the project resulted in minimal disruption to the function of the clinics and day surgery.

During the six-week lift replacement program, patients were diverted to the “A” block lifts. A team of Patient Flow Assistants - or “pinkies” as they became affectionately known - helped to direct, assist and deliver

our patients safely to their destination within the AA block. The team worked in shifts from 7am to 7pm.

Planning for the next stage of the clinic refurbishment is at an advanced stage with relocation of critical ITC infrastructure to the Perkins Building well under way. Detailed design is nearing completion and staging plans for each phase of the works have been developed.

Each year our services are audited by external agencies to ensure we meet all legislative requirements and industry standards. For the first time we were awarded “Met with merit” in one of the standards (Standard 2

of the National Safety and Quality in Health Care Standards - Partnering with Consumers). This recognises and reflects the contemporary approach the organisation takes to service delivery and our ongoing commitment to providing the highest standards of care.

Patient feedback is an important tool in measuring the effectiveness of our service delivery. We are proud that our patient feedback continues to improve. In 2015, we saw the highest scores yet achieved, with patients giving out compliments on 49% of the feedback forms submitted.

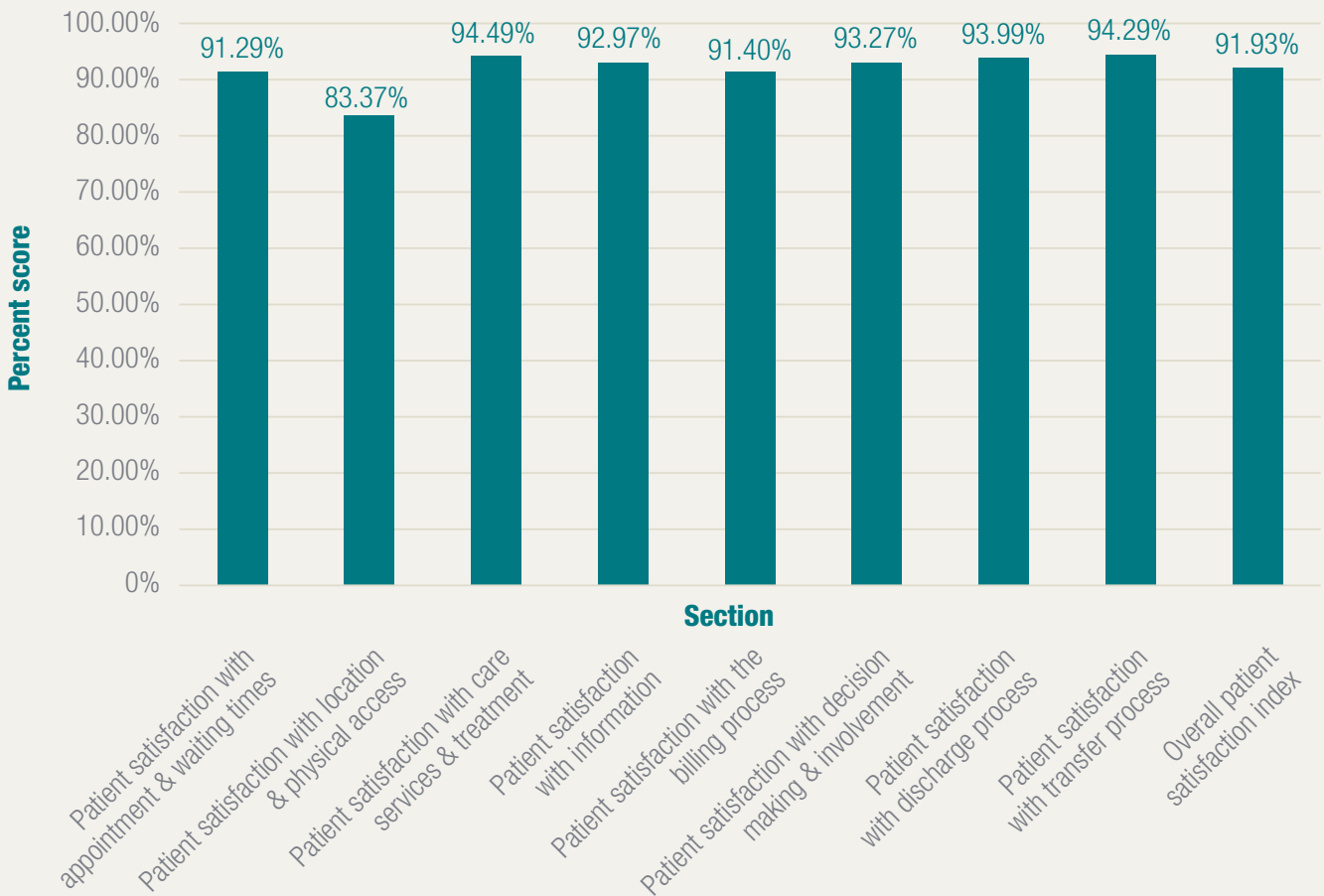


▲ The team of Patient Flow Assistants – or Pinkies – who supported patients during the six-week lift installation period

The Day Surgery Facility

Once again our Day Surgery facility scored highly in the area of patient satisfaction with all but one criteria achieving 90 per cent or more.

Patient Satisfaction



In 2015 The Day Surgery installed a new Phaco Machine ensuring that patients undergoing cataract surgery have access to the latest technology.

Teamwork and cooperation by all staff in all departments has helped deliver a high quality, caring and safe service to our patients.



Philomena gives new meaning

to patient care



Interacting with patients and making a difference to their quality of life are key motivators for the LEI's Philomena Grant.

As level two floor manager, she manages staff and oversees the day-to-day running of retina clinics.

Another part of her role is assisting patients – performing tests, providing support and helping patients understand what to expect of their treatment.

Philomena has worked at the LEI for the last 14 years and the patient is at the centre of everything she does.

“What gives me the most satisfaction in my role would have to be the interaction with the patients - knowing that we are making a difference to improve their quality of life,” she said.

“My ultimate goal in dealing with patients is providing the best nursing practice possible and giving the best customer service.

“I also value the close relationship I have with clinical staff. We work in a very busy clinic setting so we need to work very closely together.

“As there are so many different and diverse staff nationalities working at the LEI, it's become like a second family. I couldn't imagine working anywhere else.”



ABOVE
Philomena Grant



Diversity the key

to Karen's role

Every day at the LEI offers a fresh set of challenges for Karen McLachlan – and that's just the way she likes it.

As practice manager and personal assistant to glaucoma specialist Dr Antonio Giubilato, she interacts with a wide group of people.

"I like the diversity of my role," Karen said. "I like that my job allows me to help and interact

with different groups of people from patients to doctors and work colleagues.

"Working directly with Dr Giubilato and interacting with our patients allows me to experience first-hand the great work that is carried out here at LEI."

Karen initially worked in the e-Health Department when she joined the LEI in 2005.



ABOVE

Karen McLachlan

Clinicians Profiles

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Dr Andrea Ang

Dr Andrea Ang trained in ophthalmology in Perth (MBBS (Hons) UWA) and the USA (MPH, Harvard) before undertaking fellowships in cornea, anterior segment and external diseases at the Cincinnati Eye Institute, USA, and the Singapore National Eye Centre, Singapore. Dr Ang is a consultant ophthalmologist at RPH and a member of FRANZCO.

Areas of Expertise

Management of cornea, anterior segment and external diseases; corneal surgery; pterygium surgery, corneal transplantation (penetrating keratoplasty, deep anterior lamellar keratoplasty, endothelial keratoplasty); ocular surface reconstruction; limbal cell transplantation and keratoprotheses; cataract surgery, refractive surgery, LASIK, PRK.



Adjunct Clinical Professor Graham Barrett

Professor Graham Barrett trained in ophthalmology in Perth, Western Australia, and undertook specialty training in the USA. He is a consultant ophthalmic surgeon at SCGH. Professor Barrett is founding and current president of the Australasian Society of Cataract & Refractive Surgeons, and immediate past president of the Asia Pacific Association of Cataract and Refractive Surgeons. He is the recipient of major international awards including the Ridley Medal (European Society of Cataract & Refractive Surgeons), the Binkhorst Medal (American Society of Cataract and Refractive Surgeons) and the Ridley Medal (Congress of German Ophthalmic Surgeons) and is the 2016 recipient of the Innovators Kelman Lecture Award (American Society of Cataract & Refractive Surgeons).

Areas of Expertise

Cataract and refractive surgery, corneal and anterior segment disorders and surgery.



Dr Fred Chen

Dr Fred K Chen was born in Taiwan and studied medicine in Perth at The University of Western Australia (UWA). After completion of ophthalmology training at Royal Perth Hospital (RPH), he moved to London for advanced training in medical and surgical retina at Moorfields Eye Hospital. He also completed a Doctorate of Philosophy (PhD) in surgical techniques of retinal pigment epithelium transplantation for treatment of dry and wet macular degenerations at the University College of London Institute of Ophthalmology. Dr Chen returned to Perth in 2010 as a Senior Research Fellow at the UWA Centre for Ophthalmology and Visual Science. He is also a consultant vitreoretinal surgeon at RPH. His research teams are involved in testing of new treatments in dry age-related macular degeneration, high resolution retinal imaging, monitoring of inherited retinal diseases and application of stem cell technology in personalised medicine.

Areas of Expertise

Surgical retina: retinal detachment and macular hole repair, epiretinal membrane peel, complications in cataract surgery and ocular trauma. Medical retina: treatment of dry and wet macular degeneration, Lucentis and Eylea injections, Stargardt disease, retinitis pigmentosa and clinical trials of new drugs and lasers.



Professor Ian Constable AO

Professor Ian Constable AO trained in ophthalmology in New South Wales before being appointed as a Retinal Fellow at the Massachusetts Eye and Ear Infirmary and a Lecturer at Harvard University. He became the foundation Lion's Professor of Ophthalmology at The University of Western Australia in 1975 and founded the Lion's Eye Institute in 1983. He is past president of the Asia-Pacific Academy of Ophthalmology and Chairman of the Asia-Pacific Association of University Professors. He is a consultant retinal surgeon at SCGH.

Areas of Expertise

Vitreoretinal surgery, retinal vascular disease, diabetic retinopathy, macular degeneration, complex referrals and cataracts.



Adjunct Clinical Professor Geoffrey Crawford

Professor Geoffrey Crawford completed his ophthalmic training in Western Australia and is a RANZCO Fellow and a Fellow of the Royal Australasian College of Surgeons. He completed further sub-specialty training in oculoplastic surgery at Moorfields Eye Hospital in London and then cornea and refractive Surgery at Emory University in Atlanta, Georgia, USA. He is the Director of Surgical Services and the Director of the Laser Vision Centre at the LEI and a consultant ophthalmic surgeon at RPH and PMH.

Areas of Expertise

Refractive surgery: LASIK, PRK, Phakic IOL's; refractive lens surgery, corneal transplantation, pterygium surgery, corneal collagen crosslinking, insertion of Intra-corneal ring segments, management of keratoconus, ocular surface tumours, cataract surgery. He is a pioneer in many of these techniques.



Dr Jean-Louis deSousa

Dr Jean-Louis deSousa trained in ophthalmology in Perth before completing fellowships in ophthalmic plastic and reconstructive surgery in Oxford and East Grinstead in the UK. He is a member of the Australian and New Zealand Society of Ophthalmic Plastic Surgeons. A consultant ophthalmologist at RPH, he also provides ophthalmic services to the central wheatbelt from Merredin. Dr deSousa is a basic sciences examiner for RANZCO and a consultant and visiting surgeon and lecturer for humanitarian eye projects in Bali and East Timor.

Areas of Expertise

Oculoplastic surgery – eyelid tumours, eyelid malposition, cosmetic surgery, non-surgical cosmetic procedures. Orbital disease – tumours, trauma and inflammatory orbital disease. Lacrimal surgery – endoscopic lacrimal surgery.



Professor John Forrester

Professor Forrester graduated from the University of Glasgow in 1970 and is Emeritus Professor of Ophthalmology at the University of Aberdeen. He was previously Editor of the British Journal of Ophthalmology and has over the years received several awards including the London Hospital Prize for Original Research in Ophthalmology in 1977, the Duke Elder Medal and the Ida Mann Medal in 1991. In 2012 he was awarded the Donders Medal, the Bowman Medal and the Mildred Weisenfeld Award. In 2013 he gave the Ian Constable Lecture on latent infection and autoimmunity. He is currently Professor of Ocular Immunology at UWA and Consultant Ophthalmologist with special interest in ocular inflammatory disease at the Lions Eye Institute.

Areas of Expertise

Ocular immunology, uveitis, autoimmune disease; wound healing and experimental corneal transplantation; diabetic retinopathy, angiogenesis, endothelial cell function; clinical studies in uveitis, translational research in ophthalmology, imaging in ophthalmology.



Adjunct Clinical Associate Professor Adam Gajdatsy

Associate Professor Adam Gajdatsy trained in ophthalmology in Western Australia before undertaking fellowship training at the University Hospital of Wales in Cardiff and at Moorfields Eye Hospital in London in oculoplastic, lacrimal and orbital surgery. He is currently operating as an ophthalmic surgeon consultant at the LEI, Osborne Park Hospital and Murdoch Surgicentre. He also acts as an honorary ophthalmologist consultant at PMH. Associate Professor Gajdatsy sits on the Curriculum Review Committee of RANZCO. He is also President Elect of the Australian and New Zealand Society of Ophthalmic Plastic Surgeons (ANZSOPS). He is the coordinator of ophthalmology teaching at UWA.

Areas of Expertise

Lid malposition repair (droopy lid corrections), lid cancer management, cosmetic eyelid surgery, tear drainage surgery, eye socket surgery and orbital surgery.



Dr Antonio Giubilato

Dr Antonio Giubilato underwent specialty fellowship training in glaucoma at the Royal Victorian Eye and Ear Hospital after training in ophthalmology in Perth, Western Australia. This included both clinical and surgical management of glaucoma as well as research into new therapies for the condition. He is presently consultant ophthalmologist in the Glaucoma Clinic at RPH and also consults at Bentley Hospital for public patients. Dr Giubilato is currently Director of Training for the WA branch of RANZCO and an LSSF Board Member.

Areas of Expertise

Glaucoma.



Dr Tim Isaacs

Dr Tim Isaacs studied medicine in the UK, and underwent ophthalmic training at the Western Ophthalmic Hospital and Moorfields Eye Hospital in London. He completed sub-specialty training in vitreoretinal surgery at RPH and SCGH. He is currently a consultant ophthalmologist at RPH and also practices at the LEI's satellite clinic at Murdoch. His research interests include the diagnosis and management of intraocular tumours, evaluation of new therapies for diabetic retinopathy and macular degeneration.

Areas of Expertise

Vitreoretinal surgery, diabetic retinopathy, macular degeneration, retinal vascular disease, ocular oncology, choroidal melanoma.



Professor David Mackey

Professor David Mackey is Managing Director of the LEI and Professor of Ophthalmology/Director of the Centre for Ophthalmology and Visual Science (COVS) at UWA. Professor Mackey is a world authority on the genetics of eye disease, with his research extending beyond the laboratory to cascade genetic screening for at-risk individuals. He was born and educated in Tasmania, studying medicine at the University of Tasmania, completing fellowships in Melbourne, Baltimore and London. He was on the NHMRC Human Genetics Advisory Committee and chief investigator for the NHMRC Centre of Research Excellence – Translating Genetic Eye Research. Professor Mackey is also president of the International Society for Genetic Eye Disease and Retinoblastoma.

Areas of Expertise

Hereditary and genetic eye diseases. He sees patients at the LEI for second opinions on rare genetic eye diseases and more common genetic eye diseases involving new genetic research.



Professor Ian McAllister

Professor Ian McAllister undertook training in Western Australia with additional sub-specialty training in vitreoretinal disorders in the USA. He is Director of Clinical Services at the LEI and a consultant ophthalmologist at the Royal Perth and Sir Charles Gairdner hospitals. Professor McAllister is actively involved in research for cures for vitreoretinal disorders – especially retinal vascular disorders – and has held 10 NHMRC grants in this area as well as numerous minor grants. He has been involved for many years in Statewide diabetic retinopathy screening and treatment and was vice-chairman of the Ophthalmic Research Institute of Australia and chairman of the research board for many years. He has published more than 130 papers in scientific journals and has given more than 170 papers at meetings as an invited guest speaker. He has received an achievement award for distinguished service to ophthalmology from the American Academy of Ophthalmology. He was recently awarded a Doctorate in Medicine by The University of Western Australia.

Areas of Expertise

Vitreoretinal surgery and disorders, retinal vascular disease, diabetic retinopathy, macular degeneration, ocular trauma, cataract surgery.



Professor William Morgan

Professor William Morgan initially trained in Perth, Western Australia, and undertook his fellowship at COVS. He is Head of Department of Ophthalmology and consultant ophthalmologist at RPH, consultant ophthalmologist at PMH, a Professor at UWA and co-Director of the LEI's McCusker Glaucoma Centre. He has completed a doctorate in philosophy studying the response of the optic nerve to pressure, particularly in relation to glaucoma. Professor Morgan maintains an active research interest in glaucoma as well as in the epidemiology of blinding eye disease and eye diseases within Aboriginal populations.

Areas of Expertise

Glaucoma, ophthalmic public health.



Associate Professor Mei-Ling Tay-Kearney

Associate Professor Mei-Ling Tay-Kearney completed her medical training in Perth, Western Australia, before pursuing postgraduate study at Johns Hopkins Hospital in Baltimore, USA. In 2003, she was appointed Head of Department of Ophthalmology at RPH. She is a senior lecturer at UWA and a member of the Australian Society for HIV Medicine and the Australian Uveitis Study Group. She is the Chair of Qualifications and Education as well as an examiner for the RANZCO Part 2 College Examinations.

Areas of Expertise

Ocular infections, uveitis and inflammatory disorders of the eye.



Associate Professor Angus Turner

Associate Professor Angus Turner completed medical training at UWA before studying at Oxford University and completing a Masters of Evidence Based Medicine. Ophthalmology training was undertaken in Melbourne, followed by post-graduate training at the University of Sydney in refractive surgical procedures. As Director of Lions Outback Vision (LOV), Associate Professor Turner is actively involved in the delivery of specialist outreach services to remote and Indigenous communities in the Kimberley, Pilbara, Goldfields, Great Southern and South-West regions and has overseen the LOV Van project – a state-of-the-art mobile eye healthcare service that will begin delivering specialist ophthalmic services in regional and remote WA from 2016. He is an Associate Professor at UWA, where he is engaged in a number of research projects at the LEI, focusing on service delivery for remote and Indigenous people. Dr Turner is also a consultant at Fremantle Hospital and an ophthalmology teacher for the Rural Clinical School.

Areas of Expertise

General ophthalmology.



Dr Steven Wiffen

Dr Steven Wiffen trained in ophthalmology in Western Australia before undertaking fellowships at the Corneo-Plastic Unit, East Grinstead, UK, and at the Mayo Clinic, Rochester, Minnesota, USA. Dr Wiffen is a consultant ophthalmologist at Fremantle Hospital and a Senior Lecturer at UWA. He is the Director of the Lions Eye Bank of Western Australia.

Areas of Expertise

Ocular surface disorders, corneal and refractive surgery, anterior segment disorders and surgery.

Adam's surgical precision



Eye surgeon Adam Gajdatsy's focus is protecting the eye from the outside in.

As an oculoplastic, lacrimal and orbital specialist, he deals with problems that impact on vision from outside the eye itself.

"This includes quite a lot of tumour management – both benign and malignant - as well as eyelid and watery eye disorders," he said. Adam trained in ophthalmology in Western Australia before undertaking fellowship training at the University Hospital of Wales in Cardiff and the Moorfields Eye Hospital in London.

He operates as a surgeon at the LEI, Osborne Park Hospital and Murdoch Surgicentre. He is also an honorary ophthalmologist consultant at Princess Margaret Hospital.

Adam has worked at the LEI for 11 years and outside of work, loves hockey and plays in the position of goal keeper – perhaps

unsurprisingly the only position on the ground to wear face and eye protection.

"I am considered at least slightly mad by several people I know – including the hockey players," he said.

Back at work, it's the positive difference his surgeon's skills can make to a patient's quality of life that gives him most satisfaction.

"Faulty lids and tear drainage cause loss of visual performance, where tumours of the orbits or around the eye may blind or kill," he said.

"My research collaboration into orbital and ocular cancers will hopefully make a difference down the track too."



LEFT

Associate Professor Adam Gajdatsy on the hockey pitch - Photo by Toni Cronk

Lions Laser Vision

The Lions Laser Vision Centre is the only clinic in Perth to use the world's fastest and most advanced excimer laser source, the Schwind 1050RS, which corrects one dioptre of myopia in just 1.3 seconds.

Our continued investment in the latest and most advanced technology in the world, combined with the extensive experience of the Lions Laser Vision Centre's surgeons, means patients will have the best possible visual outcome after laser vision correction.

Patient safety is the centre's number one priority and ongoing investment in the latest technology supports this goal.

The history of the Lions Laser Vision Centre has been one of firsts - the first refractive laser centre in Western Australia; the first centre to perform laser PRK surgery in Australia in 1991, the first centre to perform LASIK in Western Australia in 1996 and the first and still the only accredited laser vision centre in Western Australia.

The centre has achieved accreditation each year since 2006 with ISO 9001 - an internationally-recognised quality management system.

Laser refractive surgery began with the introduction of an excimer laser in 1982 to reshape the surface of the

human cornea and achieve correction of refractive errors in the eye that normally would require glasses or contact lenses.

Initially the surface of the cornea was lasered to flatten the cornea for correction of short sightedness (myopia). It is now possible to also correct long-sightedness (hyperopia) and astigmatism. In 1990 the technique was improved by adding the creation of a flap with the ablation performed under this. LASIK was more effective and accurate, and more comfortable post-operatively with more rapid visual recovery.

LASIK is the gold standard of laser refractive surgery and the second most commonly performed eye operation in the world after cataract surgery.

There are four refractive surgeons at the Lions Laser Vision; Professor Geoffrey Crawford, Professor Graham Barrett, Associate Professor Steven Wiffen and Dr Andrea Ang, all of whom have had specialist fellowship training in refractive and corneal surgery in the United States.

The future is bright for laser vision correction with new techniques becoming available to correct all forms of refractive errors.

The Lions Laser Vision Centre will continue to provide the latest and safest technology for patients to provide them with the best possible vision without glasses or contact lenses.



▲ Lions Laser Vision surgeons Professor Geoffrey Crawford, Professor Graham Barrett, Dr Andrea Ang and Associate Professor Steven Wiffen

Lions Eye Bank

Established in 1986, the Lions Eye Bank is the only facility in WA that coordinates the collection, processing and distribution of eye tissue for transplantation.

Almost 4400 corneal transplants have been performed to date - 190 of those in 2015. During the year, 176 corneas were sourced locally and 14 from interstate. In addition to corneal transplants, scleral tissue was used in 144 other surgical procedures.

All donor tissue is used either for transplantation or, if unsuitable, for ethically approved research or surgical training with the consent of the donor's family. This tissue is crucial to advancing research and developing surgical techniques.

New storage methods have contributed to the most significant growth in almost 30 years of eye banking in WA. Where some patients used to wait more than two years for

a graft, transplants are now being performed within a matter of weeks. This chart below shows how ocular transplantation rates have more than doubled in 10 years.

State-of-the-art surgical techniques have also evolved so only the diseased portion of the cornea is replaced, enhancing the recovery period and visual outcome for the patient. Previously, the entire cornea was replaced regardless of the diagnosis.

Ten surgeons perform corneal grafts for both public and private patients including LEI clinicians Professor Graham Barrett, Professor Geoffrey Crawford, Associate Professor Steven Wiffen and Dr Andrea Ang.

Glaucoma surgeons Professor William Morgan and Dr Antonio Guibilato use scleral grafts in surgery to reduce intraocular pressure.

As a member of the Eye Bank Association of Australia and New Zealand (EBAANZ), the Lions Eye Bank works collaboratively with other eye

banks to maintain consistently high levels of quality, safety, proficiency and ethics. Excess tissue is shared when appropriate and emergency requests for tissue are always supported.

The goals of the Lions Eye Bank are to:

- Prevent blindness and improve the outcome of eye disease by providing corneal and sclera tissue for transplantation
- Raise the profile of the LEI in the community, both locally and nationally, by educating the public and medical providers about the critical role of the Eye Bank in sight-saving procedures
- Continue to remain a sustainable unit within the LEI by generating sufficient proceeds through the provision of eye tissues for transplantation

As an independent organisation, the Lions Eye Bank of Western Australia is self-funded through cost recovery and is supported by the Lions Save-Sight Foundation.

Ocular Transplants 2005-2014

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Corneas	86	97	99	121	132	142	188	199	184	183
Sclera	74	88	70	76	72	94	89	136	148	167

Gift of sight

transforms Enid's life



Enid Golden can experience the joy of watching her two children grow up because of two sight-saving corneal transplants through the Lions Eye Bank.

The 40-year-old from Margaret River, was diagnosed with keratoconus in her left eye, which caused her cornea to bulge into a conical shape, at the age of 16.

By the time she left high school, conventional methods to correct her vision were failing and she was placed on a waiting list for a cornea transplant.

At the time, there was a waiting list of up to two years but at the age of 21, Enid had her first corneal transplant.

The operation was successful and after a long recovery, her vision improved dramatically.

But 13 years later, after the birth of her first child Jesse, Enid's body rejected the cornea for no obvious reason.

"It was a very traumatic experience," she said. "I had to attend endless eye specialist appointments with a screaming newborn.

"I was sleep deprived and wanted to do everything right – as first-time mothers do – and was afraid the steroid drops I had to take would do my little boy harm."

Enid said her vision was so bad it was like looking through white frosted glass.

Her ophthalmologist was able to stop a complete rejection of the cornea but she was on constant medication, her eye was extremely light sensitive, she was in pain and discomfort and her vision fluctuated.

Enid waited until her second child Joel was two before contemplating another corneal graft and in 2014, a new cornea was inserted under the existing one.

"Within a week, my vision started clearing and constantly improving," she said.

"To this day I can't believe what an improvement the new cornea made.

"I can see very well. My light-sensitivity is almost gone and I am no longer squinting."

Enid is acutely aware that while she received the gift of sight twice, there are donor families dealing with the loss of a loved one.

"I am extremely grateful for both of my corneal donations and, being a parent, I feel so deeply sorry for the families," she said.

"I can only imagine how hard it would be to consent to a loved one's organs being donated. But hopefully, knowing what a positive impact this selfless act had on me and countless other donor recipients would bring some comfort to families."



ABOVE

Enid Golden with her husband Lance and their children Jesse and Joel

Clinic Design

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New clinic designed for future growth

Throughout the year, design work has continued on the new ground floor clinic and ancillary services.

The design process has involved substantial careful planning, many external consultants, multiple user group meetings and input from various stakeholders within the LEI to ensure the creation of a facility that will meet the community's ever-increasing demand for medical and research services.

"The objective is to create a ground floor facility that will offer greater flexibility, improved patient flows and "future proof" clinical services for many years to come," Project Manager Steve Atkins said.

"Aside from the actual tangible or visible outcomes, a degree of intangible works will be implemented within the Plant Room and other services to complement and efficiently run the new ground floor. The design is nearing completion and construction will begin in 2016."

Some of the key aspects of the new ground floor will include:

- Relocation of the Retina clinic to significantly improve the experience for all attending patients and provide greater convenience. The move will also consolidate the services for patients within one area minimising travel distances during

a visit. Such services include the photography suite, patient facilities and access to secretary and administrative functions.

- Additional consultation and testing rooms to meet the demands and volumes of patients attending the clinics. Modular style rooms have been created which offer flexibility in use and can be adapted to suit the needs of the LEI over time if required.
- A separate injection suite consisting of dedicated waiting areas, two injection rooms, recovery bays and administrative functions. This will enable segregation from the main clinic and once again improve patient flows within the entire clinic.
- A dedicated clinical trials area, featuring two clinical trials rooms plus a separate waiting area that will further enhance the experience of our important clinical trial participants.

- Upgrades to the lobby and main entrance, including relocation of the front reception, coffee shop and other facilities to greatly improve patient "way finding". Other works include the removal of the staircase and infill of the 1st Floor void to improve both acoustics and air temperature.
- An office for the Development Group in the ground floor area to better support its work in attracting funding for the LEI's important research activities.

In other significant works during the year a new lift car was installed, providing safer and more reliable transport between floors. Construction works were carried out over a period of six weeks with little or no disruption to the clinics. Works are often difficult within an operational environment, however the service provided was to expectations and completed within the time frames.



▲ An artist's impression of the new LEI lobby area

Collaborators & Visitors

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Genetics and Population Health

Visitors

- Wenzhou Medical University delegation

Collaborators

- Associate Professor Kathryn Burdon – University of Tasmania, Hobart
- Professor Minas Coroneo - University of Sydney, Sydney
- Associate Professor Jamie Craig - Flinders University, Adelaide
- Professor Jonathan Crowston - Centre for Eye Research Australia, University of Melbourne, Royal Victorian Eye and Ear Hospital, Melbourne
- Dr Elizabeth Engle - Howard Hughes Medical Institute Engle Lab & Center for Strabismus Research, Children's Hospital, Boston USA
- Associate Professor Jeremy (Jez) Guggenheim - Hong Kong Polytechnic University
- Professor Chris Hammond - King's College London School of Medicine, London, UK
- Dr Alison Hardcastle - UCL Institute of Ophthalmology, London, UK
- Professor Mingguang He - Zhongshan Ophthalmic Centre, Sun Yat-sen University, Guangzhou, China
- Dr Alex Hewitt – University of Tasmania, Hobart
- Dr Simon John - The Jackson laboratory, Bar Harbor, Maine USA
- Associate Professor Geoff Lam - Princess Margaret Hospital, Perth
- Dr Stuart MacGregor -

- Queensland Institute of Medical Research, Brisbane
- Professor Nick Martin - Queensland Institute of Medical Research, Brisbane
- Professor Paul Mitchell - Centre for Vision Research, Department of Ophthalmology and Westmead Millennium Institute, University of Sydney, Sydney
- Professor Grant Montgomery - Queensland Institute of Medical Research, Brisbane
- Professor Anthony (Tony) Moore - Institute of Ophthalmology, University College London UK
- Associate Professor Craig Pennell - School of Women's and Infants' Health, University of Western Australia, Perth
- Professor Carmel Toomes - Leeds Institute of Molecular Medicine, Leeds University, Leeds UK
- Professor Ian Trounce - Centre for Eye Research Australia, University of Melbourne, Royal Victorian Eye and Ear Hospital, Melbourne
- Dr Rohit Varma - Doheny Eye Centre, Los Angeles, California USA
- Dr Cathy Williams - University of Bristol, Bristol UK
- Dr Mary Wirtz - Oregon Health & Science University, Portland, Oregon USA
- Professor Tien Wong - Singapore Eye Research Institute, Singapore
- Dr Terri Young – University of Wisconsin, Madison, Wisconsin

Centre for Experimental Immunology

Visitors

- Professor Dirk Busch – Director of Technische Universität München, Institute for Medical Microbiology, Immunology and Hygiene
- Professor Geoff Hill – Bone Marrow Transplant Laboratory, Queensland Institute of Medical Research, Brisbane
- Professor Paul Mc Menamin – Department of Anatomy & Developmental Biology, Monash University, Melbourne

Collaborators

- Professor Matt Brown - Diamantina Institute, University of Queensland, Brisbane
- Dr Gabrielle Belz – The Walter and Eliza Hall Institute, Melbourne
- Professor Dirk Busch – Institute for Medical Microbiology, Immunology and Hygiene, Munich, Germany
- Professor Ian Frazer – Translational Research Institute, University of Queensland, Brisbane
- Associate Professor Nadia Guerra – Faculty of Natural Sciences, Imperial College London, United Kingdom
- Professor Geoff Hill - Bone Marrow Transplant Laboratory, Queensland Institute of Medical Research, Brisbane
- Dr David Huang - Molecular Genetics of Cancer Division, The Walter and Eliza Hall Institute of Medical Research, Melbourne
- Professor Philip Hugenholtz -

Australian Centre for Ecogenomics,
University of Queensland

- Dr Nicholas Huntington – The Walter and Eliza Hall Institute, Melbourne
- Professor Wallace Langdon - School of Pathology and Laboratory Medicine, University of Western Australia, Perth
- Professor Shaun McColl - Director, The Centre for Molecular Pathology, Adelaide University, Adelaide
- Professor Paul McMenamin - Department of Anatomy & Developmental Biology, Monash University, Melbourne
- Professor Stephen Nutt – The Walter and Eliza Hall Institute, Melbourne
- Professor Stan Riddell, Fred Hutchinson Cancer Center, Seattle, USA
- E/Professor John Papadimitriou – School of Pathology and Laboratory Medicine, University of Western Australia, Perth
- Professor Mark Smyth - Cancer Immunology Program, Peter MacCallum Cancer Centre, Melbourne
- Dr Fernando Souza-Fonseca-Guimaraes – Queensland Institute for Medical Research
- Professor Joseph Trapani - Cancer Immunology Program, Peter MacCallum Cancer Centre, Melbourne
- Professor Ranjeny Thomas - Diamantina Institute, University of Queensland, Brisbane
- Professor George Yeoh – School of Chemistry and Biochemistry, University of Western Australia, Perth

Ocular Tissue and Engineering Laboratory

Visiting Researchers and Doctors

- Dr Ling Zhang (Post-doctoral research fellow)
- Dr Erwei Hao (Post-doctoral research fellow)
- Dr Jinping Wang (Post-doctoral research fellow)
- Dr Wei Chen (Post-doctoral research fellow)

Visiting Professor and Speakers

- Dr Peter Van Wijngaarden - Centre for Eye Research Australia

Research Collaborators International

- Professor Lyndon Da Cruz - Moorfields Eye Hospital, London- Vision Eye Institute
- Dr Michael Edel - Research Institute of Hospital Val d Hebron, Barcelona, Spain
- Dr Robert Johnston - Cheltenham General Hospital, Cheltenham, UK

Local/National

- Professor Rod Dilley - Ear Sciences Centre, School of Surgery, UWA
- Professor Robyn Guymer - Centre for Eye Research Australia, University of Melbourne
- Professor Mel Ziman – Edith Cowan University, Perth
- Associate Professor Aron Chakera - Department of Nephrology, Sir Charles Gairdner Hospital, Perth
- Associate Professor Seng Khee Gan – Department of Endocrinology, Royal Perth Hospital, Perth

- Associate Professor Damien Harkin - School of Biomedical Sciences, Faculty of Health, QUT and Queensland Eye Institute
- Dr Elin Gray – Edith Cowan University, Perth
- Dr Kristen Nowak – Perkins Institute, Perth
- Dr John De Roach – Australian Inherited Retinal Disease Registry, Perth

Physiology and Pharmacology

Research Collaborators

- Dr Gerhard Zinser - Heidelberg Engineering, Germany
- Dr Mukesh Jain - Custom Vis Lasers, Perth
- Professor Mark Humayun - University of Southern California, USA
- Professor Marinko Sarunic - Simon Fraser University, Canada
- Professor Martin Hazelton - Massey University, New Zealand
- Prof Mark Gillies - Sydney Save sight Institute
- Richard Keeler - Curator Museum Royal College of Ophthalmologists, London
- Victor Previn - Ellex Medical lasers Adelaide
- Rohan Essex - Australian National University, Canberra



High Chinese myopia rates

in the spotlight

A leading expert on myopia rates in China delivered a well-attended Raine Lecture in 2015.

Formerly the Deputy Director of Zhongshan Ophthalmic Centre at Sun-yat Sen University in Guangzhou, Professor Mingguang He is now Professor of Ophthalmic Epidemiology at the University of Melbourne.

He ran China's first glaucoma survey and the largest twin registry in China and has published almost 200 papers in international peer-reviewed journals.

Professor He's Raine Lecture shared some findings from a newly-established high myopia registry study in China.

LEI Managing Director Professor David Mackey hosted his visit.



ABOVE

Professor He and Professor Mackey



LEFT

Professor He with Professor Mackey and friends at UWA

Conferences & Invited Lectures

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January

- Schuster I. Oral presentation
- Selected participant and speaker. Recipient of a Network of Immunology Frontiers Travel Award. 4th Network of Immunology Frontiers Winter School on Advanced Immunology, Singapore

February

- Schuster I. Oral presentation
– Selected participant and speaker. Recipient of a prestigious Keystone Symposia Scholarship. Autoimmunity and Tolerance Keystone Symposium, Keystone, Colorado, USA
- Chen F. Optometrist Association Australia (WA)

March

- Mackey D. Myopia or Pterygium, what's the choice for your children and how much time they spend outdoors? Invited speaker. Royal Australian & New Zealand College of Ophthalmologists Victorian State Branch Meeting, Melbourne, Australia
- Mackey D. Predicting glaucoma in family members. Invited speaker. Royal Australian & New Zealand College of Ophthalmologists Victorian State Branch Meeting, Melbourne, Australia
- Mackey D. Draw the family tree – interactive case for registrars. Training course for registrars. Royal Australian & New Zealand College of Ophthalmologists Victorian State Branch Meeting, Melbourne, Australia
- Degli-Esposti M. Invited Speaker, Rheumatology Department Meeting, Fiona Stanley Hospital, Perth, Australia
- Degli-Esposti M. Plenary Speaker, 32nd Australia and

New Zealand Cornea Society Meeting, Perth, Australia

- Chen F. RANZCO Ophthalmological Colloquium, Perth, Australia
- McAllister I. Devices and aids for the teaching and demonstration of ophthalmoscopy in the nineteenth century. Cogan meeting. New York, USA.

April

- Mackey D. How convicts, mutineers and sun worshippers shaped genetic eye research in Australia. Invited speaker. Manton Center Seminar, Boston Children's Hospital, Boston, USA
- Mackey D. How convicts, mutineers and sun worshippers shaped genetic eye research in Australia. Invited speaker. Massachusetts Eye and Ear, Boston, USA
- Mackey D. Strabismus and Refractive Error – Prevalence and Associations in the Twins Eye Study in Tasmania, Brisbane Adolescent Twin Study, and the Western Australian Raine Eye Health Study. Invited speaker. Boston Children's Hospital Ophthalmology/Radiology Monthly Conference Seminar, Boston, USA
- Mackey D. Retinal Dystrophies – five genes a clinician should know. Invited speaker, Paediatric Ophthalmology & Strabismus Session, Asia-Pacific Association of Ophthalmology, Guangzhou, China
- Chen F. 30th Asia Pacific Academy of Ophthalmology meeting, Guangzhou, China
- Chen F. Centre for Cell Therapy and Regenerative Medicine Symposium, Perth, Australia
- Chen F. Poster presentation. The Association for Research in Vision and Ophthalmology (ARVO) Conference, Denver, USA
- O'Halloran R. "Evaluating the

benefits of diabetic retinal screening: OCT versus DRS cameras." RANZCO Colloquium meeting, Perth, Australia

- Host B. "Evaluating patient and practitioners' perceptions and experiences of teleophthalmology." RANZCO Colloquium meeting, Perth, Australia
- Turner A. "Increasing the rate of diabetic screening in WA." RANZCO Colloquium meeting, Perth, Western Australia
- Chen F. "Tissue engineering of Bruch's membrane for retinal regeneration." Centre for Cell Therapy and Regenerative Medicine Annual Research Symposium, Curtin University, Perth, Australia
- McLenachan S. "ARPE19 cell-derived extracellular matrix promotes RPE differentiation." Science on the Swan Inaugural Conference, Perth, Australia

May

- Degli-Esposti M. Plenary Speaker, NK2015: 15th Meeting of the Society for Natural Immunity, Montebello, Canada
- Magno A. Presentation on data from the LEI's gene therapy clinical trial for Age-related Macular Degeneration at the Australasian Gene and Cell Therapy Society's 9th Biennial Conference in Melbourne, Australia, and the Science Lands in Parliament event organised by the WA Branch of the Australian Society for Medical Research (ASMR). Perth, Australia
- McLenachan S. Presentation at the ASMR event, presenting a poster titled Personalised Cell Therapy for Macular Degeneration. Perth, Australia
- Turner A. Two-point optometry CPD accredited education session

on teleophthalmology, Kalgoorlie Regional Hospital, Australia

- McAllister I. Invited Speaker. Retinal vein occlusion. Current and future treatment trends. Optomax meeting. Perth, Western Australia.
- McAllister I. Invited Speaker. Posterior segment complications in ocular trauma. Evaluation and management of posterior segment trauma. International Ophthalmology Symposium. Bali, Indonesia.

June

- Mackey D. Genetics and its clinical application. Invited speaker. World Glaucoma Congress, Hong Kong
- Schuster I. Invited speaker Seminar Series of the Peter Doherty Institute for Infection & Immunity, The University of Melbourne, Australia
- Degli-Esposti M. Invited Speaker, Animal Models of Disease, EMBL Australia PhD Course, Harry Perkins Institute of Medical Research, Perth, Australia
- Degli-Esposti M. Invited Speaker, AILS2015 1st Australian Innate Lymphocyte Symposium, Melbourne, Australia
- Mackey D. Genetic Optic Neuropathies. Invited speaker, RANZCO Inter-Hospital Clinical Meeting, Perth, Australia
- Mackey D. Why do you wear glasses? Genes and environment affecting myopia. Invited speaker, Harry Perkins Institute of Medical Research, Perkins Seminar Series, Perth, Australia
- Mackey D. Twins Eye Studies of Strabismus. Invited speaker, Bayer Continuing Education for Orthoptics Australia Western Australian branch. Perth, Australia
- Mackey D. Paediatric and Genetic Eye Disease. Royal Australian College of Surgeons teaching to eye trainees Dili, East Timor

- Degli-Esposti M. Invited Speaker, Infection and Immunity Seminar Program, Charles Perkins Centre, University of Sydney, Australia
- Chen F. Australian and New Zealand Society of Retinal Specialists Congress, Sydney, Australia
- Chen F. Asia-Pacific Vitreo-retina Society Annual Congress, Sydney, Australia
- Andoniou C. Oral presentation – Selected speaker. 40th International Herpesvirus Workshop, Boise, Idaho, USA

August

- Mackey D. Return of results for imputed myocilin mutations in GWAS studies. Ophthalmic Genetics Session. Invited moderator and speaker. International Society for Genetic Eye Diseases & Retinoblastoma ISGEDR, Halifax, Canada
- McAllister I. Invited Speaker. 1. Neil Della Lecture: Retinal Vein Occlusion: Where are we going and when are we going to get there? 2. Wide field imaging in retina vein occlusion. Useful or

not? 3. Intravitreal Aflibercept for the Treatment of Diabetic Macular Edema: Evaluating the Impact on Diabetic Retinopathy. ANZSRS/APVRS Conjoint meeting. Sydney, Australia.

- McAllister I. Treatment of retinal vein occlusions in the age of anti-VEGF. Future directions in Ophthalmology, Brisbane, Australia.

September

- Degli-Esposti M. Invited Speaker, Annual Scientific Meeting, Australian Rheumatology Association WA State Branch, Perth, Australia
- Mackey D. UV and eyes. Invited speaker, D-Light Symposium, Telethon Kids Institute, Perth, Australia
- Mackey D. What colour are your eyes? Invited speaker, Institute of Advanced Studies Public Lecture for International Year of Light, The University of Western Australia, Perth, Australia
- Mackey D. The International Glaucoma Genetics Consortium (IGGC) and the Consortium for Refractive Error and Myopia



▲ David Mackey speaks at the D-Light Symposium

- (CREAM), Invited speaker, Raine Study Day, The University of Western Australia, Perth, Australia
- Mackey D. Global assessment of retinal dystrophies. Invited speaker, Retina Genetics session, World Congress of Paediatric Ophthalmology and Strabismus, Barcelona, Spain
 - Mackey D. Pedigrees and Populations: Success with Sequencing and GWASK. Invited speaker World Congress of Paediatric Ophthalmology and Strabismus, Barcelona, Spain
 - Mackey D. Phenotype: genotype correlates in retinal dystrophies. Invited speaker, Retina Medical session, World Congress of Paediatric Ophthalmology and Strabismus, Barcelona, Spain
 - McAllister I. Invited Speaker. Role of Choriorretinal anastomosis in the management of CRVO. Euretina annual meeting. Nice, France.
 - McAllister I. Technique of laser anastomosis creation and improved success rates with new purpose designed laser photocoagulator. Retina Society annual meeting, Paris, France.

October

- Mackey D. Ophthalmic Genetics. Invited speaker, The Royal Children's Hospital Paediatric Seminar, Melbourne, Australia
- Mackey D. Genetic and environmental influences in development of strabismus. Invited speaker, European Strabismological Association, Venice, Italy
- Degli-Esposti M. Invited speaker, 38th Annual Scientific Meeting of the Australasian Cytometry Society, Perth, Australia
- Chen F. Lions Club District Convention Perth, Australia
- Chen F. Annual Medicines update, Pharmaceutical Society of Australia
- Chen F. Retina Australia National Congress, Melbourne, Australia

November

- Mackey D. Mitochondrial optic neuropathies – how do I differentiate these from glaucoma? Symposium – Diagnostic Dilemmas in Glaucoma. Invited speaker. Royal Australian & New Zealand College of Ophthalmologists 47th Annual Scientific Congress, Wellington, New Zealand
- Mackey D. Why find a gene? Translating Genetic Eye Research. Symposium. Invited Chair and Panel Speaker. Royal Australian & New Zealand College of Ophthalmologists 47th Annual Scientific Congress, Wellington, New Zealand
- Degli-Esposti M. Invited speaker, Immunotherapy@Brisbane 2015, Brisbane, Australia
- Yu D-Y. "Research discoveries to clinical application: developing a new glaucoma filtration surgery." Ida Mann Lecture. Royal Australian and New Zealand College of Ophthalmology congress, Wellington, New Zealand

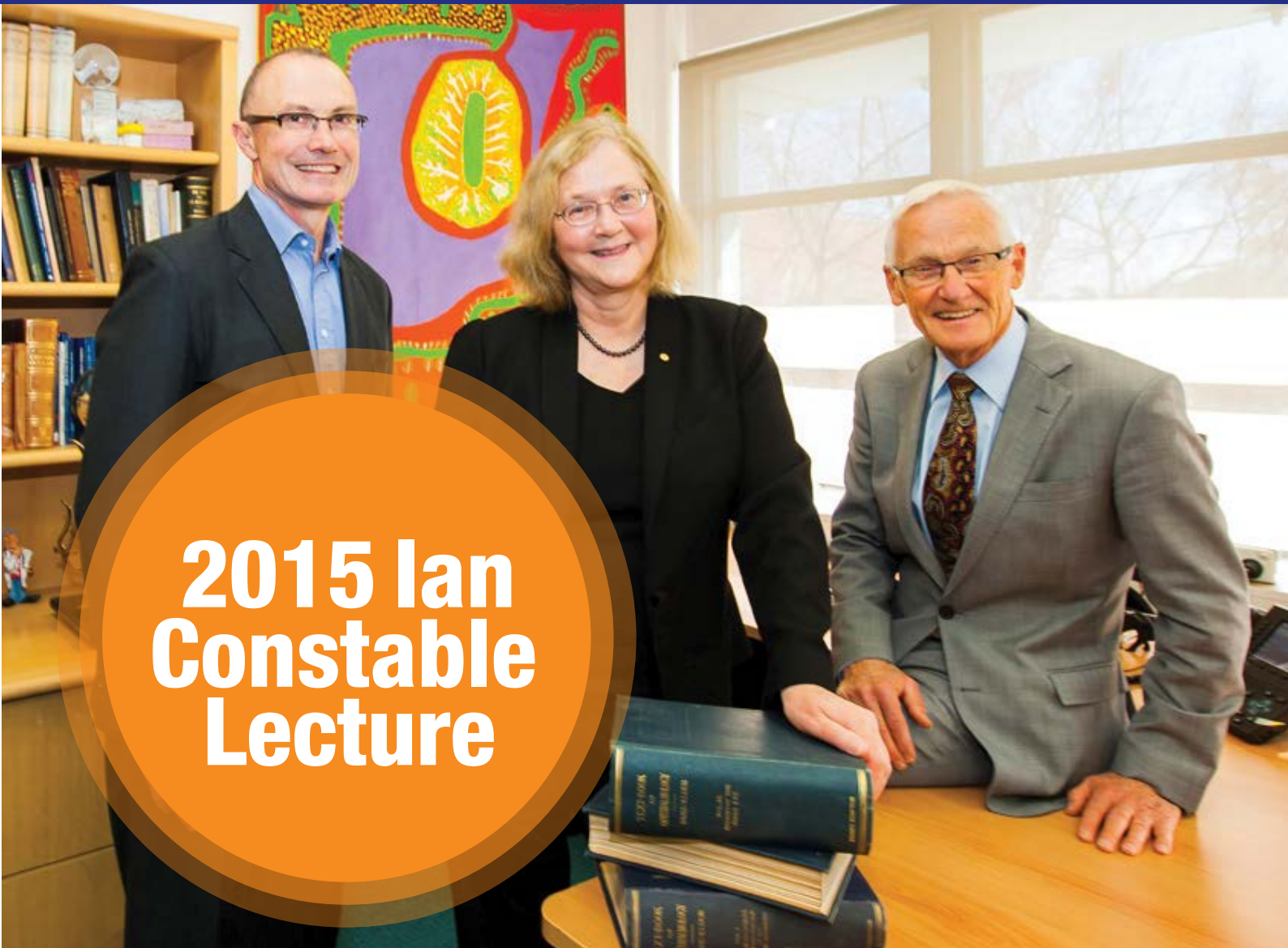
- Mackey D. "The future progression of myopia: seeing where we are going". Marshall M Parks Lecture. The 2015 American Academy of Ophthalmology meeting, Las Vegas, USA
- Chen F. RANZCO Annual Congress, Wellington, New Zealand
- Chen F. UWA-UMGU-UCL Collaborative Research Meeting, Perth, Australia
- McAllister I. Thrombolytics and clots and the eye. RANZCO 2015, Wellington, New Zealand.

December

- Degli-Esposti M. Session Chair, Australasian Society of Immunology meeting Canberra, Australian Capital Territory, Australia
- Degli-Esposti M. Plenary Speaker, 8th Australasian Virology Society Meeting and 11th Annual Meeting of the Australian Centre for Hepatitis & HIV Virology Meeting 2015, Hunter Valley, Australia
- Degli-Esposti M. Invited speaker,



▲ Fellow Nobel Laureate Professor Barry Marshall (right) was one of the many special guests to attend Professor Blackburn's Ian Constable Lecture at UWA



2015 Ian Constable Lecture

Australian-born Nobel Laureate Professor Elizabeth Blackburn delivered the 2015 Ian Constable Lecture.

The 16th annual lecture was very well received with more than 500 people packing UWA's Octagon Theatre to hear her speak.

Professor Blackburn spoke on Implications of Telomere Maintenance in Ageing-Related Processes and Diseases, exploring how stress, poverty, diet and lifestyle as well as genes contribute to rapid ageing of the body's cells.

Professor Blackburn won the Nobel Prize for Physiology and Medicine in 2009 after discovering the molecular nature of telomeres - protective DNA-protein complexes that help stabilise the body's genetic information.

Her research has linked short telomeres to heart disease, diabetes, cancer, chronic stress and post-traumatic stress disorder.

LEI Managing Director Professor David Mackey said it was wonderful to have such a successful Australian researcher as a role model for our scientists delivering this year's lecture.



ABOVE

Professor David Mackey, Nobel Laureate Professor Elizabeth Blackburn and Professor Ian Constable at the LEI

Open Day



▲ Angus Turner at LEI Open Day

A key part of the LEI's mission is community engagement and education to build awareness, maintain a high reputation and increase funding.

An increasingly important way for the LEI to connect with the community is through the annual Open Day, which invites people to a behind-the-scenes look at our research and clinical work.

The 2015 Open Day was no different, giving visitors a chance to discover what it is like to be colour blind or have glaucoma.

Also on offer was "Coffee with a Professor", clinic tours and information on laser surgery, eye research and clinical trials, and the Lions Outback Vision Van project.

Mark & Natasha's

ride to save sight



Eight years ago, Mark's daughter Kim was diagnosed with uveitis. She was just six at the time.

The condition caused an inflammation of Kim's inner eye, which would have eventually led to tissue damage and severe visual impairment if left untreated.

Kim was immediately referred to Professor Mei-Ling Tay-Kearney at the LEI and since her initial diagnosis, she has received weekly injections and medication to manage her condition.

Uveitis affects one in 4500 people – usually the young and working age group - and is estimated to account for 15 per cent of visual impairment in Australia.

“To help raise funds for the Lions Eye Institute, my eldest daughter Natasha and I decided to ride from Land's End in Cornwall to John O'Groat's in Scotland,” Mark said.

“Over 12 days we covered 1550km and the total elevation of 18,000 metres was the equivalent of climbing Everest twice. I'd forgotten how hilly Cornwall is!

“We raised around \$15,000 for the LEI and we are thankful for everyone's support.”

ABOVE

Mark and his daughter Natasha at Land's End, Cornwall, at the start of their fundraising bike ride in June, 2015

Acknowledgements

Bequests

- Estate of the Late Edna Bailey
- Estate of the Late Alan and Lilian Cameron
- Estate of the Late Clarice Edna Copper
- Estate of the Late Marie Fanlo
- Estate of the Late Margaret Kerman
- Estate of the Late Barbara Morganari
- Estate of the Late Carolyn Pool
- Estate of the Late Anna Taphorn
- Estate of the Late Gladys Whitford

Memorial gifts, honouring

- Anonymous
- Mr John Fussell
- Mr Peter Kidd
- Ms Rhoda Mullins
- Mrs Pearce
- Ms Lorraine Penny
- Mr John Regan
- Ms Doreen Stewart
- Mr Tan
- Ms Katina Yiannakis

Special Gifts

- Anonymous
- Mr Kevin Bowen
- Dr Fred Chen
- Mr George Church
- Professor Geoffrey Crawford
- Mr John Cruickshank
- Dr Jean-Louis deSousa

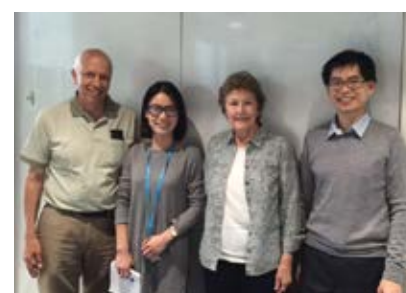
- Mrs Petrina Freedman
- Golden Group
- Mr Norman Hogg
- Dr Patricia Kailis AM OBE
- Mandurah Murray Mayday Club
- Medical Centre Chemist, Nedlands
- Mr and Mrs Brad and Carolyn Mioceвич
- Mrs Elva Moore
- Oxford Compounding
- Mrs Nancy Patterson
- Prime Movers (Inc)
- Mrs Gwynneth Roberts
- Mr and Mrs John and Lee Saleeba
- Drs Sjakon and Shelley Tahija

Trusts and Foundations

- Australian Foundation for the Prevention of Blindness (AFPB)
- Berg Family Foundation Pty Ltd
- BrightFocus Foundation
- Channel 7 Telethon Trust
- Constantine Family Foundation Pty Ltd
- Fred Hollows Foundation
- Lions Save-Sight Foundation
- McCusker Charitable Foundation
- The Patrick Foundation
- Quality of Life Foundation
- RANZCO Eye Foundation
- Stan Perron Charitable Foundation Ltd

Major Institutional Support

- Bayer Global Ophthalmology Awards
- Device Technologies
- Federal Government of Australia – Australian Research Council Discovery Project, Commonwealth Department of Health, National Health and Medical Research Council
- Government of Western Australia – Department of Health, Country Health Service
- Lotterywest
- Ophthalmic Research Institute of Australia
- Perpetual IMPACT Philanthropy
- Quadrant Energy Pty Ltd
- Retina Australia (WA)
- Sir Charles Gairdner Hospital
- Telstra
- The University of Western Australia



▲ John and Lee Saleeba were generous supporters of the LEI in 2015. They are pictured here with Dr Fred Chen and research assistant Xiao Zhang

Lions Save-Sight Foundation

The year under review, 2015, has again been one of collaboration and assistance between the Lions Save-Sight Foundation and the LEI.

Dr Matthew Wikstrom completed his PDG Brian King Fellowship and we now await the selection of our next fellow appointment. Applications are currently being considered and we stand ready to fund the new appointee. In recent times we have not had suitable students to avail themselves of the Dr Jack Hoffman Scholarship but have at a recent Board meeting approved a sum of \$10,000 to support a post-graduate student of Chinese background who comes highly recommended from The University of WA.

Earlier in 2015, a grant application by LEI to the National Health and Medical Research Council for funding to continue a project in conjunction with the Busselton Health Study was unsuccessful. Following the presentation of a proposal from Professor Mackey, LSSF have provided funding of \$15,000 to cover this project.

Lions' members in Western Australia were privileged to have Professor Fred Chen attend both our District

Conventions in October 2015. His address was very well received, and we are grateful for his giving time to us and allowing Lions members to gain an insight into the excellent work being undertaken at the LEI.

On this same note, we are grateful for those senior executive members of the LEI team who have made themselves available to act as guides for those Lions clubs which have undertaken visitations to the LEI. All who have visited are excited to find such a facility and even more delighted that it exists under the name of Lions.

During this last year, I have been able to represent both organisations as a guest speaker at various clubs and social group organisations (outside of Lions) to "spread the word" about our work. It has been a privilege to do so, and it is especially important, in that day time meetings ensures busy professionals at the LEI are not taken away from their valuable work. I strongly believe it is important to accept these invitations and spread our great story at every opportunity.

In concluding, I would like to firstly congratulate Professor David Mackey on his winning of a Churchill Fellowship. They are not easy to come by and reflect his high standing in the profession. Secondly I would like

to acknowledge the advancement of Professor Angus Turner to his role with UWA and Lions Outback Vision. With many Lions clubs in non-metropolitan areas, the vision of a Lions mobile clinic van (and a very large one at that!) going through their towns will be a great morale boost for them.

Yet again, we look forward to the year ahead and trust that LEI will again go from strength to strength. We continue to stand behind them with our support.



Ambrose Depiazzi
CHAIRMAN, LIONS SAVE-SIGHT
FOUNDATION (WA) INC.

Volunteers

The LEI's warm and friendly volunteers are among the first people patients encounter when they walk through the doors of the LEI.

Established in 2010, the Volunteer Program is coordinated by Robin Miller. She took over the role from Kay Hooper during 2015.

They play a crucial support role for patients and support many of the LEI's activities during the year, including the annual Open Day, Ian Constable Lecture, Telethon and Visionaries Luncheon.

Other work involves assistance with Christmas decorations and festivities and maintenance of brochures and magazines in the Robert Linton Library.

Interest in joining the Volunteer Program remains strong and overall numbers grew to 34 during the year.

All volunteers undergo an induction and participate in training, including Hand Hygiene Australia initiatives and wheelchair use.



▲ Volunteers manning the desk in the Verdun St building offer great support to our patients and visitors



Volunteering reaps

its own rewards

“What is the essence of life? To serve others and to do good.”

Aristotle might have lived more than 2000 years ago, but his words still resonate for the LEI's band of volunteers, who support vulnerable patients requiring help and support before and after their medical treatment.

This dedicated group of 34 women and men is led by Volunteer Coordinator Robin Miller.

Decked out in their red vests, volunteers are often the first to greet patients as they arrive at the LEI. The volunteers assist in many ways

- escorting the elderly and vision impaired, collecting medications from the QEII pharmacy or providing safe access to refreshments.

As coordinator, Robin supervises the LEI Volunteer Program, helps to recruit and train volunteers and, along with Team Leaders, ensures appropriate rostering to meet workloads and changing circumstances.

“I first heard about the LEI's Volunteer Program from a friend who was a volunteer at the time and joined up in July 2011,” she said.

“I love and enjoy the interaction with staff and our volunteers but get the most satisfaction from helping in a

small way to make a difference to a patient's visit - either by offering a tea or coffee, having a chat, arranging transport or just a cheerful ‘hi’.

“I believe volunteering is good for the soul and very rewarding!”



ABOVE

Volunteer Coordinator Robin Miller: “volunteering is good for the soul”

Grants

Australian Competitive Grants

NHMRC Program Grant

- Immunological therapies for cancer, chronic infection and autoimmunity
- Chief investigator – Degli-Esposti M

NHMRC Centre for Research Excellence

- Translation of genetic eye research integrating education, counselling and testing with gene discovery and gene-based therapies for eye disease
- Chief investigators – Mackey D, Hewitt A, Burdon K, Craig J

NHMRC Project Grant

- Understanding the role of CD4 T cells in viral infection a means of improving anti-viral immunotherapy
- Chief investigators - Degli-Esposti M, Andoniou C

NHMRC Project Grant

- Developing a new glaucoma surgery using precision ablation of the trabecular meshwork
- Chief investigators – Yu D-Y, Morgan W, Cringle S

NHMRC Project Grant

- Non-invasive retinal vein pulsation pressure measurement
- Chief investigators – Morgan W, Yu D-Y

NHMRC Project Grant

- A fibroin-based prosthetic Bruch's membrane for the treatment of Age-Related Macular Degeneration
- Chief investigator – Chen F

NHRMC Development Grant

- Non-invasive intra-cranial pressure measurement
- Chief investigator – Morgan W

NHMRC Principal Research Fellowship

- Degli-Esposti M

NHMRC Early Career Fellowship

- Chen F

NHMRC Scholarship

- Kang M

ARC Discovery Project

- Utilising virally-encoded proteins to decipher apoptotic regulatory mechanisms
- Chief investigators – Andoniou C, Degli-Esposti M

Ophthalmic Research Institute of Australia

- Investigating mechanism of visual scotoma and metamorphopsia due to macular disease using multimodal imaging
- Chief investigator – Bukowska D

Ophthalmic Research Institute of Australia

- Assessment of Tenecteplase (metalyase) as an acute interventional treatment for branch retinal vein occlusion (BRVO)
- Chief investigators – McAllister I, Shaw A, Yu D-Y

Retina Australia

- Accelerating therapeutic discoveries for Retinitis Pigmentosa
- Chief investigator – Mackey D

Perpetual IMPACT Philanthropy Program

- Does modification of time outdoors during childhood affect myopia in early adulthood?
- Chief investigator - Mackey D

Government Grants

Commonwealth Department of Health

- Turner A

Government of Western Australia Department of Health

- Round 18 MHRIF

Government of Western Australia Department of Health

- NIRIS Award
- Chen F

Government of Western Australia Department of Health

- Lions Outback Vision
- Turner A

WA Country Health Service

- Turner A

Other Grants

Channel 7 Telethon Trust

- Turner A

Fred Hollows Foundation

- Turner A

RANZCO

Sir Charles Gairdner Hospital

- Scholarship
- McLenachan S

Stan Perron Charitable Foundation

- Degli-Esposti M

Lions Save-Sight Foundation

- Research support

The University of Western Australia

- Centre for Ophthalmology and Visual Science Infrastructure Funding

The University of Western Australia

- AA Saw Scholarship Top Up
- Kang M

International Grants

- BrightFocus Foundation
- Mackey D

GOAP Bayer

- Chen F

Total Grants 2015 **\$5,676,043**

Financial Statements

The summary below is an aggregate of the Institute's financial results and research grants administered by the Institute.

Income Statement	2015	2014
For the year ended 31 December	\$	\$
Total income including research grants	18,308,056	20,596,746
Total expenditure including research expenses	(16,556,480)	(20,518,533)
Operating profit before significant items	1,751,576	78,213
Fair value adjustment of investments	347,601	609,387
Operating profit after significant items	2,099,177	687,600
Change in the fair value of available for sale financial assets	2,367,702	-
Accumulated profit at the beginning of the year	32,637,545	31,949,945
Accumulated Profit at the End of the Year	37,104,424	32,637,545

Balance Sheet	2015	2014
At 31 December	\$	\$
Total Funds	37,104,424	32,637,545
Represented by		
Cash assets	14,790,421	18,337,101
Available for sale financial assets	2,878,780	-
Other assets	1,964,431	2,472,646
Other financial assets	24,925,916	18,157,868
Property, plant and equipment	8,212,963	8,110,447
Total Assets	52,772,511	47,078,062
Payables	3,887,686	2,665,536
Research grant funds not yet spent	10,228,062	10,479,404
Provision for employee entitlements	1,552,339	1,295,577
Total Liabilities	15,668,087	14,440,517
Net Assets	37,104,424	32,637,545



Visionaries Luncheon

Generous supporters of the LEI enjoyed meeting researchers and clinicians at the 2015 Visionaries Luncheon at UWA's University Club.

Guests heard about the work of the LEI from Professor David Mackey and Institute highlights over the past year from Board Chair Stephen Pearce.

Mr Pearce thanked LEI's "visionaries" – those people whose philanthropic support helps the LEI to fund vital eye research, facilities and infrastructure.

Professor Mariapia Degli-Esposti presented a talk called "Immunology at the forefront of improved therapies for eye diseases".



ABOVE

Professor Mackey addresses attendees at the annual Visionaries Luncheon



**You're
saving sight
too**

The Lions Eye Institute is on a quest to save sight.

We offer a full range of eye health services through our clinic, and as a non-for-profit organisation, part proceeds directly support our world leading medical researchers.

Visit our website:

lei.org.au



Acronyms

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A digital version of this report is
available on our website:

www.lei.org.au

AFPB	Australian Foundation for the Prevention of Blindness Trust
AICD	Australian Institute of Company Directors
AMA	Australian Medical Association
ANZSOPS	Australian and New Zealand Society of Ophthalmic Plastic Surgeons
APACRS	Asia-Pacific Association of Cataract and Refractive Surgeons
ASCRS	American Society of Cataract and Refractive Surgery
AUSCRS	Australasian Society of Cataract and Refractive Surgeons
COVS	Centre of Ophthalmology and Visual Science, The University of Western Australia
FRANZCO	Fellow of the Royal Australian and New Zealand College of Ophthalmologists
IOL	Intraocular lens
LASEK	Laser epithelial keratomileusis
LASIK	Laser-assisted in-situ keratomileusis
LEI	Lions Eye Institute
LOV	Lions Outback Vision
LSSF	Lions Save-Sight Foundation
NHMRC	National Health and Medical Research Council
OTEL	Ocular Tissue Engineering Laboratory
PMH	Princess Margaret Hospital
PRK	Photorefractive keratectomy
RANZCO	Royal Australian and New Zealand College of Ophthalmologists
RPH	Royal Perth Hospital
SCGH	Sir Charles Gairdner Hospital
UWA	The University of Western Australia



HAPPY BEGINNINGS IN
RESEARCH

COHZV
SZNDC
VKCNR
KCRHN
LXQVQ

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