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The Royal Australian and New Zealand College of Ophthalmologists

54th Annual Scientific Congress

20–23 October 2023

Perth Convention and Exhibition Centre, Perth

PROGRAM AND ABSTRACTS

WILEY

RANZCO The Royal Australian and New Zealand College of Ophthalmologists

Aims and Scope: *Clinical and Experimental Ophthalmology* is the official journal of The Royal Australian and New Zealand College of Ophthalmologists. The journal publishes peer-reviewed original research and reviews dealing with all aspects of clinical practice and research which are international in scope and application. CEO recognises the importance of collaborative research and welcomes papers that have a direct influence on ophthalmic practice but are not unique to ophthalmology.

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Clinical & Experimental Ophthalmology

Clinical and Experimental Ophthalmology (CEO) is committed to building a publishing culture of diversity, equity, and inclusion. *CEO* strives to increase the participation of women, those from underrepresented cultural groups, early career professionals, and those from all regions of the world as Section Editors, Editorial Board members, authors, and peer reviewers. As the journal of The Royal Australian and New Zealand College of Ophthalmologists (RANZCO), *CEO* acknowledges the Aboriginal and Torres Strait Islander Peoples, the Traditional Owners of Country throughout Australia, and recognises their continuing connection to land, waters and community. We pay our respects to them and their cultures; and to their Elders past, present and emerging. In recognition that RANZCO is a bi-national College, we acknowledge the Rangatiratanga of Māori as Tangata Whenua and Treaty of Waitangi partners in Aotearoa New Zealand.

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54th Annual Scientific Congress
20–23 October 2023

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20–23 October 2023

Perth Convention & Exhibition Centre

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PAST LECTURER

Clinical & Experimental Ophthalmology WILEY

Past Lecturers and Briefs for the Named Lectures: RANZCO Annual Scientific Congress

1 | THE SIR NORMAN GREGG LECTURE (ESTABLISHED 1958)

The Norman McAlister Gregg Lecture was established in 1958 by the Council of the Ophthalmological Society of Australia in recognition of the outstanding contribution made to ophthalmology by Sir Norman Gregg. The lecture covers a clinical or basic science topic that has clinical relevance and may cover some facet of work not previously published (both ophthalmologists and non-ophthalmologists can be considered). The presentation shall be for 25 minutes duration and will include 5 minutes for questions or discussion. The lecture becomes the property of the College. A "Gregg Medal" is presented, together with a certificate, to the lecturer at the conclusion of the lecture.

1961	Sir Lorimer Dodds
1964	Prof Ida Mann
1967	Prof Ramon Castroviejo
1970	Prof Lorenz E Zimmerman
1973	Prof Gustav Nossal
1975	Prof William F Hoyt
1981	Prof Robert M Ellsworth
1984	Prof Barrie Jones
1986	Dr Thomas Mandel
1987	Prof Ian Constable
1988	Prof Colin Blakemore
1989	Dr Robert Machemer
1990	Prof Ian Gust
1991	Prof Doug Coster
1992	Prof Stephen Drance
1994	Prof Harry A Quigley
1995	Prof Richard Larkins
1996	Prof George Waring
1997	Prof Susan Lightman
1998	Prof Richard Collin
1999	Prof Edward Stone
2000	Prof Stuart Fine
2000	Prof Yasuo Tano
2001	Mr John Hungerford
2002	Justice Michael Kirby
2003	Prof Caroline MacEwan
2005	A/Prof David Mackey

2006	Prof David Apple
2007	Prof Jost B Jonas
2008	Prof Charles McGhee
2009	Mr Geoffrey Rose
2010	Prof Paul Mitchell
2011	Prof Elizabeth Engle
2012	Prof Brenda Gallie
2013	Dr David Chang
2014	Prof Hugh R Taylor AC
2015	Prof Peter McCluskey
2016	Prof Denis Wakefield AO
2017	Dr Noel Alpins AM
2018	Prof Robyn Guymer AM
2019	Prof Tien Y Wong
2020	*–Congress postponed due to COVID-19*
2021	Prof Graham D Barrett
2022	Prof Ian McAllister
2023	Dr Shigeru Kinoshita

2 | THE COUNCIL LECTURE (ESTABLISHED 1963)

The Council Lecture was established in 1963 to honour Fellows engaged in original work, or to establish a means whereby a Fellow can deliver an authoritative and distinguished lecture on a subject of which the Fellow has particular experience or knowledge. The presentation shall be for 25 minutes duration and will include 5 minutes for questions or discussion. The lecture becomes the property of the College. The Council Lecture provides an opportunity for Fellows who are not necessarily a member of an academic department to present their work. It generally goes to senior Fellows who have made a contribution to clinical ophthalmology. A certificate is presented to the lecturer at the start of the lecture.

1963	Dr Adrian Lamb
1965	Dr David Waterworth
1965	Dr Kenneth George Howsam (OSA)
1967	Dr Edgar John Donaldson
1967	Dr Reuben Hertzberg
1968	Dr William Deane-Butcher
1969	Dr Thomas a'Beckett Travers (ACO)
1970	Dr Peter Augustine Rogers
1971	Dr Ronald Lowe
1973	Dr Reuben Hertzberg
1975	Dr John Wallis Hornbrook
1979	Dr Shirley Sarks
1980	Dr Courtney Hugh Greer
1981	Dr Brian Gilmore Wilson
1982	Dr James Kirkwood Galbraith
1984	A/Prof Fred C Hollows

1985	Prof Frank A Billson
1986	Dr Bruce Crawford
1987	Dr Peter J Graham
1988	Dr Alex Hunyor
1990	Dr Barry Desmond Coote
1991	Prof Fred Hollows
1992	Dr Frank Taylor
1993	Dr Gordon Wise
1994	Prof Hugh R Taylor
1995	Dr Bill Gillies
1996	Prof Richard Cooper
1997	Dr David Moran
1998	Dr Mark Harrison
1999	A/Prof David Mackey
2000	A/Prof Peter McCluskey
2001	Dr Jamie La Nauze
2002	Prof Tony Molteno
2003	A/Prof Mark Elder
2004	Dr Alan McNab
2005	Dr Bill Glasson
2006	A/Prof Robyn Guymer
2007	A/Prof Helen Danesh-Meyer
2008	A/Prof Robert Casson
2009	A/Prof Timothy Sullivan
2010	Dr Noel Alpins
2011	Dr Stephen Best
2012	Prof Mark Gillies
2013	A/Prof Julian Rait
2014	A/Prof Mark D Daniell
2015	A/Prof John Grigg
2016	Prof Gerard Sutton
2017	Prof Jonathan Crowston
2018	Prof Stephanie Watson
2019	A/Prof Penelope Allen
2020	*–Congress postponed due to COVID-19*
2021	A/Prof Clare L Fraser
2022	Prof Frank Martin AM
2023	Dr Jennifer Arnold

3 | THE DAME IDA MANN MEMORIAL LECTURE (ESTABLISHED 1988)

The Dame Ida Mann Memorial Lecture was established in 1988 by the Council of the College in recognition of the outstanding contribution made to ophthalmology by Dame Ida Mann. The presentation shall be for 25 minutes duration and will include 5 minutes for questions or discussion to cover an important topic that is oriented to the

basic or novel clinical sciences of ophthalmology with clinical relevance (not confined to Fellows). The lecture becomes the property of the College. A certificate is presented to the lecturer at the start of the lecture.

1988	Prof John D Pettique
1989	Dr Dorothy Potter
1991	Dr Adam Locket
1992	Dr Mark Florence
1993	Dr Robert Buttery
1995	Prof Trevor Lamb
1996	Prof Val Alder
1997	Prof Ian Constable
1998	A/Prof Denis Stark
1999	Dr Kerryn Williams
2000	Prof Charles McGhee
2001	Prof Grant Sutherland
2002	Dr Ian Morgan
2003	Prof Harminder Dua
2004	Dr Stuart Graham
2005	Dr Peter Kaiser
2006	Prof Harry Quigley
2007	Prof Paul McMenamin
2008	Prof John McAvoy
2009	Prof Jonathan Crowston
2010	A/Prof Jamie Craig
2011	Prof Justine Smith
2012	Prof Colin Green
2013	Prof Jan Provis
2014	Prof Minas T Coroneo
2015	Prof Dao-Yi Yu
2016	Prof Maarten P Mourits
2017	Prof Trevor Sherwin
2018	Dr Russell Van Gelder
2019	Prof John Marshall
2020	*–Congress postponed due to COVID-19*
2021	Prof Alex Hewitt
2022	Prof Helen Danesh-Meyer
2023	Prof Kathryn P Burdon

4 | THE FRED HOLLOWS LECTURE (ESTABLISHED 1999)

The Fred Hollows Lecture was established in 1999 to recognise the work Prof Fred Hollows did with Indigenous people and in raising the profile of ophthalmology. The Hollows Lecture is for Fellows involved in outreach or international ophthalmology. The presentation shall be for 25 minutes duration and will include 5 minutes for discussion to address a topic of applied public health research with a community focus. The lecture becomes the property of the College. A certificate is presented to the lecturer at the start of the lecture.

1999	Dr William Morgan
2000	A/Prof Paul Mitchell
2001	A/Prof Glen Gole
2002	Prof John Mathews
2003	Dr Ivan Goldberg
2004	Dr Rob Moodie
2005	Prof Ravi Thomas
2006	Prof Minas Coroneo
2007	Prof Lyle Palmer
2008	Prof Hugh R Taylor AC
2009	Dr Mark Loane
2010	A/Prof Henry Newland
2011	Prof Jill Keeffe OAM
2012	Prof Geoffrey Tabin
2013	A/Prof Nitin Verma
2014	Dr Garry Brian
2015	Dr Neil Murray
2016	Dr James Muecke
2017	Dr Geoffrey Cohn OAM
2018	A/Prof Angus Turner
2019	Dr Anasaini Cama
2020	*–Congress postponed due to COVID-19*
2021	Dr Catherine Green AO
2022	Prof Clare Gilbert
2023	Dr Anthony Bennett Hall

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Clinical & Experimental Ophthalmology WILEY

SCIENTIFIC PROGRAM

SATURDAY 21 OCTOBER

06:30–07:45	**Apellis Hosted Morning Symposium**
	Venue: BelleVue Ballroom 1
06:30–07:45	**Abbvie Hosted Morning Symposium**
	Venue: BelleVue Ballroom 2
08:00–08:05	**WELCOME TO COUNTRY**
	Len Collard
	Venue: Riverside Theatre
08:05–08:30	**RANZCO CONGRESS OPENING LECTURE**
	Dr Craig Challen SC OAM
	Venue: Riverside Theatre
	Topic: Against all odds—The story of the 2018 Tham Luang cave rescue
	Chair: Prof Adrian Fung
08:30–09:30	**RANZCO PLENARY**
	Dr Kristin Bell, Dr Justin Mora, Dr John Kennedy and Prof Nitin Verma AM
	Venue: Riverside Theatre
	Topics: Update *Vision2030 and beyond*—Australia, *Vision2030 and beyond*—Aotearoa New Zealand and *Update ANZEF*
	Chair: Dr Grant Raymond
09:30–10:00	**COUNCIL LECTURE**
	Dr Jennifer Arnold
	Venue: Riverside Theatre
	Topic: Way points on the journey of a clinical researcher: Where were we then, where we are now, where we are going
	Chair: Dr Alan Luckie
10:00–10:30	**Morning Tea**
10:30–11:00	**SIR NORMAN GREGG LECTURE**
	Dr Shigeru Kinoshita
	Venue: Riverside Theatre
	Topic: Toward corneal regenerative medicine
	Chair: Dr Andrea Ang
11:00–11:30	**GLAUCOMA UPDATE LECTURE**
	Prof Tina Wong
	Venue: Riverside Theatre
	Topic: Making blebs beautiful again: Insights into collagen remodelling and the future direction of anti-fibrotic strategies
	Chair: Prof Keith Martin
11:30–12:00	**RETINA UPDATE LECTURE**
	A/Prof Fred Chen
	Venue: Riverside Theatre
	Topic: Deep phenotyping, pitfalls in pivotal trials and precision genetics
	Chair: Dr Xavier Fagan

(Continues)

12:00–13:30	**Lunch**
13:30–15:00	**CONCURRENT SESSIONS**
	COURSE—Neuro-ophthalmology challenges: Survival guide to diagnosing and managing neuro-ophthalmic conditions
	Venue: BelleVue Ballroom 1
	Chair: Prof Helen Danesh-Meyer
	COURSE—Uveitis bootcamp: Everything you need to know to confidently manage uveitis as a comprehensive ophthalmologist
	Venue: Riverside Theatre
	Chair: Dr Thomas Campbell
	COURSE—Presbyopia unlocked: Why do we have to bother?
	Venue: BelleVue Ballroom 2
	Chair: Dr Smita Agarwal
	PROFESSIONAL DEVELOPMENT—Keeping your surgical edge – honing your surgical skills through coaching and simulation
	Venue: Riverview 4
	Chairs: Prof Nigel Morlet and Dr John McCoombes
	FREE PAPERS—Epidemiology/Genetics
	Venue: Meeting Room 3
	Chairs: Dr Alex Hewitt and A/Prof Andrea Vincent
15:00–15:30	**Afternoon Tea**
15:30–17:00	**CONCURRENT SESSIONS**
	COURSE—Paediatric oculoplastic surgery: An update for all ophthalmologists
	Venue: Meeting Room 6
	Chairs: Dr Krishna Tumuluri and Dr Thomas Hardy
	COURSE—Intraocular lens calculations: A subspecialists' perspective
	Venue: BelleVue Ballroom 2
	Chair: Dr Elsie Chan
	COURSE—ANZGS Symposium and audit: Controversies in glaucoma
	Venue: Riverside Theatre
	Chair: Prof Graham Lee
	Co-Chairs: Prof Tina Wong, Prof Keith Martin and Prof Helen Danesh-Meyer
	COURSE—Telehealth around the world—What works now and what's the 2030 horizon?
	Venue: Riverview 4
	Chair: A/Prof Angus Turner
	FREE PAPERS—Uveitis/Oncology/Paediatrics/Strabismus
	Venue: Meeting Room 3
	Chairs: Dr Caroline Catt and Prof Justine Smith
17:30–19:00	**Graduation and Awards Ceremony and President's Reception**
	Venue: BelleVue Ballroom 1
19:30–22:00	**Young Fellows' Dinner**
	Venue: The Reveley
19:30–21:30	**Zeiss Hosted Evening Symposium**

SUNDAY 22 OCTOBER

06:30–07:45 **Bausch + Lomb Hosted Morning Symposium**

Venue: BelleVue Ballroom 1

06:30–07:45 **Roche Hosted Morning Symposium**

Venue: BelleVue Ballroom 2

08:00–08:30 **FRED HOLLOWS LECTURE**

Dr Anthony Bennett Hall

Venue: Riverside Theatre

Topic: Preventing blindness from diabetes in low and middle income countries—The Diabetic Retinopathy Network

Chair: Dr James La Nauze

08:30–09:00 **NEURO-OPHTHALMOLOGY UPDATE LECTURE**

Dr Neil R Miller, MD, FACS

Venue: Riverside Theatre

Topic: Neuro-ophthalmology updates: Information that will change your practice tomorrow!

Chair: Prof Celia Chen

09:00–10:00 **AUSTRALIAN VISION RESEARCH (AVR) PLENARY**

Venue: Riverside Theatre

Chairs: Dr Jennifer Fan Gaskin and Prof Stephanie Watson OAM

10:00–10:30 **Morning Tea**

10:00–10:30 **AUSTRALIAN SOCIETY OF OPHTHALMOLOGISTS (ASO) AGM**

Venue: Meeting Room 7

10:30–12:00 **PLENARY—BEST PAPER PRESENTATIONS**

Gerard Crock and John Parr Awards

Venue: Riverside Theatre

Chairs: Dr Brett O'Donnell and Dr Mei Hong Tan

12:00–13:30 **Lunch**

13:30–15:00 **CONCURRENT SESSIONS**

COURSE—Management strategies for common strabismic conditions

Venue: BelleVue Ballroom 2

Chairs: A/Prof Geoffrey Lam and Dr Shanel Sharma

COURSE—Rosacea update: What you need to know from lids to optic nerve

Venue: BelleVue Ballroom 1

Chair: Dr Jo Richards

COURSE—What did I miss… that I really need to know today!

Venue: Riverside Theatre

Chair: A/Prof Constantinos Petsoglou

RANZCO PROFESSIONAL DEVELOPMENT—Business skills for doctors

Venue: Riverview 4

Chair: Dr Irene Tan

FREE PAPERS—Retina

Venue: Meeting Room 3

Chairs: Dr Sukhpal S Sandhu and Dr Graham Hay-Smtih

(Continues)

15:00–15:30	**Afternoon Tea**
15:30–17:00	**CONCURRENT SESSIONS**
	COURSE—AUSCRS SYMPOSIUM 2023: Latest advances and future of refractive cataract surgery
	Venue: Riverside Theatre
	Chair: Dr Aanchal Gupta
	COURSE—Optic disc elevation—The good, the bad and the ugly
	Venue: BelleVue Ballroom 1
	Chairs: Prof Celia Chen and Prof Helen Danesh-Meyer
	COURSE—Management of diabetic macular oedema and proliferative diabetic retinopathy in 2023
	Venue: BelleVue Ballroom 2
	Chair: Prof Paul Mitchell AO
	RANZCO PROFESSIONAL DEVELOPMENT—Why do they matter? Registries demystified – the what, why, how and where
	Venue: Riverview 4
	Chairs: Prof Lawrence Lee, Prof Mark Gillies, Dr Jennifer Arnold and Prof Nigel Morlet
	FREE PAPERS—Oculoplastic/Orbit
	Venue: Meeting Room 3
	Chairs: Dr Jenny Danks and Dr Kenneth Chan
17:00–18:00	**Film and Poster Viewing Session**
	Venue: Exhibition Hall
19:00	**Senior Fellows' Dinner**
	Venue: Hyde Perth Kitchen & Cocktails
19:30–21:30	**Alcon Hosted Evening Symposium**

MONDAY 23 OCTOBER

06:30–07:45	**ANZGS Morning Symposium**
	Prof Tina Wong
	Venue: BelleVue Ballroom 2
	Topic: Drug eluting implants: An emerging form of glaucoma treatment
	Chair: Prof Keith Martin
08:00–08:30	**DAME IDA MANN MEMORIAL LECTURE**
	Prof Kathryn P Burdon
	Venue: Riverside Theatre
	Topic: Why is my child blind? How genomics provides the answers patients and parents seek
	Chair: Prof David Mackey AO
08:30–09:00	**CATARACT UPDATE LECTURE**
	Vincenzo Maurino
	Venue: Riverside Theatre
	Topic: Challenging cataract surgery and new trends in cataract surgery
	Chair: Dr Mo Ziaei
09:00–09:30	**REFRACTIVE UPDATE LECTURE**
	Prof Dan Z Reinstein
	Venue: Riverside Theatre
	Topic: What innovations is a practice offering to be at the forefront of refractive surgery?
	Chair: Dr Season Yeung

09:30–10:00	**ROYAL AUSTRALIAN AND NEW ZEALAND COLLEGE OF OPHTHALMOLOGISTS (RANZCO) AGM**
	Venue: Riverside Theatre
10:00–10:30	**Morning Tea**
10:30–12:00	**PLENARY - CLINICAL CONTROVERSIES**
	Venue: Riverside Theatre
	Chair: Dr Amy Cohn
12:00–13:30	**Lunch**
13:30–15:00	**CONCURRENT SESSIONS**
	COURSE—When the going gets tough in cataract surgery: A video symposium of how to deal with challenges during cataract surgery
	Venue: BelleVue Ballroom 1
	Chairs: Prof Nitin Verma AM and Dr Vignesh Raja
	COURSE—Retinal imaging: The best cases from the Royal Victorian Eye and Ear Hospital Angiogram Meeting for 2023
	Venue: BelleVue Ballroom 2
	Chair: Dr Amy Cohn
	COURSE—Update of common paediatric conditions for all ophthalmologists
	Venue: Riverside Theatre
	Chairs: Dr Shanel Sharma and Dr Loren Rose
	RANZCO PROFESSIONAL DEVELOPMENT—Dr David Chang and Dr Geoff Emerson - Making our highest volume cataract/retina procedures sustainable. What can I do?
	Venue: Riverview 4
	Chair: Dr John McCoombes
	FREE PAPERS—Glaucoma/Neuro-Ophthalmology
	Venue: Meeting Room 3
	Chairs: Dr Colin Clement and Dr Steve Colley
15:00–15:30	**Afternoon Tea**
15:30–17:00	**CONCURRENT SESSIONS**
	COURSE—Angle based minimally invasive glaucoma surgery for the cataract surgeon—Which one should I use?
	Venue: BelleVue Ballroom 1
	Chairs: Dr Jason Cheng and Dr Colin Clement
	COURSE—Myopia - General and retinal management
	Venue: Riverside Theatre
	Chair: A/Prof Fred Chen
	All India Ophthalmic Society (AIOS)
	Venue: Riverview 4
	Chair: Dr Lalit Verma
	FREE PAPERS—Cataract/Cornea/Refractive
	Venue: Meeting Room 3
	Chairs: Dr Jacqueline Beltz and Dr Evan Wong
17:00	**Closing Remarks**

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Clinical & Experimental Ophthalmology WILEY

1 | RANZCO CONGRESS OPENING LECTURE, SATURDAY 21 OCTOBER 2023

Dr Craig Challen, SC, OAM

Against all odds – The story of the 2018 Tham Luang cave rescue

Synopsis:

Adventurer, cave diver, veterinary surgeon, businessman and pilot Dr Craig Challen shares his experience as a participant in the 2018 Tham Luang cave rescue, providing an inside account of the extraordinary events that unfolded, focusing on the theme of leadership in a challenging environment.

Craig delves into the crucial role of leadership during the Thai cave rescue, highlighting the vital lessons that can be applied to a variety of contexts, including the medical field. Drawing from his experiences, he emphasises the significance of effective communication, fostering trust within teams and making tough decisions under extreme pressure. Craig underscores the importance of adaptability, resilience, and maintaining a calm and composed demeanour in demanding circumstances.

The challenges encountered during the cave rescue will be connected to those faced by medical professionals by exploring the critical decision-making processes involved in both scenarios, emphasising the need for thorough evaluation, quick thinking and the ability to mitigate risks effectively. Craig shares valuable insights on maintaining focus, managing stress and making calculated choices when lives hang in the balance.

The story of the Tham Luang rescue highlights the universal nature of leadership skills and risk assessment strategies, contributing to a deeper understanding by attendees of the complexities inherent in their daily work and inspiring them to apply the lessons to their own professional challenges. The captivating narrative and practical takeaways make this talk a powerful source of inspiration and guidance for professionals seeking to enhance their leadership capabilities and risk assessment skills, particularly surgeons who face high-stakes situations and engage in risk management during complex procedures.

Brief Curriculum Vitae:

Dr Craig Challen SC OAM is an Australian cave diver, notable for his efforts in saving a soccer team of 12 boys and their coach in the 2018 Thai cave rescue.

As one of Australia's leading technical divers, Craig is a member of the Wet Mules, a diving group that takes on some of the world's deepest underwater caves. After commencing cave diving in the 1990s, he was an early adopter of closed-circuit mixed gas rebreathers.

Craig's notable explorations include the extension of Cocklebiddy Cave on the Nullarbor Plain of Australia in 2008 and the Pearse Resurgence in New Zealand over the last 10 years. He has additionally explored caves throughout Australia, New Zealand, China, Thailand, Vanuatu and the Cook Islands.

Craig also has an avid interest in shipwreck diving and has explored sites over the last 15 years in the South China Sea, Solomon Islands, Australia, New Zealand, Thailand, Malaysia and Indonesia.

In 2018, Dr Challen, alongside his diving partner Dr Richard 'Harry' Harris, were invited to assist in the rescue operation of a Thai soccer team trapped Thailand's deep Tham Luang Cave, in a story that gripped the world. The pair worked 14–16 hour days making trips into the cave on a daily basis, working cooperatively to ensure the safe evacuation from the cave for everyone. Craig's expertise and experience in diving saw him help to de-kit the boys of their diving equipment after escaping the first flooded section of the evacuation route, carry them to the next section and prepare them for the next dive.

His unwavering and selfless bravery following the successful rescue of the trapped soccer team saw him be awarded the Star of Courage. In 2019, Dr Craig Challen and Dr Richard Harris SC OAM were named as the first dual Australians of the Year for their heroic efforts and "service to the international community".

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2 | COUNCIL LECTURE, SATURDAY 21 OCTOBER 2023

Dr Jennifer Arnold, MBBS, FRANZCO

Way points on the journey of a clinical researcher: Where were we then, where we are now, where we are going

Synopsis:

In this Council Lecture I will illustrate how clinical research can be combined within an everyday ophthalmic practice to round out a rewarding professional life, describing research of varying methodologies in which I have been involved at all stages of my professional career. I will discuss several examples that exemplify the gradual evolution of knowledge that is incorporated into and modifies our patient management, as well as pointing to developments and improvements in the future. These examples include: reticular pseudodrusen, macular neovascularisation multimodal imaging and classification, photodynamic therapy, refinements in management of neovascular age-related macular degeneration from clinical trials to clinical practice through real world evidence.

Brief Curriculum Vitae:

Dr Jennifer Arnold is a Sydney based medical retinal specialist and researcher. Trained at the Sydney Eye Hospital followed by a medical retinal fellowship in Paris under Professors Gabriel Coscas and Gisele Soubrane, she worked as a consultant in Aberdeen Scotland for five years before returning to Sydney to take up practice at Marsden Eye Specialists.

Working many years with John and Shirley Sarks set the foundation for an ongoing focus in age-related macular degeneration, which remains one of her main interests along with retino-vascular diseases.

As well as pursuing full time clinical practice, Jennifer maintains a strong involvement in clinical research resulting in over 80 publications: she runs a dynamic clinical research department and has been principal investigator in over 70 international clinical trials of new treatments for a range of retinal conditions. She is additionally active in the analysis of real world outcomes for the management of retinal diseases as a researcher and committee member of the Fight Retinal Blindness! Project.

She is widely consulted for local and international advisory boards, research planning and supervising committees, grant application and assessment committees and has recently joined as Medical Advisor to the Vienna-based RetinSight which translates AI programs into retinal clinical practice. Jennifer is the immediate past chair of the Australian New Zealand Society of Retinal Specialists and is a member of the Macula Society.

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3 | SIR NORMAN GREGG LECTURE, SATURDAY 21 OCTOBER 2023

Dr Shigeru Kinoshita, MD, PhD

Toward corneal regenerative medicine

Synopsis:

Devastating ocular surface and cornea-related disorders, such as Stevens-Johnson syndrome, chemical injury, Fuchs endothelial corneal dystrophy and severe corneal endothelial failures, are very difficult to treat properly. Several types of transplantable cultivated mucosal epithelial sheets have been developed thanks to state-of-the-art corneal regenerative medicine and the latest advancements in ocular surface biology. The first is the allogeneic/autologous corneal epithelial stem-cell sheet, the second is the autologous oral mucosal epithelial sheet and the third is the induced pluripotent stem-cell derived corneal epithelial sheet. Some of them have been officially approved by the European Medicines Agency and the Pharmaceuticals and Medical Devices Agency for clinical use.

A similar corneal regenerative medicine can be applied to treat corneal endothelial dysfunction. For example, a surgical modality using novel cultured human corneal endothelial cells (CHCEC), which is the injection of CHCEC with Rho-associated protein kinase (ROCK) inhibitor into the anterior chamber, has now shown promise in clinical efficacy. Another aspect of our cutting-edge translational research is focused on developing a novel medical treatment for the early-phase corneal endothelial disease. To that end, ROCK-inhibitor eye drops have proved effective in treating partial endothelial dysfunction.

It is our great hope that cornea-related translational research, such as that described above, will receive official governmental approval based on the accumulated data on the safety and efficacy aspects of the procedures, thus ultimately resulting in the worldwide prevention of blindness.

Brief Curriculum Vitae:

Dr Shigeru Kinoshita, a clinician scientist, graduated from Osaka University Medical School in 1974 and has

served as the Professor and Chair of Ophthalmology at Kyoto Prefectural University of Medicine since 1992. Because of his stepping down from the Chair of Ophthalmology in March 2015, he was elected the Professor and Chair of Frontier Medical Science and Technology for Ophthalmology at Kyoto Prefectural University of Medicine in April 2015. He has been continuously working as a distinguished clinician scientist.

In the early 1980s at Harvard Medical School, he, in collaboration with Dr Richard A. Thoft, established the concept of centripetal movement of corneal epithelium, and his groundbreaking work has shed new light on the importance of limbal epithelium. His series of findings has had an enormous impact on this subject and has afforded much insight, ultimately contributing to the development of the corneal stem cell theory set forth by Tuen-Tien Sun. Based on these concepts, Dr Kinoshita developed a new surgical procedure for in vivo corneal epithelial transplantation that has led to epithelial stem cell transplantation for ocular surface rehabilitation. Over the past 40 years, his primary interest has been focused on the translational research of new therapeutic modalities for severe corneal diseases. Following this path, his group has established the rational design and technologies of cultivated mucosal epithelial stem cell transplantation for severe ocular surface disorders such as Stevens-Johnson syndrome and chemical injury, and CHCEC injection therapy for corneal endothelial dysfunction. His group also proved the clinical efficacy of ROCK-inhibitor topical application for partial corneal endothelial dysfunction.

Dr Kinoshita is a recipient of the 1999 Alcon Research Institute Award, the 2008 Castroviejo Medal Lecturer of the Cornea Society, the 2009 ARVO Gold Fellow, the 2010 Claes H. Dohlman Conference Address of the TFOS, the 2010 Meibom Lecturer in Germany, the Doyne Memorial Lecturer of the 2011 Oxford Ophthalmological Congress in United Kingdom, the 2011 Elsemay Bjorn Lecture in Finland, Schepens Eye Research Institute Alumnus Awardee 2011, the Peter Herberg Lecture at IMCLC2012, the Richard Lindstrom Lecture, CLAO, ASCRS 2014, Charles D. Kelman Innovator Award, ASCRS 2015, the Friedenwal Award Lecturer at the ARVO 2016, The Coster Lecture at the Australian and New Zealand Cornea Society 2017, and David Easty Lecture at the Bowman's Club 2017. He served as an Association for Research in Vision and Ophthalmology (ARVO) Program Committee Member in the Cornea Section between 1996 and 1999, the ARVO Trustee of the Cornea Section between 2006 and 2011, and the ARVO Vice President in 2010–2011.

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4 | GLAUCOMA UPDATE LECTURE, SATURDAY 21 OCTOBER 2023

Prof Tina Wong, MBBS, FRCS(Ed), FRCOphth, FAMS, PhD(Lond)

Making blebs beautiful again: Insights into collagen remodelling and the future direction of anti-fibrotic strategies

Synopsis:

Surgical options have long been historically reserved for patients with either advanced stages of the disease and/or ineffective intraocular pressure (IOP) control with medications or laser associated with signs of progressive loss of vision. Trabeculectomy surgery is a highly effective operation in lowering the IOP but can have risks of failure, mainly from the wound healing response and scarring, as well as a lifetime risk of blindness as a result of mitomycin C being prescribed as the gold standard of care since the late 1980s. While over the past four decades we have witnessed tremendous improvements in surgical techniques, as well as more recently, the emergence of minimally invasive devices further adding to our surgical armamentarium, the anti-fibrotic management in bleb forming glaucoma surgeries have largely remained stagnant and unchanged. With the increasing life span in the world population and greater accessibility to surgery at earlier stages of disease, we are witnessing a significant increase in the number of patients undergoing surgery. For most countries, bleb forming surgeries remain an important surgical option for achieving target IOPs of low teens to single digits. Unpredictable scarring is a serious complication that hampers success in achieving the goal of long-term IOP control. Finding an alternative to mitomycin C remains elusive and drives continued efforts interrogating the biological processes fuelling this obstacle. In this lecture, new emerging concepts and ongoing research directions will be discussed that are striving to deliver safer anti-scarring strategies.

Brief Curriculum Vitae:

Head of the Glaucoma Service and Senior Consultant at the Singapore National Eye Centre, Director of Clinical Translational Research and Head of the Ocular Therapeutics and Drug Delivery Group at the Singapore Eye Research Institute and Professor at Duke-NUS Graduate Medical School. Professor Wong is the founding President of the Glaucoma Association Singapore. She is the Executive Director of the National Health Innovation Centre supporting healthcare innovation and enterprise in Singapore.

Professor Wong's research focuses on the development of new therapeutics to improve surgical and clinical outcomes. She is an internationally renowned glaucoma specialist, with an interest in ocular wound healing and post glaucoma surgery management. She leads an interdisciplinary research program on translational and clinical research on ocular wound healing and drug delivery.

Professor Wong's research has improved the understanding of the burden and risk factors that affect the surgical outcomes of glaucoma surgery. She has developed two sustained drug delivery therapies, reaching clinical trials for the medical treatment of glaucoma and cataract surgery. She holds 10 patents to her name and is a co-founder of two spin off biotech companies that have attracted several millions of dollars of private investment. Professor Wong is a strong advocate for translating innovative research to healthcare solutions that will directly improve quality and access to care.

Professor Wong is a scientific thought leader in the field of wound healing in glaucoma surgery and ocular drug delivery, having published widely in these areas, with a Google scholar H-index of 42. She has nationally funded research grants amounting to SG$25 M. She has received national and international awards for her contribution to the field of glaucoma surgical wound healing and ocular drug delivery. Of notable mention, Professor Wong was awarded the President's Science and Technology Award in Singapore in 2014. This award is the country's highest honour bestowed on exceptional research scientists and engineers in Singapore for their excellent achievements in science and technology. These national awards are given annually to recognise and celebrate outstanding and invaluable contributions by individuals or teams to the research and development landscape in Singapore. This research was recognised as one of the top 50 significant developments in Singapore in past 50 years in the same year.

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5 | RETINA UPDATE LECTURE, SATURDAY 21 OCTOBER 2023

A/Prof Fred Chen, MBBS(Hons), PhD(London), FRANZCO

Deep phenotyping, pitfalls in pivotal trials and precision genetics

Synopsis:

Multimodal retinal imaging is now the standard of care for retinal diagnostics and management. Cases will be presented to illustrate the essential role multimodal imaging plays in the work-up of complex clinical scenarios. The use of artificial intelligence, through incorporating large data sets from research and clinical care settings for deep learning, is now gaining momentum. Although issues with implementation remain, potential solutions are on the horizon.

New agents for the treatment of neovascular age-related macular degeneration and geographic atrophy have now been approved by the major regulatory agencies for routine clinical care. Do we know enough, however, about the efficacy of these therapies to embrace them? Do these new treatments, lacking long term safety data, offer significant gains over our current armamentarium? For geographic atrophy, is there sufficient trial data to support the widespread use of complement inhibitors? New methods of drug delivery for age-related macular degeneration, diabetic macular oedema and macular telangiectasia type 2 will be covered.

Our surgical and medical retinal subspecialities are now being transformed by a tidal wave of rapid advances in precision medicine. Molecular diagnostics is gaining traction for accurate diagnosis and prognosis within the fields of ocular oncology and inherited retinal diseases. This technology, however, is not infallible. Understanding the pitfalls is important given the development of personalised gene therapy. This emergence of molecular medicine will be illustrated by the utility of circulating tumour DNA in the management of choroidal melanoma and the Australian led development of antisense therapy for Retinitis Pigmentosa type 11.

Brief Curriculum Vitae:

Dr Fred Chen is a vitreoretinal surgeon and clinician-researcher based in Perth. In 2010, after completing both a PhD at the University College London in retinal cell transplantation and medical and surgical retina Fellowships at Moorfields Eye Hospital, Dr Chen returned to Perth to establish the Ocular Tissue Engineering Laboratory at the Lions Eye Institute to further the investigation of stem cell therapy and inherited retinal diseases.

Dr Chen is also an active principal investigator in ophthalmic clinical trials of novel retinal therapies and systemic drug toxicity, his clinical interest being the natural history of genetic eye diseases and clinical trial endpoints. His laboratory examines variants of uncertain significance, using patient-derived cell models, and also develops gene replacement and patient-customised antisense therapies that alter gene splicing to treat inherited retinal diseases.

Dr Chen has been awarded numerous fellowships and research grants from the Australian National Health and Medical Research Council. He is a Fellow of the Royal Australian and New Zealand College of Ophthalmologists and has previously served on the Board of the Ophthalmic Research Institute of Australia. He is a Principal Research Fellow at the University of Western Australia and a Clinical Associate Professor at the University of Melbourne.

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6 | FRED HOLLOWS LECTURE, SUNDAY 22 OCTOBER 2023

Dr Anthony Bennett Hall, MBChB, MGenMed, FRCOpth, MD, FRANZCO

Preventing blindness from diabetes in low and middle income countries – The Diabetic Retinopathy Network

Synopsis:

The number of people with diabetes mellitus in sub-Saharan Africa is projected to increase to about 47 million by 2045. The magnitude of diabetic retinopathy (DR) will increase proportionally.

The Diabetic Retinopathy Network (DR-NET) was established in 2014 as part of the VISION 2020 LINKS program at the International Centre for Eye Health, London School of Hygiene and Tropical Medicine. This eye health partnership program partners eye units in low- and middle-income countries (LMIC) with eye units in the UK to improve the quality and quantity of eye care training and service delivery. There are now 28 DR centres in 20 LMICs, including a DR-NET LINK between RANZCO and Pacific Island programs.

The DR-NET key activities included situation analysis of partners, workshops bringing together whole eye teams including the *Ministry of Health* representative, development of two year action plans, a DR-NET toolkit to plan and implement services, whole team training visits between LINKS partners to build capacity and the development of national DR guidelines in collaboration with the *Ministry of Health*.

The Kilimanjaro Christian Medical Centre in Tanzania was one of the first LINKS programs. We established a screening program for DR using an intervention mapping approach. Key aspects of this program included a needs assessment of people living with diabetes and health care workers, a trial of DR screening methods, comic strips as motivational strategy to increase uptake of DR screening, healthcare worker education, an electronic database of people living with diabetes, implementation of mobile DR screening and program evaluation.

The Fred Hollows Foundation is leading research in innovative approaches to DR screening.

The LINKS program has proved to be a mutually beneficial way of building capacity to treat and prevent unnecessary loss of sight and blindness in LMICs. There remain enormous challenges ahead to eliminate avoidable visual impairment particularly from DR.

Brief Curriculum Vitae:

Anthony Bennett Hall was born in Lesotho in Southern Africa. He worked in Zimbabwe and Lesotho as a general medical doctor for a number of years. Anthony spent 12 years in the UK, training in general ophthalmology and retinal surgery. He joined CBM in 2000 as head of the Department of Ophthalmology at Kilimanjaro Christian Medical Centre in Tanzania. Based in Tanzania for over a decade, Anthony ran a post graduate program in ophthalmology and a fellowship program for vitreo-retinal surgeons. Anthony is on the Board of Directors of the Fred Hollows Foundation and is on the Board of Kilimanjaro Centre of Community Ophthalmology Tanzania. He was previously on the Vision 2020 Australia Board and served as Chair of RANZCO's international development committee. He represented RANZCO on the Queen Elizabeth Diamond Jubilee Trust fellowship committee. Anthony is currently a vitreo-retinal surgeon in Newcastle.

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7 | NEURO-OPHTHALMOLOGY UPDATE LECTURE, SUNDAY 22 OCTOBER 2023

Dr Neil R. Miller, MD, FACS

Neuro-ophthalmology updates: Information that will change your practice tomorrow!

Synopsis:

Recently, there have been a number of important advances in the diagnosis and management of several

neuro-ophthalmic disorders. These advances have major implications for practitioners and should change your practice if you have not changed it already! In this talk, I will discuss several of what, in my opinion, are the most important. These include advances that have changed the approach to and management of patients with acute optic neuritis. Specifically, it is no longer appropriate to offer all patients with acute optic neuritis the "option" of treatment with systemic corticosteroids. Instead, all patients except for those suspected of having an infectious etiology (e.g., tuberculosis) should be treated immediately with high-dose steroids. In addition, patients with recurrent steroid-sensitive but steroid-dependent optic neuritis require an assay for antibodies to myelin oligodendrocyte glycoprotein. With respect to idiopathic intracranial hypertension (aka primary pseudotumor cerebri), we now know that patients with this condition can tolerate up to 4 grams of acetazolamide per day and that permanent weight loss – a major objective in the successful management of such patients – can be better achieved with bariatric surgery than through weight loss clinics. It is now clear that "visual snow" is an organic disorder of perception and should be treated as such rather than as a psychological problem. Finally, molecular genetics is playing an increasingly important role in the management of children with optic pathway gliomas, so much so that targeted therapy is now both available and beneficial for such individuals.

Brief Curriculum Vitae:

Dr Neil Miller is the Frank B. Walsh Professor of Neuro-Ophthalmology and Professor of Ophthalmology, Neurology, and Neurosurgery at the Johns Hopkins University School of Medicine. He has authored over 570 articles, 93 chapters and 13 books, including the 4th edition of *Walsh and Hoyt's Clinical Neuro-Ophthalmology* and has co-edited the 5th and 6th editions of this textbook as well as four editions of an abbreviated version of the textbook *Walsh and Hoyt's Clinical Neuro-Ophthalmology: The Essentials*", the most recent of which was published in 2020.

Dr Miller also has co-authored two editions of *The Neuro-Ophthalmology Survival Guide*, a textbook designed for both physicians and students. Dr Miller has spoken at numerous local, national and international meetings and has given 62 named lectures around the world. In addition, he has been involved with many clinical trials in the field of neuro-ophthalmology. Many of Dr Miller's previous Fellows and residents hold faculty positions at major institutions throughout the United States and around the world.

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8 | DAME IDA MANN LECTURE, MONDAY 23 OCTOBER 2023

Prof Kathryn P. Burdon, BSc(Hons), PhD

Why is my child blind? How genomics provides the answers patients and parents seek

Synopsis:

There are over 900 recognised rare eye diseases and most of them are caused by small changes to a big genome. The overarching goal of my research program is to generate the knowledge that allows us to provide accurate genetic diagnosis for rare eye disease through identifying and characterising the causative genes and genetic variants. Recent leaps forward in technological capability for interrogating the human genome have driven an explosion in new knowledge about the genes and variants that cause hundreds of rare eye diseases. In addition to discovering new genes, we have found that the genetic and molecular underpinnings of disease do not always reflect our clinical classifications, and that the genetic heterogeneity of many rare diseases is immense. Our ability to interrogate entire genomes has revolutionised both gene discovery and diagnostics but has also highlighted the challenges of interpreting genetic data in individuals, kick-starting international efforts to characterise and categorise genetic variants. This presentation will explore the benefits of genetic diagnosis for patients and families, illustrating modern approaches to gene discovery for rare eye disease and highlight important contributions Australia is making to global efforts to understand the clinical impacts of genetic variants. Advances in genomic technologies and understanding of disease-causing genes continue to increase the utility of genomic testing in the diagnosis and management of rare eye diseases.

Brief Curriculum Vitae:

Professor Kathryn Burdon began her journey in ophthalmic genetics with a PhD from University of Tasmania in 2004 on the genetics of paediatric cataract where she discovered the genetic cause of Nance-Horan Syndrome. She spent two years as a post-doctoral fellow at Wake Forest University Baptist Medical Center in

North Carolina, USA, working on complex disease genetics, primarily the cardiovascular and renal complications of diabetes mellitus. On her return to Australia in 2005 she joined the Department of Ophthalmology at Flinders University in Adelaide where she established a research group focused on the identification of genes for blinding diseases, including glaucoma, keratoconus and diabetic retinopathy, as well as continuing her work in childhood cataract.
In 2014 she returned to the University of Tasmania to join the genetics theme at the Menzies Institute for Medical Research where she is now the Theme Leader. She runs an internationally recognised ophthalmic genetics research program focused on identifying the genetic risk factors for blinding eye disease and characterising the causative genes and variants in animal and cellular models. She has skills in molecular biology, human genetics, genetic statistics and bioinformatics and collaborates broadly with ophthalmologists and geneticists around the world.

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9 | CATARACT UPDATE LECTURE, MONDAY 23 OCTOBER 2023

Mr Vincenzo Maurino, MD, BQOphth, CertLAS, RCOphth

Challenging cataract surgery and new trends in cataract surgery

Synopsis:

Cataract surgery is never to be underestimated and remains a complex eye procedure that requires experience, practice and surgical situational awareness to be successfully completed. I will discuss what is involved in my daily cataract practice and how I manage it and the latest changes to my cataract surgery.

- Complex cataract cases, especially brunescent cataract and cataract with zonulopathy, need extra and specific counselling. Detailed planning is needed to approach these cases with confidence and safety and achieve success. I will discuss and provide video examples of the approach to different challenging brunescent cataract and cataract with zonulopathy and their management.
- High volume cataract surgery and the advent of immediate sequential bilateral cataract surgery that goes alongside high-volume surgery. Immediate sequential bilateral cataract surgery is here to stay and to become the norm due to its advantages and minimal/similar risks to sequential surgery.
- Cataract surgery is now a viable way to achieve spectacle independence in our older patients with the latest extended depth of focus) intraocular lens (IOL) causing minimal visual side effects compared with previous generation multifocal diffractive IOL.

IOL implants are not risk free and some IOL have recently been plagued by problems, with severe IOL mineralisation causing complete IOL opacification. I will show how to tackle these cases and the technique used to enable “in the bag” or sulcus IOL exchange and enhance patient's safety and outcome.

Brief Curriculum Vitae:
Dr Vincenzo Maurino is an Italian-British ophthalmologist who is Consultant Ophthalmologist and Director of the Cataract Service at Moorfields Eye Hospital in London. His special areas of interests are cataract surgery and corneal surgery as well as refractive surgery.
He graduated magna cum laude in Italy and after a four-year ophthalmology residency in Italy, he won a scholarship to move to London to further his surgical ophthalmic training. At Moorfields Eye Hospital he completed fellowships in paediatric ophthalmology, glaucoma, cataract, refractive surgery and corneal transplant surgery.
Dr Maurino's research interests lie in the fields of cataract and corneal surgery, and he has published in several peer reviewed international journals. He has been invited to lectures nationally and internationally. He served on the scientific committee of the Italian Society of Ophthalmology for longer than a decade and on the board of the International Society of Corneal, Stem Cells and Ocular Surface. He was awarded the Italian Society of Ophthalmology Medal Lecture in 2016. He received the title of Officer of the Order of The Star of Italy by Mr Sergio Mattarella, the President of Italy, in 2015. He is passionate about surgical training and has trained hundreds of eye surgeons from all over the world in cataract and corneal surgery and he regularly holds training surgical courses nationally and abroad. He has continued working in Italy as Visiting Professor of corneal surgery at the Tor Vergata University in Rome.

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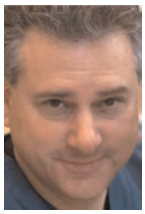
10 | REFRACTIVE UPDATE LECTURE, MONDAY 23 OCTOBER 2023

Prof Dan Z. Reinstein, MD, MA(Cantab), FRCSC, DABO, FRCOphth, FEBO



What innovations is a practice offering to be at the forefront of refractive surgery?

Synopsis:

Three major innovations have reached maturity from the forefront of refractive surgery to be generalised amongst refractive surgeons: small incision lenticule extraction (SMILE), PRESBYOND and implantable contact lens (ICL) sizing.

– SMILE, with its unique biomechanical profile, enables larger optical zones to be programmed resulting in less spherical aberration induction and hence better night vision, while better preserving corneal nerves giving less dry eye symptoms and more rapid return to normal, including contact sports. The VISUMAX 800 introduced in 2021, provides technical improvements including 3x faster lenticule cutting time (<10 s) and software control for centration and cyclotorsion optimising both the efficacy and safety of treatment.

– PRESBYOND is a corneal treatment option for presbyopia combining a micro-anisometropia with extended depth of field produced by modulation of spherical aberration. PRESBYOND enables the correction of plano presbyopia and astigmatic ametropias between −8.00D to +5.00D. This modality obviates the need for the higher risk and lower accuracy of clear lens extraction. With over 97% of the population as suitable candidates, the bilateral laser in situ keratomileusis procedure enabling a prompt return to work and daily activities with less side effects, faster adaptation time and no loss of contrast. Laser in situ keratomileusis accuracy offers improved spherical equivalent and cylinder accuracy as well as future adjustability, reversibility and an in-built extended depth of field that enables high quality optic, low posterior capsule opacification rate monofocal intraocular lenses to be used for future cataract surgery if needed, without resorting to contrast-lowering multifocal or diffractive intraocular lenses.

– ICL has significantly expanded the treatment range outside of that amenable to corneal refractive surgery. However, the challenge of ICL sizing problems requiring exchange or more serious complications is probably responsible for generally low adoption rates (excluding where marketing and social engineering leads to ICL implantation despite being excellent candidates for corneal procedures). Very high-frequency digital ultrasound (VHFDU) and the Reinstein ICL formula has produced significantly better sizing, with vault prediction improved by a factor of 3.4 compared to white-to-white and by a factor of 2.2 compared to anterior segment optical coherence tomography based sizing. By Reinstein formula 61% of eyes achieve a vault within ±100 μm and 96% within ±300 μm of predicted. Thus VHFDU sizing provides greatly improved early and long-term safety for ICL technology making it potentially an alternative to corneal refractive surgery for the general ophthalmologist that has not invested in laser technology and specialist training to perform corneal refractive surgery.

Brief Curriculum Vitae:

Professor Dan Z. Reinstein is the Founder and Medical Director of the London Vision Clinic, now part of the EuroEyes Group. Dr Reinstein is a board-certified ophthalmologist in the United States and Canada and holds professorships in the UK, New York and Paris. Since the 1990's he has dedicated himself solely to developing the specialty of refractive surgery and is now Chair of the Standards and Accreditation Committee of the World College of Refractive Surgery and Visual Science. Over the course of his career, Dr Reinstein developed and contributed the first measurements of the epithelium with mapping, developed and published extensively in the new diagnostic field of corneal layered 3D pachymetric imaging and biometry with VHFDU, later adding optical coherence tomography methodology.

He has delivered over 1000 lectures at professional meetings on five continents and published over 200 articles in peer-reviewed medical journals. He is a leader in the field of therapeutic refractive surgery and founded this section for the *Journal of Refractive Surgery* where he continues as Section Editor. He has authored a definitive textbook on SMILE, contributed to 44 book chapters and published proceedings, and is extensively published in the ophthalmic press.

His work and patents related to VHFDU administered by the Center for Technology Licensing at Cornell University (Ithaca, New York) led to the commercialisation of VHFDU robotic scanning with the Insight 100 from ArcScan Inc., which together with his sizing formula is now the most accurate method of sizing the ICL. He developed PRESBYOND Laser Blended Vision, now part of the Carl Zeiss Meditec platform. He has been the lead refractive surgery consultant for Carl Zeiss Meditec since 2001, has a proprietary interest in the Insight 100 technology and consults for CSO Italia (MS39 OCT).

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Clinical & Experimental Ophthalmology WILEY

06:30 – 07:45 **Apellis Hosted Morning Symposium**

Venue: BelleVue Ballroom 1

06:30 – 07:45 **Abbvie Hosted Morning Symposium**

Venue: BelleVue Ballroom 2

08:00 – 08:05 **Welcome to Country**

Len Collard

Venue: Riverside Theatre

Chair: Dr Antony Clark

08:05 – 08:30 **CONGRESS OPENING LECTURE**

Title: Against all odds – The story of the 2018 Tham Luang cave rescue

Dr Craig Challen SC OAM

Venue: Riverside Theatre

Chair: Prof Adrian Fung

Synopsis: Adventurer, cave diver, veterinary surgeon, businessman and pilot Dr Craig Challen shares his experience as a participant in the 2018 Tham Luang cave rescue, providing an inside account of the extraordinary events that unfolded, focusing on the theme of leadership in a challenging environment.
Craig delves into the crucial role of leadership during the Thai cave rescue, highlighting the vital lessons that can be applied to a variety of contexts, including the medical field. Drawing from his experiences, he emphasises the significance of effective communication, fostering trust within teams and making tough decisions under extreme pressure. Craig underscores the importance of adaptability, resilience, and maintaining a calm and composed demeanour in demanding circumstances.
The challenges encountered during the cave rescue will be connected to those faced by medical professionals by exploring the critical decision-making processes involved in both scenarios, emphasising the need for thorough evaluation, quick thinking and the ability to mitigate risks effectively. Craig shares valuable insights on maintaining focus, managing stress and making calculated choices when lives hang in the balance.
The story of the Tham Luang rescue highlights the universal nature of leadership skills and risk assessment strategies, contributing to a deeper understanding by attendees of the complexities inherent in their daily work and inspiring them to apply the lessons to their own professional challenges. The captivating narrative and practical takeaways make this talk a powerful source of inspiration and guidance for professionals seeking to enhance their leadership capabilities and risk assessment skills, particularly surgeons who face high-stakes situations and engage in risk management during complex procedures.

08:30 – 09:30 **RANZCO PLENARY**

Title: Vision 2023 Australia, Vision 2030 New Zealand and ANZEF

Venue: Riverside Theatre

Chair: Dr Grant Raymond

Speakers and Topics:
Dr Kristin Bell – *Vision2030 and beyond* – Australia
Last year, RANZCO launched the *Vision 2030 and beyond* plan to enhance equitable service provision across Australia and to develop and maintain a sustainable, well-distributed ophthalmology workforce, with the ultimate goal of eliminating avoidable blindness. The presentation focuses on stakeholder engagement and progress to date in key areas of Service Delivery, Workforce and Training, Aboriginal and Torres Strait Islander Healthcare and Preventative Healthcare.
Dr Justin Mora – *Vision2030 and beyond* – Aotearoa New Zealand
In May 2023, RANZCO launched the *Vision 2030 and beyond* plan to enhance equitable service provision across Aotearoa New Zealand and to develop and maintain a sustainable, well-distributed ophthalmology workforce, with the ultimate

goal of eliminating avoidable blindness. The presentation focuses on stakeholder engagement and progress to date in key areas of Service Delivery, Workforce and Training, Māori and Pasifika Healthcare and Preventative Healthcare.
Dr John Kennedy – Update ANZEF
Dr John Kennedy is presenting an update on RANZCO's philanthropic arm, the Australian and New Zealand Eye Foundation (ANZEF). Key initiatives include the ANZEF grant round, programs funded in Australia, New Zealand and the Asia Pacific region, and its scholarships to grow the First Nations ophthalmology workforce.
Q&A with Prof Nitin Verma AM

09:30 – 10:00 **COUNCIL LECTURE**

Title: Way points on the journey of a clinical researcher: Where were we then, where we are now, where we are going

Dr Jennifer Arnold

Venue: Riverside Theatre

Chair: Dr Alan Luckie

Synopsis: In this Council Lecture I will illustrate how clinical research can be combined within an everyday ophthalmic practice to round out a rewarding professional life, describing research of varying methodologies in which I have been involved at all stages of my professional career. I will discuss several examples that exemplify the gradual evolution of knowledge that is incorporated into and modifies our patient management, as well as pointing to developments and improvements in the future. These examples include: reticular pseudo drusen, macular neovascularisation multimodal imaging and classification, photodynamic therapy, refinements in management of neovascular age-related macular degeneration from clinical trials to clinical practice through real world evidence.

10:00 – 10:30 **Morning Tea**

10:30 – 11:00 **SIR NORMAN GREGG LECTURE**

Title: Toward corneal regenerative medicine

Dr Shigeru Kinoshita

Venue: Riverside Theatre

Chair: Dr Andrea Ang

Synopsis: Devastating ocular surface and cornea-related disorders, such as Stevens-Johnson syndrome, chemical injury, Fuchs endothelial corneal dystrophy and severe corneal endothelial failures, are very difficult to treat properly. Several types of transplantable cultivated mucosal epithelial sheets have been developed thanks to state-of-the-art corneal regenerative medicine and the latest advancements in ocular surface biology. The first is the allogeneic/autologous corneal epithelial stem-cell sheet, the second is the autologous oral mucosal epithelial sheet and the third is the induced pluripotent stem-cell derived corneal epithelial sheet. Some of them have been officially approved by the European Medicines Agency and the Pharmaceuticals and Medical Devices Agency for clinical use.
A similar corneal regenerative medicine can be applied to treat corneal endothelial dysfunction. For example, a surgical modality using novel cultured human corneal endothelial cells, which is the injection of cultured human corneal endothelial cells with Rho-associated protein kinase inhibitor into the anterior chamber, has now shown promise in clinical efficacy. Another aspect of our cutting-edge translational research is focused on developing a novel medical treatment for the early-phase corneal endothelial disease. To that end, Rho-associated protein kinase-inhibitor eye drops have proved effective in treating partial endothelial dysfunction.
It is our great hope that cornea-related translational research, such as that described above, will receive official governmental approval based on the accumulated data on the safety and efficacy aspects of the procedures, thus ultimately resulting in the worldwide prevention of blindness.

11:00 – 11:30 **GLAUCOMA UPDATE LECTURE**

Title: Making blebs beautiful again: Insights into collagen remodelling and the future direction of anti-fibrotic strategies

Prof Tina Wong

Venue: Riverside Theatre

Chair: Prof Keith Martin

Synopsis: Surgical options have long been historically reserved for patients with either advanced stages of the disease and/or ineffective intraocular pressure (IOP) control with medications or laser associated with signs of progressive loss of vision. Trabeculectomy surgery is a highly effective operation in lowering the IOP but can have risks of failure, mainly from the wound healing response and scarring, as well as a lifetime risk of blindness as a result of mitomycin C being prescribed as the gold standard of care since the late 1980s. While over the past four decades we have witnessed tremendous improvements in surgical techniques, as well as more recently, the emergence of minimally invasive

devices further adding to our surgical armamentarium, the anti-fibrotic management in bleb forming glaucoma surgeries have largely remained stagnant and unchanged. With the increasing life span in the world population and greater accessibility to surgery at earlier stages of disease, we are witnessing a significant increase in the number of patients undergoing surgery. For most countries, bleb forming surgeries remain an important surgical option for achieving target IOPs of low teens to single digits. Unpredictable scarring is a serious complication that hampers success in achieving the goal of long-term IOP control. Finding an alternative to mitomycin C remains elusive and drives continued efforts interrogating the biological processes fuelling this obstacle. In this lecture, new emerging concepts and ongoing research directions will be discussed that are striving to deliver safer anti-scarring strategies.

11:30 – 12:00 **RETINA UPDATE LECTURE**

Title: Deep phenotyping, pitfalls in pivotal trials and precision genetics

A/Prof Fred Chen

Venue: Riverside Theatre

Chair: Dr Xavier Fagan

Synopsis: Multimodal retinal imaging is now the standard of care for retinal diagnostics and management. Cases will be presented to illustrate the essential role multimodal imaging plays in the work-up of complex clinical scenarios. The use of artificial intelligence, through incorporating large data sets from research and clinical care settings for deep learning, is now gaining momentum. Although issues with implementation remain, potential solutions are on the horizon.

New agents for the treatment of neovascular age-related macular degeneration and geographic atrophy have now been approved by the major regulatory agencies for routine clinical care. Do we know enough, however, about the efficacy of these therapies to embrace them? Do these new treatments, lacking long term safety data, offer significant gains over our current armamentarium? For geographic atrophy, is there sufficient trial data to support the widespread use of complement inhibitors? New methods of drug delivery for age-related macular degeneration, diabetic macular oedema and macular telangiectasia type 2 will be covered.

Our surgical and medical retinal subspecialities are now being transformed by a tidal wave of rapid advances in precision medicine. Molecular diagnostics is gaining traction for accurate diagnosis and prognosis within the fields of ocular oncology and inherited retinal diseases. This technology, however, is not infallible. Understanding the pitfalls is important given the development of personalised gene therapy. This emergence of molecular medicine will be illustrated by the utility of circulating tumour DNA in the management of choroidal melanoma and the Australian led development of antisense therapy for Retinitis Pigmentosa type 11.

12:00 – 13:30 **Lunch**

13:30 – 15:00 **CONCURRENT SESSIONS**

13:30 – 15:00 **COURSE -**

Neuro-ophthalmology challenges: Survival guide to diagnosing and managing neuro-ophthalmic conditions

Venue: BelleVue Ballroom 1

Chair: Prof Helen Danesh-Meyer

helendm@gmail.com

Aim: To discuss challenging cases and provide a practical approach.
Panel: Prof Helen Danesh-Meyer, Prof Celia Chen and Dr Neil Miller
Synopsis: This is an interactive course in which case-based presentations will be used to review techniques essential to diagnose neuro-ophthalmic conditions and discuss appropriate investigations and practical advice on management. Seven cases spanning basic to complex neuro-ophthalmic cases will be presented. The emphasis on working through the cases from presentation through clinical investigations and ordering appropriate tests. The course will highlight areas in which common clinical mistakes occur and how to avoid them. The course emphasises neuro-ophthalmologic emergencies and conditions that are often difficult to diagnose.

13:30 – 15:00 **COURSE -**

Uveitis bootcamp – Everything you need to know to confidently manage uveitis as a comprehensive ophthalmologist

Venue: Riverside Theatre

Chair: Dr Thomas Campbell

thomasgordoncampbell@gmail.com

Aim: This course is intended to help non-uveitis specialists confidently assess, investigate and manage uveitis. Clinicians will learn how to efficiently investigate uveitis, how to escalate therapy, how to manage cataracts and glaucoma in the setting of uveitis, and how to safely identify sight and life threatening causes of uveitis.
Panel: Dr Thomas Campbell, Dr Anthony Hall, Dr Richard Stawell

Speakers and Topics:
A/Prof Lyndell Lim – What investigations should be done for my patient with uveitis?
Dr Noor Ali – My patient needs more than just drops – What do I do now?
Dr Rachael Niederer – My uveitis patient has cataracts – What extra should I do in uveitic cataract surgery?
Dr Xia Ni – My uveitis patient is developing glaucoma – What do I do now?
Dr Robyn Troutbeck – How do I know if my patient has sight-threatening uveitis?

13:30 – 15:00 **COURSE**

Presbyopia unlocked: Why do we have to bother?

Venue: BelleVue Ballroom 2

Chair: Dr Smita Agarwal

smitaagarwal@hotmail.com

Aim: The aim is to discuss key points in the day-to-day management of presbyopia for general ophthalmologists relevant to all those who see presbyopic patients wanting cataract surgery or independence from glasses. The speakers will be discussing: Why is presbyopia important?; Why do we need to inform our patients undergoing cataract surgery about various options available whether public or privately insured?; Pros and cons of various options?; How to safely choose from various options and what will be most relevant for whom?; Watchouts for corneal and lenticular options. Each speaker will give their five pearls to the audience regarding surgery optimisation and patient selection.
Synopsis: Presbyopia is a common inevitable condition with increasing prevalence due to growing population with increasing life expectancy. There have been significant developments in the management of presbyopia over the last few years, with relatively satisfactory outcomes. Each one has its own pros and cons and there is no formula to find the right fit! Experience over the years managing presbyopic patients does help. Uncorrected presbyopia can significantly affect patients daily activities and impact negatively on quality of life and productivity. Offering presbyopia solutions to each individual is becoming a necessity rather than a lifestyle choice. We have a great panel of experienced surgeons treating presbyopia with various options and will be discussing in depth as to how they manage their patients in their clinics. What are the things that we need to look for? Why is it important to make patients aware of each option in their age group? Each one will present how they discuss various options with different patients whether in a public or private setting. What are the pearls for general ophthalmologists who would like to start safe presbyopia management in their practice?
Panel: Dr Tanya Trinh, Dr Alison Chiu, Dr Ben Lahood, Dr Chameen Samarawickrama, Dr Jacquie Beltz, Prof Dan Reinstein and Dr Smita Agarwal
Speakers and Topics:
Dr Tanya Trinh – Presbyopia: Why is it important?
Dr Jacqueline Beltz – Various treatment options available
Dr Alison Chiu – How do we discuss options in private setting? Pros and cons of each
Dr Chameen Samarawickrama – Should we be discussing options with our uninsured patients in public or private setting? Pros and cons of each option
Dr Ben Lahood – Lenticular options: How do we choose and watch outs?
Dr Smita Agarwal – Corneal options: How do we choose and watch outs?
Prof Dan Reinstein – What are the redlines for corneal and lens treatment options for presbyopia?

13:30 – 15:00 **RANZCO PROFESSIONAL DEVELOPMENT**

Title: Keeping your surgical edge – honing your surgical skills through coaching and simulation

A two-part course exploring the role of surgical coaching in cataract surgery and the role of simulators in improving surgical performance and as an aid to those returning to practice after a break.
Speakers and Topics:
Prof Nigel Morlet – Surgical coaching
Dr Vignesh Raja and Dr Rahul Chakrabarti – Surgical simulator

Venue: Riverview 4

Chairs: Dr John McCoombes and Prof Nigel Morlet

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13:30 – 15:00 **FREE PAPERS - Epidemiology/Genetics**

Venue: Meeting Room 3

Chairs: Prof Alex Hewitt and A/Prof Andrea Vincent

Ocular adverse events after influenza vaccination in older adults: self-controlled case series

Yohei Hashimoto[1], Masao Iwagami[2], Hayato Yamana[3], Sachiko Ono[4], Yoshinori Takeuchi[5], Nobuaki Michihata[6], Kohei Uemura[7], Makoto Aihara[8], Hideo Yasunaga[9]
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Purpose: Case reports have shown ocular adverse events after influenza vaccination. Thus, we investigated the risk of ocular adverse events after influenza vaccination.
Method: This self-controlled case series study used a claims database linked with vaccination records in a large city in Japan between April 2014 and September 2021. Individuals aged ≥65 years who developed ocular adverse events during their follow-up periods were included. We defined the exposure as influenza vaccination and the primary outcome as at least one of the following five eye diseases: uveitis, scleritis, retinal vein occlusion, retinal artery occlusion or optic neuritis. We used conditional Poisson regression to estimate the within-subject incidence rate ratio of ocular adverse events during the risk periods (0–35 days after the vaccination) compared to the control periods.
Results: A total of 4,527 cases were eligible (median age 74 years; male 42%). The incidence rate ratio during the risk period was 1.00 (95% confidence interval 0.86–1.17). No increased risk was observed for individual components of the outcome either; the incidence rate ratio was 1.05 (0.86–1.30) for uveitis, 1.01 (0.70–1.46) for scleritis, 0.92 (0.68–1.24) for retinal vein occlusion, 0.76 (0.31–1.87) for retinal artery occlusion and 0.65 (0.27–1.58) for optic neuritis.
Conclusion: The present self-controlled case series study showed no apparent increase in the risk of ocular adverse events after influenza vaccination in older adults. These results would mitigate concerns of older adults who may hesitate to receive influenza vaccination for fear of ocular adverse events.

The genetic and environmental contributions to myopia progression during young adulthood

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Purpose: We previously reported that myopia progression continues into young adulthood. This study explores the environmental and genetic risk factors for myopia progression during the third decade of life.
Methods: A total of 624 young adults had cycloplegic autorefraction and ocular biometry measurements at 20 (baseline) and 28 (follow-up) years old. Participants were genotyped and their polygenic scores (PGS) for refractive error were calculated. Self-reported screentime at 20–28 years were collected prospectively and longitudinal trajectories for screentime were generated. Sun exposure was quantified using conjunctival ultraviolet autofluorescence (CUVAF) area.
Results: Median myopia progression and axial elongation were -0.023D/year and +0.01mm/year, respectively. Female sex, parental myopia, screentime and PGS, but not CUVAF, were significantly associated with myopia progression and axial elongation. Four groups of screentime trajectory were found: "consistently-low" (n = 148), "consistently-moderate-high" (n = 250), "consistently-high" (n = 76) and "increasing low-to-high" (n = 150). Myopia progression and axial elongation were faster in those with "consistently-high" or "consistently-moderate-high" screentime compared to "consistently-low" ($p \leq 0.024$). For each z-score increase in PGS, myopia progression and axial elongation increased by -0.008D/year ($p = 0.039$) and 0.005 mm/year ($p < 0.001$), respectively. Screentime and PGS accounted for 1.7% and 0.6% of the variance in myopia progression, and 1.0% and 2.5% in axial elongation. The interaction effect between PGS and CUVAF or screentime was not significant ($p \geq 0.35$).

Conclusion: Myopia progressing during early adulthood is faster with higher levels of screentime or genetic predisposition, but there was no genetic–environment interaction effect.

Environmental impact of intravitreal injections in Queensland: Opportunities for sustainable healthcare

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Purpose: To evaluate the environmental impact of delivering the public intravitreal injection (IVI) service and provide support for policies in an environmental, economic and social context. Southeast Queensland is home to 3,800,000 people and only represents 73% of the total Queensland population. The Royal Brisbane and Women's Hospital, Princess Alexandra Hospital, Gold Coast University Hospital and the Caloundra Hospital are local to Southeast Queensland and these centers provide the public ophthalmology service for the geographically dispersed population of Queensland.
Methods: A two-year retrospective study of all patients receiving IVIs in Southeast Queensland was compiled to characterise the service requirements and quantify waste. Operating procedures were examined to describe disposal methods, identify recyclable or potentially reusable components, and identify unnecessary redundancy. Additionally, distance travelled by patients over a representative three-month period was performed to estimate the potential carbon emissions for different modalities of travel available to each locale.
Results: A total of 39,036 public IVIs were performed during 2020 and 2021, resulting in approximately 5.3 tonnes of consumables, including procedure packs, needles and gloves. The analysis of standard operating procedures identified opportunities to reduce waste and promote more sustainable practices. The study also estimated the potential carbon emissions associated with patient travel and highlighted the environmental impact of the IVI service.
Conclusion: This study provides valuable insights into the environmental impact of the public intravitreal injection service in Southeast Queensland. The findings demonstrate the need for more sustainable practices in healthcare, particularly with regards to waste reduction and transportation.

COVID-19 and the eye – A comprehensive review

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Purpose: To provide a comprehensive review on the ocular manifestations of COVID-19 to date, including prevalence, suggested mechanisms of action and clinical red flags.
Methods: A narrative literature review was conducted in November 2022 using four electronic databases: PubMed, EMBASE, MEDLINE and Cochrane Database of Systematic Reviews. Articles were sourced by using appropriate key words and reviewed for relevance. Patient demographics, time course from infection to onset of visual symptoms, risk factors and outcomes were measured for papers that met inclusion criteria.
Results: A total of 860 articles were obtained from the literature search and 211 papers were included in the analysis based on eligibility criteria. A wide range of ocular conditions related to COVID-19 were identified: conjunctivitis (n = 94) herpetic eye disease (n = 1), episcleritis (n = 2), scleritis (n = 4), uveitis (n = 25) endogenous endophthalmitis (n = 19), glaucoma (n = 7), retinal artery and vein occlusion (n = 36), optic neuritis (n = 25), optic neuropathy (n = 14), strabismus (n = 4), retinitis (n = 3), COVID-19-retinopathy (n = 20), orbital sequelae (n = 56), amongst rarer conditions (n = 6).
Conclusions: There is an increasing body of knowledge on how COVID-19 infection affects the eye. Raising clinician awareness on the range of ocular sequelae, risk factors and the time course associated with COVID-19 infection is essential to ensure prompt diagnosis and treatment of potentially sight-threatening disease.

Impact of organism virulence on endophthalmitis outcomes

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Purpose: To determine the impact of organism virulence upon visual outcomes in endophthalmitis.

Methods: Multicenter, retrospective cohort analysis of patients with endophthalmitis. A literature review with median lethal dose (LD50) values was utilised to categorise cultured organisms into low and high virulence. Linear regression model was constructed to examine predictive variables for final visual acuity.
Results: A total of 610 eyes with endophthalmitis were included. Median visual acuity at presentation was hand movements and 20/120 at the final follow up. Severe visual loss (≤ 20/200) occurred in 237 eyes at final follow up (38.9%). The culture positive rate was 48.5% (296 eyes). Poor presenting visual acuity was associated with a positive culture (odds ratio 3.186). High virulence organisms were more likely to be found after glaucoma surgery (15 eyes, 34.9%) and vitrectomy (five eyes, 35.7%) compared to intravitreal injection (two eyes, 2.9%, $p < 0.001$). On multivariate analysis, the following were associated with poorer visual outcome: poor presenting vision ($p < 0.001$), glaucoma surgery ($p = 0.050$), trauma ($p < 0.001$), oral organism ($p = 0.001$) and high virulence organism ($p < 0.001$). Highly virulent organisms were associated with a 4.5 odds ratio of severe visual loss at final follow up ($p < 0.001$) and a 1.9 odds ratio of developing retinal detachment or requiring enucleation during the follow up period ($p = 0.028$).
Conclusion: Virulent organisms greatly increase the risk of vision loss and requiring enucleation. Poor presenting vision and positive culture with a virulent organism are hallmarks of a poor visual outcome that can be used to guide management of endophthalmitis.

Assessing the impact of COVID on diabetic retinopathy in Fiji: A five-year review

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Purpose: To evaluate the impact of COVID on the rates and severity of diabetic retinopathy (DR) in the Fijian diabetic population undergoing their first DR screening.
Methods: The rates and severity of DR in diabetic cases were analysed using Pacific Eye Institute's electronic medical records from January 2018 and December 2022. Trained technicians screened and graded diabetic patients for DR using standard fundus photography in the hospital and outreach clinics. Screened DR cases were referred to ophthalmologists for further management.
Results: Of the 6,356 new diabetic cases screened using fundus photography, 30.4% had some form of DR in at least one eye. When individual eyes were analysed, 28% had DR, with 8.6% having proliferative diabetic retinopathy (PDR). Of the 2791 new eyes with DR seen by an ophthalmologist, 25.2% had PDR, including 2.6% with advanced diabetic eye disease (significant vitreous haemorrhage, sub-hyaloid haemorrhage or tractional retinal detachment). There was a statistically significant increase in the prevalence rates of PDR among the eyes of newly screened diabetics, from 7.8% before COVID (2018–2019) to 9.9% in 2022, when normal services resumed. Similarly, the prevalence of advanced diabetic eye disease among newly diagnosed DR eyes increased significantly from 1.8% to 5.4% over the same period.
Conclusion: Diabetes eye care services need to be strengthened as the burden of sight-threatening DR has grown as a result of COVID disruptions in health services. This study also emphasises the need to explore novel DR screening techniques and technologies to address similar challenges in the future.

Estimating the economic burden of herpes zoster ophthalmicus: Findings from the Auckland Zoster Study

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Purpose: To estimate the cost burden of herpes zoster ophthalmicus (HZO) and identify factors associated with increased costs in New Zealand.
Methods: We analysed data from the Auckland Zoster Study, including 869 patients who were treated for HZO at the Greenlane Eye Clinic with a median follow-up of 6.3 years. We calculated direct costs, including inpatient, outpatient, drugs and procedures. We also examined patient demographics, clinical presentation and complications as factors influencing costs.
Results: The mean cost per patient for inpatient treatment was \$278.82 ± \$1628.79, outpatient treatment was \$2231.16 ± 3762.62, drug cost was \$113.51 ± 1288.57 and procedure cost was \$562.45 ± 2582.89. The total mean cost per patient was \$3185.95 ± 6791.22. Caucasians had the highest mean cost, followed by Asians, Māori and Pacific Peoples. Patients with ocular involvement and specific complications had higher costs. An older age at onset, uveitis, optic neuropathy and the higher number of recurrences were also associated with increased treatment costs.

Conclusions: Our study provides valuable insight into the economic burden of HZO and highlights the need for an improved immunisation strategy to reduce the cost burden to New Zealand. Further research is needed to better understand the overall economic and societal burden of HZO.

The establishment of a novel diabetes retinal screening service in outer-metropolitan Sydney

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Purpose: Currently, Australian diabetic retinopathy (DR) screening is not standardised and relies on opportunistic referrals. The South Western Eye and Diabetes Deep Learning Algorithm study has developed a multicentre diabetes retinal screening service in outer-metropolitan Sydney. This report describes the service structure and examines patient satisfaction with screening.
Methods: Participants were ≥ 10 years old, had diabetes and attended one of four study sites: two Campbelltown Hospital Diabetes Clinics, Liverpool Hospital High-Risk Foot Clinic and a general practitioner clinic. Hospital-site participants underwent two-field, table-top fundus photography and ocular coherence tomography. This was performed at Campbelltown Hospital by an ophthalmic photographer and at Liverpool Hospital by a trained medical student. Tropicamide 0.5% was administered if non-mydriatic images were ungradable. General practitioner-site participants underwent non-mydriatic hand-held fundus photography. Retinal imaging was graded for DR by two consultant ophthalmologists and bulk-billed ophthalmologist referrals were arranged for those with referable DR. All participants completed questionnaires regarding satisfaction with retinal imaging, pupil dilation and convenience of same-day screening.
Results: There were 522 study participants. The prevalence of any DR, referable DR and sight-threatening DR was 33.9%, 25.1% and 12.3% respectively. 92.0% of participants reported it convenient to undergo same-day retinal imaging and 96.5% would undergo imaging again. Of the 435 (84.6%) participants who required tropicamide eyedrops, only 10.1% found it uncomfortable. Approximately 70% of those with sight-threatening DR complied with follow-up with bulk-billing ophthalmologists.
Conclusion: With Australia moving towards standardised DR screening, this service demonstrates an effective model of retinal screening that has been well-accepted across various healthcare settings.

Characterisation of splicing defects associated with disease-causing USH2A variants using patient-derived dermal fibroblasts

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Purpose: Biallelic pathogenic variants in the USH2A gene can cause Usher syndrome type 2A (USH2A) or a non-syndromic autosomal recessive retinitis pigmentosa. This project aims to identify and characterise USH2A splicing variants using patient-derived cells.
Methods: Dermal fibroblasts were propagated from skin biopsies from 11 patients with USH2A-associated retinopathy, including eight Usher and three autosomal recessive retinitis pigmentosa cases. Pre-mRNA splicing of 10 USH2A variants (four missense, three indel, one nonsense, one synonymous and one splice site variants) was analysed in the fibroblasts using reverse transcriptase polymerase chain reaction. Fibroblasts derived from a patient with compound heterozygous USH2A mutations, one in exon 6 (c.949C>A) and the other in exon 7 (c.1256G>T), were reprogrammed to induced pluripotent stem cells and then differentiated into retinal organoids before assessing the USH2A transcripts.
Results: Fibroblasts expressed USH2A transcripts that contained only exons 26–72. A c.9258+1G>A variant abolished the natural exon 46 splice donor site, deleting the last 153 nucleotides of exon 46 from the mature transcript, and the c.949C>A synonymous variation

activated a cryptic donor site in exon 6, omitting 193 nucleotides from the mature transcript. Splicing defects were not detected in the other eight variants tested in fibroblasts.

Conclusions: Two USH2A variants associated with cryptic splicing were identified. Patient-derived fibroblasts are useful for identification of USH2A splice variants located within exons 26–72. Identification of USH2A variants associated with cryptic splicing provides opportunities to better understand pathogenic mechanisms and therapeutic interventions such as antisense oligonucleotide-mediated splice switching.

Non-linear reduction of the hyperautofluorescent ring in a retinitis pigmentosa cohort

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Purpose: Reduction in the auto fluorescent (AF) ring area is the hall mark of disease progression in retinitis pigmentosa (RP). We investigate the linearity of ring contraction in a large cohort of RP patients.

Method: In 77 patients with RP clinical diagnosis, AF rings from short wavelength AF (SWAF) modality (Heidelberg Spectralis) were segmented with ring area, horizontal extent and natural logarithm of the ring area (ln [area]) extracted for each image. In each eye, linear regression against time was conducted for each of the three parameters and the slopes summarised. Goodness of fit in each linear model was assessed with R2. Linear mixed-effects modelling accounted for inter-eye correlation

Results: A total of 139 eyes was analysed (mean baseline age 35.4 years, mean follow-up period 3.8 years). The mean (95% confidence interval) progression rate for ring area, horizontal extent, ln[area] were -0.57 (-0.74 to -0.41) mm^2/year, -0.12 (-0.15 to -0.09) mm/year and -0.07 (-0.08 to -0.06 ln(mm^2)/year, respectively. After reversal of ln[area] transformation, ring area decrease was estimated 6.80% per year. Ranking R2 by the total change in ring area, the top quartile showed significantly higher R2 when using ln[area] as dependent variable than area and horizontal extent. This suggests a non-linear ring contraction for eyes with larger change in ring dimension.

Conclusion: The progression rates reported can serve as comparison data in future clinical trials. Our data suggest that natural history of AF ring contraction in RP was better modelled nonlinearly and may influence the choice of RP clinical trials endpoint.

Intronic tandem repeat expansion in TMCO1 is associated with open angle glaucoma severity

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Purpose: Glaucoma is one of the most heritable human diseases, with variants in TMCO1 among the earliest and strongest common genetic risk factors known. Recently, this risk has been attributed to the expansion of a neighbouring 28bp variable number tandem repeat (VNTR) in an intron of TMCO1. We sought to understand the clinical impact of TMCO1 VNTR expansion length in an Australian glaucoma registry.

Method: A total of 3,123 participants with open angle glaucoma from the Australian and New Zealand Registry for Advanced Glaucoma were genotyped at two variants associated with TMCO1 VNTR expansions of increasing lengths. In a subset of individuals, repeat lengths were also measured by a targeted PCR-based assay or by long-read sequencing. For comparison, we also identified individuals heterozygous for the MYOC p.Gln368Ter variant.

Results: Increased TMCO1 VNTR length was associated in a dose-dependent manner with a younger age at glaucoma diagnosis, higher prevalence of high-tension glaucoma, higher intraocular pressure and a higher likelihood of glaucoma family history. The clinical phenotype of individuals with the longest TMCO1 repeat expansions was similar to that of MYOC p.Gln368Ter heterozygotes, although at a 3.5 times higher frequency in the general population.

Conclusion: TMCO1 VNTR expansions represent a new class of genetic risk variant in glaucoma, and are associated with increasingly severe glaucoma diagnosed at a progressively younger age. The molecular mechanism by which these expansions increase glaucoma risk remains to be determined.

15:00 – 15:30 **Afternoon Tea**

15:30 – 17:00 **CONCURRENT SESSIONS**

15:30 – 17:00 **COURSE -**

Paediatric oculoplastic surgery – An update for all ophthalmologists

Aim: Outline common and important oculoplastic conditions seen in children and give an update on their management. The presentations will be case based and interactive, with audience participation encouraged.
Speakers and Topics:
Dr James Slattery – What is that lesion? – differentiating common adnexal lesions
Dr Krishna Tumuluri – Congenital ptosis – overview and updates on surgical management
A/Prof William Katowitz – Congenital nasolacrimal duct obstruction – overview and updates on surgical management
Dr Thomas Hardy – Orbital cellulitis – evidence based management
Dr Olivia MacVie/Dr Anne Halbert – Vascular lesions management
Prof Timothy Sullivan – Paediatric orbital tumours – overview and updates in management
Dr Hugo Lee and Dr Blanche Lim – Interesting cases and panel discussion

Venue: Meeting Room 6

Chairs: Dr Krishna Tumuluri and Dr Thomas Hardy

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15:30 – 17:00 **COURSE -**

Intraocular lens calculations: A subspecialists' perspective

Aim: Intraocular lens (IOL) calculations in patients with ocular co-morbidities pose a challenge for surgeons. The aim of this course is to discuss ways to optimise the refractive outcomes in patients with corneal disease, glaucoma and vitreo-retinal disorders.
Objectives:
1. Revise the different biometers and intraocular lens formulae.
2. Discuss IOL calculations in patients with ocular co-morbidities.
3. Discuss methods to correct residual refractive errors following surgery.
Topics and Speakers:
Dr Jack Kane – Biometers and IOL formulae
A review of biometers and IOL formulae.
Dr Vignesh Raja – IOL calculations and vitreo-retinal surgery
IOL calculations in patients with silicone oil, undergoing scleral-fixated IOL surgery, or combined vitreo-retinal surgery.
Dr Judy Ku – IOL calculations and glaucoma surgery
IOL calculations in glaucoma patients – in the nanophthalmic eye and in patients undergoing glaucoma filtration surgery.
A/Prof Elaine Chong – IOL calculations and corneal disease
IOL calculations in patients with irregular corneas, such as in the presence of corneal scars, corneal transplants or keratoconus.
Dr Vincenzo Maurino – Intra-operative complications – changing the plans
Dr Mo Ziaei – Correcting refractive errors.
Cornea- based and IOL approaches to correcting refractive errors.
Dr Elsie Chan – Case presentations
Cases will be presented and discussed with the audience and the panel in an interactive format.

Venue: BelleVue Ballroom 2

Chair: Dr Elsie Chan

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15:30 – 17:00 **COURSE -**

ANZGS symposium and audit – Controversies in glaucoma

Aim: Glaucoma management is fraught with controversies. Patients often present late before more definitive treatment such as filtering surgery is performed. Why weren't they referred sooner? Drops traditionally were first-line treatment, however the LiGHT trial has shown SLT can be more efficacious... or has it? Which patients need laser vs the ones that need lens removal? MIGS has become standard practice for glaucoma patients having cataract surgery. Are patients really benefitting from the procedure or is it no better than cataract surgery alone? Which patients do better with a trabeculectomy rather than a tube? Glaucoma management is fraught with controversies.

The aim of this symposium is to learn the approach to glaucoma management from experts in the field.
Speakers and Topics:
1. Dr Jennifer Fan Gaskin – When do I refer to a glaucoma subspecialist & Audit CPD Cat 3 - Measuring Outcomes 12.5 points
2. A/Prof Simon Skalicky - Primary drops vs SLT
3. Dr David Manning - PI vs cataract surgery for chronic angle closure glaucoma
4. A/Prof George Kong - MIGS vs no MIGS for glaucoma patients having cataract surgery
5. A/Prof Paul Healey - Trabeculectomy vs tube

Venue: Riverside Theatre

Chair: Prof Graham Lee

Co-chairs: Prof Tina Wong, Prof Keith Martin, Prof Helen Danesh-Meyer

mdglee@hotmail.com

15:30 – 17:00 **COURSE -**

Telehealth around the world – What works now and what's the 2030 horizon?

Aim: Telehealth has evolved over the last two decades in many pilot projects and modalities. 2020 saw mainstream adoption across health jurisdictions and disciplines. This course will examine the teleophthalmology systems comparing the patient end assessment with assistance from technicians, nurses, home-based and optometrists. AI-enabled vs. human diagnosis as well synchronous vs. asynchronous systems will be debated from India, Australia, Singapore and the UK with and examination of funding models for sustainability.
Speakers and Topics:
A/Prof Angus Turner – Introduction and debate
There will be a 45 minute debate-style featuring an affirmative individual or team from four countries promoting four different modalities.
Dr Rodney Morris and Narendran Venkatapathy – Technician supported vision centres and the "RetCam Shuttle"
Prof Robyn Guymer – Home-based
Dr Mark Chia and Dr Yachana Shah – Optometry-facilitated
Each speaker will address: Where are we in 2023 and what actually works? How are the models funded?
Public open floor discussion
A/Prof Daniel Ting and Prof Pearse Keane – How is AI going to change telehealth by 2030? – global perspectives from Singapore and UK?

Venue: Riverview 4

Chair: A/Prof Angus Turner

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15:30 – 17:00 **FREE PAPERS - Uveitis / Oncology / Paediatrics / Strabismus**

Venue: Meeting Room 3

Chairs: Prof Justine Smith and Dr Caroline Catt

Herpes zoster ophthalmicus recurrence: Implications for treatment and monitoring

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Purpose: The purpose of this study was to examine risk factors and frequency of recurrences in patients with herpes zoster ophthalmicus (HZO).

Method: All subjects with acute HZO from the Auckland Zoster study seen between 2006 to 2016 were included. The primary outcome measure was disease recurrence. Secondary outcome measures include complications and vision loss.

Results: This study reviewed 869 patients with HZO over a median follow-up time of 6.3 years. A total of 551 recurrences were observed, with at least one recurrence seen in 200 subjects (23.0%). Uveitis was the most common form of recurrence (34.8% of cases). The median time to first recurrence was 3.5 months. Moderate vision loss (≤ 20/50) occurred in 15.5%, 28.6%, 31.4%, 50.0% and 57.4% of eyes with zero, one, two, three and

four or more recurrences respectively. Predictors of HZO recurrence included immunosuppression ($p = 0.026$), higher presenting intraocular pressure ($p = 0.001$), corneal involvement ($p = 0.001$) and uveitis ($p < 0.001$) on multi-variate analysis. Topical steroids were initiated in the first month of presentation for 437 subjects, and recurrence observed in 184 (42.1%) of these subjects. In patients who ceased topical steroid, recurrence occurred after a median time of 1.4 months, with 90% of cases by seven months.

Conclusion: Recurrence of HZO is common, with an increased risk of vision loss with more recurrences. These findings indicate the need for close monitoring for potential recurrences, especially after cessation of topical steroid treatment, and in those with identified risk factors for recurrence.

Clinical presentation and long-term outcomes of patients with occlusive retinal vasculitis

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Purpose: To describe the clinical presentation and long term outcomes of patients with occlusive retinal vasculitis.

Methods: We reviewed 141 consecutive eyes (96 patients) presenting with occlusive retinal vasculitis to Greenlane eye clinic, Auckland between 2000 to 2021. Ultra-wide-field fluorescein angiography images were obtained to quantify the area of nonperfusion, which represented the ischaemic index.

Results: Median age at diagnosis was 41.0 years and 81 (57.4%) were female. Diagnosis was tuberculosis in 31 eyes (22.0%), idiopathic in 26 eyes (18.4%), sarcoid in 13 eyes (9.2%), systemic lupus erythematosus in 10 eyes (7.1%), Behcet's disease in 20 eyes (14.2%), toxoplasmosis in six eyes (4.3%), Bartonella in three eyes (2.1%) and CMV retinitis in four eyes (4.3%). Systemic immunosuppression was required for 69 (48.9%) and panretinal photocoagulation in 54 eyes (38.3%). Complications occurred in 89 eyes (62.9%) and included vitreous haemorrhage in 19 eyes (13.4%), neovascularisation iris seven eyes (5.0%), epiretinal membrane 36 eyes (25.5%), retinal detachment nine eyes (6.4%) and uveitic glaucoma 14 eyes (9.9%). Complications were more common in older subjects ($p = 0.002$), greater area of retinal ischaemia ($p = 0.029$) and in those with macular ischaemia ($p = 0.039$). Despite the high rate of complications, moderate vision loss 6/15-6/60 only occurred in six eyes (4.3%) and severe vision loss ≤ 6/60 in 20 eyes (14.2%).

Conclusion: Occlusive retinal vasculitis is associated with a moderate risk of vision threatening complications. Fluorescein angiography is useful for risk stratification. Majority of patients maintain good vision on immunosuppressive therapy.

Predictive factors for uveitis refractory to treatment in initial-onset acute Vogt-Koyanagi-Harada disease

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Purpose: To identify the predictive factors for uveitis refractory to treatment in initial-onset acute Vogt-Koyanagi-Harada (VKH) disease in Victoria, Australia.

Method: A retrospective chart review of 38 patients diagnosed with initial-onset acute VKH disease at the Royal Victorian Eye and Ear Hospital from July 2001 to March 2023 was performed. Patients were divided into two subgroups: uveitis responsive to treatment (15 patients) and uveitis refractory to treatment (23 patients). Predictive factors for uveitis refractory to treatment were determined using a multivariate logistic regression analysis.

Results: At time of systemic steroid therapy commencement, clinical findings of anterior chamber cells of 2+ or higher (relative risk [RR] 1.99; 95% confidence interval [CI] 1.20, 3.31; $p = 0.008$) and vitreous cells 1+ or higher (RR 1.87; CI 1.15, 3.04; $p = 0.015$) were predictive of uveitis refractory to treatment. Commencement of systemic steroid therapy at one week or later after onset of ocular symptoms (RR 1.85; CI 1.11, 3.07; $p = 0.013$) and the absence of bacillary detachments on macular optical coherence tomography (RR 0.49; CI 0.26, 0.90; $p = 0.010$) were also predictive of uveitis refractory to treatment. Absence of intravenous corticosteroids as initial therapy, was not a statistically significant predictive factor.

Conclusion: Initial-onset acute VKH patients who have a delay in the commencement of systemic steroid therapy, greater severity of intraocular inflammation, and absence of macular bacillary detachments, are more likely to progress toward chronic disease refractory to treatment.

Increasing rates of herpes zoster ophthalmicus in Australia despite the availability of zoster vaccines

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Purpose: Few studies have investigated incidence of herpes zoster ophthalmicus (HZO) since the introduction of zoster vaccinations. In Australia, two zoster vaccines are available and recommended for people ≥ 60 years old: Zostavax®, the live-attenuated vaccine, available for free to 70–79-year-olds via Australia's National Immunisation Program (NIP) since November 2016; and Shingrix®, the non-live subunit vaccine, available privately since September 2021 (not on the NIP). This study aimed to approximate HZO incidence by examining prescriptions supplied for HZO treatment in Australia from 2016–2021.
Methods: Aciclovir and valaciclovir prescriptions supplied via the Pharmaceutical Benefits Scheme for the treatment of HZO in Australia from October 2016 to August 2021 were retrospectively analysed. Annual prescription rates were examined over time using Poisson models.
Results: Zostavax coverage reported to the Australian Immunisation Register in 2016–2020 was 30.4–33.9%. From 2017–2020, HZO rates rose 12% per year (annual prescription rate ratio, relative risk [RR] 1.12, 95% confidence interval [CI] 1.11, 1.13). The relative increase from 2017–2020 was equivalent in those recommended, and those not recommended, to receive zoster vaccination by age (valaciclovir-treated subgroups), increasing by 47% in 61-90-year-olds (RR 1.47, 95% CI 1.41, 1.53) and by 45% in 5-60-year-olds (RR 1.45, 95% CI 1.38, 1.51), respectively.
Conclusion: Despite the availability of two zoster vaccines, HZO rates appear to be increasing within the Australian population, including in those recommended for vaccination by age. Ophthalmologists should encourage vaccination to eligible patients to increase vaccination coverage. Health policymakers may wish to consider including Shingrix on the NIP, given its reported greater efficacy.

Uveitic cystoid macular edema: A real world experience

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Purpose: To examine the real-world management and outcomes of uveitic cystoid macular edema (CME).
Methods: Setting: Single centre, clinical practice. Study population: 248 eyes of 218 patients with uveitic CME evaluated between 2009 and 2021. Procedures: Clinical and demographic data were analysed from a database. CME was identified on spectral-domain optical coherence tomography (SD-OCT) and documented for presence, improvement or resolution.
Results: CME occurred in 248 eyes in 218 patients. Median age at time of CME was 51.7 years [interquartile range 37.3-63.9] and 129 (59.2%) were female. Overall likelihood of resolution was 209/248 eyes (85.3%).Higher rates of response were seen with higher doses of prednisone (odds ratio 1.027, $p = 0.012$) and for those receiving ≥ 60 mg prednisone response was close to 86%. On univariate analysis, infectious etiology (hazard ratio [HR] 0.576, $p = 0.019$) and epiretinal membrane (HR 0.686, $p = 0.013$) were significantly associated with lower chance of resolution of CME. On multivariate analysis, epiretinal membrane was associated with decreased resolution (HR 0.735, $p = 0.045$) and infectious aetiology approached significance (HR 0.635, $p = 0.059$). Recurrence of CME occurred in 85 eyes (36.5%) during the follow up period. Predictors of increased likelihood of recurrence were current smoking status (HR 1.818, $p = 0.042$) and subretinal fluid at diagnosis (HR 1.577 $p = 0.043$). Eyes with infectious aetiology were less likely to have recurrence of CME (HR 0.891, $p = 0.019$).
Conclusions: Management of CME is challenging given the various aetiologies, severity of the macular oedema as well as response to the therapy. A high rate of resolution was observed, given sufficient time, but recurrence occurs in 36.5%. Current smoking status plays an important role in the risk of recurrence and patients must be encouraged to stop smoking.

Should we screen for uveitis in all patients with systemic sarcoidosis?

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Purpose: Ocular involvement is common in sarcoidosis. Our study aimed to evaluate the role of screening for uveitis in subjects with sarcoidosis.
Methods: Retrospective case series of 88 subjects with a pre-existing diagnosis of sarcoidosis and no previous diagnosis of uveitis, who underwent an ophthalmology review and examination at the Auckland District Health Board between January 2016 and December 2021.
Results: Sarcoid uveitis was diagnosed in 50 subjects (56.8%) and 45 required ocular treatment. In those presenting with acute eye symptoms, uveitis was observed in 94.1% (32 out of 34 subjects) while in those undergoing a screening examination, uveitis was observed in 27.8% (15 out of 54 subjects). Sarcoid uveitis was observed in six out of 27 subjects (22.2%) who were entirely asymptomatic at screening. On multivariate analysis, blurring of vision (odds ratio [OR] 26.2, $p < 0.001$), eye pain (OR 7.3, $p = 0.014$) and respiratory disease (OR 7.1, $p = 0.044$) were associated with increased risk of sarcoid uveitis. In the 41 subjects with no uveitis at initial examination, three subjects (7.3%) subsequently developed uveitis.
Conclusions: Our study highlights the importance of ophthalmic screening of all patients with systemic sarcoidosis, even in asymptomatic patients. With a high correlation of ocular symptoms in diagnosis of sarcoid uveitis, ophthalmologists should educate patients to look out for the development of symptoms of ocular inflammation, and clinicians who continue follow up for systemic sarcoidosis should remind patients to watch carefully for these symptoms to facilitate timely diagnosis and intervention.

The use of interferon alpha-2A for treatment of corneal and conjunctival intraepithelial neoplasia

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Purpose: To evaluate the response of primary and recurrent conjunctival and corneal intraepithelial neoplasia (CCIN) to treatment with topical interferon alpha-2a (A2A). Interferon A2A is being increasingly utilised in the absence of available commercial or compounded interferon alpha-2b (A2B).
Method: Retrospective observational interventional case series of 57 eyes from 57 patients from two institutions, reviewed for a diagnosis of CCIN. Patients were diagnosed with either incisional or excisional biopsy or impression cytology. All were administered topical interferon A2A 1 million IU/mL four times a day for at least three months. Statistical analyses were used to correlate recurrence with treatment length, patient and tumour variables.
Results: Fifty-seven eyes from two Australian institutions with CCIN diagnoses were treated with interferon A2A until clinical tumour resolution. The median tumour free follow-up was 24 months with a median time to resolution being five months. Median treatment duration was six months. There was no significant difference in resolution parameters between primary and recurrent CCIN. Approximately 26% of patients had a recurrence within the three-year median follow-up period. Only two patients suffered serious side effects that caused them to cease treatment.
Conclusion: Recurrence rates were higher using interferon A2A when compared to interferon A2B. Interferon A2A may be a viable alternative, but prospective data is needed. It is likely patients were undertreated despite demonstrated clinical resolution if the interferon was ceased prior to six months of continuous treatment.

Secondary extraocular extension in uveal melanoma following primary photodynamic therapy

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Purpose: To present the clinical presentation, diagnosis and management of patients with uveal melanoma who developed secondary extraocular extension (EOE) following photodynamic therapy (PDT).
Method: This retrospective, observational case series presents three patients managed by two ocular oncology services in the United Kingdom. Clinical, radiological, histopathological and surgical procedural data were analysed.

Results: Three patients with a diagnosis of choroidal melanoma were treated with PDT. All patients displayed tumour regression following initial treatment. Treatment included three sessions of PDT using a standard protocol. EOE occurred at mean 42.3 months [range 24–66] after treatment. This was identified on eye ultrasound, as an incidental finding on neuroimaging and following enucleation for suspected clinical recurrence in the three cases. The first patient received subsequent stereotactic radiosurgery, then developed liver metastases and remains on treatment with immunotherapy. The remaining two patients were managed with enucleation, which confirmed histological evidence of EOE. One displayed direct extension via posterior ciliary nerve; while the other tumour showed optic nerve invasion. One patient is planned for orbital radiotherapy.

Conclusions: Radiotherapy in the form of plaque brachytherapy, external beam radiotherapy, or stereotactic radiotherapy remains the mainstay of treatment for uveal melanoma. Primary PDT is a recognised treatment modality, with favourable characteristics including smaller size and amelanotic lesions. This series highlights the risk of EOE following PDT, an entity that is not identifiable clinically and has not been well-described in literature. Long term follow up of these patients with eye ultrasound and optical coherence tomography is essential to monitor for local recurrence and EOE.

Treatment burden for unilateral retinoblastoma

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Purpose: To compare the burden of treatment between enucleation and intravenous chemotherapy (IVC) as primary treatments for unilateral retinoblastoma.

Method: A retrospective analysis of children with unilateral retinoblastoma treated at The Royal Children's Hospital Melbourne between January 2000 and July 2022.

Results: Fifty-seven children with unilateral retinoblastoma treated with primary enucleation (PE) or IVC were included in the study. Mean follow-up was 100.6 months (range 8-207). All survived, none developed metastatic spread. 51/57 children were treated with PE, 10 of whom required adjuvant IVC (PEAIVC); 6/57 underwent primary IVC (PIVC), 50% of whom later required secondary enucleation. Children who underwent PE or PEAIVC (mean 6.49 and 7.60, respectively) required fewer examinations under anaesthesia (EUA) compared to PIVC (mean 16.5; $p < 0.001$); children with proven non-heritable retinoblastoma underwent fewer EUAs ($p = 0.002$). Children treated only with PE required fewer total number of general anaesthetics (i.e. including EUAs, MRI, port insertion and other related surgeries) and admissions than those who received any IVC, regardless of genetic status ($p < 0.001$). There was no difference between groups for ophthalmology outpatient review (mean PE 4.25 vs. PEAIVC 3.90 vs. PIVC 5.17; $p = 0.602$) although children receiving any IVC required more oncology outpatient appointments (mean PE 1.97 vs. PEAIVC 16.7 vs. PIVC=17.83; $p < 0.001$). Complications associated with enucleation included orbital implant migration and ptosis requiring surgical management. Febrile neutropenia and anaphylaxis were the most common complications from IVC.

Conclusion: IVC is significantly associated with increased number of general anaesthetics, hospital admissions and oncology outpatient appointments compared to primary enucleation. Primary enucleation is associated with further surgeries.

Real-world outcomes of low-dose atropine therapy on myopia progression during the COVID-19 pandemic

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Purpose: To report the outcome of low-dose atropine (0.01% and 0.05%) for preventing myopic progression in a real-world Australian cohort during the COVID-19 pandemic.

Methods: Records of children presenting with myopia were retrospectively reviewed at a comprehensive ophthalmic practice. Children who discontinued treatment, ages >18; and cases with hereditary conditions were excluded. The rate of progression of myopia after treatment with atropine was compared to historical data to evaluate the effectiveness of the regime.

Results: One hundred and one children (mean baseline spherical equivalent (SphE) [-3.70 ± 2.09 D] and axial length (AL) [24.59 ± 1.00 mm]) were analysed. The mean age of the children was 10.4 +/- 2.89 years and 61% were females. The average follow-up time was 17.9 ± 12.5 months. The mean AL and SphE growth on 0.01% atropine eyedrops were 0.219 ± 0.35 mm and -0.250 ± 0.86 D per year respectively. 68.1% of the patients treated with 0.01% atropine were mild progressors (<0.5 D change/year). Non-responders when commenced on a higher dose of atropine (0.05%) experienced a 93% ($p = 0.012$) and 30% reduction in SphE and AL growth, respectively. Family history, higher myopia or younger age at baseline and shorter duration of treatment were associated with steeper progression ($p < 0.01$). Both doses were well tolerated.
Conclusions: Low-dose atropine was shown to be beneficial in a real-world clinical setting, despite interruptions to follow-ups secondary to COVID-19 pandemic. 0.05% dose of atropine may be effective in cases where 0.01% was ineffective.

Paediatric Thyroid Eye Disease – 20 years experience

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Purpose: To provide Australian data on the clinical presentation, disease progression and management of children with thyroid eye disease (TED).
Methods: Retrospective review of children (< 18 years) with TED from 2001-2022 seen in endocrine and ophthalmology clinics at the Children's Hospital Westmead, Sydney.
Results: Eighty-five children with TED were identified of which 59 had ophthalmic assessment – mean age 11 years (range 2-17). Forty-eight patients were females (81%) and 11 were males (19%). Fifty-seven patients (97%) had hyperthyroidism,and two euthyroid at onset of TED. Six patients had other auto-immune disorders including coeliac disease (2), type 1 diabetes (2), juvenile myasthenia gravis and ovarian failure. Common ophthalmic findings were proptosis (n = 51, 86%), lid lag (n = 32, 54%), lid retraction (n = 20, 33%), eye pain (n = 17, 29%), keratopathy (n = 14, 24%) and EOM limitation (n = 10, 17%). Orbital imaging was performed in 14 patients (24%), with findings of proptosis (9/14 patients) and extraocular muscle enlargement (4/14 patients). Three patients underwent surgery – two epible-pharon repair and one ptosis surgery.
Conclusion: This is the largest cohort of Australian data on paediatric TED. Most patients had mild TED and managed conservatively.

Paediatric corneal cross-linking: Impact on corrected distance visual acuity, astigmatism, pachymetry and KMax

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Purpose: To review outcomes in corrected distance visual acuity (CDVA), astigmatism, KMax and pachymetry following a corneal cross-linking (CXL) procedure in children.
Method: Retrospective cohort study of all patients who underwent an accelerated CXL procedure at the Queensland Children's Hospital, Brisbane, from 2018 through 2021. Data collected on patient demographics, baseline metrics (CDVA, astigmatism, pachymetry, KMax) and follow up changes at 3-, 6-, 12- and 24-months post CXL.
Results: Forty-six eyes of 30 patients who underwent a CXL procedure were reviewed. Median age (range 9-18) at time of surgery was 13.5 years with a 1.5:1 male: female ratio. Twenty-four percent of patients were of Aboriginal or Torres Strait-Islander origin.
At final follow up, there were 24 patients (with six lost to follow-up). The majority (51%) maintained their CDVA however in 23% there was improvement. Average preoperative astigmatism was 4.3D with 89% patients showing a change of astigmatism by ±2D or less post-operatively. Preoperative mean KMax was 59.9D. Most patients (63%) experienced Kmax improvement/flattening. Preoperative mean pachymetry was 445 microns, while post-operative mean pachymetry was 435 microns. No patients required a second treatment.
Conclusion: Accelerated CXL attenuated disease progression in patients with paediatric keratoconus over a two-year period providing comparable results to that to be expected in an adult population.

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Clinical & Experimental Ophthalmology WILEY

06:30 – 07:45 **Bausch + Lomb Hosted Morning Symposium**

Venue: BelleVue Ballroom 1

06:30 – 07:45 **Roche Hosted Morning Symposium**

Venue: BelleVue Ballroom 2

08:00 – 08:30 **FRED HOLLOWS LECTURE**

Title: Preventing blindness from diabetes in low and middle income countries – The Diabetic Retinopathy Network

Dr Anthony Bennett Hall

Synopsis: The number of people with diabetes mellitus in sub-Saharan Africa is projected to increase to about 47 million by 2045. The magnitude of diabetic retinopathy (DR) will increase proportionally.
The Diabetic Retinopathy Network (DR-NET) was established in 2014 as part of the VISION 2020 LINKS program at the International Centre for Eye Health, London School of Hygiene and Tropical Medicine. This eye health partnership program partners eye units in low- and middle-income countries (LMIC) with eye units in the UK to improve the quality and quantity of eye care training and service delivery. There are now 28 DR centres in 20 LMICs, including a DR-NET LINK between RANZCO and Pacific Island programs.
The DR-NET key activities included situation analysis of partners, workshops bringing together whole eye teams including the Ministry of Health representative, development of two year action plans, a DR-NET toolkit to plan and implement services, whole team training visits between LINKS partners to build capacity and the development of national DR guidelines in collaboration with the Ministry of Health.
The Kilimanjaro Christian Medical Centre in Tanzania was one of the first LINKS programs. We established a screening program for DR using an intervention mapping approach. Key aspects of this program included a needs assessment of people living with diabetes and health care workers, a trial of DR screening methods, comic strips as motivational strategy to increase uptake of DR screening, healthcare worker education, an electronic database of people living with diabetes, implementation of mobile DR screening and program evaluation.
The Fred Hollows Foundation is leading research in innovative approaches to DR screening.
The LINKS program has proved to be a mutually beneficial way of building capacity to treat and prevent unnecessary loss of sight and blindness in LMICs. There remain enormous challenges ahead to eliminate avoidable visual impairment particularly from DR.

Venue: Riverside Theatre

Chair: Dr James La Nauze

08:30 – 09:00 **NEURO-OPHTHALMOLOGY UPDATE LECTURE**

Title: Neuro-ophthalmology updates: Information that will change your practice tomorrow!

Dr Neil R. Miller

Synopsis: Recently, there have been a number of important advances in the diagnosis and management of several neuro-ophthalmic disorders. These advances have major implications for practitioners and should change your practice if you have not changed it already! In this talk, I will discuss several of what, in my opinion, are the most important. These include advances that have changed the approach to and management of patients with acute optic neuritis. Specifically, it is no longer appropriate to offer all patients with acute optic neuritis the "option" of treatment with systemic corticosteroids. Instead, all patients except for those suspected of having an infectious etiology (e.g., tuberculosis) should be treated immediately with high-dose steroids. In addition, patients with recurrent steroid-sensitive but steroid-dependent optic neuritis require an assay for antibodies to myelin oligodendrocyte glycoprotein. With respect to idiopathic intracranial hypertension (aka primary pseudotumor cerebri), we now know that patients with this condition can tolerate up to 4 grams of acetazolamide per day and that permanent weight loss – a major objective in the successful management of such patients – can be better achieved with bariatric surgery than through weight loss clinics. It is now clear that "visual snow" is an organic disorder of perception and should be treated as such rather than as a psychological problem. Finally, molecular genetics is playing an increasingly important role in the management

	of children with optic pathway gliomas, so much so that targeted therapy is now both available and beneficial for such individuals.
	Venue: Riverside Theatre
	Chair: Prof Celia Chen
09:00 – 10:00	**AUSTRALIAN VISION RESEARCH (AVR) PLENARY**
	Speakers and Topics: Perth Eye Foundation – Welcome/introduction A/Prof Michele Madigan – Emerging from the darkness: cells in the choroid that detect light? Dr Hemal Mehta – FRB! 2.0: Using SMART on FHIR to achieve single point data entry and save time for clinicians Dr Rod O'Day – Precisely mapping choroidal tumour margins A/Prof Ranjay Chakraborty – Myopia in children – a result of inadequate melatonin production and circadian rhythm dysfunction? Dr Jennifer Fan Gaskin – Preventing glaucoma blindness – a new drug to control post-operative scarring
	Venue: Riverside Theatre
	Chairs: Dr Jennifer Fan Gaskin and Prof Stephanie Watson
	drjfan@gmail.com
10:00 – 10:30	**Morning Tea**
10:00 – 10:30	**AUSTRALIAN SOCIETY OF OPHTHALMOLOGISTS (ASO) AGM**
	Venue: Meeting Room 7
10:30 – 12:00	**PLENARY - Best Paper Presentations**
	Venue: Riverside Theatre
	Chairs: Dr Brett O'Donnell and Dr Mei-Hong Tan

Visual field loss and crash risk: A population-based study

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Purpose: Assess car crash risk with the severity and site of visual field loss in a 50+ year old group.
Methods: Police reported car crashes, licensing and hospital morbidity data were linked to a longitudinal whole population database of Humphrey visual field tests from 1990 to 2019. A binocular integrated visual field was derived from individual monocular field tests.
Results: Of 31,295 participants, 4,307 had at least one car crash. Visual field loss occurred in 39% of the cohort but comprised 56% that had at least one crash. Any binocular visual field loss increased the odds of a car crash by 84% (95% confidence interval 1.71-1.97). Severe visual field loss in any quadrant significantly increased crash risk. Moderate visual field loss increased car crash risk only if it occurred in the left upper or lower quadrants. Central visual field loss was not associated with an increased risk of crash.
Conclusion: Visual field loss was associated with greater risk of car crash in a real-world population.

Genotype-phenotype correlation in PRPH2-associated retinopathy

Rachael C. Heath Jeffery[1], Andrea L. Vincent[2], Jennifer Thompson[6,7], Terri McLaren[6,7], Tina Lamey[6,7], Danial Roshandel[3], Lauren Ayton[4], Fred K. Chen[8]

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Purpose: Peripherin-2 (NP_000313.2) is a photoreceptor-specific tetraspanin protein encoded by the PRPH2 gene (MIM #179605). This study describes the genetic spectrum, electrophysiological features and clinical phenotypes of PRPH2-associated retinopathy.
Methods: An international multicenter study conducted at the Lions Eye Institute (Perth), the Royal Victorian Eye and Ear Hospital (Melbourne) and Greenlane

Clinical Centre (Auckland). Ultra-wide-field fundus autofluorescence (UWF-FAF) images were acquired to grade the phenotype and electrodiagnostics were performed incorporating the standards of the International Society for Clinical Electrophysiology of Vision. Genomic DNA was analysed using disease-specific next generation sequencing SmartPanels and pathogenicity was determined based on American College of Medical Genetics and Genomics criteria. Patients with a heterozygous pathogenic or likely pathogenic variant in PRPH2 were eligible for inclusion.

Results: Sixty-seven patients carrying 35 unique PRPH2 variants were included, of which 28 (42%) were female. The mean (SD, range) age at symptom onset and age at examination were 51 (13, 26-78) and 56 (14, 21-85) years respectively. Thirty-nine patients had electrophysiology performed. UWF-FAF demonstrated four main phenotypes; central areolar choroidal dystrophy (n = 14), Stargardt fleck-like dystrophy (n = 21), butterfly-vitelliform dystrophy (n = 18) and rod-cone dystrophy (n = 14). All eight patients harbouring the p.Arg172 substitution manifested a central areolar choroidal dystrophy phenotype. All patients with the p.Glu187 substitution showed a Stagardt fleck-like dystrophy. Seven patients carried the nonsense mutation p.Tyr204Ter illustrating a range of phenotypes.

Conclusion: Missense variants manifest a restricted phenotype while truncating nonsense variants demonstrate a range of phenotypes on UWF-FAF. Genetic modifiers, such as ROM1, may interact with the wild-type allele and influence the clinical phenotype.

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Excellent diagnostic accuracy of neonatal nurses in detection of referral warranted retinopathy of prematurity

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Purpose: To evaluate the level of agreement of specialist trained retinopathy of prematurity (ROP) nurses compared with an experienced paediatric ophthalmologist in the detection of referral warranted ROP (RWROP) using wide field digital retinal imaging.

Methods: Prospective, observational study of neonates at Mater Mothers' Hospital, Brisbane from July 2020 to November 2022. The primary outcome was the presence of RWROP at any stage during the neonate's neonatal intensive care unit journey.

Results: One hundred and ninety-five neonates (55% male) with a total of 768 screening visits were included. Median number of visits for each neonate was three (interquartile range 2-5, range 1-12). At the initial screen, nurse and ophthalmologist agreed about presence of RWROP for 191 of 195 neonates (98%, Kappa 0.79, $p < 0.0001$), with 100% nurse sensitivity for RWROP detection. If all screens during the neonate's neonatal intensive care unit inpatient stay were included, agreement was 98% for RWROP. There was disagreement in just 16 screenings (2%) for 11 (6%) neonates. Of the five screenings (0.7%) that the ophthalmologist thought referral was warranted and the nurse did not, three were disagreements in whether the zone was posterior zone 2 or zone 1.

Conclusion: There was an excellent level of agreement between trained ROP nurses and ophthalmologist during neonatal screening, with 100% sensitivity in RWROP detection. Incorporating nurse ROP screening could decrease delay in image reporting and improve parental communication. This study suggests that interpretations made by specialist trained nurses could be safely integrated in a more efficient method of ROP screening in an Australian population.

The Bacterial Ocular Surveillance System: Preliminary results from the 2019-2020 national report

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Purpose: Antimicrobial resistance (AMR) is a public health threat worldwide. Surveillance data for AMR from

ocular infections are scarce relative to other infectious diseases globally. The Bacterial Ocular Surveillance Program (BOSS) was initiated at the Sydney Eye Hospital in 2016 and has expanded nationwide. We report the spectrum and AMR of bacteria isolated from cornea scrapings in bacterial keratitis in 2019 and 2020.

Method: A retrospective analysis of bacteria isolated from cornea scrapings from patients with bacterial keratitis from Sydney, Melbourne, Adelaide and Perth was conducted from 1 January 2019 to 31 December 2020.

Results: There were 1,002 organisms isolated from corneal scrapings from 10 participating sites. There were 719 (72%) gram-positive and 283 (28%) gram-negative organisms. Coagulase-negative staphylococci (CoNS) 32% (323/1002), *Staphylococcus aureus* 20% (205/1002), *Corynebacterium spp*. 4% (45/1002) and *Pseudomonas aeruginosa* 14% (139/1002) were the most common organisms. Antimicrobial resistance was found for CoNS to cefalotin 24%, chloramphenicol 11%, ciprofloxacin 7% and gentamicin 6%; *S. aureus* to cefalotin 12%, ciprofloxacin 7%, chloramphenicol 3%, gentamicin 2%; *Corynebacterium spp*. to cefalotin 35%, ciprofloxacin 10%, chloramphenicol 10%; *Pseudomonas aeruginosa* to ciprofloxacin 1.4%, gentamicin 1.4%, and tobramycin 0.8%. All gram-positive isolates were susceptible to vancomycin.

Conclusion: CoNS were the main causal organisms of bacterial keratitis. About one-quarter of CoNS and a third of *Corynebacterium spp*. were resistant to cefalotin. An increasing number of *Pseudomonas aeruginosa* were noted with resistance to antibiotics. Ongoing nationwide monitoring of AMR in ocular infections is important for informing both clinical decision-making and empiric therapy strategies.

Applying glaucoma polygenic risk scores in the clinical setting to assist decision making

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Purpose: To describe a series of cases in which knowledge of the glaucoma polygenic risk score would affect clinical practice.

Method: A case series drawn from established open-angle glaucoma participants and family members in the PROGRESSA and Australian and New Zealand Registry for Advanced Glaucoma studies. The clinical course of the top second percentile (n = 99 participants) and the bottom fifth percentile (n = 141 participants) as calculated from normal population distributions was examined. Clinically-relevant glaucoma outcomes were examined with multivariable logistic regression. Representative case examples from high and low risk individuals were examined in detail.

Results: Participants in the highest genetic risk group developed glaucoma younger (seven years, 95% confidence interval [CI] 2.5-11.3, $p = 0.002$) and were more likely to develop advanced disease (two-fold risk (95% CI 1.1-3.4, $p = 0.010$), bilateral central visual field loss (two-fold risk, 95% CI 1.1-3.6, $p = 0.024$), require bilateral trabeculectomy (three-fold risk, 95% CI 1.4- 5.6, $p = 0.002$) and had more affected family members than those in the low genetic risk group. Representative case examples indicating how these results will affect future clinical practice are presented.

Conclusion: Cases at the top extreme of polygenic risk develop severe glaucoma outcomes. Utilising this information to prevent these glaucoma outcomes is a key piece of research translation requiring ongoing research and education of eye health professionals.

Assessing the risk of vision loss from Leber hereditary optic neuropathy to identify families eligible for mitochondrial donation

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Purpose: After the passing of Maeve's Law in 2022 which allowed mitochondrial donation, the Medical Research Future Fund has funded the MitoHOPE program. This multidisciplinary collaboration will offer

mitochondrial donation for women at risk of passing on mitochondrial diseases such as Leber hereditary optic neuropathy (LHON).

Method: To determine those most at risk of LHON, we reviewed Australian LHON pedigrees and population studies screened for LHON mitochondrial mutations.

Results: We identified 96 genetically unrelated LHON pedigrees with over 620 affected individuals and 4,948 asymptomatic carriers. The risk of vision loss among those with a LHON mutation was 17.5% for males and 5.4% for females. Risk of vision loss was influenced by the number of close affected relatives and mitochondrial haplotype. Analysis of the UK Biobank and Australian cohort studies found more than 1 in 1,000 people in the general population carry either the m.14484T>C or the m.11778G>A LHON variant. None of the subset of carriers examined had visual acuity of 6/60 or worse, suggesting a very low penetrance of LHON in the general population. These data allowed us to identify women of reproductive age most likely to benefit from mitochondrial donation and invite them to participate in the mitoHOPE program.

Conclusion: Together with our LHON registry, the mitoHOPE program provides families with the very real hope of eliminating LHON vision loss in future generations.

12:00 – 13:30 **Lunch**

13:30 – 15:00 **CONCURRENT SESSIONS**

13:30 – 15:00 **COURSE -**

Management strategies for common strabismic conditions

Aim: A case-based interactive Q&A session with the aim of increasing the confidence of the general ophthalmologist who is seeing strabismus patients and managing routine strabismus cases.

Speakers and Topics:
Panel: A/Prof James Elder, Dr Craig Donaldson, Dr Loren Rose, Dr Wendy Marshman and Dr Kim Tan
The expert panel, with audience involvement, will be discussing management of common strabismic conditions in adults and children such as: esotropia; exotropia; vertical tropias; strabismic syndromes; and nerve palsies.

Venue: BelleVue Ballroom 2

Chairs: A/Prof Geoffrey Lam and Dr Shanel Sharma

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13:30 – 15:00 **COURSE -**

Rosacea update: What you need to know from lids to optic nerve

Aim: This course aims to update ophthalmologists from all subspecialties on this important and common genetic disease of the innate immune system. The aberrant cathelicidin pathway in rosacea has implications for the whole eye, playing a role in lid disease, sight threatening corneal disease and even being an important consideration in scleritis, uveitis, glaucoma and diabetes . Corneal and uveitis specialists will provide ophthalmic perspectives along with illustrative cases, live polling and some important take home messages. A dermatologist will present tips for recognising and classifying facial disease and understanding how and why current therapies work.

Speakers and Topics:
Dr Jo Richards – Uveitis, ocular immunology and infection perspective: Rosacea, a systemic genetic disorder of innate immunity. The aberrant cathelicidin pathway, dysregulation and modulation. Implications for management during perioperative care, in cataract, glaucoma, retinal and uveitis practice. Issues with steroids and rosacea.
Dr Nathan Wong – Cornea perspective: Rosacea affecting lids, conjunctiva and cornea. How to manage cicatricial disease, conjunctivochalasis, corneal melt and neovascularisation. Cross-over conditions. Surgical and medical management tools. Contact lens intolerance in rosacea. Possible implications for cataract surgery.
Dr Joy Yee – Rosacea dermatology perspective: classification, subtypes, differential diagnoses, similar conditions and pitfalls. Established and emerging therapies. The role of the dermatologist.
Case presentations: Dr Jo Richards (glaucoma and uveitis in rosacea), Dr Nathan Wong (cornea), Dr Ehud Zamir (uveitis, scleritis and missed diagnosis) and Dr Verity Moynihan (paediatric)

Venue: BelleVue Ballroom 1

Chair: Dr Jo Richards

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13:30 – 15:00 **COURSE -**

What did I miss ... that I really need to know today!

Aim: This course aims to provide eight talks that update ophthalmologists on the latest innovations within each subspecialty. Provided by a faculty of 10 diverse speakers it builds on the format designed by Dr Haymet. This course was run during the Virtual RANZCO Congress in 2020 and had exceptional feedback from attendees. It is combined with a pre- and post-test quiz to reinforce the most important learning points. Within a 90 min session, the course will summarise the major medical and surgical innovations in the last two years that each sub-specialist considers most important for general ophthalmologists to be aware of and apply to their patients.

Speakers and Topics:
A/Prof Constantinos Petsoglou – Introduction and pre-test
Dr Caroline Catt – Paediatrics update
A/Prof Constantinos Petsoglou – Cornea update
Dr Andrea Ang – Cataract update
Dr Anne Lee – Glaucoma update
Prof Peter McCluskey – Uveitis update
Prof Celia Chen – Neuro-ophthalmology update
Dr Brett O'Donnell – Oculoplastic update
Dr Li-anne Lim – Oncology update
Prof Adrian Fung – Retina update
Prof Adrian Fung – Post-test and question and answer session

Venue: Riverside Theatre

Chair: A/Prof Constantinos Petsoglou

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13:30 – 15:00 **RANZCO PROFESSIONAL DEVELOPMENT**

Title: Business skills for doctors

Synopsis: This session will cover contemporary issues relating to the business aspects private ophthalmology. The topics are aimed at doctors, in particular owners of businesses or those planning to own. The session will also be relevant to those managing ophthalmology practices.
Dr Brian Kent-Smith - Communicating with patients: what we say and why it matters
Ms Shannon Mony - How to manage patients that are difficult or unreasonably demanding in their expectation of care.
Dr Carolyn Ross - Maintaining clinical practice that is Medicare compliant
Ms Colleen Sullivan - Accreditation and quality improvements and the benefits to a practice
Ms Donna Glenn - Interview techniques, when recruiting clinical and administration staff for your practice
Panel discussion

Venue: Riverview 4

Chair: Dr Irene Tan

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13:30 – 15:00 **FREE PAPERS - Retina**

Venue: Meeting Room 3

Chairs: Dr Suki Sandhu and Dr Graham Hay-Smith

Early optical coherence tomography signs of atrophy in age related macular degeneration

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Purpose: To describe the optical coherence tomography (OCT) imaging signs of atrophy in age-related macular degeneration: incomplete and complete retinal pigment epithelium and outer retinal atrophy (iRORA and cRORA respectively), and nascent geographic atrophy (nGA), and to examine their association with risk of developing geographic atrophy (GA).

Methods: A total of 280 eyes from 140 participants with bilateral large drusen and without nGA at baseline underwent OCT imaging and colour fundus photography at six-monthly intervals for up to 36 months. OCT scans were

graded for iRORA, cRORA and nGA and colour fundus photographs were graded for GA. The association between the OCT signs of atrophy with GA development and their probability of progression to GA at 24-months, were examined.

Results: At baseline, nine (3%) eyes and 49 (18%) eyes had cRORA and iRORA respectively. Prevalent or incident iRORA and cRORA, and incident nGA, were all significantly associated with an increased rate of developing GA (adjusted hazard ratio 12.1, 65.7 and 78.6, respectively; all $p \leq 0.021$). The probability of developing GA after 24 months from the detection of iRORA and cRORA was 3% and 26% respectively, which was significantly lower than the probability of 38% from the detection of nGA ($p \leq 0.039$).

Conclusion: OCT imaging signs of atrophy based on iRORA, cRORA and nGA were all significant risk factors for developing GA that could be used to select a high-risk cohort for progression to GA. The feasibility of early intervention trials could also be improved by using nGA as a surrogate endpoint for GA.

Efficacy and safety of pegcetacoplan in patients with geographic atrophy from phase 3 OAKS and DERBY trials and efficacy from Phase 3 GALE Trial

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Purpose: To evaluate safety and efficacy of pegcetacoplan in patients with geographic atrophy (GA) secondary to age-related macular degeneration (AMD).

Methods: The 24-month, phase 3 OAKS (N = 637; NCT03525600) and DERBY (N = 621; NCT03525613) trials randomised patients (2:2:1:1) to intravitreal pegcetacoplan monthly (PM) or every other month (PEOM) or sham monthly or every other month. In the three-year, open-label, extension study, GALE (N = 790; NCT04770545), patients who were receiving pegcetacoplan continued the same treatment, while those who were receiving sham switched to pegcetacoplan at the same dosing regimen. The main outcome reported here is change from baseline in GA lesion area by fundus autofluorescence at month 24. Safety outcomes, including rates of treatment-emergent adverse events (TEAE), were also assessed.

Results: In a prespecified pooled analysis of OAKS and DERBY, pegcetacoplan reduced GA lesion growth by 21% for PM ($p < 0.0001$; nominal) and 17% for PEOM ($p < 0.0001$; nominal) vs. pooled sham. Pegcetacoplan was well tolerated; most study eye ocular TEAEs were mild/moderate. TEAE rates across all arms in both studies ranged from 82–88% (46–62% for ocular and 72–80% for non-ocular TEAEs). The rate of intraocular inflammation per injection was 0.20% (excluding four events attributed to drug impurity). The rate of infectious endophthalmitis per injection was 0.034%. New-onset exudative AMD was reported in 12.2%, 6.7% and 3.1% of the PM, PEOM and pooled sham arms, respectively, over 24 months. Long-term efficacy from the GALE study will be presented.

Conclusions: Treatment with pegcetacoplan slowed lesion growth and was well tolerated over 24 months.

Exudative age-related macular degeneration events from phase 3 OAKS, DERBY and GALE Clinical Trials of pegcetacoplan in geographic atrophy

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Purpose: To evaluate new-onset exudative age-related macular degeneration (eAMD) events from the phase 3 OAKS, DERBY and GALE trials of pegcetacoplan in patients with geographic atrophy secondary to age-related macular degeneration.

Methods: Patients were randomised to pegcetacoplan monthly (PM), every other month (PEOM) or sham. Patients who developed eAMD received anti-vascular endothelial growth factor (VEGF) at the investigator's discretion.

Results: In a pooled safety analysis of OAKS and DERBY (PM, N = 419; PEOM, N = 420; sham, N = 417), pegcetacoplan was well tolerated at 24 months. eAMD rates were 12.2%, 6.7%, and 3.1% for PM, PEOM and sham, respectively, and lower in patients without baseline fellow eye choroidal neovascularisation (11.0% PM, 5.6% PEOM, 1.5% sham). No pegcetacoplan-treated patients discontinued the trials due to eAMD. No serious adverse events of eAMD were reported. Most (85.7%) cases were associated with occult choroidal neovascularisation. A mean of 0.53, 0.52 and 0.45 anti-VEGF injections per month were administered following eAMD diagnosis in 98.0% (n = 50), 96.4% (n = 27) and 84.6% (n = 11) of PM, PEOM and sham patients, respectively. Median best-corrected visual acuity change from the visit preceding eAMD to month 24 was -5, -6, and -5 letters for PM, PEOM and sham, respectively. Data from the GALE trial will be presented.

Conclusions: Pegcetacoplan was well tolerated over 24 months. Despite higher eAMD rates with pegcetacoplan,

there were no serious adverse events or trial discontinuations due to eAMD, and response to anti-VEGF was as expected.

Intravitreal Aflibercept 8mg Injection in patients with neovascular age-related macular degeneration: 60+96 week results from the Phase 3 Pulsar trial

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Purpose: To evaluate the efficacy and safety of aflibercept 8 mg every 12 (8q12) or 16 weeks (8q16) versus aflibercept 2 mg every 8 weeks (2q8), each after three initial monthly injections in patients with treatment-naïve neovascular age-related macular degeneration.
Methods: PULSAR (NCT04423718) is an ongoing, double-masked, 96-week, phase 3 trial: patients were randomised 1:1:1 to receive 8q12, 8q16 or 2q8. The 48-week results are reported here, 60-week results will be presented at RANZCO 2023. Primary endpoint was best-corrected visual acuity (BCVA) change from baseline at Week 48 (non-inferiority margin at 4 letters). Key secondary endpoint was proportion of patients with no intraretinal/subretinal fluid in central subfield at Week 16 and other secondary endpoints included safety.
Results: Overall, 1,009 patients (8q12: n = 335; 8q16: n = 338; 2q8: n = 336) were evaluated. Primary endpoint was met with aflibercept 8 mg (8q12 vs. 2q8: $p = 0.0009$; 8q16 vs. 2q8: $p = 0.0011$). Observed mean (±SD) change from baseline (±SD) in BCVA at Week 48 was +6.7 ± 12.6 (baseline: 59.9 ± 13.4), +6.2 ± 11.7 (baseline: 60.0 ± 12.4), and +7.6 ± 12.2 letters (baseline: 58.9 ± 14.0) with 8q12, 8q16 and 2q8, respectively. Aflibercept 8 mg demonstrated superior drying versus aflibercept 2 mg at Week 16; 63% versus 52% of patients, respectively, had no intraretinal/subretinal fluid in central subfield ($p = 0.0002$). The safety of aflibercept 8 mg and 2 mg was similar.
Conclusions: Aflibercept 8 mg met the primary endpoint, demonstrating non-inferiority in BCVA versus aflibercept 2 mg, with no new safety signals through 48 weeks. Overall, aflibercept 8 mg provides greater therapeutic benefit and equivalent safety versus aflibercept 2 mg.

Switching to Faricimab significantly reduces lesion activity of eyes with neovascular age-related macular degeneration in three months

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Purpose: Pivotal clinical trials of faricimab, a bispecific antibody that binds angiopoietin-2 and vascular endothelial growth factor (VEGF)-A approved for neovascular age-related macular degeneration (nAMD) and diabetic macular oedema, reported vision gains similar to aflibercept, greater reduction in central subfield thickness and more durable efficacy. Limited data are available on whether the same outcomes can be achieved in routine clinical practice
Methods: Retrospective analysis of data from the prospectively designed Fight Retinal Blindness! outcomes registry. Eyes with neovascular age-related macular degeneration that switched from a first generation VEGF inhibitor with ≥ 3 months of follow-up from the first faricimab injection (baseline visit) were identified. The primary outcome was activity of the choroidal neovascular membrane; secondary outcomes included visual acuity, treatment interval and ocular adverse events.
Results: A total of 182 eyes of 146 patients switched from aflibercept (66%) or ranibizumab (34%) after a median of 24 injections over a median of 1169 days. Mean visual acuity was good (70.5 LogMAR letters) with a median injection interval of 41 days at the time of switching. The lesion activity rate was significantly reduced ($p < 0.001$) three months later, with the proportion of inactive lesions increasing from 45% to 67% after a median of two injections. Visual acuity improved slightly by 0.6 letters (N.S.), treatment interval remained the same. There were no reports of intraocular inflammation.
Conclusion: Faricimab treatment in real world practice inactivated a significant number of choroidal neovascularisation lesions that had been active using fitst generation VEGF inhibitors. Later Fight Retinal Blindness! analyses will determine whether treatment intervals were extended.

Optical coherence tomography angiography findings in a cohort of patients with neovascular age-related macular degeneration

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Purpose: To describe optical coherence tomography angiography (OCTa) findings of patients presenting with clinical signs consistent with diagnosis of neovascular age-related macular degeneration (nAMD) attending a medical-retina practice.
Method: A total of 438 sequential patients with clinical signs of nAMD were seen at Sydney West Retina in Sydney, including early and more advanced cases. Almost all patients had fluorescein angiography and in selected cases, indocyanine green, angiography, together with colour retinal photographs and spectral-domain optical coherence tomography, using Zeiss Cirrus 5000/ 6000. Further OCTa imaging was conducted using the Zeiss PlexElite 9000 with segmentation appropriate to detect choroidal neovascularisation, typically outer retina/choriocapillaris and retinal pigment epithelium fit segments. OCTa images were compared with images from the other modalities.
Results: In 365 cases (83.3%), a well-defined choroidal neovascularisation (CNV) was evident on OCTa, while in 73, this was not clearly visible. Among the 73 without visible CNV, certain lesions which appeared to mask the CNV appearance, including geographic atrophy, n = 41; large pigment epithelial detachment or retinal pigment epithelium tear, n = 12; media opacities, n = 5; movement artifact, n = 4. No obvious cause was evident in 12 cases. Bilateral CNV was seen in 176 cases, while unilateral CNV was seen in 189 cases. Of these unilateral cases, their fellow eye had signs of a subclinical (asymptomatic) CNV in 25 cases (13.2% or 1 in 8).
Conclusion: High-quality OCTa can resolve CNV in 83% of patients with typical clinical signs of nAMD. Certain lesions may mask this appearance, particularly atrophy or pigment epithelial detachment. Signs indicating CNV will be shown, including the "double later sign". The extent, configuration and course of OCTa-defined CNV will be described.

How likely is allergy and anaphylaxis development in patients having eye injections with chlorhexidine?

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Purpose: Chlorhexidine is used for prevention and treatment of infection. The development rate and mechanism of allergy and anaphylaxis to chlorhexidine is not understood. It is thought that repeated or prolonged exposure to chlorhexidine can sensitise the immune system and trigger an allergic reaction. Health care workers and patients having repeat exposure are more likely to develop allergy.
Method: Patients having intra-vitreal injections are a representative cohort that have long term repeated exposure to chlorhexidine. To assess the incidence of discontinuation of chlorhexidine, we conducted a multi-clinician review of doctors exclusively using aqueous chlorhexidine (Chlorhexidine-gluconate 30 mg/ml 0.1% Pfizer) for antisepsis prior to intravitreal injection.
Results: In a cohort of 3,809 patients, and 85,968 injections given since 2011, three patients were identified who discontinued chlorhexidine antisepsis, due to reported increased ocular surface discomfort. This was after intravitreal injection with chlorhexidine antisepsis as compared with Betadine. No patient demonstrated true allergy and none showed positive skin testing.
Conclusions: We conclude that repeat exposure to chlorhexidine in our cohort of patients did not lead to a significant development of chlorhexidine allergy or anaphylaxis. Clinicians should not be concerned about inducing allergy with repeated chlorhexidine exposure. Our previous research in ophthalmology also demonstrated a very high patient tolerance to, and a very low rate of endophthalmitis with chlorhexidine use, and therefore we continue to offer aqueous chlorhexidine as first-choice for antisepsis prior to intravitreal injection.

Improved anatomical control with faricimab in the phase 3 YOSEMITE/RHINE trials in diabetic macular oedema

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Purpose: Two-year data from the YOSEMITE/RHINE (NCT03622580/NCT03622593) trials demonstrated faricimab, a dual angiopoietin-2 (Ang-2)/vascular endothelial growth factor-A inhibitor, maintained vision gains with extended treatment durability. This analysis assessed retinal fluid control in patients with diabetic macular oedema (DMO).
Method: YOSEMITE/RHINE were randomised, double-masked, active comparator-controlled trials investigating efficacy, safety and durability of faricimab 6.0 mg versus

aflibercept 2.0 mg in patients with DMO. Patients were randomised 1:1:1 to faricimab 6.0 mg personalised treat-and-extend (T&E), faricimab 6.0 mg every 8 weeks (Q8W) or aflibercept 2.0 mg Q8W through week 100 (pooled N = 1891).

Results: Noninferior vision gains at one year were maintained through year 2. Nearly 80% of patients who achieved Q16W dosing at week 52 remained on Q16W with no interval reduction. Time-to-75th percentile for first central subfield thickness < 3 25 μm was 36 weeks for aflibercept (median injections: 7) vs. 20 weeks for faricimab Q8W (hazard ratio [HR] 1.37; 95% confidence interval [CI] 1.20-1.56; $p < 0.0001$) and T&E (HR 1.47 [95% CI 1.29-1.68]; $p < 0.0001$) arms (median injections: 5 and 4). Time-to-50th percentile for first intra-retinal fluid absence was 84 weeks for aflibercept (median injections: 12) vs. 48 weeks for faricimab Q8W (HR 1.63 [95% CI 1.41–1.88]; $p < 0.0001$) and T&E (HR 1.67 [95% CI 1.45–1.93]; $p < 0.0001$) arms (median injections: 9 and 7).

Conclusion: Dual Ang-2/vascular endothelial growth factor-A inhibition with faricimab offers vision gains and extended durability over two years for DMO, while enabling patients to reach absence of DMO and intra-retinal fluid faster with fewer injections versus aflibercept.

Angiographic features on optical coherence tomography angiography and ultrawide field imaging predict anti-vascular endothelial growth factor response in diabetic macula oedema

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Purpose: Diabetic macular oedema (DMO) is the leading cause of blindness in diabetic patients. Intravitreal anti-vascular endothelial growth factor (VEGF) therapy is the mainstay treatment for DMO but over 40% of eyes demonstrate poor treatment responses and require alternate therapies. Identifying good/poor responders prior to treatment would be of great benefit to current clinical practice.

Methods: We have performed a three-year prospective study with the aim to identify pre-treatment biomarkers that predict functional (visual acuity; VA) and structural (central retinal thickness; CRT) outcomes. We recruited 76 eyes with DMO, which were then treated with Aflibercept (Eylea) monthly for six months. At baseline all patients had bloods taken and underwent fundus photography, optical coherence tomography (OCT), ultrawide-field fluorescein angiography and OCT angiography. From these baseline scans, specific details were graded in a masked fashion by three ophthalmologists and quantitative features were extracted, including macular vessel density derived from OCT angiography.

Results: From these baseline recordings, we found at six months, eyes with a greater vessel density (on OCT angiography) were predictive of VA improvement ($p = 0.001$), eyes with peripheral non-perfusion (on ultra-wide-field fluorescein angiography) were predictive of CRT reduction ($p = 0.005$) and elevated low-density lipoprotein at baseline was predictive of both VA improvement and CRT reduction ($p < 0.001$). We found no predictive value in any other demographic, blood or imaging-based marker.

Conclusion: These results suggest angiographic features play an important role in anti-VEGF treatment response in DMO and may be used as biomarkers to better-stratify patients who will benefit from anti-VEGF therapy.

Aqueous humour cytokines associated with optical coherence tomography features in diabetic macular oedema

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Purpose: To assess the association between cytokine expression and optical coherence tomography (OCT) features of diabetic macular oedema (DMO).

Methods: This is a post-hoc analysis of baseline data from a prospective study designed to evaluate the effect of intravitreal ranibizumab injections on aqueous humour cytokines in center-involved DMO. OCT images were evaluated for baseline imaging features of DMO including: central macular thickness (CMT), macular volume (MV), subretinal fluid height, morphological pattern, intraretinal cyst size, status of the ellipsoid zone/external limiting membrane, presence of disorganisation of retinal inner layers, number of hyperreflective foci and the presence of epiretinal membrane or vitreomacular traction. Hierarchical cluster analysis

was used to identify two clusters that shared similar cytokine characteristics (low and high expression profiles), and differences in OCT imaging parameters across clusters were compared by multivariable logistic regression models.

Results: Cytokine concentrations and OCT images were obtained from 30 eyes of 25 patients. Hierarchical cluster analysis demonstrated that low cytokine concentrations were associated with better best-corrected visual acuity (BCVA) (odds ratio [OR] 0.90, [95% confidence interval; CI 0.81,0.99], $p = 0.05$), thinner CMT (OR 1.08, [95% CI 1.01,1.17], $p = 0.03$), and lower MV (OR 2.08, [95% CI 1.10,3.90], $p = 0.02$). Reduced BCVA, greater CMT and larger MV were individually correlated with IL-7, IL-9, MIP-1a and TNF-a. Increased subretinal fluid and presence of disorganisation of retinal inner layers was associated with other various cytokines.

Conclusion: Higher cytokine expression is associated with worse BCVA, CMT and MV. Although multiple cytokines are likely to be involved in DMO, we identified specific cytokines that may drive the process.

An intravitreal 'photo-switch' molecule for reanimation in retinitis pigmentosa: A first-in-human trial

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Purpose: To assess the efficacy of a novel intravitreal "photo-switch" molecule (KIO-301) which renders retinal ganglion cells responsive to light.

Methods: As part of an ongoing, six subject (12 eyes) phase I/II dose-escalating study (ABACUS) of the safety, tolerability and efficacy of KIO-301 administered intravitreally to patients with non-syndromic late-stage retinitis pigmentosa (RP; NCT05282953), subjects undergo general ophthalmic examination at four hours, one day, and one, two and four weeks post injection. Safety lab assessments are performed at baseline and 29 days. A subject-reported effectiveness survey is administered at four timepoints post-injection over the same 29-day period.

Results: There were no reported systemic or ocular adverse events. The ocular examination remained unchanged from baseline. There were no significant changes in any clinical chemistry or hematology laboratory values at 29 days. The subject-reported outcome indicated an improvement in the ability to perceive contrast between light and dark at Day 7 and 29 post injection and perceived improvement in overall functional vision. Patient reported experiences were positive and a subject with no light perception recovered light perception.

Conclusion: Small molecule photoswitch compounds have shown promise in the ability to restore vision in RP animal models. This case study, as part of an ongoing, larger clinical trial, documents the first-in-human report of safety and tolerability of KIO-301 in this late-stage RP population. Early signs of patient reported effectiveness are encouraging and support additional patients and dose escalation.

Two parallel, phase 3 randomised controlled trials of the NT-501 ciliary neurotrophic factor implant for Macular Telangiectasia type 2

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Purpose: Very little was known about idiopathic macular telangiectasia type 2 (MacTel type 2) 20 years ago when the International MacTel Project, sponsored by the Lowy Medical Research Institute, began. Here we present the outcomes of two parallel phase 3 studies of ciliary neurotrophic factor, delivered by the NT-510 device (Neurotech, RI, USA) for MacTel Type 2.

Methods: Eyes were randomised 1:1 to receive sham or the NT-501 implant. The primary outcome was the rate of change from baseline in the area of ellipsoid zone loss over 24 months as measured by en face spectral domain-optical coherence tomography Secondary outcomes included adverse events. Results were analysed by intention to treat.

Results: A total of 228 patients were randomised overall to both studies, 115 in NTMT-03A and 113 in NTMT-03B. The rate of ellipsoid zone area (mm^2) change was reduced by 56.4% in Study A and 29.2% in Study B. Impaired dark adaptation was noted in 16.8% NT-501 treated eyes compared with 8.4% sham surgery eyes. Other events that were reported more commonly in NT-501 eyes compared to sham surgery eyes included miosis (15.3% vs. 3.9%) and suture-related adverse events (2.0% vs. 0.6%). Choroidal neovascularisation occurred in 2.0% NT-501 eyes vs. 2.6% sham surgery. Two (1.0%) implants were extruded.

Conclusion: The NT-501 ciliary neurotrophic factor device is the first intervention that has been shown to safely slow photoreceptor degeneration in MacTel Type 2.

Prediction of vitreomacular traction syndrome outcomes with deep learning: A pilot study

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Purpose: To investigate the potential of an optical coherence tomography (OCT) based deep-learning model in the prediction of vitreomacular traction (VMT) syndrome outcomes.
Methods: A single-centre retrospective review. Records of consecutive adult patients attending the Royal Adelaide Hospital vitreoretinal clinic with evidence of spontaneous VMT were reviewed. All patients with evidence of causes of cystoid macular oedema or secondary causes of VMT were excluded. OCT scans and outcome data obtained from patient records was used to train, test and then validate the models.
Results: Ninety-five patient files were identified from the OCT (SPECTRALIS system; Heidelberg Engineering, Heidelberg, Germany) records. Twenty-five percent of the patients spontaneously improved, 48% remained stable and 27% had progression of their disease. The final model utilised a sequence of longitudinal patient data and was able to predict 'improvement' or 'stable' disease with a positive predictive value of 0.72 and 0.79, respectively.
Conclusions: Deep-learning models may be utilised in real-world settings to predict outcomes of VMT. This approach requires further investigation as it may improve patient outcomes by aiding ophthalmologists in cross-checking management decisions and reduce the need for unnecessary interventions or delays.

15:00 – 15:30 **Afternoon Tea**

15:30 – 17:00 **CONCURRENT SESSIONS**

15:30 – 17:00 **COURSE -**

AUSCRS SYMPOSIUM 2023 – Latest advances and future of refractive cataract surgery

Aim: The aim of this symposium will be to provide the audience with tips and tools that can be incorporated into their practice to achieving great results with modern cataract surgery. From the basics on preoperative evaluation to challenging scenarios like post-laser in situ keratomileusis and keratoconus patients. As well as a formal format, presentations will contain case discussions to highlight important concepts. The audience will leave with knowledge to allow them to take their cataract surgery practice to the next level.
Speakers and Topics:
Dr Andrea Ang – Preoperative patient counselling and expectations
Dr Ben LaHood – Preoperative measurements and biometry: unique features to look out for. Long eyes short eyes, posterior corneal astigmatism, anterior chamber depth, tear film, red flags
Dr Aanchal Gupta – Planning your astigmatism correction: features on the intraocular lens (IOL) master, use of topography and also central topography, integrated Ks, toric calculators
Dr Tanya Trinh – Presbyopia solutions: monovision, extended depth of focus and Trifocal, diffractive vs. non-diffractive designs
Dr Jacqueline Beltz – Intraoperative tips: what is the ideal size rhexis, should I clear the anterior capsule, is IOL centration are important
Dr Vincenzo Maurino – IOL calculation and IOLs types in post-laser in situ keratomileusis eyes
Prof Graham Barrett AM – IOL formulae and optimising refractive outcomes in patients with keratoconus

Venue: Riverside Theatre

Chair: Dr Aanchal Gupta

15:30 – 17:00 **COURSE -**

Optic disc elevation – The good, the bad and the ugly

Aim: This course will cover the practical approach in unilateral disc elevation and in bilateral optic disc elevation. Recent advances in optical coherence tomography imaging and important investigation modalities to evaluate optic nerve elevation will be discussed.
Synopsis: Optic disc elevation may be the presenting feature of a sight threatening or a life threatening condition.
Congenital anomalous elevation of one or both optic discs can result from drusen that may be easily visible by ophthalmoscopy or impossible to identify unless one uses an ancillary technique such as autofluorescence, optical coherence tomography, ultrasonography, fluorescein angiography or computed tomographic scanning.

(Continues)

Patients with optic disc drusen – even drusen that are superficial – may be misdiagnosed as having papilledema as may patients with congenital optic disc elevation from optic disc hypoplasia and tilted optic discs.
In true optic disc swelling, the differential diagnosis differs according to whether the swelling is unilateral or bilateral, or whether the optic nerve functions are normal or abnormal.
Ancillary tests such as optical coherence tomography, ultrasonography, fluorescein angiography or neuroimaging play an instrumental role to help the clinician to reach the correct diagnosis.
A collaborative approach is important in the management of neuro-ophthalmology patients with disc elevation.
In this symposium, various conditions that cause anomalous optic disc elevation as well as the methods to distinguish them from papilledema and other causes of acquired optic disc swelling will be discussed. The importance of inter-disciplinary collaboration will be highlighted.

Panel: Prof Neil Miller, Prof Helen Danesh-Meyer, Prof Celia Chen, Dr Jolandi van Heerden and Dr Jane Lock

Speakers and Topics:
Prof Neil Miller – Congenital anomalous elevations of the optic disc(s)
Prof Helen Danesh-Meyer – Practical approach to unilateral optic nerve elevation
Prof Celia Chen – Practical approach to bilateral optic nerve elevation
Dr Jolandi Van Heerden – Papilloedema: Neuro-imaging considerations
Dr Jane Lock – Communicating with interdisciplinary colleagues – tips and pitfalls?

Venue: BelleVue Ballroom 1

Chairs: Prof Celia Chen and Prof Helen Danesh-Meyer

15:30 – 17:00 **COURSE -**

Management of diabetic macular oedema and proliferative diabetic retinopathy in 2023

This new course will update RANZCO fellows on current approaches to the management of 2 key and relatively frequent causes of progressive visual loss, Diabetic Macular Oedema (DMO), and Proliferative Diabetic Retinopathy (PDR). Key data from recent Phase III randomised trials will be presented and will be supplemented with a large array of case presentations showing short, intermediate - and long-term outcomes with standard therapy. These will include more difficult cases, such as combined DME/ PDR, presence of extensive exudate, or of significant cataract, and those presenting during pregnancy or in patients with renal failure, plus vitreoretinal surgical options.
Speakers and Topics:
1. Prof Paul Mitchell AO - Introduction to Course on DME and PDR:
2. Dr Richard Kha - Overview of current Global & Australian data on prevalence of DME and PDR.
3. Dr Jia Hui Lee - Overview of Key Randomised Clinical Trials for DME; DRCR.net protocol studies, plus key recent trial data for aflibercept and faricimab.
4. Practical Management of Diabetic Macular Oedema and Proliferative Diabetic Retinopathy.
DME: Current protocols for use of anti-VEGF, including injection-intensive cases, extensive exudate deposition, suspending therapy, follow-up approaches.
Prof Paul Mitchell AO - PDR: Typical and atypical PDR presentations, management of combined DME/PDR, pan-retinal laser techniques and endpoint, use of adjunctive anti-VEGF, predictors of “crunch” phenomenon, follow-up.
6. A/Prof Lyndell Lim - Management of DME/ PDR during pregnancy.
7. Prof Ian McAllister - When is Vitreoretinal Surgery needed for PDR and Outcomes of Surgery; Have indications changed?
8. Prof Chandrakumar Balaratnasingam - Vitreoretinal Surgery Techniques for PDR Complications; Approach to surgery for traction detachment in PDR, including videos.
9. Panel Discussion of Cases and General Discussion - Prof Paul Mitchell will direct questions to All other Panel Members regarding a series of cases to demonstrate approach to management of difficult and recalcitrant cases, including vision-threatening retinopathy developing during pregnancy

Venue: BelleVue Ballroom 2

Chair: Prof Paul Mitchell AO

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15:30 – 17:00 **RANZCO PROFESSIONAL DEVELOPMENT**

Title: Why do they matter? Registries demystified – the what, why, how and where

Synopsis: This interactive session will address practical ways college members can implement collection of treatment outcomes in their clinics to meet their CPD requirements, track their outcomes and improve patient

care. Experiences from registries across the country will be shared with audience polling and the opportunity for interactive discussion.
Speakers and Topics:
Prof Lawrence Lee – How tracking outcomes using registries can help you meet your CPD requirements
Prof Stephanie Watson – Practical tips for implementing audit data collection in your clinic
Dr Richard Symes – How tracking outcomes of uveitis management can improve outcomes
Dr Rod O'Day – Development of an ocular melanoma registry
A/Prof Fred Chen – The Australian Inherited Retinal Disease Registry and DNA Bank
Dr Hemal Mehta – Fight Retinal Blindness! registry – developments to track macular atrophy as new treatments become available

Venue: Riverview 4

Chairs: Prof Lawrence Lee, Prof Mark Gillies, Dr Jennifer Arnold, Prof Nigel Morlet

15:30 – 17:00 **FREE PAPERS - Oculoplastic / Orbit**

Venue: Meeting Room 3

Chairs: Dr Jenny Danks and Dr Kenneth Chan

Ocular manifestations of obstructive sleep apnea: A systematic review and meta-analysis

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Background: The association of obstructive sleep apnea (OSA) with development of eye diseases is unclear. This current systematic review and meta-analysis attempts to summarize and analyze associations between OSA and ocular disorders in the literature.
Methods: PubMed, EMBASE, Google Scholar, Web Of Science, and Scopus databases were searched from 1901 to July 2022 in accordance with the Preferred Reporting in Systematic Review & Meta-Analysis (PRISMA). Our primary outcome assessed the association between OSA and the odds of developing floppy eyelid syndrome (FES), glaucoma, non-arteritic anterior ischemic optic neuropathy (NAION), retinal vein occlusion (RVO), keratoconus (KC), idiopathic intracranial hypertension (IIH), age-related macular degeneration (AMD) and central serous chorioretinopathy (CSR) through odds ratio calculated at the 95% confidence interval.
Results: Forty-nine studies were included for systematic review and meta-analysis. The pooled OR estimate was highest for NAION [3.98 (95% CI 2.38, 6.66)], followed by FES [3.68 (95% CI 2.18, 6.20)], RVO [2.71(95% CI 1.83, 4.00)], CSR [2.28 (95% CI 0.65, 7.97)], KC [1.87 (95% CI 1.16, 2.99)], glaucoma [1.49 (95% CI 1.16, 1.91)], IIH [1.29 (95% CI 0.33, 5.01)] and AMD [0.92 [95% CI 0.24, 3.58]. All observed associations were significant ($p < 0.001$) aside from IIH and AMD.
Conclusion: OSA is significantly associated with NAION, FES, RVO, CSR, KC, and glaucoma. Clinicians should be informed of these associations so early recognition, diagnosis, and treatment of eye disorders can be addressed in at-risk groups, and early referral to ophthalmic services is made to prevent vision disturbances. Similarly, ophthalmologists seeing patients with any of these conditions.

Bilateral epiphora improvement after unilateral dacryocystorhinostomy: Outcomes and predicting factors

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Purpose: Patients with bilateral epiphora often have asymmetric symptoms and nasolacrimal duct pathology. Contralateral or untreated eye effects following treatment of one eye have been observed in macular degeneration and glaucoma therapies, which may be mediated by bilateral neural reflexes. This study aimed to quantify the proportion of patients with bilateral epiphora who had improvement bilaterally following unilateral dacryocystorhinostomy and investigate predictive factors.

Methods: A retrospective cohort study of patients from an Australian lacrimal clinic was performed. Eligible patients were adults, complained of bilateral epiphora and had follow up after a unilateral DCR between 2012 and 2022. Two-sided confidence intervals were calculated for the proportion of participants in each outcome group. Ordinal elastic net regression identified clinical features important in better outcome groups and estimated their effect sizes.
Results: Of 243 patients, the median post-operative follow-up duration was 3 months. Fifty-eight percent (95% CI 52-64%, n=141) had significant bilateral improvement, 5% (95% CI 3-9%, n=13) had small bilateral improvement and 26% (95% CI 20-31%, n=62) had ipsilateral improvement only. Independent predictors of outcome were older age (OR 1.01), contralateral nasolacrimal duct narrowing (OR 1.37), contralateral nasolacrimal duct obstruction (OR 0.93) and longer follow-up time (OR 0.85).
Conclusion: Many patients who undergo unilateral DCR surgery have bilateral improvement of their epiphora. Contralateral nasolacrimal system diagnosis, patient age and follow-up duration were associated with different outcomes. Further study may elucidate underlying mechanisms of contralateral tearing improvement after ipsilateral DCR.

Radiological measurements of lacrimal gland in thyroid eye disease

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Purpose: Lacrimal gland enlargement is a common feature of thyroid eye disease and has been positively correlated with the clinical activity score. Although lacrimal gland volume is the preferred measure of lacrimal gland size, its calculation is not clinically translatable due to the expertise, time and advanced software required. The aim of our study is to determine whether the lacrimal gland volume in patients with thyroid eye disease undergoing magnetic resonance imaging can be estimated using simpler lacrimal gland linear and area measurements.
Methods: A retrospective review of 102 orbits with thyroid eye disease who underwent orbital magnetic resonance imaging was conducted. The maximum length, width and area of the lacrimal gland were measured in axial and coronal sections. Lacrimal gland volume was calculated by using a manual segmentation technique on all consecutive axial slices on commercially available software, OsiriX. All quantitative measurements were correlated with the lacrimal gland volume.
Results: Mean age of participants was 59 $\pm$ 16 years and 67% (n = 34) were female. With multivariate analyses, combined lacrimal gland axial and coronal area strongly correlated with volume (r = 0.843, $p < 0.01$). Strong univariate predictors of volume included axial area (r = 0.704, $p < 0.01$) and coronal area (r = 0.722, $p < 0.01$), while moderate predictors included axial length (r = 0.523, $p < 0.01$), axial width (r = 0.521, $p < 0.01$), coronal length (r = 0.450, $p < 0.01$) and coronal width (r = 0.649, $p < 0.01$).
Conclusion: In patients with thyroid eye disease, lacrimal gland volume can be estimated using axial and coronal areas, which is simpler and more time efficient than calculating volumes.

Surgical management of orbital fractures in the South Island of New Zealand

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Purpose: Orbital fractures are a common presentation to acute care and the indications and timing for surgery are controversial. Existing studies evaluating the surgical management of such fractures in Australasia are limited. We aimed to assess surgical intervention rates, indications for surgical repair and complication rates in orbit-involving fractures occurring in Christchurch, New Zealand.
Method: We performed a retrospective review of all orbital fractures presenting to Christchurch Hospital, New Zealand from March 2019 through March 2021.
Results: A total of 284 patients had orbital fractures, composed of 116 isolated wall fractures and 168 complex orbitofacial fractures. More complex fractures were managed surgically compared with isolated fractures (59% vs. 48%), however only 27% of complex fractures had surgery involving the orbit. Mean time to surgery was 7.4 days across both fracture types. For isolated orbital fractures, the primary indication for surgical intervention was size/radiological appearance (78%), followed by enophthalmos (13%) and clinical entrapment (9%). The overall surgical complication rate was 10%, with 6% of fractures requiring further surgery. New diplopia occurred post-operatively in 5% of cases.
Conclusion: Surgical intervention for orbital fractures in the South Island of New Zealand occurs early. Nearly half of isolated orbital wall fractures were managed

surgically, and the decision to proceed to surgery is based predominantly on radiological findings. Orbital surgery in complex fractures was less common.

Management of periocular basal cell carcinoma: A six-year retrospective review

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Purpose: Analysis of periocular basal cell carcinoma (BCC) patient demographics, tumour characteristics and surgical outcomes of a complex case load at a quaternary referral centre.
Methods: A retrospective study of periocular BCC management was conducted over a 6-year period from January 2014 to December 2019 at Sydney/Sydney Eye Hospital, Australia. Paper/electronic patient medical records were evaluated. Cases were divided into two groups: Group 1 consists of primary BCC, and Group 2 consists of recurrent BCC at presentation, or from Group 1.
Results: 131 patients with 158 periocular BCC cases were reviewed. Mean follow-up period was 28.6 months. Mean age of diagnosis was 71. Male-to-female ratio was 1:1.07. 98.7% of the study population were of Northern European descent.15.3% had additional malignancies.
Predominant histological subtypes were nodular (30%), noduloinfiltrative (22%) and infiltrative (17%). Case mix in Group 1 and Group 2 were 88.6% and 11.4% respectively. Tumour location was mainly lower lid (58.7%). Management was either fresh frozen section (FFS, 61.4%) or surgical excision with margins (SEM, 38.6%).
Three cases (1.9%) had post-operative complications. Complete excision at primary procedure were 70.5% for SEM and 87.6% for FFS. Incomplete excision was related to aggressive subtypes ($p<0.05$, x2). Recurrence rate was 4.4% and was also associated with aggressive subtypes.
Conclusion: Incomplete clearance and recurrence are linked to aggressive subtypes and medial canthal region. Improved outcomes with FFS relative to SEM were reported in this study. Future studies comparing to Mohs microsurgery would be valuable in evaluating patient satisfaction, outcome measures and health economics.

Inferior orbital fissure release to access the inferolateral orbital apex

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Purpose: To describe a novel technique that will improve surgical access to the inferior and inferolateral posterior orbit via release of the inferior orbital fissure (IOF).
Methods: Cadaveric dissection study. Measurements were taken in the sagittal plane from the midpoint of the inferior orbital rim to the most posterior aspect of the orbital floor.
Results: Eleven orbits from six cadaver heads were dissected with the aid of a rigid endoscope and microsurgical instruments. Structures traversing the IOF were protected by Muller's muscle, which is a smooth muscle layer spanning its entire length. This study demonstrated that an additional 11.09 ± 2.28 mm of access to the posterior orbit was gained following the release of periorbita from the IOF.
Conclusion: We propose that the IOF release can be adopted as a minimally invasive technique during the approach to the inferior and inferolateral orbital apex

Treatment of periocular cutaneous melanoma in situ with imiquimod

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Purpose: To report the safety and efficacy of a 12-week course of imiquimod cream to periocular melanoma in situ.
Method: Patients routinely underwent pretreatment confocal microscopy and biopsy followed by a 12-week course of topical Imiquimod.
Results: Seventeen patients over a four year period were treated, 14 females, three males, average age 77 years. Nine patients had recurrent lesions following previous radiotherapy or surgery with the number of previous excisions ranging from one to 12. Eight patients were successfully treated with no recurrence clinically and on routine follow up confocal microscopy. Six patients have ongoing treatment due to incomplete reaction requiring retreatment. One patient with chronic leukaemia did not develop a cutaneous reaction and underwent surgery. One patient was found to have residual atypical cells on follow up confocal microscopy. Follow up range was 6-37 months (average 13).

Conclusion: There were no serious complications during the 12 week treatments and no post treatment morbidity. Patient reaction to imiquimod was variable and sometimes required retreatment with more frequent applications to achieve a result.

RANZCO trainees and thyroid eye disease management

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Purpose: To evaluate the current practice patterns in the management of thyroid eye disease (TED) by RANZCO trainees within New Zealand.
Method: A cross-sectional study on ophthalmologists and RANZCO trainees in New Zealand via an online questionnaire was conducted in April 2021 to examine current practice patterns for the evaluation, monitoring and management of thyroid eye disease. The chi-square test was used to identify associations between responses and demographic variables.
Results: Eighty ophthalmic surgeons completed the survey (50% response rate). Of those, 72% were consultants and 28% were trainees. Around half (45%) of trainees saw less than one case of TED in their clinical practice per month. Trainees were more likely to utilise a grading system for the severity (89%) and activity (95%) of TED compared to consultants (73% and 63%, respectively). Trainees were more likely to use TSH receptor antibodies (63%) as the initial investigation in a case of euthyroid TED, compared to consultants (27%). All trainees who responded recommend selenium supplementation, whereas only half (57%) of consultants do. Both trainees and consultants had minimal experience using biologic agents in the treatment of active TED. Compared to trainees, less consultants used radiotherapy as management of active TED (35% vs. 57%).
Conclusion: Trainees see limited numbers of TED in their clinical practice. Despite this, findings suggest trainees are more likely to adhere to international guidelines compared to general ophthalmologists. Greater training focus on novel therapies and establishment of a national TED multidisplinary team would allow optimisation of TED management for the future.

Clinical and laboratory outcomes of patients with initial presumed auto-antibody negative, euthyroid eye disease

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Purpose: Patients presenting with clinical signs of thyroid eye disease who are euthyroid and thyroid auto-antibody negative on biochemical testing are a very uncommon group of patients. We aim to describe the clinical characteristics, investigation findings and outcomes of this patient group.
Methods: Retrospective multicentre observational case series involving patients who were clinically diagnosed with thyroid eye disease, and were euthyroid with negative thyroid auto-antibodies at initial presentation. Data collected included demographics, clinical presentation, thyroid function and antibody tests, other investigations, treatment and management outcomes.
Results: Ten patients were identified. The mean age at presentation was 54.8 ± 19.0 years of age, with six patients (60%) being male. The most common presenting findings were decreased extraocular movements (9, 90%), lid retraction (9, 90%), proptosis (9, 90%), lid lag (8, 80%) and blurred vision (6, 60%). All patients demonstrated asymmetric enlargement of extraocular muscles on imaging. Four patients (40%) developed biochemical evidence of thyroid disease during follow up at two, three, 17 and 31 months. Two patients (20%) underwent observation only. Four patients (40%) were managed with intravenous steroids. Four patients (40%) had both medical management and surgical intervention. At last follow up, patients had stable disease (5, 50%) or significant improvement of their disease with mild residual symptoms (5, 50%).
Conclusion: We present a case series of patients clinically diagnosed with euthyroid eye disease who also had negative auto-antibodies at initial presentation. All patients had stable disease or complete resolution of symptoms with interventional strategies typically used for thyroid eye disease.

Five year summary of RANZCO trainees logged procedures for each training site and its application

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Purpose: This study analyses the data collected from the RANZCO e-diary to map the surgical and laser experience gained at each training post in Australia and New Zealand. This will enable better planning of term

allocation to registrars for them to gain a comprehensive ophthalmologic training exposure.
Method: Trainees currently log their surgical experience on the RANZCO e-diary. This data from 2018 to 2023 inclusive was analysed. Procedures were grouped into the 25 RANZCO defined procedures of which there is a required minimum number. The numbers of procedures in each of these groups was determined for each training post in Australia and New Zealand
Results: There were 214,530 procedures entered, of which 194,120 were classified as one of the minimum required procedures. One hundred and thirty-six sites had information for five years, another 100 for one to four years. The experience gained at different sites varied immensely. This data will be presented, along with how this data may be used to balance the experience of trainees or address any deficiency noted for a trainee.
Conclusion: The data shows the available surgical and laser experience at each RANZCO training site. This should enable planning of term allocation to ensure adequate experience is attained by all trainees.

Using artificial intelligence to reduce ocular work place eye injury

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Purpose: Ocular trauma is a major cause of monocular blindness worldwide[1] and accounts for a significant proportion of emergency department presentations each year. The Australian Institute for Health and Welfare reported that 44% of all emergency department presentations for ocular trauma were due to foreign bodies[2]. Monocular blindness describes the loss of vision in one eye, and consequent loss of binocular depth perception and visual field reduction[3]. Ocular trauma in the workplace is an important and preventable cause of emergency department presentations and permanent ocular injury. Ocular trauma is easily preventable through the correct use of personal protective eye equipment (PPE) and continued compliance in the workplace.
Methods: Assessment of an ocular artificial intelligence (AI) application for PPE wear to improve safety compliance in health care workers.
Results: The AI platform was able to accurately detect and monitor compliance with PPE in 250 healthcare workers, thereby reducing the risk of ocular injury in the work place e.g splash injuries, infection and trauma.
Conclusion: We have developed an easy to use AI system to improve compliance with PPE in the workplace and potentially mitigate the risk of ocular injury. Data collected from Macquarie University medical students demonstrates the role of AI in detecting the presence of PPE to increase workplace compliance through the application of a validated AI system for the identification of PPE. This AI platform may be applied in other settings such as construction and manufacturing.
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1. Keel S, Xie J, Foreman J, Taylor HR, Dirani M. The prevalence of vision loss due to ocular trauma in the Australian National Eye Health Survey. Injury. 2017;48(11):2466-2469.
2. AIHW. Eye injuries in Australia 2010–11 to 2014–15. In: Australian Government 2015.
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Orbital fractures and concurrent ocular injury in the South Island of New Zealand

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Purpose: Orbital fractures are a common presentation to acute care and carry an associated risk of ophthalmic complications. Existing studies evaluating rates of concurrent ocular injury associated with these fractures in Australasia are limited.
We aimed to assess rates of concurrent ophthalmic injury in orbit-involving fractures occurring in Christchurch, New Zealand. Secondary aims included characterisation of fracture types and patient demographics.
Method: We performed a retrospective review of all orbital fractures presenting to Christchurch Hospital, New Zealand from March 2019 through March 2021.
Results: A total of 284 patients had orbital fractures, of which 41% were isolated wall fractures, while 59% were complex orbitofacial fractures. Fractures were more common in males and occurred more frequently in young individuals, with a median age of 35. The most common mechanism of injury was interpersonal violence (32%), followed by falls (23%) and sporting related injuries (18%).

Forty-one percent of patients were reviewed by ophthalmology. Of those seen by us, 33% had an associated ocular injury. Severe ocular injury (defined as vision threatening or requiring ocular surgery) occurred in 4.9% of these patients and was more common in complex fractures than in isolated fractures. 0.7% of patients required intraocular surgery as a result of their orbital fracture.

Conclusion: Orbital fractures occurring in Christchurch have a high rate of concurrent ocular injury. Severe injuries were more common in patients with a complex facial fracture pattern. They predominantly occur in young individuals and the most common mechanism of injury is interpersonal violence.

17:00 – 18:00 **Film and Poster Viewing Session**

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Clinical & Experimental Ophthalmology WILEY

06:30 – 07:45 **ANZGS Morning Symposium**

Title: Drug eluting implants: An emerging form of glaucoma treatment

Prof Tina Wong

The focus to optimise medical management for glaucoma patients has reached a pivotal stage with the exponential interest in the use of new materials to optimise the efficiency of hypotensive medical treatment in lowering the intraocular pressure. This lecture will take the audience through a journey into the history of drug delivery in the eye and provide some insights into how this genre of medical innovation can improve glaucoma management in the future.

Venue: BelleVue Ballroom 2

Chair: Prof Keith Martin

08:00 – 08:30 **DAME IDA MANN MEMORIAL LECTURE**

Title: Why is my child blind? How genomics provides the answers patients and parents seek

Prof Kathryn P. Burdon

Synopsis: There are over 900 recognised rare eye diseases and most of them are caused by small changes to a big genome. The overarching goal of my research program is to generate the knowledge that allows us to provide accurate genetic diagnosis for rare eye disease through identifying and characterising the causative genes and genetic variants. Recent leaps forward in technological capability for interrogating the human genome have driven an explosion in new knowledge about the genes and variants that cause hundreds of rare eye diseases. In addition to discovering new genes, we have found that the genetic and molecular underpinnings of disease do not always reflect our clinical classifications, and that the genetic heterogeneity of many rare diseases is immense. Our ability to interrogate entire genomes has revolutionised both gene discovery and diagnostics but has also highlighted the challenges of interpreting genetic data in individuals, kickstarting international efforts to characterise and categorise genetic variants. This presentation will explore the benefits of genetic diagnosis for patients and families, illustrating modern approaches to gene discovery for rare eye disease and highlight important contributions Australia is making to global efforts to understand the clinical impacts of genetic variants. Advances in genomic technologies and understanding of disease-causing genes continue to increase the utility of genomic testing in the diagnosis and management of rare eye diseases.

Venue: Riverside Theatre

Chair: Prof David Mackey AO

08:30 – 09:00 **CATARACT UPDATE LECTURE**

Title: Challenging cataract surgery and new trends in cataract surgery

Dr Vincenzo Maurino

Synopsis: Cataract surgery is never to be underestimated and remains a complex eye procedure that requires experience, practice, and surgical situational awareness to be successfully completed. I will discuss what is involved in my daily cataract practice and how I manage it and latest changes to my cataract surgery.

- Complex cataract cases, especially brunescent cataract and cataract with zonulopathy need extra and specific counselling. Detailed planning is needed to approach these cases with confidence and safety and achieve success. I will discuss and provide video examples of the approach to different challenging brunescent cataract and cataract with zonulopathy and their management.
- High volume cataract surgery and the advent of immediate sequential bilateral cataract surgery that goes alongside high-volume surgery. Immediate sequential bilateral cataract surgery is here to stay and to become the norm due to its advantages and minimal/similar risks to sequential surgery.
- Cataract surgery is now a viable way to achieve spectacle independence in our older patients with the latest extended depth of focus) intraocular lens (IOL) causing minimal visual side effects compared with previous generation multifocal diffractive IOL.

IOL implants are not risk free and some IOL have recently been plagued by problems with severe IOL mineralisation causing complete IOL opacification. I will show how to tackle these cases and the techniques used to minimise zonular damage and to enable "in the bag" or sulcus IOL exchange and enhance patient's safety and outcome.

Venue: Riverside Theatre

Chair: Dr Mo Ziaei

09:00 – 09:30 **REFRACTIVE UPDATE LECTURE**

Title: What innovations is a practice offering to be at the forefront of refractive surgery?

Prof Dan Z. Reinstein

Synopsis: Three major innovations have reached maturity from the forefront of refractive surgery to be generalised amongst refractive surgeons: small incision lenticule extraction (SMILE), PRESBYOND and implantable contact lens (ICL) sizing.

– SMILE, with its unique biomechanical profile, enables larger optical zones to be programmed resulting in less spherical aberration induction and hence better night vision, while better preserving corneal nerves giving less dry eye symptoms and more rapid return to normal, including contact sports. The VISUMAX 800 introduced in 2021, provides technical improvements including 3x faster lenticule cutting time (<10 s) and software control for centration and cyclotorsion optimising both the efficacy and safety of treatment.
– PRESBYOND is a corneal treatment option for presbyopia combining a micro-anisometropia with extended depth of field produced by modulation of spherical aberration. PRESBYOND enables the correction of plano presbyopia and astigmatic ametropias between -8.00D to +5.00D. This modality obviates the need for the higher risk and lower accuracy of clear lens extraction. With over 97% of the population as suitable candidates, the bilateral laser in situ keratomileusis procedure enabling a prompt return to work and daily activities with less side effects, faster adaptation time and no loss of contrast. Laser in situ keratomileusis accuracy offers improved spherical equivalent and cylinder accuracy as well as future adjustability, reversibility and an in-built extended depth of field that enables high quality optic, low posterior capsule opacification rate monofocal intraocular lenses to be used for future cataract surgery if needed, without resorting to contrast-lowering multifocal or diffractive intraocular lenses.
– ICL has significantly expanded the treatment range outside of that amenable to corneal refractive surgery. However, the challenge of ICL sizing problems requiring exchange or more serious complications is probably responsible for generally low adoption rates (excluding where marketing and social engineering leads to ICL implantation despite being excellent candidates for corneal procedures). Very high-frequency digital ultrasound and the Reinstein ICL formula has produced significantly better sizing with vault prediction improved by a factor of 3.4 compared to white-to-white and by a factor of 2.2 compared to anterior segment optical coherence tomography based sizing. By Reinstein formula 61% of eyes achieve a vault within ±100 μm and 96% within ±300 μm of predicted. Thus very high-frequency digital ultrasound sizing provides greatly improved early and long-term safety for ICL technology making it potentially an alternative to corneal refractive surgery for the general ophthalmologist that has not invested in laser technology and specialist training to perform corneal refractive surgery.

Venue: Riverside Theatre

Chair: Dr Season Yeung

09:30 – 10:00 **ROYAL AUSTRALIAN AND NEW ZEALAND COLLEGE OF OPHTHALMOLOGISTS (RANZCO) AGM**

Venue: Riverside Theatre

10:00 – 10:30 **Morning Tea**

10:30 – 12:00 **PLENARY- CLINICAL CONTROVERSIES**

Speakers and Topics:

Dr Shigeru Kinoshita – One thought about Meibomian gland dysfunction and its inflammation

Meibomian gland inflammation is commonly associated with ocular surface inflammation, which can occur in conditions such as blepharokeratoconjunctivitis, ocular rosacea, and phlyctenular keratitis. The clinical features of Meibomian gland dysfunction with inflammation, Meibomitis-related keratoconjunctivitis, are similar to those observed in the aforementioned diseases, suggesting a close relationship between inflammatory MGD and ocular surface inflammation. Accurate diagnosis and management of meibomitis, an inflammatory form of MGD, are crucial for effectively treating the resulting ocular surface inflammation. We propose that the meibomian glands and ocular surface should be considered as a single unit, termed "meibomian gland and ocular surface," emphasizing their interconnectedness.

Dr Vincenzo Maurino – The advent of ISBCS: the way forward in clinical practice

I will discuss the recent trends for ISBCS at Moorfields Eye Hospital. The newest literature on safety and efficacy profile of immediate sequential bilateral cataract surgery (ISBCS) compared to delayed sequential bilateral cataract surgery (DSBCS) will be presented. ISBCS could be the best surgical choice for our patients when clinically indicated.

Prof Dan Reinstein – Social engineering in refractive surgery leads to nefarious conspiracies that pray on the ignorance of the lay public enabling inferior options to be offered as the only option
Refractive surgery is elective and entails operating on eyes that apart from a refractive error, are healthy and see well. There are a number of accepted and widely performed procedures that have gained and maintained traction despite being

a lower standard of care than alternative options. For example, clear lens exchange with a multifocal IOL is widely regarded as an appropriate treatment option for early presbyopic patients in the absence of cataract despite corneal surgery (monovision, PresbyMax or PRESBYOND) being a safer, more accurate, lower side effect, adjustable and reversible option. The social engineering behind for this phenomenon will be explored. A second example is the low penetrance of epithelial thickness mapping in preoperative screening for keratoconus before corneal refractive surgery. Epithelial mapping has been shown to be the most sensitive adjunctive tool in detecting early keratoconus and provides better patient safety, when combined with the currently accepted standard of tomography (e.g. Pentacam). Finally, a third example is the increasing prevalence of offering ICL implantation in low to moderate myopia in eyes suitable for corneal refractive surgery, where the safety profile of extraocular corneal surgery clearly surpasses the safety of an intraocular procedure.

Prof Neil Miller – Post-Cataract Surgery Anterior Optic Neuropathy: Is there such a thing and, if so, why does it occur and how can we prevent it?

Previous studies have documented that some patients develop an acute anterior optic neuropathy that occurs within 1 year after apparently uncomplicated cataract surgery (post-cataract surgery anterior optic neuropathy, PCSAON). There are two types of this optic neuropathy: an immediate form that occurs within a few days after the surgery associated with an increased intraocular pressure during or shortly after the surgery, and a delayed type, the explanation for which is uncertain. Furthermore, patients who have experienced either spontaneous non-arteritic anterior ischemic optic neuropathy (NAION) or PCSAON in one eye may have an increased risk of a similar event occurring after cataract surgery in the fellow eye. More recently, however, retrospective studies have produced conflicting results as to whether or not the use of topical anesthesia for cataract surgery as well improvements in surgical techniques have eliminated or at least reduced the risk of development of PCSAON. In this talk, I will discuss these issues. I suggest that patients who have experienced either spontaneous NAION or PCSAON in one eye and who are being considered for cataract surgery in the fellow eye should be counseled on the possible increased risk of developing PCSAON.

Prof Tina Wong – SLT and Angle Closure Glaucoma

The clinical utility of SLT is well established for POAG eyes. However, treating angle closure glaucoma with SLT is not standard practise. The application of SLT and the new direct SLT will be discussed in this presentation.

Venue: Riverside Theatre

Chair: Dr Amy Cohn

12:00 – 13:30 **Lunch**

13:30 – 15:00 **CONCURRENT SESSIONS**

13:30 – 15:00 **COURSE -**

When the going gets tough in cataract surgery: A video symposium of how to deal with challenges during cataract surgery

Aim: With the advances in surgical technique and instrumentation, cataract surgery is one of the safest surgeries in medicine today. However, every cataract surgeon comes across challenging cases, either from the word go or during the course of the surgery. How we learn from our own mistakes or from our peers helps us become better surgeons, enabling us to provide a fantastic outcome for our patients. With a variety of techniques, tips and tricks, this video based symposium will show you how to deal with an expected/unexpected challenge or complication during cataract surgery.

Speakers and Topics:

Prof Nitin Verma AM – Introduction
Dr Andrea Ang – Managing the small pupil
Dr Vignesh Raja – Zonular dialysis
Dr Minu Mathen – Managing posterior capsule rupture
Dr Sunil Thangaraj – When and how to abandon phaco
Dr Dimitri Yellachich – Management of the unstable lens with intraocular lens implantation in the absence of capsular support
Dr Vaibhav Shah – Challenging cataracts in the Indigenous population
Dr ZhuLi Yap – Management of traumatic cataracts
Dr Sunil Thangaraj – Management of intumescent/brown cataracts

Venue: BelleVue Ballroom 1

Chairs: Prof Nitin Verma and Dr Vignesh Raja

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13:30 – 15:00 **COURSE -**

Retinal imaging: The best cases from the Royal Victorian Eye and Ear Hospital Angiogram Meeting for 2023

Aim: Following on from the success of last year's similar symposium, we aim to show a selection of cases highlighting diverse retinal pathologies and management dilemmas. The expert panel will be interrogated regarding pathophysiology, natural history and evidence-based therapy. Audience participation is welcome but voluntary. Our aims for the symposium are:
1. To discuss a wide range of retinal pathologies;
2. To apply best practice and peer review literature to retinal disease management;
3. To showcase the best use of multimodal imaging in retinal disease management; and
4. To encourage discussion between panel members and audience.
Panel: A/Prof Salmaan Qureshi, Dr Ming-Lee Lin, Dr Xavier Fagan and A/Prof Fred Chen
Topics for Discussion: Diabetic macula oedema; proliferative diabetic retinopathy; macula telangiectasia; retinal vein occlusion; patch off blindness and paracentral acute middle maculopathy; uveitis; inherited retinal dystrophies; white dot syndromes; and many more.

Venue: BelleVue Ballroom 2

Chair: Dr Amy Cohn

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13:30 – 15:00 **COURSE -**

Update of common paediatric conditions for all ophthalmologists

Aim: A refresher course with updates to ensure that more general ophthalmologists are updated and feel confident in seeing paediatric patients and managing routine paediatric cases. Also aim to clarify when paediatric cases may need referral to a tertiary paediatric ophthalmic department. By increasing the general ophthalmologist's confidence in assessing paediatric patients, we aim to ensure that all children who require ophthalmic care can receive timely care from the current network of private paediatric and general ophthalmologists and the public hospital ophthalmic services.
Panel: Dr Caroline Catt, Prof John Grigg and Prof David Mackay
Speakers and Topics:
Dr Loren Rose – Update in myopia assessment and management including the latest lens technology
A/Prof Susan Carden – Retinopathy of prematurity: managing a changing paradigm
Dr Hugo Lee – Update of paediatric eyelids for the general ophthalmology
Dr Maree Flaherty – Dylexia: the ophthalmologist's role
Dr Linda Zheng – Allergic conjunctivitis, when to treat, how and when should immunotherapy be considered or not
Dr Jane Lock – Assessing optic discs in kids

Venue: Riverside Theatre

Chairs: Dr Shanel Sharma and Dr Loren Rose

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13:30 – 15:00 **RANZCO PROFESSIONAL DEVELOPMENT**

Title: Making our highest volume cataract/retina procedures sustainable. What can I do? A session with Dr David Chang and Dr Geoff Emerson

Synopsis: This session will highlight progress on sustainable practices in ophthalmology internationally and our sustainable practice guides which offer practical steps on improving the sustainability of cataract surgery and intravitreal injections here at home. We have two international guest speakers appearing via video link, presenting an update on advances in sustainable practices in ophthalmology in the United States as they relate to cataract surgery (Dr Chang) and intravitreal injections (Dr Emerson). This will be followed by members of the RANZCO Sustainability Committee presenting the new RANZCO Sustainable Practice Guidelines for cataract surgery and intravitreal injections and discussing tips and experiences around implementing changes. There will be live polling to assess audience practices and attitudes before the presentations, and how these change after reflection at the end of the session. The polling with reflection will make this session a reviewing performance CPD activity.
Speakers and Topics:
Dr John McCoombes – Introduction with polling questions on attitudes, practices and intentions
Dr David Chang – Progress in sustainability at the American Academy of Ophthalmology, the EyeSustain coalition and improving cataract surgery sustainability in USA
Dr Geoff Emerson – Sustainability initiatives at the American Society of Retinal Specialists and progress on improving sustainability of intravitreal injections in USA

RANZCO Sustainable practice guidelines presented by members of the Sustainability Committee, highlighting experience and barriers with implementing changes for sustainability.
Wrap up with polling questions on plans and intentions for change

Venue: Riverview 4

Chair: Dr John McCoombes

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13:30 – 15:00 **FREE PAPERS - Glaucoma / Neuro-Ophthalmology**

Venue: Meeting Room 3

Chairs: Dr Colin Clement and Dr Steve Colley

Beyond the blinks: A comparative exploration into patient experiences of visual field testing and optical coherence tomography

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Purpose: The Patient Experience of Eye Examination evaluation Study is aimed at characterising the patient's experience across major components of their eye consultation. In the first part of our report, we describe and compare patient experiences of Humphrey's visual fields (HVF) and optical coherence tomography (OCT).
Method: Prospective, cross-sectional study involving adult patients presenting to three private outpatient ophthalmic practice in Brisbane. Participants underwent semi-structured interviews based on a 12-item questionnaire, with two items specifically addressing HVF and OCT. Primary outcomes included patient ratings on a 100 mm visual analogue scale and thematic analyses of patient comments.
Results: A total of 203 patients (M:F 101:102) took part in the study. Among them, 72% were over 60 years old and 56% had glaucoma. Patients tolerated OCT significantly better than HVF, regardless of whether they had glaucoma or not ($p = 0.0000$). Glaucoma patients had significantly lower tolerance for HVF compared to non-glaucoma patients ($p = 0.0016$). Qualitatively, HVF elicited a much higher response rate (56.6%) than OCT (4.8%). Notable themes for HVF included difficulties in concentration, anxiety, physical discomfort and scepticism. While OCT was generally well tolerated, some challenges were reported, such as physical discomfort, stress and cost.
Conclusion: The first part of the Patient Experience of Eye Examination evaluation Study underscores critical concerns and patient-specific obstacles in visual field testing and OCT, pinpointing prevalent "pain-points" and shedding light on the often-overlooked complexities of the ophthalmic care experience.

A comparison of web-browser perimetry Melbourne Rapid Fields to Humphrey Field Analyzer in rural Australia

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Purpose: To compare the performance of device-independent web-browser perimetry software Melbourne Rapid Fields (MRF-web) to Humphreys Fields Analyzer (HFA) 24-2 SITA Faster for glaucoma in rural populations.
Methods: The study recruited 100 glaucoma cases from rural sites in New South Wales. Participants either had confirmed or suspected glaucoma, had a visual acuity >6/12, and no other progressive ocular, neurologic, or systemic disease. Participants underwent visual acuity testing before completing the 24-2 test on MRF-web. MRF-web was run on a MacBook 13-inch laptop and was calibrated to the appropriate pixel density, screen size, screen brightness, and viewing distance. The results were compared with HFA outcomes for mean deviation, pattern standard deviation, and visual field index. A qualitative survey was also used to determine user preference by Likert-scale rating the MRF-web versus HFA in terms of time, ease of use, and comfort.

Results: Linear regression testing found a high correlation between the mean deviations of the MRF-web and HFA (r=0.96). Participants favoured the MRF-web due to its shorter time, ease of use, and accessibility.
Conclusion: The MRF-web can produce reliable and comparable outcomes to HFA 24-2 SITA Faster. The perimetry software may be an alternative to standard automated perimetry that is more cost-effective, device-independent, and accessible. It can therefore be employed for use in regional and remote areas with scarce resources and issues of access. MRF-web can also be performed independently by the patient, introducing the possibility for home-monitoring and testing for glaucoma.

No association between nocturnal hypoxaemia and glaucomatous outcomes

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Purpose: To evaluate the relationship between parameters of obstructive sleep apnoea including nocturnal hypoxaemia and oxygen desaturation, and parameters of disease progression in glaucoma.
Methods: A total of 325 patients with suspect or early-manifest primary open-angle glaucoma consecutively sampled from the PROGRESSA cohort wore a pulse oximeter for three consecutive nights. Multivariate analysis correlated oxygen desaturation index (ODI) and nocturnal oximetry (basal peripheral oxygen saturation [SpO_2] levels) with retrospectively collected spectral-domain optical coherence tomography (SD-OCT) data and Humphrey visual fields (HVF).
Results: There were no associations between ODI and SD-OCT parameters including cross-sectional macular ganglion cell/inner plexiform layer (mGCIPL) or peripapillary retinal nerve fiber layer (pRNFL) thickness (mGCIPL: $p = 0.798$; pRNFL $p = 0.521$), or longitudinal SD-OCT thinning (mGCIPL: $p = 0.123$; pRNFL: $p = 0.512$). Similarly, ODI did not correlate with HVF progression (p =0.240). There were no associations between SpO_2 and cross-sectional SD-OCT parameters (mGCIPL thickness: $p = 0.732$; pRNFL thickness: $p = 0.394$), longitudinal change in SD-OCT parameters (rate of mGCIPL change: $p = 0.833$, rate of pRNFL change: $p = 0.334$), nor HVF progression ($p = 0.325$).
Conclusion: Our work suggests that both nocturnal hypoxaemia and oxygen desaturations may have limited value as correlates of disease progression in glaucoma

The clinical utility of a glaucoma polygenic risk score in early and advanced glaucoma

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Purpose: To describe the clinical characteristics of high and low polygenic risk (PRS) participants within a cohort of early glaucoma (PROGRESSA Study) and a cohort of advanced glaucoma (Australian and New Zealand Registry for Advanced Glaucoma; ANZRAG)

Method: Longitudinal progression analysis of early manifest glaucoma participants from the PROGRESSA study (top 2.5th percentile, n = 87, versus bottom 20th percentile, n = 115). Cross-sectional analysis of established open-angle glaucoma cases in ANZRAG (top 2.5th percentile, n = 367, versus bottom 20th percentile, n = 265). Glaucoma PRS expressed as a percentile of a normal population. Clinically relevant glaucoma outcomes were examined with multivariable linear and logistic regression.

Results: PROGRESSA participants in the top 2.5th percentile of population PRS were six years younger ($p = 0.006$) at diagnosis, displayed greater (95% confidence interval [CI] 0.62-6.47, $p = 0.018$) highest-recorded intraocular pressure, and demonstrated faster pRNFL thinning (-0.51 microns/year, 95% CI -0.13 to -0.90, $p = 0.009$) compared with the bottom 20th percentile. ANZRAG cases in the top 2.5th percentile were at 1.5 times increased risk (95% CI 1.04-2.07, $p = 0.03$) of developing advanced disease, 1.5 times increased risk (95% CI 1.07-2.30, $p = 0.021$) of bilateral central field loss, and 2.2 times increased risk (95% CI 1.48-3.5, $p < 0.001$) of bilateral trabeculectomy than the bottom 20th percentile. Participants in the top 5th percentile developed glaucoma five years younger (95% CI -2.2 to -7.4, $p < 0.001$) than the bottom 20th percentile.

Conclusion: Individuals at the same extreme tails of population polygenic distribution had consistently worse glaucoma outcomes in early and advanced disease.

Multicenter Canaloplasty Data Registry – Outcomes of ab-interno canaloplasty across different glaucoma types and severity

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Purpose: Collating results from the iTrack Global Data Registry, this study aims to investigate efficacy and safety of ab-interno canaloplasty in reducing intraocular pressure (IOP) and number of medications across all grades of glaucoma severity and types of glaucoma.

Methods: Prospective multicenter cloud-based database (iTrack Global Data Registry, part of the International Glaucoma Surgery Registry), real-world study including glaucoma patients undergoing canaloplasty with the iTrack or iTrack Advance canaloplasty device (Nova Eye Inc., Fremont, USA). Mean reduction in IOP and number of medications (meds) were the primary endpoints and eyes were grouped based on baseline glaucoma severity (early, moderate, severe, advanced) and glaucoma type.

Results: A total of 313 eyes have been enrolled up to April 2023. IOP for primary open angle glaucoma at baseline and six months post-op were 17.5 ± 5.5 and 13.1 ± 3.4 (25% reduction), and meds were 2.2 ± 1.2 and 1.5 ± 1.3 (n = 220) respectively. IOP for secondary open angle glaucoma was 19.6 ± 5.9 and 13 and meds (34% reduction) were 1.8 ± 0.9 and 0.3±0.6 (n = 19). IOP for ocular hypertension was 21.9 ± 8.4 and 16.6 ± 2.6 (24% reduction) and meds were 1.3 ± 1.1 and 1 ± 1.4 (n = 27). IOP for primary angle closure glaucoma was 21.3 ± 6.4 and 13.1 ± 3.7 (38.5% reduction) and meds were 1.9 ± 1.5 and 1 ± 1.2 (n = 41). Based on stage: IOP for early, moderate, severe and advanced groups at baseline was 17.8 ± 4.8 (n = 138), 17.4 ± 5.8 (n = 45), 15.1±4 (n = 19) and 17.1±6.8 (n = 16) and at six months 13.9 ± 3.9, 13.1 ± 3.1, 11.5±2.3 and 11.1±2.5

Conclusion: Ab interno canaloplasty could effectively reduce IOP and medications use across all types and stages of glaucoma.

Polygenic risk predicts the magnitude of pressure reduction when initiating therapy for treatment-naive glaucoma

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Purpose: Lowering intraocular pressure reduces the risk of glaucoma vision loss. First-line therapy is typically topical drops or selective laser trabeculoplasty, but treatment response can be variable. The magnitude of pressure reduction in treatment-naive glaucoma is better predicted using a glaucoma polygenic risk score (PRS).
Methods: Participants in the prospective longitudinal PROGRESSA clinical registry with a calculated PRS and at least one eye that was treatment-naive at baseline (n = 1425 eyes of 767 participants). Treatment initiation was at the clinician's discretion and intraocular pressure (IOP) reduction was measured at the next clinic visit. Participants with a PRS in the top tertile of population risk were compared to the rest of the cohort. The magnitude of IOP reduction was compared to the United Kingdom Glaucoma Treatment Study (mean reduction 3.8 mmHg), while adjusting for baseline IOP.
Results: Altogether, 264 treatment-naive eyes (N = 191 patients) commenced treatment (drops in 166 eyes and selective laser trabeculoplasty in 98 eyes). Mean PRS was similar between groups (65 ± 2; 63 ± 3; $p = 0.70$). Participants were more likely to achieve a 4 mmHg reduction if their PRS was in the top tertile (odds ratio 2.8; $p < 0.001$), after adjusting for baseline IOP.
Conclusion: Higher glaucoma polygenic risk score predicts a greater pressure reduction in treatment naive eyes.

Optic nerve sheath infiltration in thyroid eye disease

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Purpose: To assess the predictive value of radiological optic perineuritis, fat infiltration and scleral enhancement for active thyroid eye disease (TED) and dysthyroid optic neuropathy.
Methods: Thyroid eye disease patients who had axial and coronal fat-suppressed contrast enhanced T1-weighted magnetic resonance imaging performed were included. Optic perineuritis was defined by the presence of contrast enhancement surrounding the intraorbital optic nerve. All scans were reviewed by three reviewers, including an expert neuro-radiologist. Clinical assessments were performed by orbital surgeons or neuro-ophthalmologists and the disease activity (active/inactive) and presence or absence of dysthyroid optic neuropathy was recorded.
Results: The study population consisted of 76 orbits from 38 patients with a mean age of 53 ± 15 years, with 25 (66%) being female. Optic perineuritis was present in 28 (37%) orbits, fat infiltration in 37 (49%) and scleral enhancement in 14 (18%) orbits. Optic perineuritis, fat infiltration and scleral enhancement were all significantly associated with active clinical disease ($p < 0.01$ for all). Optic perineuritis predicted dysthyroid optic neuropathy (odds ratio [OR] 3.4, $p < 0.05$). Fat infiltration (OR 2.8, $p = 0.1$) and scleral enhancement (OR 2.3, $p = 0.23$) were not significantly associated with dysthyroid optic neuropathy.
Conclusion: We present the first study highlighting radiological optic perineuritis as a predictor of dysthyroid optic neuropathy and a marker of more severe and active disease. Intraorbital fat infiltration and scleral enhancement is also more commonly observed in active TED than inactive TED. These radiological findings may serve as useful diagnostic and stratification tools in evaluating TED patients.

The association between immune checkpoint inhibitors and optic neuropathy: A systematic review

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Purpose: Immune checkpoint inhibitors are a novel class of monoclonal antibodies frequently becoming a mainstay of cancer immunotherapy. With the recent increase in popularity of these agents, immune-related adverse events including optic neuropathy are becoming more frequently reported. This review aims to explore the association between immune checkpoint inhibitors

and optic neuropathy through analysis of incidence, clinical features, investigations, treatment and patient outcomes.

Method: A systematic search of the databases PubMed/MEDLINE, Embase and CENTRAL was performed to September 2022. Data collection and risk of bias analysis was subsequently conducted in accordance with the PRISMA guidelines.

Results: Eleven articles fulfilled inclusion criteria. The results showed an increased incidence of optic neuropathy among patients receiving immune checkpoint inhibitor therapy compared to the general population. Presentation with painless reduced visual acuity and optic disc swelling was most common. Investigation findings were poorly documented. The only two patients who achieved full resolution of symptoms were treated with oral prednisolone.

Conclusion: There is a strong association between immune checkpoint inhibitor therapy and development of optic neuropathy. Although it remains uncommon, the incidence of optic neuropathy in this population greatly exceeds the general population. Future research is needed to establish a minimum therapeutic dose of immune checkpoint inhibitors to minimise exposure and subsequent risk of optic neuropathy.

An observational cohort study of 100 patients presenting with functional visual loss

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Purpose: To increase our knowledge of functional visual loss and to compare the findings with other functional syndromes.

Method: Patients with functional visual loss were recruited through the neuro-ophthalmology clinics at three major hospitals in London, United Kingdom, over a 12 month period. A full assessment of patients' medical history was obtained from their general practitioner and participants completed a series of questionnaires assessing relevant associations. Two control groups were included: one of pathological controls with organic visual loss and one of normal healthy controls.

Results: Data were obtained on 157 participants: 100 with functional visual loss; 21 pathological controls with organic visual loss; and 36 healthy non-pathological controls. Participants with functional visual loss were typically female (74%) with a mean age at vision loss of 40.0 $\pm$ 16 years. Sixty-four percent of cases had bilateral vision loss; 26% of the total cohort had organic visual loss with functional overlay; 50% of patients with functional visual loss had a pre-existing psychiatric diagnosis, the most common being a depressive disorder; 87% of patients had a previously diagnosed medical illness, most commonly neurological (45%); and 35% of participants self-reported at least one additional functional symptom.

Conclusion: Our population of functional visual loss patients shares many similarities to patients with the majority of other functional neurological disorders. They are generally young, female and have a greater than expected rate of psychiatric, medical and coexistent ocular conditions. We found increased rates of precipitating stressors, clinical depression and organic eye problems in patients with functional visual loss.

Clinical profile of myelin oligodendrocyte glycoprotein antibody associated disease: The first New Zealand perspective

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Purpose: To describe clinical features, disease course and treatment outcomes of myelin oligodendrocyte glycoprotein antibody associated disease (MOGAD) in New Zealand patients.

Methods: This retrospective multicentric, regional study included 56 adults with MOGAD confirmed with positive MOG-antibodies. Data from patients (n = 89) with MOGAD referred to the Neuro-ophthalmology or Neurology Service (Greenlane Clinical Centre, Auckland District Health Board and Waikato Hospital, Waikato District Health Board) from 2011 onwards were collected. Paediatric patients (age of first onset < 16, n = 33) were excluded from this study. Information collected includes demographics, clinical features, MOG—IgG-Ab serology and neuroimaging.

Results: Of 56 MOGAD patients, 31 (55%) were female, 23 (41%) were New Zealand European and 12 (21%) were

Māori/Pasifika. The median (interquartile range; IQR) age at attack onset was 38 (27-49) years. There were 121 acute neurological attacks in total, with 25 (44.6%) patients experiencing relapses; relapsing patients experienced thre attacks on average (min: 2; max: 13). Types of neurological attacks included: 99 (82%) optic neuritis, 23 (19%) transverse myelitis, four cerebral attack (3%) and eight (7%) brainstem/cerebellar attack. A total of 111 (91%) attacks were treated with corticosteroids, 11 attacks underwent PLEX and four attacks received intravenous immunoglobulin. Median (IQR) nadir visual acuity for optic neuritis was 20/60 (20/30-CF) with final visual acuity of 20/20 (20/18-20/30), $p < 0.001$. Median retinal nerve fibre layer thickness in MOGAD optic neuritis of 147 μm (IQR 108 - 178), reduced to the final median retinal nerve fibre layer thickness of 73 μm (IQR 64-87), $p < 0.001$.

Conclusion: MOGAD presents most commonly with optic neuritis with good outcomes from the acute event. However, 10% will require plasma exchange. The relapse rate is high and patients need to be monitored closely.

Degree of papilloedema does not affect venous pulsation in estimation of intracranial pressure

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Purpose: To investigate if the degree of optic nerve swelling influences the accuracy of intracranial pressure (ICP) estimation with photoplethysmography.

Method: Objective measurement of optic nerve swelling was done using Bruch's membrane opening (BMO) minimum rim width. The severity of optic nerve swelling was also graded by two independent observers using the modified Frisén Scale. Ophthalmodynamometry measurement of venous pulse amplitudes with modified photoplethysmography was done to estimate intracranial pressure and this was compared to the opening pressure of lumbar puncture. Linear mixed modelling was used to examine the variable effects on the estimated and measured ICP.

Results: Thirty-one participants with suspected idiopathic intracranial hypertension were examined. BMO neural thickness was found to be not a confounding factor of the estimated ($p = 0.1028$) nor the measured ICP ($p = 0.8102$). The mean absolute difference between the estimated and measured ICP was 2.4 mmHg (SD 1.7) with a correlation coefficient of 0.96 as published by Morgan et. al. BMO neural thickness was associated with subjective Frisén grading ($p < 0.05$). Intraocular pressure was not associated with the estimated ($p = 0.2498$) or measured ICP (p=0.9992).

Conclusion: The degree of papilloedema does not affect venous pulsation in estimating intracranial pressure using modified photoplethysmography.

Insights into childhood idiopathic intracranial hypertension: Twenty-year study on features and outcomes in Auckland, New Zealand

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Purpose: To examine the clinical features and outcomes of childhood idiopathic intracranial hypertension (IIH) in a New Zealand population.

Methods: This is a retrospective cohort study of children (age < 18 years) diagnosed with IIH over 20 years (1 January 2003 to 31 December 2022) in Auckland, New Zealand. The diagnosis of IIH was confirmed using the revised Dandy diagnostic criteria.

Results: Of the 90 children identified with IIH, 54 children met diagnostic criteria for IIH. There was an average follow-up period of three years (range 0.7-17.7 years) for each patient. Headache was the most common presenting feature (81%) followed by pulsatile tinnitus (22%). There was a higher predilection for obesity (body mass index ≥ 95% centile; 78% vs. 45%) and female (83% vs. 52%) gender in the post-pubertal (age 12-17 years, n = 31), as compared to pre-pubertal (age ≤ 11 years, n = 23) group. Treatment was commenced with acetazolamide (94%) and/or topiramate (23%), with one patient requiring surgical intervention (ventriculoperitoneal shunt). The average period to papilloedema resolution was one year (range 0.1-4.3 years); acetazolamide was restarted in three patients following disease quiescence off treatment. Four patients had documented optic disc pallor with mild visual field impairment. Patients with an underlying cause for intracranial hypertension (secondary IIH, n = 22) had more aggressive disease, reflected by 22% (n = 5) of patients requiring surgical intervention.

Conclusion: This is the first cohort study of IIH in a paediatric population in New Zealand. The post-pubertal group was similar to adult IIH features, while being distinctly different from the pre-pubertal group. Long-term visual outcomes for childhood IIH are favourable, compared with secondary IIH.

15:00 – 15:30 **Afternoon Tea**

15:30 – 17:00 **CONCURRENT SESSIONS**

15:30 – 17:00 **COURSE -**

Angle based minimally invasive glaucoma surgery for the cataract surgeon – Which one should I use?

Aim: To introduce all angle based minimally invasive glaucoma surgery (MIGS) devices and techniques available in Australia, that can be combined with cataract surgery, to the general ophthalmologist. The symposium will describe which devices are suitable for those willing to step out of their surgical comfort zone in the management of mild to moderate primary open angle glaucoma.
Speakers and Topics:
Dr Colin Clement - iStent: Why the iStent is the perfect MIGS for the general ophthalmologist
A/Prof Shamira Perera - Hydrus: The "superior" MIGS to try once you are comfortable with the iStent
Dr Alannah Walsh - GATT: The most cost effective MIGS device
Dr Jason Cheng - iTrack Advance: Treating the whole physiological drainage pathway, not just bypassing the meshwork
Panel and audience discussion on the pros and cons of each device

Venue: BelleVue Ballroom 1

Chairs: Dr Jason Cheng and Dr Colin Clement

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15:30 – 17:00 **COURSE -**

Myopia – General and retinal management

Aim: Discussion for general ophthalmologists about the: (i) causes and management of myopia; (ii) myopia issues in cataract surgery; (iii) medical retina implications; and (iv) surgical retinal implications.
Speakers and Topics:
Prof David Mackey AO – Myopia – incidence, risk factors, management
Prof Graham Barrett AM – Cataract and intraocular lens selection in myopia
Dr Xia Ni Wu – Medical retina issues – classification, imaging, complications, management
Prof Ian McAllister – Surgical retina – rates of detachment, treatment strategies, complications

Venue: Riverside Theatre

Chair: A/Prof Fred Chen

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15:30 – 17:00 **COURSE -**

All India Ophthalmological Society (AIOS) A video symposium from the land of the unexpected!

Tackling the Unexpected (Oops moments during surgery)
Speakers and Topics:
Dr Samar Basak - Oops during Keratoplasty
Dr Harbansh Lal - Oops during Phaco
Dr Lalit Verma - Oops during VR surgery
Dr Namrata Sharm - Oops during Refractive surgery
Dr Lalit Verma - Managing post operative endophthalmitis
Dr Namrata Sharma - Approach to infective keratitis
Dr Harbansh Lal - Tips in Toric IOL
Dr Samar Basa - Small cornea lesions BUT big problems for premium IOL surgeons

Venue: Riverview 4

Chair: Dr Lalit Verma

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15:30 – 17:00 **FREE PAPERS - Cataract / Cornea / Refractive**

Venue: Meeting Room 3

Chairs: Dr Jacqueline Beltz and Dr Evan Wong

Gender differences in refractive outcomes using the Barrett Universal 2 Formula

Lior Lipsky

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Purpose: To evaluate gender differences in cataract surgery refractive outcomes.
Methods: A retrospective study included patients who underwent cataract surgery at Palmerston North Hospital, New Zealand, by a single surgeon between 2021 and 2023. Subjective refraction was performed not earlier than one month. Only eyes achieving a best corrected visual acuity of 6/12 or better were included. Data gathered included age, gender, biometry, implanted intraocular lens and post-operative refractive outcome. The primary outcome was the refractive predictive error of the Barrett Universal 2 formula, defined as post-operative refraction minus the predicted refraction.
Results: A total of 288 eyes of 254 patients, 150 females (59%) and 104 males (41%), were included. The refractive predictive error was statistically different between males (0.058) and females (-0.065) ($p = 0.002$). Gender ($p = 0.002$) and age ($p = 0.034$) were the only parameters found to be significantly correlated with the refractive predictive error on multivariable analysis including axial length, average keratometry, anterior chamber depth, white-to-white age and gender. Males were found to have a significantly longer axial length ($p = 0.005$), flatter average keratometry ($p < 0.0001$) and a wider white-to-white ($p = 0.002$).
Conclusion: Gender was found to be a significant predictor of the refractive outcome for the Barrett Universal 2 formula. Gender-specific intraocular lens optimisation may improve cataract surgery refractive outcomes.

Assessing and improving the consistency of cataract grading

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Purpose: To assess consistency of subjective Lens Opacities Classification System (LOCS) III grading, repeatability of objective Pentacam Scheimpflug lens densitometry parameters, and correlation between these two systems.
Methods: Slit-lamp photographs sent to six graders for lens grading using LOCS III. Patients were evaluated by the Pentacam Scheimpflug System for the Pentacam Nucleus Staging (PNS) cataract grading score, the PNS average density, PNS maximum density and Pentacam Densitometry of Zone 1. Consistency of LOCS III scores evaluated using Bland-Altman plots. Repeatability of Pentacam parameters analysed by calculation of within-subject standard deviation, repeatability, precision, coefficient of variation and intraclass correlation coefficient. Association between these two methods evaluated with the Spearman correlation coefficient.
Results: Eighty-three eyes from 78 patients with cataracts included. Overall, interobserver agreement of LOCS III scores was low and repeatability of the Pentacam was high. Significant correlations found between LOCS III nuclear opalescence scores and the PNS score and Pentacam Densitometry of Zone 1 (PDZ1) (rho = 0.472 and 0.434, respectively, both with $p < 0.001$). Similarly, significant correlations found between LOCS III nuclear colour scores and the PNS score and PDZ1 (rho = 0.364 and 0.276, respectively, $p < 0.05$). Significant correlation between LCOS III cortical opacity scores and Pentacam average percentage and Pentacam maximum density percentage (rho = 0.335 and 0.335, respectively, $p < 0.05$).
Conclusion: The LOCS III scores have low interobserver agreement, whereas Pentacam Scheimpflug lens densitometry is highly repeatable and correlates with LOCS III scores.

Post-operative sutureless scleral fixated intraocular lens tilt: A Victorian prospective cohort study

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Purpose: Flanged intrascleral haptic fixation technique (FIHFT) is a procedure that has been proposed as an alternative method for secondary intraocular lens (IOL) insertion in the context of poor capsular support. Substantial IOL tilt can be a complication of the surgery, and this can introduce refractive error. To date, no study has evaluated the degree of IOL tilt and its clinical significance specific to sutureless scleral fixated IOLs in Victoria. Herein we prospectively review the clinical characteristics and outcomes of sutureless scleral fixated IOLs for patients presenting to a Victorian vitreoretinal unit and present our three-month data.
Method: Patients recruited were those waitlisted and had FIFHT in a Victorian vitreo-retinal unit. Pre- and post-operative data collection included demographic

characteristics, visual acuity (VA), intraocular pressure, clinical features and complications. Additionally, IOL tilt was measured by anterior segment ocular coherence tomography post-operatively.

Results: Sixteen consecutive patients underwent FIHFT. Comorbidities included raised intraocular pressure (63%, n = 10), cystoid macula oedema (18.8%, n = 3), choroidal effusion (6.3%, n = 1) and moderate IOL tilt of 9.5 degrees (6.3%, n = 1). Preoperative and one-month post-operative logMAR VA mean ± standard deviation was 1.7 ± 0.4 and 0.6 ± 0.4 respectively ($p < 0.001$).

Conclusion: FIHFT remains to be a good method for secondary IOL insertion. Post-operative VA improvement, in addition to cystoid macula oedema complication rates, were comparable to other studies.

Visual outcomes, spectacle independence and patient-reported satisfaction of the Vivity extended range of vision intraocular lens

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Purpose: This study aimed to evaluate and compare visual outcomes, spectacle independence, and patient satisfaction on bilaterally implanted Vivity extended depth-of-focus (EDOF) or monofocal intraocular lenses (IOLs) after cataract surgery in patients with early glaucoma.

Methods: In this retrospective, non-randomized, interventional cohort study, patients with early glaucoma undergoing cataract surgery received bilateral implantation of either EDOF (AcrySof IQ Vivity; Alcon) or monofocal (Clareon/SN6ATx/SN60WF; Alcon) IOLs. The primary outcome was monocular uncorrected intermediate visual acuity (UIVA). The secondary outcomes were monocular uncorrected distance (UDVA) and near (UNVA) visual acuity, spectacle independence, patient satisfaction, and photic phenomena. Fifty-eight eyes from 29 patients, including 32 eyes in the EDOF group and 26 eyes in the monofocal group, were included in the study.

Results: UIVA (0.06 ± 0.16 versus 0.39 ± 0.10 LogMAR; P<0.001) and UNVA outcomes (0.29 ± 0.10 versus 0.55 ± 0.18 LogMAR; P<0.001) were significantly better in the EDOF group than in the monofocal group, respectively. There was no difference in UDVA and corrected distance visual acuity outcomes between the groups (P>0.05), but both spectacle independence and patient satisfaction scores were significantly higher in the EDOF group (P<0.001 and P<0.05, respectively). There was no difference in self-reported photic phenomena.

Conclusions: Bilaterally implanted EDOF IOLs provided excellent distance vision and better intermediate and near vision than monofocal IOLs in patients with early glaucoma. Spectacle independence and patient satisfaction were significantly higher in patients who received EDOF IOLs. Photic phenomena were rare and seldom bothersome.

Pilot data for the #7 asymmetric Descemet's membrane endothelial keratoplasty trephine

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Purpose: To report the clinical outcomes of a novel asymmetric trephine for Descemet's membrane endothelial keratoplasty (DMEK) tissue preparation. The design of the trephine creates an asymmetric marking in the graft for correct orientation in the eye while incorporating the force distribution principles of curved surfaces to minimise graft tears during graft preparation.

Methods: A case series of 30 consecutive DMEK operations are reported, 15 of which used the novel #7 trephine and 15 that used standard methods of donor graft preparation. Patient and donor characteristics, tissue preparation time, surgical complications, total surgical time and endothelial cell counts (ECC) at three months post-surgery are reported.

Results: All cases were completed successfully at initial operation. Use of the #7 trephine significantly decreased both mean graft preparation time (5 vs. 9 mins, $p = 0.02$) and mean surgical time (32 vs. 38 mins, $p = 0.03$) compared to the standard technique. Using the #7 trephine, there were no graft preparation complications and all grafts attached successfully without the need for rebubbling. In contrast, there were two minor graft tears, of which one required rebubbling, using standard techniques. The three-month endothelial cell counts was comparable between techniques (28% vs. 30% cell loss, $p > 0.05$).

Conclusions: The #7 trephine improved the safety profile and speed of DMEK graft preparation as well as reducing the overall surgical time, without the need to alter standard DMEK manipulation techniques used within the eye. The trephine has potential for use in eye-banks to enable the delivery of pre-prepared DMEK tissue for surgical use.

Trends in corneal transplantation in Australia over 25 years

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Purpose: Corneal transplantation is the most common transplant surgery performed in Australia. In 2021, approximately 78% of corneal transplants performed were registered with the Australian Corneal Graft Registry (ACGR). Additional data examining corneal transplantation in Australia are warranted to supplement ACGR findings. This study aimed to explore Australian corneal transplantation rates from 1994–2021.
Method: Medicare is Australia's universal health insurance scheme. Using this comprehensive data source, we retrospectively analysed corneal transplantation services (item nos. 42653 and 42656) performed in Australia from 1994–2021. We used Poisson regression to compare the relative change in transplantation rates between years.
Results: From 1994–2021, 26,122 corneal transplantation services performed in Australia. Most were performed in 65–84-year-olds (11,164, 42.7%) and in New South Wales (8,958, 34.3%), Queensland (7,294, 27.9%), followed by Victoria (4,987, 19.1%). Corneal transplantation rates tended to be lower in 1994–2006, and higher in 2006–2021; the rate in 2006 was 31% lower than in 1994 (relative risk 0.69, 95% confidence interval 0.62–0.77), and the rate in 2021 was 85% higher than in 2006 (relative risk 1.85, 95% confidence interval 1.68–2.03).
Conclusion: Corneal transplants registered with the ACGR were stable from 1997–2006 and increased from 2006–2020. Comparatively, this analysis suggests transplantation rates tended to decrease from 1994–2006, before increasing thereafter. Rising transplantation rates in the last 15 years may reflect the increased application of transplants, improved technique with rise in endothelial keratoplasty, and/or changing burden of corneal disease. The findings have implications for corneal donation and banking.

How is dry eye disease being managed in everyday practice? A Save Sight Dry Eye Registry study

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Purpose: To report current trends in the presentation and management of dry eye disease (DED) using the data from the Save Sight Dry Eye Registry (SSDER), the first international interdisciplinary registry to collect high-quality outcome data from DED patients in routine clinical practice.
Methods: Patient demographics, medical history and clinical data were recorded in the prospectively designed web-based SSDER database. Descriptive statistics were calculated using mean, SD and range.
Results: The SSDER contained data from 1,602 clinical visits on 696 eyes of 349 patients with mean age ± SD 55.7 ± 16.4 years (range 18-94 years) and 79.4% female, from nine clinicians at seven practices in Australia, UK and Spain. Most patients (65%) were White/Caucasian and 21.5% were Asian. Diagnoses at the index visit included evaporative DED 90.1% (n = 627), aqueous deficient DED 42.7% (n = 297) and corneal neuropathic pain 7.9% (n = 55). One in four eyes (n = 174) were treatment-naïve. Ocular surface staining was severe in 16 (2.3%) eyes, moderate in 69 (9.9%), mild in 143 (20.5%), minimal in 212 (30.5%) and 256 (36.8%) eyes had no staining. Associated ocular conditions included meibomian gland disease (n = 390), cataract surgery (n = 67), cataract (n = 56), refractive surgery (n = 42) and glaucoma (n = 40). The most-commonly prescribed treatments, per eye for all visits, were artificial tear substitutes (n = 3,031), anti-inflammatory therapy (n = 1,702), warm compresses to the eyelids (n = 976), eyelid hygiene (n = 229), autologous serum (n = 155) and diet/nutritional supplements (n = 142).
Conclusion: Most DED patients encountered by clinicians in everyday practice will have evaporative dry eye

and meibomian gland disease with many requiring a range of treatments.

Artificial intelligence in keratoconus – Can technology help predict progression? A systematic review

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Purpose: Keratoconus in patients can progress at different ages and rates making it difficult to determine the optimal timing for follow up and for interventions such as corneal cross-linking. Artificial intelligence (AI) is a burgeoning field in ophthalmology; it has been used to predict progression of conditions such as diabetic retinopathy and glaucoma. Previous studies have shown that AI can accurately diagnose keratoconus. Less is known on AI use in predicting progression of the disease.
Method: A systematic review of peer-reviewed articles was performed in February 2023 using medical databases (Medline, PubMed, EMBASE, Cochrane) and engineering databases (IEEE Xplore, ACM Digital Library). Studies which were non-English, investigated keratoconus diagnosis or treatment efficacy rather than disease progression, or conference proceedings were excluded.
Results: A total of 455 records were identified. Following duplicate removal, full-text and abstract screening, six studies were included. The number of eyes used in the studies ranged from 218 to 1331 (median 350, interquartile range 275). AI methods used included convolutional neural networks, machine learning and random forests. Input modalities included optical coherence tomography, anterior segment optical coherence tomography and Pentacam topography. Overall, the studies reported good utility of AI in predicting keratoconus progression. Meta-analysis was not possible due to heterogeneity in AI methods and reported outcomes. The quality of included articles was highly variable with often unclear reporting of patient selection, methodological details and validation methods.
Conclusion: Emerging evidence indicates that AI may have a role in predicting keratoconus progression. Further high-quality studies are needed to establish its place in clinical practice.

Correlation between diagnostic tests in dry eye: Save Sight Dry Eye Registry insights

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Purpose: To determine the dry eye disease (DED) diagnostic tests for clinical signs that correlate with symptoms, in the real-world setting.
Methods: A cross-sectional, real-world study was conducted utilising the prospective, web-based, international Save Sight Dry Eye Registry. Baseline data were collected from routine clinical practice from nine clinicians across practices in Australia, Spain and the United Kingdom. Diagnostic clinical tests included tear break up time (TBUT), meibomian gland drop out and ocular surface staining. Symptoms were assessed using the Ocular Surface Disease Index (OSDI) and Ocular Comfort Index (OCI), and anxiety and depression were screened with the Patient Health Questionnire-4 (PHQ-4). Associations of diagnostic tests for DED signs, with symptoms, including the PHQ-4, were examined using Spearman's rho bivariate correlation (p 0.05).
Results: Shorter TBUT was significantly correlated with OCI-overall discomfort score (rho 0.18, $p = 0.04$), OCI-frequency of discomfort (rho 0.20, $p = 0.03$), and PHQ-4 symptom of 'little interest or pleasure in doing things' (rho 0.12, $p = 0.03$). Notably, PHQ-4 scores were significantly correlated with OSDI-frequency of symptoms (rho 0.54, $p < 0.001$), OSDI-vision related quality of life (rho=-0.53, $p < 0.001$) and OSDI-environmental triggers (rho -0.55, $p < 0.001$).
Conclusions: In the real-world setting, shorter TBUT was significantly associated with DED discomfort and

higher likelihood of depression. Clinicians should be aware of the usefulness of tear film stability assessment in managing DED discomfort.

Two-year outcomes of corneal cross-linking in thin corneas with keratoconus: A Save Sight Keratoconus Registry study

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Purpose: To report the efficacy and safety of corneal cross-linking (CXL) in thin corneas (≤ 400 μm) with keratoconus, and compare the outcomes with thicker corneas (> 400 μm) two years post-CXL.
Methods: Data from 30 practices in Australia, New Zealand, France and Italy were included. Seventy-seven eyes of 70 patients (mean age 27.0±10.4 years; female 35.7%) had a thin cornea, and 689 eyes (528 patients, 24.5±9.3 years; female 30.5%) had a thick cornea. Outcome measures included changes in visual acuity, corneal curvature, and minimum corneal thickness (MCT) adjusted for age, sex, practice and laterality, and frequency of adverse events.
Results: At two years post-CXL, in thin corneas, the mean visual acuity, Kmax and K2 were unchanged (all $p > 0.05$) and MCT decreased ($p = 0.010$). The adjusted mean changes (95% confidence interval) in visual, keratometry and pachymetry outcomes were similar (all $p > 0.05$) for thin and thick corneas: visual acuity (0.86 [-2.6 to 4.3] vs. 0.91 [-0.7 to 2.6] logMAR letters respectively), Kmax (0.8 [-0.2 to 1.8] vs. 0.4 [-0.1 to 1.0]) D respectively], K2 (0.43 [-0.4 to 1.2] vs. 0.21 [-0.3 to 0.7] D respectively), and MCT (-19.1 [-28.8 to -9.3] vs. -14.3 [-20.3 to -8.3] μm). Frequency of haze and corneal scarring were similar in thin and thick corneas (haze 3.1% vs. 2.4%, respectively $p = 0.668$; scar 3.1% vs. 0.9%, respectively $p = 0.148$).
Conclusions: Corneal cross-linking may further thin the corneas that are thin while visual and keratometry outcomes were stabilised in both thin and thick corneas. The frequency of adverse events at two years post-CXL was low.

Refractive outcomes mixing and matching the PanOptix trifocal and Vivity enhanced depth of vision intraocular lens implants

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Purpose: This study compared visual outcomes of a mixing and matching approach using a trifocal (PanOptix) amd extended depth of focus (EDOF) (Vivity) intraocular lens (IOL) for bilateral refractive lens exchange (RLE) or cataract surgery.
Method: Retrospective case series of patients undergoing either RLE or cataract surgery from November 2020 to November 2021. All participants had a PanOptix and/or Vivity IOL implanted. Patients were divided into three groups: bilateral PanOptix implants, bilateral Vivity implants, or one PanOptix and one Vivity IOL implant between the two eyes (mixed IOL). Outcome measures included post-operative unilateral refractive outcomes and binocular uncorrected distance visual acuity (VA) and uncorrected near VA.
Results: There were 218 eyes (109 patients) who either had RLE (n = 152 eyes, 69.7%) or cataract surgery (n = 66 eyes, 30.3%) bilaterally. Patients either received bilateral PanOptix (n = 46 eyes), bilateral Vivity (n = 44 eyes) or mixed IOLs (n = 128 eyes). Post-operative spherical equivalent was within 0.25D of the intended target in the majority of eyes implanted with the PanOptix (93.2%) or Vivity (84.7%) IOL. Mean post-operative binocular uncorrected distance VA was similar in all three groups (PanOptix -0.01 ± 0.07, Vivity 0.00 ± 0.07, Mixed IOL -0.03 ± 0.08). The percent of individuals with binocular uncorrected near VA of N6 or better differed between the three groups (PanOptix 75%, Vivity 98.2%, mixed IOL 89.1%).
Conclusion: Mixing and matching an extended depth of focus with a trifocal IOL offers patients increased refractive correction options.

Clinical results of SMILE using the Visumax 800 versus the Visumax 500 for myopia

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Purpose: To compare the clinical results and potential benefits of myopic small incision lenticule extraction (SMILE) treatments using the new Visumax 800 over its precursor the Visumax 500 system and to determine the safety and efficacy of both lasers.

Methods: An analysis of the last 50 patients who underwent SMILE using the Visumax 500 (Group 1) and the first 50 patients who underwent SMILE (Group 2) with the Visumax 800 was performed at a single centre. The cohorts were compared one month post-operatively with regards to uncorrected distance visual acuity, mean refractive spherical equivalent, best corrected visual acuity and complications. Total suction times were also compared.

Results: The uncorrected visual acuity between both groups showed no significant differences with 90% in Group 1 and 88% in Group 2 achieving $\geq$ 6/7.5. The mean refractive spherical equivalent results were equivalent in both groups with 93% (Group 1) and 92% (Group 2) within $\pm$ 0.5 of the intended result. There was no loss of best corrected visual acuity in either group. One suction loss occurred in Group 1 but none in Group 2. The average total suction time was 34 seconds vs. 13 seconds respectively in Group 1 and Group 2. No other intraoperative or post-operative complications were noted.

Conclusion: The Visumax 800 is as safe and effective as the established Visumax 500 for myopic SMILE procedures. The added benefit of lower suction times with the 800 reduces the risk of complications such as suction loss. When cyclotorsion and centration software is fully available there will be even more advantages.

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CATARACT

Risk factors for corneal endothelial cell loss after cataract phacoemulsification surgery

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Purpose: To evaluate the changes in corneal endothelial cell density (CECD) occurring after cataract phacoemulsification surgery and identify factors associated with cell loss.
Methods: This was a retrospective study conducted on patients who underwent cataract phacoemulsification surgery between 1 January and 31 December 2018. Demographic data and biometric parameters were obtained preoperatively. Ultrasound metrics were recorded for each operation, including total on time (TOT), total equivalent power in position 3 and cumulative dissipated energy (CDE). Using corneal specular microscopy, CECD was measured preoperatively and post-operatively at 12, 24 and 36 months. Factors associated with decreased CECD were identified.
Results: This study included 223 eyes of 133 patients. Mean CECD was 2530.03 $\pm$ 285.42 cells/mm^2 preoperatively, and significantly decreased to 2364.22 $\pm$ 386.98 cells/mm^2 at 12 months ($p < 0.001$), 2292.32 $\pm$ 319.72 cells/mm2 at 24 months ($p < 0.001$) and 2242.85 $\pm$ 363.65 cells/mm^2 at 36 months ($p < 0.001$). The amount of cell loss was associated with age, gender, preoperative CECD, preoperative anterior chamber depth, lens thickness, TOT and CDE. Using multivariate analysis, age, preoperative CECD and TOT were identified as independent predictors for CECD loss 12 months after surgery.
Conclusion: The greatest decrease in CECD occurred during the first year after cataract surgery, and the amount of cell loss was influenced by both baseline patient characteristics and ultrasound metrics. These results suggest that minimising TOT during cataract surgery may reduce post-operative corneal endothelial cell loss. Longer term prospective studies in a larger cohort may yield more information.

Combined small-aperture intraocular lens and sulcus intraocular lens for treatment of cataract and keratoconus

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Purpose: To evaluate the effectiveness of treatment of patients with keratoconus and cataract with cataract extraction and insertion of a small-aperture intraocular lens (IOL) and sulcus IOL in a single procedure.
Methods: All patients with keratoconus and cataract treated with cataract extraction and simultaneous insertion of small fixed-aperture intraocular lens (Acufocus IC-8) inserted into the capsular bag with a capsular tension ring and a sulcus IOL (1st Q Add-On) to correct for any expected post-operative spherical or astigmatic refractive error were included. Preoperative patient demographics, visual acuity, refraction and clinical features were recorded. Post-operative uncorrected visual acuity, corrected distance visual acuity and refraction were recorded at visits one day, one week and one month after surgery. Adverse outcomes were also recorded.
Results: There were 12 patients included in this study. Patients' preoperative visual acuity ranged from 6/6 to 6/75 (mean 6/36). On average they had mean corneal curvature of 48.8D (range 43.74-53.73D) and corneal astigmatism of 5.7D (range 3.2-9.2D) in the central cornea as measured by the Pentacam. Most patients achieved a post-operative corrected distance visual acuity of 6/6 to 6/9. Patients gained 2-10 lines of best corrected vision (mean 5.8). Post-operative refractions had a mean spherical equivalent of -0.73D and mean astigmatism of -1.10D. One patient developed toxic anterior segment syndrome but recovered to 6/7.5 at 3 months.
Conclusion: The treatment of keratoconus and cataract with simultaneous small aperture IOL and sulcus IOL has been shown to be effective and safe with improvement in visual acuity.

Do complication rates change post-lockdown? The New Zealand Cataract Risk Stratification System Phase IV

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Purpose: To assess the effect of the refined New Zealand Cataract Risk Stratification (NZCRS) scoring system on rates of intraoperative complications during routine phacoemulsification cataract surgery in a large public teaching hospital setting, evaluate post-operative complication rates and compare these post-lockdown results to pre-lockdown rates (earlier NZCRS cohorts).
Method: Prospective assessment of 512 consecutive cases of routine cataract surgery using a refined NZCRS scoring system, which recommends that high-risk cases be performed by senior fellows or consultants. Preoperative, intraoperative and post-operative data were reviewed.
Results: Adherence was high (97.9%) and total intraoperative complication rate (8.0%) was lower than the no-intervention-phase. Intraoperative and post-operative (12.3%) complication rates were no different to earlier NZCRS cohort studies, but there were higher rates of posterior capsule tears (2.3%). The surgeon operating at the time of an intraoperative complication was a registrar in 1.8%, a senior fellow in 2.9%, and a consultant in 2.7% with adverse contributing factors commonly documented. Visual outcomes were generally excellent, with median Snellen visual acuity of 6/7.5 uncorrected and 6/9 best-corrected.
Conclusion: With risk stratification during a global pandemic, trainees can perform or participate in appropriate phacoemulsification cataract surgery with an overall intraoperative complication rate similar to those of more senior surgeons.

Refractive outcomes after astigmatism-correcting cataract surgery in a large multi-surgeon private practice

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Purpose: To evaluate whether published results on astigmatic correction can be replicated with a typical, unselected, diverse, patient population in a large multi-surgeon practice.
Method: Billing records from the Eye Institute Remuera were reviewed and 200 cases were included. Preoperative and post-operative visual acuity were compared. Vector analysis was performed (ASSORT Group Analysis Calculator, Alpins method) using preoperative axial length, anterior keratometry, total corneal astigmatism; intraocular lens (IOL) power, cylinder and target axis; IOL A-constant; and either auto refraction or subjective post-operative refraction. Vectors were used to calculate astigmatism correction index, magnitude of error and angle of error.
Results: Ocular comorbidities were frequent (42.0%) and preoperative visual acuity was good (mean best-corrected 6/9.5-2). Vector results were similar to reports in the literature: magnitude of surgically induced astigmatism was 1.25D $\pm$ 0.63, target induced astigmatism was 1.17D $\pm$ 0.49, magnitude of error 0.08D and difference vector 0.48D $\pm$ 0.31. Intraoperative complications were rare (0.5%). Postoperative visual acuity was excellent: 6/7.5 unaided in emmetropic targets and overall, best available mean visual acuity was 6/7.5 or better in 95%. Of patients with previous refractive surgery, 93.3% achieved unaided visual acuity of 6/9.5 or better, and all achieved 6/7.5 or better with minor refractive correction
Conclusion: Regardless of toric IOL model and ocular comorbidities, visual outcomes after astigmatic-correcting cataract surgery using toric-IOLs are excellent, mirroring literature results using ideal research settings. And despite challenges in calculating IOL power for eyes with prior refractive surgery, with careful selection and using multiple calculators, excellent visual outcomes can be achieved.

First do no harm – Reusable Drysdale nucleus manipulator instruments implicated in cataract surgical complications

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Purpose: To analyse reused Drysdale nucleus manipulator (DNM) instruments associated with intraoperative complications for sharp defects and evaluate their elemental composition to determine probable source.
Method: This laboratory study utilised scanning electron microscopy to examine six DNMs (5 reused, 1 control) for sharp surface defects (number, dimensions), and elemental composition determined using energy dispersive spectroscopy.
Results: Scanning electron microscopy detected sharp burrs in all reused DNMs (5 of 5). Energy dispersive spectroscopy revealed most sharp defects were composed of either aluminium or carbon, indicating they originate either from instrument wear or build-up of organic residues, respectively. No sharp defects were found in the control DNM (1 of 1).
Conclusion: Cataract surgery is amongst the most common surgeries performed worldwide. DNMs are widely employed as second instrument to facilitate lens rotation/cracking, and commonly reused in lieu of environmental considerations and curbing healthcare expenditure. However reuse may predispose DNMs to developing sharp defects, which can lead to surgical complications including, in our experience, posterior capsule rupture[1]. Of note, digital (finger palpation) rather than visual means (operating microscope), served to identify all defective DNMs in our study[1], highlighting a practical consideration for detecting instrument failure. The exquisite sensitivity of the human finger, able to discriminate between patterned surfaces down to 13 nanometres (despite fingerprint structure in the sub-millimetre range)[2] has long been recognised and depicted in the sensory homunculus.

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Incorporating the Catquest-9SF into routine cataract service to monitor patient-reported outcome measures

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Purpose: In August 2021, the Australian Commission on Safety and Quality in Health Care published the Cataract Clinical Care Standard highlighting the need for routine monitoring of patient-reported outcome measures to support patient-centred healthcare. Our study aimed to explore the limitations and challenges of implementing the Catquest-9SF questionnaire into routine cataract surgery to monitor patient-reported outcomes.
Method: This project is being conducted at Sydney and Sydney Eye Hospital, Australia. It involves three-phases with the Catquest-9SF questionnaire being administered to every patient undergoing cataract surgery. (i) Pilot phase: questionnaire completed on the day of surgery (250-300 patients over three months). (ii) Main phase: questionnaires completed at the Cataract Pre-Assessment Clinic (600-800 over 6-12 months). (iii) Electronic phase: questionnaire completed using the Health Outcomes and Patient Experience platform via iPads (250-300 patients over three months). All post-op questionnaires are re-administered to patients during their one-month post-op follow up appointment in the outpatient clinic.
Results: Challenges associated included staff being unfamiliar with patient-reported outcome measures, increased staff workload, appropriate storage of questionnaires and following up patients in the outpatient setting for post-op questionnaires. Limitations included funding for iPads and technical support. Patient reported issues include language barriers and difficulty with print size that required carer engagement.
Conclusion: There are multiple limitations and challenges that need to be addressed when incorporating the Catquest-9SF into routine practice. However, with the demand for cataract surgery on the rise, there is a need for systematic monitoring of patients' experiences to drive patient-centred, service improvements.

New Zealand Cataract Risk Stratification

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Purpose: To further validate the New Zealand Cataract Risk Stratification (NZCRS) system, as it becomes standard of care at Greenlane Clinical Centre, Auckland District Health Board, New Zealand.
Method: Prospective cohort study. Preoperative risk stratification of consecutive cataract cases (n = 300) using the NZCRS scoring system in a public teaching hospital setting, Auckland, New Zealand. Identification of higher-risk cases and recommendation to allocate these cases to senior surgeons – fellow or consultant. Primary outcome: intraoperative complication rates relative to adherence to NZCRS recommendations.
Results: Eighty-seven cases (29%) identified by NZCRS as high risk and recommended for fellows or consultants (attendings). Primary surgeons were residents, fellows and consultants in 47 (15.7%), 48 (16%) and 205 (68.3%) cases, respectively. Overall intraoperative complication rate was 6.7%. There was no statistical difference in complication rates between surgeon levels. The NZCRS scoring recommendations were adhered to in 99% of cases. In the group of cases that adhered to the NZCRS recommendations (n = 296), the intraoperative complication rate was 6.4%. Mean best-corrected visual acuity was 6/7. Post-operative cystoid macular oedema was reported in 4.7%. Re-scoring by an investigator revealed 30.0% of high-risk cases compared to 20.3% identified by the surgeons due to differences in anterior chamber depth and cataract density scores.
Conclusions: The NZCRS system helps identify high-risk cataract cases. Subsequent allocation to appropriate surgeon levels results in a reduction of intraoperative complications.

Patient attitudes to cataract surgery: Disclosure, consent and training

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Purpose: To assess patient attitudes to trainee involvement in cataract surgery in a teaching hospital setting.
Method: An anonymous questionnaire was developed and used to assess patient recall of informed consent, attitudes and reasons for altruism related to trainee involvement in cataract surgery.
Results: More than half did not recall seeing a trainee surgeon before surgery or being told that a trainee may perform their cataract surgery. Around a third of patients were not aware of the level of the surgeon performing their cataract surgery. The vast majority of patients (90%) support trainee surgeon involvement in cataract surgery. Reasons for this altruism were mainly the "need for trainees to learn". The majority agreed that trainee surgeons are expected to be involved in all aspects of a patient's care in a teaching hospital (70%) and that this will benefit the trainee surgeon themselves (77%). Most were happy for a trainee surgeon to be present in the operating room during their cataract surgery (91%), fewer patients expressed they would be happy for a trainee to be taking part (45%) or performing (43%) their cataract surgery with supervision.
Conclusion: Although most patients support trainee involvement in cataract surgery, less would consent to trainee involvement in their cataract surgery. Therefore, we may need to further address patient concerns and fears regarding trainee involvement in the future.

Extended depth of focus intraocular lenses in patients with mild glaucoma requiring concurrent micro-invasive glaucoma devices: Safety and efficacy

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Purpose: To evaluate the clinical outcomes in patients receiving an extended depth-of-focus (EDOF) intraocular lens (IOL) in eyes with mild open-angle glaucoma.
Method: Ninety-five eyes of 53 patients undergoing cataract surgery with combined EDOF IOL and minimally invasive glaucoma surgery device, by three surgeons, were retrospectively assessed. Primary outcome measures included uncorrected distance and near visual acuity, mean absolute difference from spherical equivalent target. Secondary measure includes incidence of intraoperative and post-operative complications and rescue medication.
Results: Mean age was 74.4 years and 62.3% of patients were female. 83.6% of eyes at post-op had uncorrected distance vision of 6/9 or better and 75.5% achieved N8 or greater at near. The mean absolute difference from SE target was 0.47 ± 0.44D. Mean intraocular pressure decreased from 16.41 ± 4.6 mmHg at preop to 12.29 ± 3.1 mmHg at three months post-op. The mean number of intraocular pressure-lowering medication decreased from 1.04 ± 0.85 medications to 0.84 ± 0.89 medications

over a similar period, with 37.9% of eyes reducing at least one medication. There were no complications.
Conclusion: EDOF IOLs potentially offer a greater range of optical independence following cataract surgery. Use in eyes with comorbidities however has been selective with relative tight inclusion criteria previously. This retrospective study indicates solid visual outcomes in eyes with mild glaucoma suggesting EDOF IOLs represent a possibility for these patients. Refractive outcomes approach literature in standard cohorts. Prospective studies inclusive of contrast sensitivity and patient reported outcomes may provide further confirmation of the value of these IOLs in this cohort.

Comparing Barrett True-K and Haigis-L formulae for cataract surgery following laser-assisted in situ keratomileusis

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Purpose: Achieving a desired refractive outcome can be challenging for cataract surgery on eyes which have previously undergone corneal refractive surgery such as laser-assisted in situ keratomileusis (LASIK). This small study compares the accuracy of the Barrett True-K and Haigis-L formulae in predicting refractive outcome in cataract surgery for eyes which have previously undergone myopic LASIK surgery.
Method: This retrospective, consecutive audit was conducted at a private ophthalmology practice in Sydney, Australia. Patient records were reviewed and 11 eyes that had undergone previous LASIK were included. All patients had routine cataract surgery with insertion of PCIOL Alcon SN60WF. Measurements were undertaken using Zeiss IOLMaster® 700 which considers both anterior and posterior corneal curvature to provide a more accurate representation of corneal refractive power.
Results: Using Barrett True-K formula, seven patients had myopic surprise and four had hypermetropic surprise; range +0.36 to -0.93D, average -0.25D, median -0.25D. Using Haigis-L formula, all 11 cases had myopic surprise; range -0.06 to -2.28D, average -0.71D, median -0.59D. Haigis-L gives a recommendation of toric IOL power, while Barrett True-K only provides for spherical correction.
Conclusion: This study shows that Barrett True-K formula is more accurate than Haigis-L in prediction of refractive outcome. However, there is a risk of hypermetropic surprise which can be overcome by aiming for myopia of at least -0.5D. Using the Haigis-L formula avoids hypermetropic surprise, however the larger range of myopic refractive surprise makes it less accurate in predicting a desired refractive outcome.

Outcomes of pinhole intraocular lens implantation in eyes with irregular astigmatism

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Purpose: To report the visual and refractive outcomes of pinhole intraocular lens (IOL; IC-8) implantation in eyes with irregular corneal astigmatism.
Methods: A retrospective, single surgeon, case series of 26 eyes was conducted. Eyes with irregular astigmatism undergoing cataract surgery were implanted with IC-8 pinhole IOLs. Eyes with at least one month follow-up were included.
Results: Indications for pinhole IOL implantation included ocular rosacea (9), prior pterygium surgery (5), prior laser in situ keratomileusis/photorefractive keratectomy (4), keratoconus (3), prior penetrating keratoplasty/deep anterior lamellar keratoplasty (2), infectious keratitis (2) and epithelial basement membrane dystrophy (1). An uncorrected distance visual acuity of 6/6 and 6/12 was achieved in 42% and 96% of eyes respectively. All eyes achieved an uncorrected near visual acuity of N10 or better with 55% achieving N5. A corrected distance visual acuity of 6/6 and 6/9 was achieved in 61% and 100% respectively. Seventy percent of eyes achieved within ± 0.5D of target spherical and cylindrical refraction.
Conclusion: This study suggests that pinhole IOLs (IC-8) can be effective in eyes with irregular astigmatism.

Comparison of corneal outcomes in refractive surgeries

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Purpose: Corneal ectasias are a well-known complication of refractive surgery due to the impact of tissue

ablation on corneal biomechanics. We compare the impact of the two kerato-refractive surgeries laser in situ keratomileusis (LASIK) and small incision lenticule extraction (SMILE) on the corneal topography and ablation post-treatment in myopic patients.
Methods: In this prospective study, data of a 118 eyes was collected at Amanat Eye Hospital, Rawalpindi and Islamabad branches between January 2019 to December 2019. The patients were divided into two groups, 66 eyes were included in the LASIK group and 52 eyes in the SMILE group. Mean changes in central corneal thickness, keratometric readings were assessed post-procedure and analysed using non-parametric Mann-Whitney U test.
Results: It was found that the decrease in central corneal thickness was significantly greater in SMILE than LASIK while curvature change was comparable in the two groups.
Conclusion: SMILE causes a significantly higher degree of tissue ablation as compared to LASIK in the Pakistani population. The safety and efficacy of the treatment remains comparable.

Linear dysphotopsia following cataract surgery due to the Maddox rod effect of a posterior capsular crease: A case series

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Purpose: To describe the clinical features of patients who reported a characteristic linear dysphotopsia following cataract surgery that could be directly correlated to a linear crease of their posterior lens capsule: the 'Maddox rod effect'.
Methods: Clinical case series with clinical images.
Results: Four cases of a Maddox rod effect were identified from a single surgeon's clinical records. In each case, clinical photographs confirmed a well-defined, linear crease visible on the posterior lens capsule. Each patient described seeing a linear streak emanating from any point source of light, which was confirmed when the patient drew their subjective point spread function. The direction of the streak was orthogonal to the direction of the capsular fold. The streak disappeared with either YAG laser capsulotomy or with spontaneous resolution of the capsular fold.
Conclusion: A linear fold of the posterior capsule can cause a characteristic linear dysphotopsia at an orientation that is orthogonal to the direction of the fold.

Evaluation of causes of rebound iritis after cataract surgery

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Purpose: To study the incidence, causes and management of patients with persistent iritis after cataract surgery in Indian eyes.
Method: A retrospective review was done of patients who were diagnosed with rebound or persistent iritis after cataract surgery during one year period. Patient demographics, previous medical history, preoperative, intraoperative and post-operative factors of 26 eyes (23 patients) were compared with a control group of 26 eyes who did not have persistent iritis after cataract surgery.
Results: The overall incidence of post-operative iritis was 1.96%. Majority of cases had previous history of ocular inflammation (44%). After excluding such patients, association with diabetes mellitus and use of pupil expansion devices was found to be statistically significant ($p < 0.05$). Others causes observed were poor compliance, retained lens matter and possible herpes reactivation.
Conclusion: Risk factors for persistent iritis after cataract surgery include being diabetic and pupil expansion device use. Surgeons should check compliance and if the correct drops are being instilled. There should also be high index of suspicion in non resolving iritis for herpes reactivation and antiviral therapy should be considered in such cases.

Safety of subconjunctival triamcinolone injection as a substitute for post-operative steroid drops for cataract surgery

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Purpose: We wish to describe the method and experience of a single surgeon series of approximately 400 cases in which subconjunctival steroid was used in place of topical post-operative steroid.

Method: The main concern with this technique is the potential for poor post-operative intraocular pressure (IOP) control.
Results: There was one case requiring post-operative elevated IOP management and two cases with extension of the routine review period for IOP monitoring.
Conclusion: We feel that the advantages of this technique (patient comfort, compliance-independent, good post-operative inflammatory control and cost) justify the small risk in an appropriately selected patient population.

CORNEA

Diagnosis and management of keratoconus in community optometry practices

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Purpose: Defining the patterns of practice and referral criteria of optometrists within New Zealand to identify therapeutic and diagnostic management of keratoconus in the community.
Methods: Optometrists in New Zealand were invited to complete an anonymous online survey evaluating patterns of practice and referral criteria to ophthalmology. Optometrists were recruited through New Zealand Association of Optometrists and Cornea and Contact Lens Society of New Zealand, as well as private practices via email.
Results: Responses from 168 optometrists showed 47.6% had $\geq$ 15 years experience, 21.7% prescribed soft and 6.4% prescribed rigid gas permeable (RGP) lenses daily. Main barriers to prescribing RGPs was suboptimal fitting experience, low demand and patient discomfort. Majority (41.1% referred on progression of corneal parameters. Practice size or location was not associated with the number of newly diagnosed cases. Optometrists with greater experience were more likely to prescribe RGP lenses and co-manage patients with ophthalmologists. Topographic unit ownership suggested an increased likelihood of prescribing RGP lenses but did not alter referral patterns.
Conclusion: Our survey provides an indication of current practice and highlights the important role of optometrists in the diagnosis and management of patients with keratoconus. Our results identify substantial variability in diagnostic and referral patterns, and we propose that patients would benefit from the development of standardised guidelines for referral and co-management with ophthalmologists.

Assessing barriers to accessing care; investigating low attendance to tertiary keratoconus clinics

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Purpose: Determine the barriers to gaining access to the crosslinking service in Auckland particularly among Māori and Pacific Peoples.
Methods: Data from patient records at Auckland District Health Board was collected prospectively over 12 months. Parameters included age, gender, body mass index, ethnicity, New Zealand deprivation score of residence (NZDep; area-based measure of socioeconomic status, 1 = low deprivation to 10 = high deprivation), disease severity (maximum keratometry and thinnest corneal thickness), attendance, distance travelled to clinic, car ownership, employment and visual outcomes.
Results: Four hundred and fifty-four subjects with keratoconus had a mean age of 24.1 $\pm$ 0.8years, mean body mass index of 33.0 $\pm$ 9.7 and 43% were female. Pacific People consisted 40.2% of the population, Māori 27.2%, Europeans 21.2%, Asian 9.9% and Middle Eastern, Latin American and African 1.3%. Mean distance travelled was 12.5 $\pm$ 9.5km, NZDep was 6.8 $\pm$ 2.6 and attendance was 69.0 $\pm$ 42.5%. Lowest attendance was in Pacific People and highest was in Asians (58.88% vs. 90%, $p = 0.02$). Mean worst-eye visual acuity at attendance was 0.75 $\pm$ 0.47 logMAR (6/35). Māori and Pacific People had the highest NZDep ($p < 0.001$), presented younger ($p = 0.02$), had higher disease severity ($p < 0.001$) and worse visual acuity ($p < 0.001$).
Conclusion: A low rate of attendance was seen in this patient cohort attending a keratoconus clinic. Pacific People and Māori presented younger with worse disease severity and visual acuity but also had the highest non-attendance rate. Our results suggest that deprivation, ethnicity and unemployment were found to be active barriers to clinic attendance.

The use of the Medmont-E300, Revo-NX and Pentacam-AXL for keratoconus management in eye care practices

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Purpose: To evaluate the repeatability and agreement of a Placido disc-based videokeratoscope (Medmont-E300 topographer) typically used in primary care with spectral-domain optical coherence tomography (Revo-NX) and Scheimpflug corneal tomography (Pentacam-AXL) typically used in secondary-care.
Method: A prospective study where one eye from each subject was randomised to have central and thinnest corneal thickness (TCT) and maximum, mean, steep and flat keratometry (Kmax, Kmean, Ksteep and Kflat), measured with all three devices. Three measurements were completed per device to assess intra-observer repeatability.
Results: A total of 110 eyes from 110 patients with keratoconus were analysed. Repeatability was best with the Pentacam for central corneal thickness, Kmax, Kmean, Ksteep and Kflat parameters (precision = 9.21, 0.8, 0.38, 0.52, 0.58). The Medmont had better repeatability than the Revo with Kmax, Kmean, Ksteep and Kflat (precision = 1.41, 1.35, 1.43, 1.59). Revo had the best repeatability with TCT (precision = 3.81). The intraclass correlation coefficient was > 0.94 for all parameters in all devices. Agreement was generally poor between devices. However, there was good agreement between Pentacam and Medmont Kflat measurements ($p > 0.05$).
Conclusion: Repeatability of keratometry parameters with the Pentacam and Medmont were greater than the Revo, suggesting a lower threshold for change for anterior corneal changes. There was poor agreement between devices. The Revo had the greatest repeatability for TCT, suggesting a lower threshold for assessing thinning in disease progression and corneal-crosslinking safety. The Pentacam provided the best overall compromise between keratometry and pachymetry repeatability

Corneal amyloid staining after trypan blue in Descemet's membrane endothelial keratoplasty

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Purpose: We report a case of an 82-year-old patient with concurrent Fuchs' corneal endothelial dystrophy and lattice corneal dystrophy who suffered permanent trypan blue staining of the amyloid deposits after descemet's membrane endothelial keratoplasty surgery.
Method: A retrospective case report.
Results: This case report poster presentation seeks to highlight impressive photographs of amyloid staining with trypan blue that persisted after descemet's membrane endothelial keratoplasty surgery with three years follow-up. This has only been reported in the literature a handful of times, and was visually significant in this patient, leading to glare symptoms and reduced visual acuity.
Conclusion: Trypan blue staining of amyloid deposits in the corneal stroma can be visually significant, with research suggested potential stimulation of progression of amyloid deposition. This is relevant for all anterior segment surgeons using trypan blue in the setting of primary (e.g., lattice corneal dystrophy) or secondary amyloid deposition (e.g., polymorphous amyloid degeneration, chronic inflammation, systemic disease).

Incidence of ocular surface squamous neoplasia in pterygium specimen

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Purpose: In clinically benign pterygium, many studies recommend routine histopathology analysis to assess for ocular surface squamous neoplasia (OSSN). This audit aims to: (i) assess the rate of pterygium specimens being sent for histopathology in an Australian metropolitan hospital compared to rural hospital; and (ii) to assess the incidence of OSSN in pterygium specimens.
Methods: The retrospective, consecutive study was conducted at two clinical hospitals Royal North Shore Hospital (RNSH, metropolitan), Sydney, Australia and Wagga Wagga Base Hospital (WWBH, rural). Medical records were reviewed of pterygium excision from January 2018 to December 2019.
Results: A total of 115 eyes were included in the study (n = 44 metropolitan, n = 71 rural). At RNSH, all excised specimens were sent for histopathology examination. Fifteen out of 44 cases (34.1%) demonstrated OSSN features. At WWBH, only cases suspected of OSSN features were sent for histopathology examination. Thirteen out of 71 cases (18.3%) were sent for histopathology of which only seven specimens (54%) were diagnosed to have neoplasia.
Conclusion: These pterygium excisions were performed in operating theatres. RNSH is a tertiary referral hospital hence more likely to encounter pterygia which are larger than average and/or have dysplastic features. WWBH is a

district hospital hence more representative of pterygia cases in the general community. Routine histopathological examination of pterygium specimens is recommended in facilities that encounter a high incidence of OSSN. In cases of clinically benign pterygium diagnosed on slit lamp examination by an experienced ophthalmologist, routine histopathology may not be required.

Insulin eye drops effects on resistant neurotrophic corneal ulcers

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Purpose: To evaluate insulin eye drops efficacy on neurotrophic corneal ulcers.
Method: All patients with resistant neurotrophic corneal ulcers trialled on Insulin eye drops were identified using the Taranaki base hospital pharmacy registry. Patients with before and after insulin treatment photos were selected.
Results: All four patients showed clinical improvement with insulin eye drops.
Conclusion: Insulin eye drops appear to be a cheap, effective, and safe alternative treatment option for neurotrophic corneal ulcers. More research is required on other applications for this novel treatment.

5-Fluorouracil in primary, impending recurrent and recurrent pterygium: A systematic review

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Purpose: Pterygium is an ultraviolet-related disease characterised by an aberrant, wing-shaped and active wound-healing process. There is nothing quite as disheartening for the surgeon or patient as the recurrence of pterygium, and various adjuvants have been studied to ameliorate this. This systematic review provides a comprehensive summary of the efficacy and safety of 5-Fluorouracil (5-FU) as an antimetabolite agent for pterygium management.
Methods: Searches were conducted across Ovid Medline, Embase, Cochrane, Scopus and Web of Science Core Collection databases. Studies reporting the use of 5-FU in primary, impending recurrent and recurrent pterygia were included if recurrent outcomes were reported. The primary outcomes examined were recurrence rate and complications.
Results: An appraisal of electronic searches of the databases identified 34 clinical studies reporting recurrence outcomes of 5-FU use in primary, impending recurrent and recurrent pterygia. A recurrence rate of 11.4-60% with the bare scleral technique, 3.5-35.8% with conjunctival rotational flaps, 3.7-9.6% with conjunctival autografts for intraoperative topical 5-FU, and 14-35.8% for preoperative and intraoperative injections. Post-operative intralesional injections of 5-FU to arrest progression in impending recurrent pterygium and true recurrent pterygia had success rates of 87.2-100% and 75-100%, respectively. 5-FU without surgery, arrested progression in 81.3-96% of primary and recurrent pterygia.
Conclusion: 5-FU is relatively inexpensive, available and easy to administer, making it attractive for resource-limited scenarios. 5-FU has a predilection for causing scleral thinning, corneal toxicity and graft-related complications. If 5-FU is used in the management of pterygium, it should be with caution, in selected patients and with vigilant long-term monitoring.

Development and characterisation of a clinically relevant mouse model of alkali-induced limbal stem cell deficiency

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Purpose: Limbal stem cell deficiency (LSCD) is a debilitating ocular surface disease primarily caused by alkali burns, which results in corneal conjunctivalisation, neovascularisation, chronic inflammation and fibrosis. Reliable animal models are crucial for understanding its pathogenesis and devising novel therapies. Our goal was to develop and comprehensively characterise a clinically relevant mouse model of alkali-induced LSCD.

Method: Sodium hydroxide 0.25N was topically administered to the cornea to induce total LSCD in 6–8-week-old C57BL/6J mice (n = 109). Clinical (photography, fluorescein uptake and anterior segment optical coherence tomography), histological (haematoxylin and eosin and periodic acid) and phenotypic (immunofluorescence with specific antibodies) assessments were performed at two and six weeks, and three and six months post-injury.
Results: The alkali burn resulted in corneal opacity which persisted throughout the six-month follow-up ($p < 0.0001$). At two weeks, injured eyes had more punctate lesions in the central cornea ($p = 0.0002$), which correlated with reduced central corneal epithelial thickness ($p = 0.0021$). Clinically, the regenerated epithelium stabilised by six weeks post-injury. Histology and immunofluorescence confirmed corneal conjunctivalisation with loss of K12+ epithelia, which were replaced by K8+, K13+, K15+ and K19+ counterparts. A proportion of conjunctivalised corneas spontaneously developed pericentral clusters of K12+ corneal-like epithelia which expanded into larger islands over time, indicative of transdifferentiation. Goblet cells migrated from the forniceal repository onto the cornea early post-injury but disappeared at later time points. K10+ epithelia were also observed, indicative of squamous metaplasia. Corneal neovascularisation and reduced innervation were noted.
Conclusion: Topically instilled sodium hydroxide successfully induced features of total limbal stem cell deficiency. This will allow us to explore the efficacy of biological and pharmacological agents to promote self-healing.

Ocular neuropathic pain in dry eye disease: A Save Sight Dry Eye Registry Study

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Purpose: To explore the association between ocular neuropathic pain and patient demographics, clinical signs and questionnaire scores in dry eye disease (DED).
Methods: A cross-sectional study was performed using the Save Sight Dry Eye Registry. Patients were divided into two groups based on a diagnosis of ocular neuropathic pain. Patient demographics and clinical signs of DED were compared. Scores for the Ocular Surface Disease Index (OSDI), Ocular Comfort Index (OCI), Patient Health Questionnaire-4, average screen time and treatment compliance were also compared. Descriptive and comparative analyses included frequency, percentages, mean, standard deviations, 95% confidence intervals, Mann-Whitney U tests, chi-squared test of independence and Fisher's exact test.
Results: Data from 182 Australian patients (182 right eyes) were extracted for analysis. Sixteen patients had ocular neuropathic pain. There was no statistical difference in age, gender, ethnicity, smoking status, menopause status, method of refractive correction and DED diagnosis (all $p > 0.05$). Patients with ocular neuropathic pain had a longer tear breakup time (7.88 ± 4.60 seconds vs. 5.43 ± 4.51 seconds) ($p < 0.05$), and worse total and pain-related question scores (except for air-conditioning sensitivity) for the OSDI (all $p < 0.05$). Similarly, they had worse total and individual question scores for the OCI (all $p < 0.05$). The Patient Health Questionnaire-4 also demonstrated higher rates of anxiety and depression in patients with ocular neuropathic pain ($p < 0.05$).
Conclusion: Patient demographics and clinical signs poorly differentiate patients with ocular neuropathic pain in DED. However, OSDI and OCI total scores, and OSDI pain-related question scores may have diagnostic utility.

Microbiological screening of corneas stored in organ culture medium from 2011-2022 at Lions Eye Bank of Western Australia

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Purpose: Microbiological testing of organ culture medium (OCM) used to store human donor corneas is carried out prior to tissue release for transplantation. We analysed contamination rates of corneal samples stored in OCM at Lions Eye Bank of Western Australia over a 12 year period.
Methods: All OCM samples used to preserve corneas from 2011 to 2022 underwent microbiological testing using the BACTEC FX system. Samples were collected and placed into aerobic and anaerobic culture bottles on day 3-5 of corneal preservation and 24 hours after transfer to thinning medium. Results were reported after seven days of incubation.

Results: From 2011 to 2022, 3,009 corneas were retrieved from 1581 donors, of which 2756 corneas were stored in OCM (92%). A total of 31 (1.13%) positive samples were reported. Of the positive samples, 20 had growths of bacterial origin and 11 were fungal. The majority (77.5%) of positive samples were identified on day 1 after sampling. Donors of the contaminated samples had a mean age of 55 years, with 17 male and 14 female donors. The highest incidence of contamination came from donors whose cause of death had been cancer. Death to enucleation times ranged from 3.5 to 25.5 hours (mean = 13.5 ± 7.25 hours) and death to preservation time ranged from 4.1 to 27.5 hours (mean = 14.83 ± 7.2 hours).
Conclusion: Microbiological screening of corneas stored in OCM from 2011 to 2022 showed a very low rate of positive cultures with no predictive donor characteristics.

Benefits of changing from cold storage to organ culture preservation of corneal tissue at Lions Eye Bank of Western Australia

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Purpose: To assess benefits of changing to organ culture preservation of donor corneas.
Methods: Eye bank data were retrospectively analysed for 11 years prior to and 11 years post change from cold storage in Optisol-GS to organ culture medium (OCM) storage at 37°C in 2011.
Results: From 2000 to 2021, eyes were retrieved from 2,219 donors. A total of 1,369 corneas were stored in Optisol and 2,469 in OCM. Prior to the introduction of OCM the mean number of donors was 74, compared to 128 donors per year thereafter. The mean number of corneas transplanted was significantly higher after OCM was introduced (218 vs. 114 before). Utilisation rates of corneas did not significantly differ pre-OCM (88.2%) and post-OCM (90.6%). The mean number of corneas imported per year was higher before the change (22 vs. 16 after). Death-to-enucleation times were significantly higher for corneas stored in OCM (13.4 hours) when compared to those in Optisol (10.6 hours). Death-to-preservation times were significantly higher for corneas stored in OCM (15.7 hours) when compared to those in Optisol (12.2 hours). Preliminary examination of time from tissue request to time of transplant was 203 days prior to the introduction of OCM compared to 71 days thereafter.
Conclusions: The change of corneal storage from hypothermic to normothermic conditions has resulted in an increase in donor numbers and decreased waiting times for surgery. This has allowed transplants to be scheduled rather than performed on a waiting list basis.

Differentiation of human induced pluripotent stem cells into limbal epithelial stem cells for transplantation

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Purpose: Autologous limbal stem cell sources are limited. Herein, we validate a protocol for the differentiation of human induced pluripotent stem cells (iPSC) into limbal epithelial stem cells (LESC) and corneal epithelial cells (CEC).
Method: Skin fibroblasts obtained from two healthy subjects were reprogrammed into iPSC using a standard method. After expansion in mTeSR Plus medium, iPSCs were guided toward epithelial differentiation in keratinocyte serum-free medium (KSFM) supplemented with blebbistatin (5 μM), basic fibroblast growth factor (50 μM), TGF-β inhibitor SB-505124 (10 μM) and bone morphogenic protein-4 (25 μM) for four consecutive days. The cells were then transferred to cell culture wells coated with laminin-521 (0.55 μg/cm^2) in KSFM medium and expanded for 21 days. At day 21, the cells were harvested and used for quantitative real-time polymerase chain reaction and immunocytochemica staining for LESC and CEC-specific markers including ABCG2, ΔNp63α, K14, K15, K3 and K12.
Results: All iPSC lines expressed pluripotency markers. After differentiation, the morphology of the cells changed considerably into LESC and CEC-like cells. Quantitative real-time polymerase chain reaction revealed reduced expression of OCT4, a pluripotency marker, and increased expression of ΔNp63α, a marker highly specific to LESCs. In addition, immunocytochemical showed positive staining for K3, K12, and K14, indicating corneal epithelial differentiation of the iPSCs.
Conclusion: KSFM can be used as an alternative to standard media, CnT-30 and E6, for the differentiation of iPSCs into LESCs and CECs. iPSC-derived LESCs should

be considered as an alternative autologous cell source for the treatment of bilateral limbal stem cell deficiency.

My chemical romance: Welcome to the eye parade. A 10 year retrospective study of acute chemical eye injuries

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Purpose: The purpose of this study was to characterise the patient demographics and features of ocular chemical injuries in a large metropolitan New Zealand population in order to better understand the activities and chemicals that put the eyes at greatest risk.
Method: Retrospective study of patients presenting with acute chemical eye injuries to the Greenlane Clinical Centre in Auckland, over a 10-year-period from 1 January 2012 through 31 December 2021. Patients were identified through our electronic database. Demographics, causative agent, visual acuity, severity of injury (Dua classification) and interventions were recorded.
Results: A total of 1,522 patients (65% male) with median age of 40 (interquartile range 27.5) were studied. Most injuries occurred at home (62%) or work (32%). The most common activities were cleaning (38%), trade work (18%) and recreation/DIY (8%). Seven hundred and fifty-three (50%) injuries were caused by alkaline and 295 (19%) by acidic substances (rest unclassified). Severity according to Dua grades were: 1489 I; 22 II, 5 III, 4, 1 IV, 4 VI. Forty-six patients (3%) required admission to hospital and five required surgical management. Of the four most severe injuries, half had a best corrected visual acuity of worse than 6/120 on discharge.
Conclusion: The majority of chemical injuries occur in the home while cleaning and involve some type of alkali cleaning product. Males are more likely to be affected than females. The majority of injuries are mild and settle with topical antibiotics and lubricants. However, severe injuries are potentially blinding despite being entirely preventable by eye protection. To date this is the largest study of chemical eye injuries in Oceania.

Amniotic membrane transplantation in Australia: Report of the first four years

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Purpose: Cryopreserved amniotic membrane transplantation (AMT) was re-introduced in Australia in 2018 to treat a variety of ocular diseases. This study reviews the donation and transplantation data for all AMTs performed in the first four years of the service in Australia.
Method: A retrospective cohort study was performed. Donor and recipient files were reviewed at the NSW Tissue Bank from the first donation in October 2018 until December 2022. Follow up forms and surveys were sent to the respective surgeons to evaluate their clinical experiences using the graft tissue and responses were collected. All amniotic membranes were retrieved via elective caesarean at a single maternity unit in Sydney, Australia.
Results: Sixty-seven amniotic membranes were donated, resulting in 1810 total grafts. Data was collected on 751 grafts distributed for surgical applications. The average donor gestational age was 35 $\pm$ 3.9 weeks. Ocular surface reconstruction after lesion excision, including pterygium, was the most common indication (n = 195, 27.2%), followed by corneal epithelial defects (n = 132, 18.4%), other corneal diseases (n = 77, 10.8%), chemical/thermal burns (n = 57, 8.0%), and limbal stem cell deficiency (n = 53, 7.4%). Surgeons reported AMT benefited the ocular surface in limbal stem cell deficiency and improved wound healing after burns. 99.3% of responding surgeons found the AMT helpful in their clinical practice.
Conclusion: Cryopreserved AMT can be beneficial in treating many ocular surface diseases with early Australian data supporting its clinical application.

Oxygen-supplemented transepithelial accelerated corneal crosslinking for progressive keratoconus (BOOST)

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Purpose: To investigate the effects of combining oxygen supplementation (using BOOST goggles) with enhanced

ultraviolet-A (UVA) light and increased riboflavin permeability in improving the efficacy of epithelium-on crosslinking (epi-on CXL) in patients with progressive keratoconus

Methods: Retrospective, dual-center, non-randomised longitudinal cohort case series at two private clinics in Tasmania and Queensland. Transepithelial crosslinking was performed on all patients with progressive keratoconus between 2020 and 2023. Application of an oxygen goggle mask (BOOST goggles) and pulsed UVA irradiation (1 sec on, 1 sec off) were utilised to enhance oxygen kinetics during epi-on CXL. High UVA irradiance (30 mw/cm^2) and benzalkonium chloride were used to improve stromal bioavailability. The main efficacy outcomes were chanes in mean corrected distance visual acuity (CDVA), demarcation line depths and safety over 12 months.

Results: A total of 104 eyes (88 patients) were included. Twelve months post-operatively, mean CDVA improved from a mean of 0.21±0.2 at baseline to 0.08±0.1 logMAR (P<0.0001). No statistically significant change was observed in Kmax and Km at 12 months post-operatively, but there was a trend to lower values. Average demarcation line depth was 285±45um, identified 1 month post-operatively. Only 5 eyes experienced an increase of more than 2D in Kmax, but without CDVA loss. There were no other reported adverse events.

Conclusion: Performing epi-on CXL with supplemental oxygen using patented design BOOST goggles, with accelerated and pulsed UVA irradiation in conjunction with riboflavin permeability enhancers resulted in improved CDVA and stable keratometry values up to 12 months post-operatively with a good safety profile

Graft success in Descemet's membrane endothelial keratoplasty using donor specimens showing endothelial cell loss with VisionBlue staining

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Purpose: To assess graft success following Descemet's membrane endothelial keratoplasty (DMEK) using donor tissue demonstrating endothelial cell loss during VisionBlue staining.

Methods: From a retrospective, single-surgeon case series of 238 Descemet's membrane endothelial keratoplasty procedures, 24 donor specimens were identified which demonstrated abnormal VisionBlue uptake during staining prior to surgeon peel in the operating room. Outcome measures were graft failure, number of re-bubbling procedures, time to achieve steady state visual acuity, central corneal thickness and corneal cell density.

Results: Two patients (8.3%) required re-grafting within 10 weeks. 41.6% required re-bubbling, half of which required multiple procedures. Twenty-one percent achieved steady state visual acuity within one week and 29% achieved it within four months. Mean central corneal thickness at three months was 535 um while mean corneal cell density at three months was 1842 cells/mm^2. Donor age did not correlate with any of the outcome measures.

Conclusion: The graft failure rate is in keeping with figures in the literature however the re-bubbling rate in the present study is higher than has been previously published. Given the abnormal endothelial staining pattern this increased re-bubbling rate warrants further investigation in the form of a case controlled study.

A retrospective review of fungal keratitis at two tertiary hospitals in Perth, Australia

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Purpose: Fungal keratitis is a significant cause of ocular morbidity globally. Compared to other forms of microbial keratitis, it typically has a poor prognosis due to delayed identification of causative organisms, variable drug susceptibility profiles, and limited and suboptimal antifungal options. The epidemiology of fungal keratitis varies with geography and there is a lack of contemporary data in Western Australia. We aim to present the microbiological patterns, risk factors, management, and outcomes of patients with fungal keratitis at two tertiary hospitals in Western Australia between 2006 and 2022.

Methods: A retrospective review of 82 cases of fungal keratitis at Royal Perth Hospital (n=58) and Fremantle Hospital (n=24) in Perth, Western Australia. Cases were identified by interrogation of the PathWest Laboratory information system with positive growth from corneal scrapes between 1 January 2006 to 31 December 2022. Data was extracted from medical records.

Results: The most commonly isolated organisms were Fusarium species (22%) and Candida albicans (16%). Predisposing ocular risk factors included contact lens wear (35%), pre-existing corneal disease (without a corneal graft) (26%), prolonged or recent intensive use of steroid

eye drops (21%), trauma (20%) and pre-existing corneal disease with a corneal graft (13%). 20% of patients suffered a corneal perforation. 22% of patients required one or more penetrating keratoplasties and 5% of patients went on to have an evisceration.

Conclusion: Fusarium species and Candida albicans were the most commonly isolated organisms. The most common pre-disposing ocular risk factors were contact lens wear, pre-existing corneal disease, prolonged or recent intensive use of steroid eye drops, trauma, and previous corneal grafts. A high proportion of patients required penetrating keratoplasty.

The effect of the COVID pandemic on follow-up and clinical outcomes in penetrating keratoplasty

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Purpose: Timely follow-up after penetrating keratoplasty (PK) is important to ensure optimal outcomes and to treat potential complications. This study aimed to assess the effect of the COVID-19 pandemic on follow-up rates and outcomes following PK.

Methods: A retrospective review of patients who underwent PK at the Princess Alexandra Hospital in Brisbane, Australia between January 2016 to January 2022 was undertaken. Assessments at post-operative appointments number one to ten were recorded. Lag time between the planned and actual appointments was evaluated in terms of duration and timing in relation to COVID-19. The effect of such lapses on various complications was assessed.

Results: A total of 186 patients were included for review; 103 (46.77%) were male and the mean age was 56.99 $\pm$ 20.65. Ninety-nine (53.23%) patients were in the pre-COVID group and 87 (46.77%) were in the post-COVID group. Long lapses, defined as $>$ 7 days for $\leq$ 1 week appointments, $>$ 14 days for 1–3 week appointments, $>$ 21 days for 4-8 week appointments, and $>$35 days for $\geq$ 9 week appointments, were significantly more common post-COVID (65.52%, $p = 0.04$). There was no difference in the incidence of complications in patients with a short lapse compared to those with no lapses. Patients with a long lapse in care were more likely to have graft rejection than those without lapses (21.10% vs. 6.52%, $p < 0.001$).

Conclusion: Lapses in care following PK were prevalent before and after COVID-19. Patients who have a long lapse in care were more likely to have graft rejection, but the incidence of glaucoma and failure was not affected.

Review of antibiotic prophylaxis in corneal graft surgery

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Purpose: To date, there is no literature outlining a standardised antibiotic protocol for the prevention of endophthalmitis after corneal transplant surgery. Surgeons routinely use subconjunctival and/or intracameral antibiotics post-surgery, however, this practice depend more on personal experiences rather than standardised protocols. Our study aims to describe the use of antibiotic prophylaxis among corneal surgeons in Australia and to assist in the development of a standardised protocol.

Method: Voluntary experiential survey open to all corneal surgeons who perform corneal transplant surgery in Australia between 2011 and 2021.

Results: Forty-three people were included in the study. In penetrating keratoplasty and deep anterior lamellar keratoplasty surgeries, the majority of surgeons used periocular antibiotics (58.5%) compared to intracameral antibiotics (29.3%). For both periocular and intracameral antibiotics used, cefazolin was the drug of choice. All surgeons used topical antibiotics after surgery which mainly included chloramphenicol (55.8%) and ciprofloxacin (32.6%). Majority of surgeons used these antibiotics four times a day for the duration of 2-4 weeks. Similar results were found for Descemet's stripping endothelial keratoplasty, Descemet's stripping automated endothelial keratoplasty and Descemet's membrane endothelial keratoplasty surgeries. 20.9% of surgeons reported having cases of endophthalmitis within six weeks of surgery with majority (66.7%) having one case on average. Surgeons found patient factors (57.2%) to be the main factor contributing to endophthalmitis compared to eye bank factors (14.4%) and operating theatre factors (7.1%).

Conclusion: There are consistent antibiotics prescribing patterns among surgeons across Australia for both penetrating keratoplasty and Descemet's stripping automated endothelial keratoplasty surgeries. The results of our study will inform eye banks across the nation about current practices in addition to forming part of future studies.

Microbial keratitis following corneal crosslinking for keratoconus

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Purpose: To assess the incidence and report the profile of microbial keratitis after corneal crosslinking (CXL).
Methods: This retrospective, single centre study included all patients who had undergone epithelium-off accelerated CXL at Whangārei Hospital, New Zealand from August 2020 until March 2023.
Results: Forty-six eyes of 34 patients were included in the study. Median age was 17 years (range 11-33) with a male to female ratio of 2:1. Seventy-six percent of patients were Māori (n = 26). The incidence of microbial keratitis was 6.5% (n = 3). All three patients who developed microbial keratitis had a history of atopy, with one patient on long term immunosuppressive therapy for eczema. All patients presented between day 4 and 6 post-operatively and had culture positive corneal scrapes, with Streptococcus Lancefield Group G, *Staphylococcus aureus* and *Cutibacterium acnes* isolated. Mean best corrected visual acuity was 0.4 logMAR (range 0.1-1.3) at presentation and 0.4 logMAR (range 0.1-0.7) at final follow up (mean change in vision at follow up -0.1 logMAR).
Conclusion: High rates of microbial keratitis were seen in patients undergoing CXL. All cases were of gram positive organisms and all occurred in patients with a history of atopic disease. A new post-operative care protocol has been devised to reduce the risk of microbial keratitis post CXL.

Maintaining corneal endothelial function with ripasudil: Insights from a retrospective study

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Purpose: To describe the therapeutic benefits of ripasudil, a medication originally developed to treat glaucoma and ocular hypertension, for patients with endothelial dysfunction who were treated at the Princess Alexandra Hospital and the Royal Brisbane and Women's Hospital.
Method: A six-year retrospective study of all public patients, during and after treatment, who received ripasudil at the Princess Alexandra Hospital and Royal Brisbane and Women's Hospital. Primary outcomes were visual acuity, intraocular pressure and central corneal thickness. Secondary outcomes included treatment compliance and surgical intervention.
Results: A total of 35 eyes from 32 patients were included in this study. The primary indication for ripasudil was corneal decompensation in patients with Fuch's endothelial dystrophy or with pseudophakic bullous keratopathy (46%). The second most common indication was failing corneal grafts (43%). Among the patients with failing grafts 60% required another graft. Mean visual acuity at commencement of treatment was LogMAR 0.66 (6/30+ equivalent), with slight improvement of LogMAR 0.103 (1 Snellen line) after treatment, though this was not statistically significant ($p = 0.296$). Mean central corneal thickness at commencement of treatment was 649 μm, improving by an average of 33μm, again this was not statistically significant ($p = 0.508$).
Conclusion: The predominant criteria for initiating ripasudil at these healthcare services are similar to the criteria used for patients who would benefit from endothelial graft surgery. Consequently, we have analyzed a subset of the population with severe corneal disease. Broadly, ripasudil appears to have a beneficial effect in maintaining corneal endothelial functional integrity though this was not statistically significant in this cohort.

Impact of cataract surgery on donor cornea suitability: An intra-individual retrospective audit

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Purpose: Pseudophakic donor corneal tissue has been identified as having lower endothelial cell density (ECD) and higher risk of preparation failure when compared to phakic donor tissue. As corneal tissue remains a limited resource, optimizing utilisation is essential. A retrospective data audit was undertaken to identify risk factors in pseudophakic eyes which impact tissue suitability.
Methods: Data was sourced from an existing database at the NSW Tissue Bank, Australia. Donors who had previous unilateral cataract surgery were identified with the opposite eye serving as an intra-individual control. Corneal assessment data including ECD, biomicroscopy and suitability for both eyes was collected and compared using paired t-tests.

Results: 191 donors between 1998 and 2018 were identified as having unilateral cataract surgery. The mean age of donors was 73.8 ± 9.2 years with 61.8% donors being male. Mean corneal ECD in the pseudophakic eyes was 2798.9 ± 363.3 c/mm2 vs. 2952.1 ± 362.6 c/mm2 for the phakic counterpart (p <0.001). Biomicroscopy indicated greater incidence of findings in pseudophakic eyes for both suitable and non-suitable eyes. There was a notable difference in suitability for transplantation, with 59% of pseudophakic eyes declared suitable compared to 91% in phakic eyes, which was shown to be statistically significant.
Conclusion: Despite mean endothelial cell density in pseudophakic eyes reaching minimum requirements for suitability, the percentage of eyes available for graft surgery was significantly less than the contralateral phakic eye. Increased incidence of corneal endothelial opacities in the pseudophakic eyes was a significant contributing factor in low suitability.

Microbial keratitis post accelerated corneal collagen cross linking

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Purpose: To assess rates of microbial keratitis after accelerated corneal collagen cross linking and compare this to published rates due to differences in post-operative antibiotic protocols (chloramphenicol compared to fluoroquinolones).
Method: Medical records of all cases that underwent crosslinking from April 2022 to April 2023 were reviewed. Cases that developed microbial keratitis were recorded and data analysed.
Results: A total of 94 patients were cross linked over a period of a year. Median age of cross linking was 24 years (13-49 years). Fifty-five percent of all patients cross linked were male. Three cases (3.2%) developed culture positive microbial keratitis (two cases of *Staphylococcus aureus* and one case of *Streptococcus pseudopneumoniae*) in the post-operative period. There were no patient factors associated with infection including age, learning difficulties or procedure location. All bacteria isolated were sensitive to and treated with ofloxacin resulting in complete resolution.
Conclusion: Published rates of microbial keratitis range from 1.2% to 1.5% compared to 3.2% in this audit. Infection rates may be lower in published studies due to the use of fluoroquinolones as post-operative antibiotics rather than chloramphenicol drops used here.

Dupilumab-associated ocular side effects: An under-recognised entity

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Purpose: Dupilumab is a first-in-class biologic approved for the treatment of a range of atopic conditions. Since gaining traction as an effective treatment modality in the treatment of moderate to severe atopic dermatitis, multiple reports have highlighted the occurrences of dupilumab-associated ocular side-effects (DOSE). Some were severe enough to necessitate treatment discontinuation in these patients.
Methods: A systematic review of existing literature was performed to identify clinical studies that documented and characterised patients with DOSE, and their treatment outcomes.
Results: DOSE ranges from mild diseases such as conjunctivitis, dry eyes and blepharitis, to more severe sight-threatening manifestations, which includes intraocular inflammation and cicatrising conjunctivitis. A range of treatment modalities have been proposed in the literature pertaining to management of the spectrum of ocular manifestations encountered. We have evaluated these modalities and proposed a treatment algorithm for DOSE (Figure 1). This is practice-changing and has been instituted by colleagues both locally and overseas to supplement their management of patients who are on dupilumab.
Conclusion: This is the first comprehensive review which has systematically consolidated the full spectrum of DOSE and their respective treatment modalities. Despite increasing usage of dupilumab, DOSE is only starting to be recognised as a unique disease entity – our findings serve as an important reference for future studies to understand the pathophysiology underpinning these observations, better characterise these manifestations and standardise management.

EPIDEMIOLOGY / PUBLIC HEALTH

Epidemiology and economic cost analysis of microbial keratitis from a tertiary referral hospital in Australia

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Purpose: The purpose of this study was to analyse the causative organisms of microbial keratitis, key clinical features at presentation and economic burden from a tertiary referral hospital in Australia.
Method: A retrospective review of 160 cases of microbial keratitis was performed, over a five-year period from 2015–2020. A wide variety of costs were considered to determine the economic burden, using standardised data from the Independent Hospital Pricing Authority and the cost of personal income loss.
Results: Our study showed the most commonly occurring pathogens were herpes simplex (16%), *Staphylococcus aureus* (15.1%) and *Pseudomonas aeruginosa* (14.3%). A total of 59.3% of patients were admitted, with a median length of admission of seven days. Median cost for all presentations of microbial keratitis was AUD 8,013 (USD 5,447), with costs significantly increasing with admission. The total annual cost of microbial keratitis within Australia is estimated to be AUD 13.58 million (USD 9.23 million).
Conclusion: Our findings demonstrate that microbial keratitis represents a significant economic burden for eye-related diseases and the key driving factor for the cost is the length of admission. Minimizing the duration of admission, or opting for outpatient management where appropriate, would significantly reduce the cost of treatment for microbial keratitis.

Foresight Sumba Eye Program update 2023

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Purpose: In 2020, the Sumba Eye Program (SEP) joined Foresight as the Australian non-government organisation to effectively continue its voluntary eye care program, whose purpose is to provide ophthalmic and optometric eye care to the under resourced East Indonesian Island of Sumba. The main goals now are to provide: (i) education and sponsoring local eye care nurses (ECN); and (ii) collaboration with Indonesian ophthalmologists from the Ophthalmology Department, Hasanuddin University, Makassar, Sulawesi and the Ophthalmology Department, Udayana University, Denpasar, Bali.
Method: In 2019 onwards, the COVID pandemic closed chances to continue eye camp visits to Sumba. So alternate ways by using What's App and Zoom applications were utilised to continue the teaching and maintain contact with the sponsored ECNs and ophthalmologists in Makassar. From 2023, the SEP is back to six monthly eye camps on the island of Sumba. The idea is to continue teaching the ECNs one-on-one and collaborate with the Indonesian ophthalmologists performing surgery. A trip to Makassar and Sumba in 2022 was undertaken by the SEP Directors and Foresight General Manager to re-establish links and plot the future visits.
Results: During the COVID pandemic, the ECNs continued to conduct screening eye camps monthly, providing eye care and spectacles to the Sumbanese with monthly reports to the Foresight Sumba Eye Program.
Conclusion: The Foresight Sumba Eye Program is a comprehensive eye program achieving the aims of training of the local nurses in eye care and working in collaboration with the ophthalmologists of Indonesia.

When the planet and orbit collide: E-scooter associated injuries at the Royal Melbourne Hospital

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Purpose: Alternative modes of transport are an important part of the climate solution. The City of Melbourne launched an e-scooter trial in February 2022 to assess their place in transport for Melbourne. Since their introduction, e-scooter injuries have been a significant cause of referrals to the emergency department at the Royal Melbourne Hospital, one of the two major trauma hospitals in Melbourne.
Method: In order to assess the ophthalmic injuries associated with these presentations a chart review of all referrals to the Royal Melbourne Hospital ophthalmology department during the period of the e-scooter trial was conducted.
Results: There were 17 cases of e-scooter related injuries (16 males, one female, mean age 42) presenting between February 2022 and February 2023. For reference there were 12 cases of pushbike related injuries during this time. Injuries included orbital fractures (15/17), lid lacerations (2/17) and globe injuries (8/17 subconjunctival haemorrhage, hyphema). Associated systemic injuries included intracranial haemorrhage (4/17), intrabdominal

injuries (1/17) and orthopaedic injuries (3/17). Alcohol was a factor in 42% (8/17) of cases.
Conclusion: This review shows that falls from e-scooters can be associated with significant ophthalmic injuries. A discussion of why e-scooter traumas are especially high risk for facial and head injuries and methods to mitigate the risk from this new mode of transport are also discussed.

Seeking to improve Indigenous eye health outcomes by learning from Māori perspectives surrounding eye health

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Purpose: Indigenous disparities surrounding ocular health outcomes are pervasive in the New Zealand and Australian health systems. Evidence indicates multifactorial causes of these inequities; including colonisation, ongoing marginalisation, racism, socioeconomic status, poverty and culturally unsafe practice between health professionals and Indigenous patients. This project used kaupapa Māori methodology to identify the perceptions of Māori surrounding ocular healthcare within Aotearoa New Zealand as a starting point for addressing existing inequities in eye health.
Method: Māori community members and clinicians (n = 18) via focus groups and interviews discussed topics relating to Māori health, ocular health consultations, ocular examination and access to New Zealand health services. Reflexive thematic analysis was undertaken using standard qualitative methodology.
Results: Five key themes were derived from the data. Māori patients recognise the value of ocular healthcare and highlight the importance of effective and culturally safe communication, acknowledgement of systemic barriers to accessing ocular health services and the acknowledgement of Māori cultural beliefs and models of health within ocular health services.
Conclusion: Issues reported by Māori patients within ocular health services resonate strongly with wider concepts intrinsically important to Māori; the right to access culturally safe clinical settings, the right to accurate and pertinent information-transfer between clinician and patient, involvement of family (whānau), the respect of cultural beliefs and acknowledgement of power imbalances within the wider healthcare system. Participant discussions and suggestions raise possible pathways to begin addressing ocular ethnic disparities in ocular healthcare delivery in New Zealand and beyond.

Development of an Indigenous health framework to enhance Māori eye health in New Zealand: Ngā Mata O Te Ariki

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Purpose: Indigenous health models can enhance clinical engagement between non-Indigenous clinicians and Indigenous patients in Australasia. This study sought to develop a framework with potential to address health inequities in eye health for Māori in New Zealand.
Method: Māori Indigenous-knowledge academics and experts (n = 5) participated in qualitative mixed-methodology semi-structured interviews to contribute to the creation of a Māori ocular health framework, building upon previous New Zealand Indigenous research (n = 18). Seven key themes extracted from interviews informed the development of the framework.
Results: The resulting framework entitled 'Ngā Mata O Te Ariki' provides a set of Indigenous Māori principles for use by eye care professionals to enhance engagement with Māori patients seeking ocular healthcare. The traditional Māori story of Matariki underpins nine core principles of this framework which link eye health and the Māori worldview. These are: (i) communication (whakawhitiwhiti kōrero); (ii) respect of all people (mana tangata); (iii) care for/valuing others (manākitanga); (iv) equity (mana taurite); (v) cultural safety and responsiveness (āhuru mōwai); (vi) power/governance (mana whakahaere); (vii) spiritual health (taha wairua); (viii) access (ka whai wāhi); and (ix) family health (whānau ora).
Conclusion: This framework aims to enhance both the cultural safety and responsiveness of eye health clinicians engaging with Indigenous patients in New Zealand. This offers a foundational framework to enhance eye care professional engagement with Indigenous patients to begin striving for equity in eye health in New Zealand and beyond.

Allergy and intolerance in ophthalmology patients

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Purpose: Drug adverse reactions (AR) can complicate the use of systemic and topical medications in the treatment of ophthalmological conditions. The prevalence of such AR, including both allergies and intolerances, in the inpatient ophthalmological population is uncertain. This information is required to guide future drug AR evaluation and management strategies.
Method: A multicentre retrospective study was conducted of consecutive individuals with inpatient ophthalmology visits over a 2.5-year period. Data regarding previously documented AR were collected from the institutional electronic medical record.
Results: There were 4189 individuals included in the study. There were 630 (15.0%) patients with any recorded AR. There were 126 (3.0%) patients with a documented penicillin allergy, 21 (0.5%) with a documented AR to trimethoprim-sulfamethoxazole, three with an AR to acetazolamide (0.1%) and one with an intolerance to timolol (< 0.1%). Other common ARs were associated with codeine (1.1%), morphine (0.8%) and adhesive tape (1.0%).
Conclusion: A substantial portion of ophthalmological inpatients have a history of drug AR. Allergies to antibiotics, such as penicillin and trimethoprim-sulfamethoxazole, may benefit from further evaluation to help elucidate which antibiotics these ophthalmology inpatients can receive safely.

Insights into the Western Australia Eye Health Care sector: Mapping the landscape and understanding the dynamics

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Purpose: This report offers a comprehensive overview of Western Australia's eye health care sector, covering demographics, human resources, services, funding, education, health promotion and research.
Method: Its goal is to understand the sector's dynamics and identify areas that can benefit from targeted funding to improve eye health care in the region.
Results: The report is divided into seven sections. Section 1 analyses the demographics and eye health in Western Australia, considering major eye conditions and future needs. Section 2 evaluates the demographic characteristics and numbers of the eye health care workforce. Section 3 investigates the range of services and organisations involved in eye health care. Section 4 explores the flow of funds in the sector. Section 5 addresses training pathways and professional development resources. Section 6 highlights the burden of eye diseases and ongoing health promotion projects. Section 7 discusses ophthalmology-specific research conducted in Western Australia and collaborations at various levels.
Conclusion: This submission aims to present key findings from the report that may be of particular interest to the RANZCO audience. It aims to facilitate informed discussions and propose strategies to enhance eye health care services, strengthen the workforce, optimise funding allocation, develop education programs, promote health initiatives and foster research collaborations.

Access to eye care in remote Western Australia; is population-based need being met in the Goldfields region?

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Purpose: The Goldfields is the largest regional boundary in Western Australia. Eye care is provided through telehealth, local optometry and outreach injection clinics and theatre-lists through Lions Outback Vision (LOV). No studies have assessed the trends in services in the region since the commencement of LOV in 2010. This study aimed to quantify the provision of ophthalmological services in the Goldfields over a six-year period to assess whether population-based need is being met.
Method: A retrospective, observational audit was conducted with an ethics exemption obtained from The University of Sydney. De-identified records were obtained from LOV's electronic records system. All consultations in the Goldfields region (excluding Esperance) from 2017 to 2022 were included.
Results: There were 8,823 consultations (47.5% male, 23.8% identified as Aboriginal/Torres Strait Islanders and

25% had diabetes) over six years. The number of consultations increased per year, with five times more occasions of service in 2022 (n = 2,564) than 2017 (n = 459). There was a greater number of cataract surgeries (5,148 per million in 2022) and intravitreal injections performed over the six-year period ($p < 0.001$).

Conclusion: This five-fold increase in service provision may reflect a gold standard model in outreach, achieved through consistency in medical teams, service coordination and funding. However, there remains a significant gap for the region, which has 12.5 times less full-time equivalent (FTE) than the average specialist availability nationwide (0.125 FTE ophthalmologists versus optimal 1.56 FTE using RANZCO average rates of four ophthalmologists per 100,000 population). As such, we advocate for permanent, sustainable ophthalmology services to the area.

Epidemiology and visual outcomes of ocular trauma in the Top End of the Northern Territory

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Purpose: Our primary aim was to describe the epidemiology and visual outcomes of ocular trauma in the Top End, emphasising the most common demographics and injuries. Our secondary aim was to compare ocular trauma incidence and visual outcomes between Indigenous and non-Indigenous patients.

Method: A retrospective clinical audit was conducted at the Royal Darwin Hospital, analysing emergency department visits with ocular trauma diagnostic codes between 2017-2021 (n = 1,098). Visits with inaccessible health records, no ocular injuries and unspecified diagnoses/affected eyes were excluded (n = 162).

Results: The most common demographics were males (70.62%) aged <40 years (67.41%). Assault (31.73%) was the most common mechanism of injury, followed by accidents (26.28%). Indigenous patients comprised 32.80% of injuries, with worse visual outcomes than non-Indigenous patients (0.36±0.86 and 0.10±0.55 logMAR respectively). Furthermore, 60.00% of patients with legal blindness (logMAR >1.00) were Indigenous. Eyelid/eyebrow/periorbital injuries were most common (41.50%), followed by orbital wall/facial bone fractures (25.60%). Open globe injuries (2.03% incidence) achieved the worst visual outcomes (2.37±0.82 logMAR).

Conclusion: Younger, male patients in the Top End are most commonly affected by ocular trauma, and assault forms the major cause. Collectively, 1.92% of injuries resulted in legal blindness, with high overrepresentation of Indigenous patients in this group. This data indicates that public health campaigns may be necessary to prevent visual loss from ocular trauma in the Top End population, especially in younger males. Furthermore, culturally sensitive initiatives are recommended to specifically target Indigenous populations, who are at greater risk of severe visual loss.

Endophthalmitis at a tertiary referral centre over an 11 year period: Local patterns and comparison within a broader Australian context

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Purpose: To describe types, microbiologic susceptibilities and visual outcomes of endophthalmitis presenting to Liverpool Hospital, Sydney, over an 11-year period.

Methods: Retrospective, consecutive chart review of endophthalmitis cases from January 2010 to April 2021, identified from International Classification of Diseases, 10th Revision, codes. Type of endophthalmitis, microbial organism, susceptibilities to antibiotics and visual outcomes were documented.

Results: Of 58 eyes, 30 cases were exogenous endophthalmitis (51.7%), the remaining 28 endogenous. Follow-up was defined at between 3-6 months. The proportion of eyes with best corrected visual acuity (BCVA) poorer than 6/60 at presentation was higher than at follow-up (88.9% vs. 47.9%, $p < 0.001$). Median logMAR BCVA at presentation was poorer than at follow-up (2.2 vs. 0.778, $p = 0.00672$). Nineteen eyes (32.8%) had a vitrectomy and the median time to vitrectomy was six days. Eight eyes (13.8%) were eviscerated/enucleated. Better initial BCVA ($p < 0.0001$) and vitrectomy ($p = 0.009$) predicted a better final BCVA. The overall culture-positive rate was 72.4%. 57.1% were gram-positive bacteria, 28.6% were gram-negative bacteria, 13.6% fungal, the remaining viral. No organisms were resistant to standard intravitreal antibiotics. The commonest causative organism was *Staphylococcus aureus*, 40% being methicillin-resistant *Staphylococcus aureus*. Overall, gram-positive endophthalmitis had poorer final BCVA. Regarding gram-negative endophthalmitis, a high proportion of

Klebsiella cases were associated with hepatic abscesses in Asian patients, and *Pseudomonas* cases had high rates of evisceration/enucleation.

Conclusion: Gram-positive endophthalmitis was most common. Better presenting BCVA and vitrectomy predicted a better final BCVA. Compared to other Australian centres, there is a higher rate of endogenous and gram-negative endophthalmitis, and a lower rate of fungal endophthalmitis. Resistance to current antibiotic regimes was not identified.

Ocular elastic band injuries: A five-year retrospective review of mechanisms of injuries at the Royal Victorian Eye and Ear Hospital

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Purpose: Elastic band injuries to the eye may be associated with significant visual morbidity. Exercise sports elastic bands and 'octopus' straps may cause high velocity blunt forced severe accidental trauma, with a myriad of potential complications and ocular injuries. The aim of this article is to assess the ocular morbidity and mechanisms of elastic band injuries presenting to the Royal Victorian Eye and Ear Hospital over a five-year period from 2018-2023.

Methods: Retrospective case series from chart review of electronic medical records.

Results: There were 137 total presentations for elastic band-related injuries to the Royal Victorian Eye and Ear Hospital from 11 January 2018 to 5 April 2023. There was a strong male predominance at 70.8%. Mechanisms of injury included exercise bands, elastic bands, high tension packing 'octopus straps' and other elastic-related injuries. Preliminary analysis of all elastic ocular injuries has highlighted at least three penetrating eye injuries and one case of orbital blowout fracture. Preliminary subgroup analysis for elastic sports bands yielded the most commonly associated ocular injuries were traumatic hyphaema and commotio retinae. Full visual morbidity details will be presented at the conference.

Conclusion: We present a large-scale update on elastic band injuries at a major referral centre. Elastic band injuries were associated with a significant predilection for young males with profound ocular morbidity. We hope to provide evidence to support national eye safety initiatives to reduce ocular trauma.

Assessing referral quality from optometrists and general practitioners to ophthalmologists: Implications for improved care

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Purpose: This study evaluates the referral quality from optometrists and general practitioners (GP) to ophthalmologists, acknowledging the challenges faced by GPs due to limited equipment and time constraints. Accurate information is crucial for safe triage of patients in ophthalmology, making this evaluation essential for improving referral practices and patient care.

Method: A New South Wales tertiary centre assessed 236 referrals to the ophthalmology department using the state's referral criteria. Referrals for conditions addressed in the state's referral criteria (cataract, diabetic retinopathy, glaucoma, age-related macular degeneration) were analysed based on source of referral, acceptance or rejection and rationale for rejection. The study captured two months of referrals including November 2022 and February 2023.

Results: Of the 236 referrals, 63 (26.69%) were from GPs, while 104 (44.07%) were from optometrists. Among the GP referrals within the referral criteria (57 referrals, 90.48%), only 27 (47.37%) were accepted. Visual acuity information was lacking in 23 (76.67%) of the rejected GP referrals. For optometrist referrals within the referral criteria (101 referrals, 97.12%), 95 (94.06%) were accepted. Only one referral (0.96%) was rejected due to inadequate visual acuity.

Conclusion: Disparities in referral quality were evident, with optometrist referrals demonstrating an almost two-fold (198.56%) acceptance rates compared to GPs. The study underscores the importance of including a visual acuity when referring patients from the GP setting, and suggests presenting to optometrists for primary care of isolated ophthalmological conditions may improve patient ability to be successfully referred to an ophthalmologist.

Euphorbia-related eye injuries: A systematic review

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Purpose: Euphorbia is an internationally distributed plant genus known to cause keratouveitis following sap exposure. Euphorbia plants are endemic to Australia, making this an ophthalmic public health issue of concern. Unfortunately, no guidelines for management are available. This systematic review aims to collate the reported literature regarding Euphorbia-related eye injuries and assist clinicians managing these presentations.
Method: Articles from Pubmed, Scopus, Cochrane, Embase and Cinahl were screened for relevance, then full text articles were assessed for eligibility: 26 articles documenting 46 cases were included in the analysis. Statistical analysis was performed using "R".
Results: Forty-six patients and 58 eyes with Euphorbia keratouveitis have been reported in the literature internationally. Common symptoms were pain (89%), redness (98%) and reduced vision (48%). Mean visual acuity was 6/19 on presentation (Decimal notation: 0.32 $\pm$ 0.30). Corneal epithelial defects (48), stromal oedema (64%) and anterior chamber reactions (45%) were the commonest signs. Interventions included irrigation, topical steroids and topical antibiotics. Fisher's exact tests demonstrated no statistically significant difference in final recovery with each individual management strategy. Full recovery within two weeks occurred in 91% of case with visual sequelae noted in four patients, one of whom required penetrating keratoplasty for scarring. In all cases, eye protection was not worn, and all but one case was associated with domesticated plants.
Conclusion: Overall, Euphorbia-related eye injuries are public health issues of concern internationally. Almost all cases occurred in the context of domesticated plants with handlers not using eye protection, representing a preventative health target

Experience of the first metropolitan-based public Aboriginal medical eye service in the South Western Sydney Local Health District

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Purpose: Initial 12-month experience of the first metropolitan-based Public Aboriginal Medical Eye Service in the South Western Sydney Local Health District. This study aimed to assess the demographic profile, utilisation of, and presenting conditions to the Budyari Aboriginal Medical Service, in South Western Sydney, and to identify any barriers to access.
Methods: Retrospective audit of clinical data of the 33 patients booked to the 13 Budyari Clinic sessions from commencement in February 2022 to May 2023.
Results: Mean age was 62 (range 45-82) years and 79% were female; all identified as Aboriginal and Torres Strait Islander peoples. The Budyari-based optometrist referred most patients. Attendance rate was high (n = 31, 93%). Common referral reasons included cataract (n = 15, 45%), diabetic retinopathy (n = 6, 18%) and glaucoma suspect (n = 8, 24%). A significant proportion (n = 17, 51%) were referred for further assessment at Liverpool Hospital, commonly the medical retina clinic (n = 8, 47%), however attendance rate in the hospital clinic was low (n = 8, 47%). Reasons included unable to wait with long wait times and difficulty with transport. The overall proportion of patients lost to follow up was 33% (n = 11) by the conclusion of the study. Six (18%) patients were booked for expedited 90-day cataract surgery.
Conclusion: This study provides insights into the first metropolitan Aboriginal Eye service in South Western Sydney where there are a large number of Aboriginal and Torres Strait Islander peoples.

Gram stain in the microbiologic diagnosis of infectious diseases of the eye: Analysis of seven-year data

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Purpose: We aimed to report gram stain results of specimens obtained from suspected ocular infections at a tertiary referral hospital in Tehran, Iran over a seven-year period.
Methods: The data of gram stain reports from specimens submitted for confirming suspected ocular infections taken during the seven-year period were analysed. The frequency and percentage of gram staining results and the patient's hospitalisation status were reported.
Results: Overall, 16,656 ocular specimens were submitted to Farabi Eye Hospital microbiology laboratory in a seven-year period with a mean patient age of 48.31 years. Initially microorganism was seen in 7,224 specimens (43.37%) out of that 5,039 (69.75%) were outpatient and

2,185 (30.25%) were inpatient. However, microorganism was not-detected in 9,432 specimens (56.63%) in initial smear out of that 4,999 (53.00%) were inpatient and 4,433 (47.00%) were outpatient. Out of 7,224 specimens with detected microorganism in smear, we observed bacteria in gram staining in 6,515 specimens (90.18%), 4,567 outpatients (70.10%) and 1,948 inpatient (29.90%); fungi in 672 specimen (9.30%), 232 inpatient (34.52%) and 440 outpatient (65.48%); and both microorganism in 37 (0.51%) specimens, five inpatient (13.51%) and 32 outpatient (86.49%). Among 6,5552 specimens with bacterial gram staining, 3,699 specimens (56.46%) were gram positive coccus, 2,261 specimens (34.51%) were gram negative baccilli, 371 specimens (5.66%) were gram negative coccus, 194 specimens (2.96%) were gram positive baccilli, and 27 specimens (0.41%) were filamentus.

Conclusion: Almost half of specimens revealed microorganism at the initial assessment that were submitted from outpatient clinics with the majority turning out bacteria.

The eye health of asylum seekers in Australia's offshore detention centres

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Purpose: This study describes the eye health of asylum seekers in Australia's offshore detention facilities and the eye care services available to them. It helps address the paucity of data on the common presenting eye conditions in this vulnerable population, as recommended by RANZCO.

Method: In 2015 and 2016, an outreach ophthalmology service was provided to asylum seekers on Manus Island and Nauru. A retrospective clinical audit was performed to obtain patient demographics, symptoms, presenting distance visual impairment (using World Health Organization definitions), diagnoses, management and need for services unavailable on-site.

Results: Eighty patients from 13 countries were assessed across 12 clinic days (age range 3-57 years, 84% male, 12.5% diabetic). Bilateral visual impairment was common (15 patients), mostly from refractive error (43%) and cataract (14%). Ten patients were unilaterally blind, mostly from ocular trauma (70%). No significant difference in visual impairment existed across gender, age-groups or regions of origin. Other common conditions included pterygia (21%), dry eye syndrome (12.5%) and allergic conjunctivitis (11%). Follow-up by an ophthalmologist, optometrist or medical specialist was required in 58%, 39% and 8% of cases, respectively. Eleven percent had inadequate assessments and 16% required surgeries that could not be performed due to local resource constraints.

Conclusion: Asylum seekers in offshore detention have high rates of ocular morbidity, with complex needs for intervention. This data makes a powerful case for offshore detention being an unsuitable situation, even with visiting specialists, from the perspective of long-term ocular health.

The eye health of newly arrived refugees in Adelaide, South Australia

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Purpose: This study describes the eye health of newly arrived refugees attending a state-funded health service in Adelaide. It helps address the paucity of data on the eye health of refugees, as recommended by RANZCO.

Method: Patients attending the Refugee Health Service undergo comprehensive assessment by an on-site optometrist with accredited interpreters if they have eye symptoms, personal or family history of eye disease, or visual impairment (using World Health Organization definitions). A retrospective audit of this service in 2017 was performed to obtain patient demographics, presenting and best-corrected distance visual acuity (better-seeing eye), diagnoses and management.

Results: In 2017, 494 of the 1400 refugees attending the service underwent an optometry assessment (age range 1-86 years, mean age 33.1 $\pm$ 18.6 years, 53% female). Regions of origin included the Middle East (25%), Bhutan (24%), Afghanistan (22%), Myanmar (15%) and Africa (14%). Of the 124 cases of visual impairment, 78% resolved with corrective lenses and 11% were from

cataract. Age-adjusted visual impairment was similar across different regions of origin ($p = 0.063$). Cataract was more common in Bhutanese patients (age-adjusted odds ratio 4.8; 95% confidence interval 2.0-11.4; $p < 0.001$). Distance, near, and multifocal spectacles were provided to 22%, 10%, and 30% of patients, respectively. Ophthalmology follow-up was required for 56 (11%) patients, mostly for cataract (22 patients).

Conclusion: Newly arrived refugees have high rates of visual impairment from refractive error and cataract. Integration of optometry and state-based refugee health services may improve the timely detection and treatment of these conditions.

Epidemiology, outcomes and socioeconomic cost of eye injuries

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Purpose: To report the epidemiology, visual outcomes, surgical interventions and costs of open globe (OGI), closed globe (CGI) and adnexal eye injuries (AEI).

Method: A total of 684 (155 OGI, 529 CGI/AEI) eyes from a 13-year (2008-2020) retrospective tertiary-centre. Outcome measures included best-corrected visual acuity (BCVA), prognostic modelling, operating theatre visits and direct/indirect cost evaluation.

Results: Injuries disproportionately affected young males during work and sport with eye protection only worn in 11.9% and 2%, respectively. Falls in older females at home were also prevalent. AEI occurred frequently with CGI (71.5%), particularly in assaults (88.1%) and included eyelid lacerations (20.8%), orbital injuries (12.5%) and facial fractures (10.2%). In OGI, final mean logMAR BCVA improved to 1.4±1.2 (6/150) from 2.0±1.0 (counting fingers). Only 35.7% of 98 patients who presented with hand motio/light perception/no light perception improved to ≥6/60. In CGI, the final median logMAR BCVA improved to 0.2 (6/9) from 0.5 (6/18) ($p < 0.001$). In OGI, the Ocular Trauma Score and classification and regression tree prognosticated visual outcomes ($p < 0.001$). In total, 583 procedures were required in 417 theatre visits. The total hospital (hospitalisation, theatre and follow-up visits, indirect costs) and direct societal (lost working time, absenteeism, workers' compensation) cost of open and close globe injuries for Australia approaches AUD92.6–137.5 million (USD72.1–107.3 million) per year. This represents a conservative estimate due to limitations in measuring long-term psychological impact, early retirement, welfare expenses, and carers leave.

Conclusions: OGI/CGI/AEI is a prevalent and preventable burden on patients and the economy. To mitigate this burden, cost-effective public health strategies should target at-risk populations.

Idiopathic intracranial hypertension (IIH) prevalence in the Goldfields and Pilbara regions – A retrospective case series

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Purpose: Lions Outback Vision (LOV) is the sole ophthalmology service for the Goldfields and Pilbara regions of Western Australia, and as such it is first point of referral for patients requiring ophthalmic care. LOV has seen a rise in referrals for assessment and management of patients with idiopathic intracranial hypertension (IIH) and in this retrospective case series we aim to evaluate the prevalence of IIH in these regions.

Method: A retrospective review was performed for all patients reviewed in the Goldfields and Pilbara regions using FileMaker Pro (v19, Filemaker Inc., Santa Clara, CA, USA) to screen and confirm for a diagnosis of IIH. All patients who had confirmed diagnosis of IIH on referral or met the Modified Dandy Criteria after subsequent investigations were included. The population statistics were sourced from the Australian Bureau of Statistics.

Results: A total of 17 patients with IIH were reviewed in these two regions (12 in Goldfields, five in Pilbara), with 15 patients (88.2%) being female and four (23.5%) identifying as Aboriginal. The prevalence of IIH was 22.9/100,000 in the Goldfields and 8.5/100,000 in the Pilbara. Ten patients were suspected as having IIH but did not meet the Modified Dandy Criteria due to a lack of diagnostic lumbar puncture (five in Goldfields, five in Pilbara).

Conclusion: Prevalence of IIH in the Goldfields and Pilbara regions of Australia is far greater than many other parts of the world. Further studies are required to determine the discrepancy in prevalence between metropolitan and regional Western Australia.

Impact of public health strategies during 2023 solar eclipse in Western Australia and its effect on incidence of solar retinopathy

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Purpose: To examine the incidence of solar retinopathy and assess the effectiveness of public health messages in preventing solar retinopathy in Western Australia after the 2023 solar eclipse.
Methods: Public health messages were disseminated through media campaigns conducted by the Department of Health WA and RANZCO's public health channels. Additionally, letters were sent to general practices, optometrists, and heads of public hospitals in the regions most affected by the solar eclipse, which included the towns visited by the Lions Outback Vision Van in the Pilbara and Midwest regions, the Lions Outback Vision Hub in Broome, and the emergency departments in public hospitals in Perth. Following these initiatives, data regarding the incidence of solar retinopathy was collected and analysed.
Results: Within one month after the solar eclipse, two cases of solar retinopathy were identified. One case involved a 22-year-old female in Broome, and the other case involved a 12-year-old male who presented at Perth Children's Hospital in Perth. Both patients experienced a reduction in visual acuity, with one patient developing a central scotoma in their vision. The OCT findings for both patients were consistent with solar retinopathy. Importantly, neither patient reported utilizing exposure prevention measures such as eclipse glasses.
Conclusion: This study observed a decrease in the incidence of solar retinopathy compared to previous studies found in the literature. Public health messages emphasizing the importance of utilizing exposure prevention measures have a positive impact and play a crucial role in reducing the occurrence of retinopathy.

Screening for diabetic retinopathy in paediatric and adult populations in outer-metropolitan Sydney

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Purpose: The South Western Eye and Diabetes Deep Learning Algorithm study has developed a new diabetes retinal screening service for a low socioeconomic, multiethnic, outer-metropolitan Sydney region. This report examines the prevalence of diabetic retinopathy (DR) in both adults and children in this population.
Methods: South Western Eye and Diabetes Deep Learning Algorithm participants aged 10 years or older were recruited from three hospital-based outpatient clinics and one general practice clinic. At the hospital sites, participants underwent two-field, table-top fundus photography and ocular coherence tomography, while participants at the general practice clinic underwent fundus photography with a hand-held retinal camera. Retinal images were independently graded for DR by two consultant ophthalmologists, with discrepancies resolved by regrading images until consensus was reached. The prevalence of any DR, referable DR (moderate-proliferative DR or any maculopathy) and sight-threatening DR (severe-proliferative DR or any maculopathy) was calculated for both adults (18+ years) and children (10-17 years).
Results: There were a total of 522 study participants, including 437 (83.7%) adults and 85 (16.3%) children. In the overall study population, the rates of those with any DR, referable DR and sight-threatening DR respectively were 33.9%, 25.1% and 12.3%. In adults, rates were 37.1%, 27.7% and 13.7%, while in children, rates were 17.6%, 11.8% and 4.7%.
Conclusion: This study provides insight into the high prevalence of DR in South Western Sydney. Of particular significance is the rate of referable and sight-threatening DR in children with diabetes, which is higher than data from recently published hospital-based studies in Australia.

Current applications of artificial intelligence in ophthalmology: A review

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Purpose: Artificial intelligence (AI) tools are becoming increasingly sophisticated where their use in ophthalmology is emerging. AI algorithms have been developed and applied to create novel screening tools for a variety of ophthalmological conditions. We conducted a review of the literature of the current applications of AI tools in the screening of ophthalmology conditions.
Methods: A literature search was conducted on the MEDLINE database using terms "artificial intelligence" and "ophthalmology". Studies on the clinical applications of artificial intelligence tools in ophthalmology, were included.
Results: Several artificial intelligence tools with clinical application in ophthalmology, exist. A variety of robust AI algorithms employed in the screening of ophthalmological conditions have been reported. AI tools are used in screening for diabetic retinopathy, age-related macular degeneration, retinopathy of prematurity, glaucoma, and anterior segment disorders including cataracts and dry ocular surface. These AI tools employed in screening of eye conditions have been reported to have high sensitivity and specificity: 96.8% sensitivity and 87% specificity reported for diabetic retinopathy AI screening; and 93.2% sensitivity and 88.70% specificity reported for age-related macular degeneration AI screening.
Conclusion: Artificial intelligence tools have useful clinical applications in the detection of ophthalmic conditions, where these AI algorithms have been shown to be robust. Their applications could be extended to provide increased screening of eye conditions, particularly in rural and remote regions to improve visual outcomes. AI tools should be combined with experienced clinical judgement for best patient care.

Lions InReach Vision – Improving eye care for Indigenous people, refugees and asylum seekers in Perth's East Metropolitan Region

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Purpose: We established a free-of-charge, culturally informed eye care service for the estimated 28,000 Indigenous people, refugees and asylum seekers in Perth's East Metropolitan Region. This was done as access to the alternative public service for these populations is limited by long wait lists and other cultural, linguistic and geographical barriers.
Method: A service delivery model was established by the Lions Eye Institute through partnership with the University of Western Australia, St John of God Midland Hospital and the OneSight EssilorLuxottica Foundation. Key stakeholders, including local Aboriginal and Refugee Health Services, were engaged to refine the model, generate referral pathways and promote the service. Once established, service outputs were evaluated through a retrospective audit.
Results: Lions InReach Vision (LIV) began operating in August 2022, delivering bulk-billed services through an ophthalmologist, optometrist and ophthalmology registrar. A patient liaison officer is employed to facilitate appointment reminders, transport and cultural support. To date, LIV has delivered 215 consults for 117 patients (77 Indigenous and 44 refugees) across 10 clinic half-days. Subsidised spectacles have been provided to 16 patients. One hundred and two intravitreal injections and five retinal photocoagulation procedures have been performed. Cataract surgery has been performed on 36 eyes, including a patient whose best-corrected vision improved from hand movements to 6/6 and 6/4.8 post-operatively.
Conclusion: LIV has successfully delivered free eye care to a substantial number of patients. Further expansion to once-weekly clinics are planned. Quantitative and qualitative evaluations of LIV's acceptability, quality and cost-effectiveness will be performed to seek governmental support for further upscaling.

GENETICS

Neural retina leucine zipper gene variant expanding the enhanced S cone syndrome phenotype

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Purpose: Neural retina leucine zipper (NRL) is a developmental retinal gene that is a rare cause of retinal

dystrophy. We describe the first Australian patients with novel NRL mutations. NRL acts upstream of NR2E3 the gene responsible for enhanced S cone syndrome (ESCS). NRL retinopathy has overlapping electrophysiological findings with ESCS expanding the genetic aetiology for ESCS.

Methods: Investigations included electrophysiology (ERG), best corrected visual acuity and multimodal imaging.

Results: Family 1 I1 aged 15 with symptoms from five years. International Society for Clinical Electrophysiology of Vision standard pERG showed no discernible response, while ffERG and extended protocol blue ERG was consistent with ESCS. Fundus imaging highlighted torpedo like retinal scarring. Macular optical coherence tomography showed schitic changes. Testing revealed a novel homozygous NRL likely pathogenic variant c.256G>T; p.Glu86*. Family 2 II1 and II2 (Female 4.5 and Male 3 years respectively) presented with nyctalopia, best corrected visual acuity 3/6. Paediatric flash ERG demonstrated attenuated dim blue flash responses and findings with ffERG constant with ESCS. Imaging demonstrated curved-linear yellow glistening stripes and dots scattered uniformly particularly outside the vascular arcade. Optical coherence tomography showed blurring of the retinal pigment epithelium and photoreceptor layer. Genetic testing for proband II2, revealed novel heterozygous NRL likely pathogenic frameshift variants (c.223dup p.) Leu75Profs* and c.16del p.(Ser6Alfs*13).

Conclusion: We describe the function and phenotype of two families with NRL genetic variants. The electrophysiology is consistent with ESCS but has more of an electronegative response. Family 2 have a distinct retinal phenotype of curved yellow glistening stripes and hyperfluorescent dots and are also the youngest reported cases to date.

Polygenic risk determines the glaucoma penetrance and disease severity in cases of myocilin mutation

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Purpose: Mutations in the myocilin gene are associated with early-onset glaucoma and a severe disease course. However, between siblings with the same myocilin mutation there can be profound variation in disease severity and age of diagnosis. We show that a per-allele weighted polygenic risk score for glaucoma influences the penetrance of glaucoma within and across families harbouring myocilin mutations.

Methods: Participants in the Australian and New Zealand Registry of Advanced Glaucoma with confirmed myocilin mutations (N = 201) and a calculated glaucoma polygenic risk score (PRS). The relationship between PRS and age of diagnosis was assessed using Kaplan-Meier survival analysis. Individual family pedigrees and PRS centiles were mapped to visually demonstrate the within-family disease variation caused by PRS.

Results: Kaplan-Meier survival analysis shows that a PRS in the top tertile results in a younger age of diagnosis ($p = 0.009$). Within one exemplar family, the parental PRS of 88% (myocilin+ proband) and 55% (unaffected), results in a range of PRS scores amongst the myocilin+ children (97%, 92%, 58%, 45%). Their age of diagnosis and number of surgeries corresponds to their PRS despite all inheriting the same myocilin mutation

Conclusion: Glaucoma polygenic risk scores are central to understanding the likely age-of-diagnosis and disease severity in your patient with a myocilin mutation.

Clinical and molecular characterisation of foveal hypoplasia

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Purpose: To investigate key clinical characteristics in patients with foveal hypoplasia

Methods: A series of 42 patients with conditions associated with foveal hypoplasia (FH) were ascertained from the New Zealand Database of Inherited Retinal and Optic Nerve Disease. Detailed phenotyping included best corrected visual acuity and retinal imaging with Spectralis optical coherence tomography. FH grading was performed according to the Leicester Grading System for Foveal Hypoplasia with further differentiation of grades 0 from 1 and 3 from 4 made using defined ratios of retinal layers. Statistical analysis was performed using the Mann Whitney U-test and Kruskal-Wallis H test in SPSS. Molecular investigations included targeted Sanger sequencing or next generation sequencing using an ocular gene panel.

Results: Diagnoses included congenital stationary nightblindness (CSNB; n = 17), oculocutaneous albinism (OCA; n = 15), Stickler syndrome (n = 5), PAX6 related ocular dysgenesis (n = 3), ocular albinism (n = 1) and

isolated FH (n = 1). Higher grades of FH were found in OCA and lower grades in CSNB. The degree of FH correlated with visual acuity ($p = 0.001$). Nystagmus was associated with worse visual acuity ($p = 0.002$) and higher FH grades ($p = 0.0001$). Comparison of visual acuity between OCA, CSNB and Stickler syndrome found no significant difference ($p = 0.25$). Patients with CSNB all had atypical foveal architecture with shallow foveal pits and grade 1 FH in 23%. Mild FH was identified in COL2A1 related Stickler syndrome with 5 of 8 eyes grade 1 or 2.

Conclusion: A number of heterogeneous disorders have associated abnormal foveal development. The degree of FH correlates with visual acuity.

Genotype and phenotypic investigation of a New Zealand cohort of inherited optic neuropathies

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Purpose: To describe the genotype and phenotypes in a cohort of patients with presumed inherited optic atrophy.

Methods: Retrospective review of optic atrophy patients who presented to the Genetic Eye Clinic, between January 1997 to August 2022. Comprehensive clinical examination included vision, colour vision, ocular exam, imaging and electrophysiology in some individuals. Additional testing variably included audiology, diabetic profiling and neurological examination. Family members were recruited and examined if possible. Candidate gene sequencing and next generation sequencing using an ocular gene panel were performed. In a small number of unsolved families, whole exome sequencing was performed.

Results: Seventy-one patients (41 male) from 57 families were recruited. All patients had presumed optic atrophy with typically temporal disc pallor and retinal nerve fibre layer thinning. Molecular diagnosis was achieved in 48 individuals from 36 families. Disease causing variants in OPA1 accounted for 24 cases in 17 families, including biallelic Behr disease in two patients, followed by mitochondrial disease (LHON), WFS1, ACO2, OPA3, ECHS1 and RTN4IP1. Thirty-five percent of patients were unresolved. Syndromic disease was present in 30% (24 cases in 17 families), including biallelic Behr disease in two patients, followed by mitochondrial disease (LHON), WFS1, ACO2, OPA3, ECHS1 and RTN4IP1.

Conclusion: Inherited optic atrophies are a heterogenous group of disorders, and genotyping identifies the reasonably high prevalence of syndromic disease, particularly Wolfram syndrome., amd s yndromic disease in a third. Causative variants were detected in 64.3%. The genotypic spectrum also includes ECHS1, a metabolic disorder in predominantly Samoan individuals, potentially modifiable with diet.

GLAUCOMA

Online circular contrast perimetry via a web-application: Establishing a normative 10-2 database

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Purpose: To establish a normative database using a 10-degree online circular contrast perimetry (OCCP) application.

Methods: The web-application delivered online 10-degree 52-loci perimetry using circular flickering targets. These targets consist of concentric sinusoidal alternating contrast rings. Users were guided by the application to the correct viewing distance and head position using in-built blind spot localisation and webcam monitoring. A spinning golden star was used as the fixation target and patients performed the test in a darkened room following standard automated perimetry (SAP).

Results: Sixty-nine eyes of 50 patients with mean age 64.7±12.4 years completed the OCCP test. The reliability rates and global indices for OCCP were similar to SAP. OCCP mean sensitivity reduced with age at a similar rate to SAP. Mean sensitivity per loci of 10-2 OCCP was greater than SAP by 1.24 log units (95% confidence interval 1.22 to 1.25) and obeyed a physiological hill of vision. Small biases existed in mean sensitivities between OCCP and SAP which increased with increasing spot eccentricity. Mean deviation displayed good agreement between the two tests.

Conclusion: 10-2 online circular contrast perimetry via a computer-based application has comparable perimetric results to standard automated perimetry in a normal cohort.

Online circular contrast perimetry: Stability over time and comparison to standard automated perimetry

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Purpose: To evaluate the repeatability of online circular contrast perimetry (OCCP) compared to standard automated perimetry (SAP) in a cohort of normal participants and patients with stable glaucoma over 18 weeks.
Method: Sixty eyes from 36 participants (13 controls, 23 open-angle glaucoma patients) were recruited. OCCP and SAP perimetry tests were performed twice at baseline, then at 6, 12 and 18 weeks.
Results: No significant difference between OCCP and SAP mean deviation (MD) was detected at baseline (-4.44 $\pm$ 5.28 vs. -4.86 $\pm$ 6.23, $p > 0.05$) and 18 weeks (-3.75 $\pm$ 5.18 vs. -4.77 $\pm$ 6.45, $p > 0.05$). Across four clinic visits, intraclass correlation coefficients (ICC) for MD comparing OCCP and SAP ranged from 0.84-0.87. Test-retest ICC for OCCP MD was 0.98, 95% confidence interval (CI) 0.89-0.99 at baseline and 0.87, 95% CI 0.51-0.98 at 18 weeks; SAP test-retest ICC was 0.94, 95% CI 0.70-0.99 at baseline and 0.97, 95% CI 0.84-0.99 at 18 weeks. Visual field index and pattern standard deviation showed similar trends. No significant difference between OCCP and SAP testing time was detected (337.12 $\pm$ 79.88 vs. 364.90 $\pm$ 70.46 seconds, $p > 0.05$). OCCP had slightly greater false positive (3.85 $\pm$ 3.32 vs. 3.61 $\pm$ 4.53, $p = 0.0002$) but lower false negative (0.73 $\pm$ 1.52 vs. 4.51 $\pm$ 4.98, $p < 0.0001$) and fixation loss responses (0.92 $\pm$ 1.30 vs. 2.02 $\pm$ 2.16, $p < 0.0001$).
Conclusion: OCCP demonstrated strong repeatability with similar global perimetric and reliability indices to SAP. OCCP has potential as a glaucoma screening and surveillance tool for in-clinic and at-home testing, expanding the provision of care.

Effects of pupillary constriction and dilatation on anterior chamber depth

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Purpose: Accurate anterior chamber depth (ACD) measurements are important for predicting effective lens positioning of posterior chamber intraocular lens implanted in cataract surgery. The aim of this study was to evaluate the effect of pupillary dilatation and constriction on ACD.
Method: Patients routinely have pupils dilated with tropicamide for retinal examination. Pilocarpine is used to constrict the pupil for laser peripheral iridotomy. A single operator utilised an IOLMaster 700 to capture measurements of patients undergoing peripheral iridotomy.
Results: Thirty-two eyes were measured before and after pupil constriction; and 34 eyes were measured before and after pupil dilatation. The average age of the study participants was 67 years. Pupillary constriction was associated with shallower mean ACD (2.64 $\pm$ 0.19 mm) compared to baseline state (2.71 $\pm$ 0.18 mm, $p < 0.001$). Similarly, pupil dilatation was associated with a deeper ACD (2.78 $\pm$ 0.18 mm) than baseline state (2.71 $\pm$ 0.18 mm, $p < 0.001$).
Conclusion: Pupillary constriction reduces ACD compared to baseline pupillary state, whereas pupil dilatation induces an increase in ACD. All the patients included in this study had narrow-angle requiring peripheral iridotomy. Hence, it is expected the ACD measurements are less than that in the general population. When accurate ACD measurements are required, it is imperative to do these measurements with the pupil at baseline state.

Safety and efficacy of ab-interno canaloplasty in angle closure glaucoma: 12-month results

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Purpose: Report the safety and efficacy of ab-interno canaloplasty (ABiC) using iTrack™ (Nova Eye Medical, Fremont, USA) minimally invasive glaucoma surgical device in patients with primary angle closure glaucoma (PACG) at 12 months
Method: Prospective multi-center case series of 29 eyes in 25 patients with PACG undergoing ABiC with or without cataract extraction. Data was retrieved from the International Glaucoma Surgery Registry. Outcome measures included visual acuity, intraocular pressure (IOP), number of glaucoma medications and adverse events.
Results: ABiC was combined with cataract surgery in 25 eyes and as standalone procedure in four eyes. Two

eyes had previous filtration surgery. Mean IOP and number of medications improved from 20.69 ± 6.11 mmHg and 2.03 ± 1.21 to 13.5 ± 2.94 mmHg ($p < 0.001$) and 0.67 ± 1.07 ($p < 0.001$) at 6 months (n = 12) and 15.83 ±5.0 mmHg ($p = 0.03$) and 0.33 ± 0.82 ($p < 0.001$) at 12 months, respectively. Five out of six eyes were medication-free at 12 months from 3/29 at baseline. Mean visual acuity at baseline (n = 29) was 0.63 ± 0.64 and improved to 0.10 ±0.13 at 12 months. Six out of 29 eyes had hyphaema post-op that resolved without intervention.
Conclusion: ABiC with or without phacoemulsification performed on PACG eyes resulted in significant and safe, IOP and medication reductions with most eyes medication-free at 12 months.

Comparison of intraocular pressure changes during Ziemer LDV Z8 FLACS between primary angle closure disease and normal patients

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Purpose: Quantify and compare changes in intraocular pressure (IOP) during Ziemer LDV Z8 femtosecond-laser-assisted cataract surgery pre-treatment of cataract between primary angle closure disease (PACD) and normal eyes.
Methods: Patients with clinically stable PACD who had undergone laser peripheral iridotomies and normal patients underwent femtosecond-laser-assisted cataract surgery. Pre-treatment was performed using a fluid-filled optical docking system (Ziemer ZDVZ8). With the patient supine, the IOP was measured at three time-points using an applanation tonometer – prior to administration of suction, with the suction from the platform on and one minute after laser pre-treatment.
Results: In PACD eyes, the mean IOP before, during and after suction was 21.1 ± 5.3 mm Hg (range 12 to 37 mm Hg), 79.1 ± 14.9 mm Hg (range 42 to 89 mm Hg) and 18.5 ± 5.9 (range 8 to 33 mmHg) respectively. In normal eyes, the mean IOP before, during and after suction was 18.9 ± 1.4 mm Hg (range 17 to 21 mmHg), 71.9 ± 13.0 mm Hg (range 45 to 86 mmHg) and 15.9 ± 4.0 (range 10 to 21 mmHg) respectively. The Humphrey visual field for PACD patients preoperatively had a mean MD of -5.6 ± 4.5 and mean pattern standard deviation of 2.5 ± 1.2. Six months post-operatively, the mean MD was -2.5 ±2.5 and mean pattern standard deviation of 3.0 ± 3.2 ($p = 0.4$)
Conclusion: Femtosecond pre-treatment caused a slightly greater transient rise in IOP in PACD eyes compared to normal eyes. This was well tolerated short term with functional tests showing no significant damage however, long-term implications for angle closure eyes are still unknown.

Glaucoma Australia patient impact measurement survey: The impact of education on knowledge and anxiety levels

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Purpose: To assess the impact of patient-centred glaucoma-related education provided to patients enrolled in the Glaucoma Australia Patient Support Program on patient knowledge and anxiety levels.
Method: A survey was sent to patients on the Glaucoma Australia database via mail, email and social media. A total of 1,281 surveys were returned with patient-reported information regarding their knowledge and anxiety levels in relation to glaucoma.
Baseline patient knowledge and anxiety levels are assessed by an orthoptist educator during phone-based education when patients first join the Glaucoma Australia Patient Support Program. A total of 211 patients were assessed.
Results: Sixty percent of patients surveyed rated their knowledge of glaucoma and how it is treated as 'Excellent' or 'Above Average' following their interaction with Glaucoma Australia compared to 36% of patients who were assessed by an orthoptist educator when first joining the Patient Support Program. While the percentage of patients who rated their knowledge as 'Below Average' or 'Poor' fell from 22% down to 4%. Twenty percent of patients surveyed reported that they 'Always' or 'Frequently' felt anxious in relation to their glaucoma compared to 37% of patients who were assessed by an orthoptist educator when first joining the Patient Support Program. While the percentage of patients that reported they 'Never' or 'Rarely' felt anxious in relation to their glaucoma increased from 27% to 42%.
Conclusion: Patients self-reported knowledge and anxiety levels showed significant improvement after receiving ongoing education compared to when they were first assessed by an orthoptist educator on joining the patient support program.

Customising visual field tests for individuals: adding 10-2 points to the 24-2 test grid for progression

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Purpose: Using a 10-2 pattern can locate central visual field (VF) defects in glaucoma that a sparser grid misses. However, it is often infeasible to perform both 10-2 and 24-2 tests, nor obvious when to switch. The ARREST approach adds VF locations to scotoma borders and removes locations that are too variable to contribute to future progression estimates. We test whether ARREST can automatically incorporate 10-2 locations into the 24-2.
Method: ARREST uses the previous VF test to choose locations for the current test: censoring locations < 17dB, adding new locations in regions of interest. We set the regions of interest to 10-2 locations, adding new locations at scotoma edges. We compare sensitivity and specificity of ARREST-10 for detecting progression with that of a 24-2 pattern using computer simulation. The input progressing data to the simulation was derived from 107 eyes with glaucoma followed over a fiv e-year period at the Lions Eye Institute. Test duration was also compared.
Results: ARREST-10 used on average 38 fewer presentations on the final field than the 24-2 ($p < 0.01$). There was no difference in the ability to detect visual field progression (PoPLR method) at matched specificity. Fifty-eight of the 107 eyes did not require locations to be added in the 10-2 region, with the remainder adding between 3 to 32 points.
Conclusions: Customising visual field tests for individual patients can better describe spatial visual field loss. Benefits can be achieved automatically without increasing test time or losing ability to detect visual field progression.

Minimally invasive glaucoma surgery: safety of individual devices

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Purpose: In recent decades, significant advances have been made in the field of minimally invasive glaucoma surgery (MIGS) devices, which aim to defer or prevent trabeculectomy via less arduous surgical techniques. We sought to quantify the rate and severity of complications associated with each available MIGS procedure.
Method: We conducted a literature review in January 2022, searching MEDLINE and Embase for English-language articles and abstracts published within the previous 20 years. Fifteen MIGS techniques were analysed.
Results: Across 124 studies, all MIGS devices were found to be well-tolerated, with the exception of the Cypass Micro-Stent, which was associated with increased corneal endothelial cell loss. Devices with a similar mechanism of action had similar complications. For instance, intraocular pressure spikes and device occlusion commonly affected stents bypassing the trabecular meshwork (iStent, iStent inject and Hydrus), whereas devices requiring tissue excision uniformly reported hyphaema as their most common complication. Devices manipulating the subconjunctival space, namely XEN and Preserflo, were associated with bleb-related complications not seen with other devices. Data for iStent Supra, which like Cypass acts on the suprachoroidal space, are positive but limited; there is only one published prospective study examining the device's complication rates.
Conclusion: Excluding the CyPass Micro-Stent, all 14 other marketed MIGS devices are reported to be uniformly safe in the literature. Notably, many devices lack long-term data, given the recency of their development, and many studies comprise poor quality evidence; more rigorous data will clarify the precise incidence of complications following each MIGS procedure.

Traumatic hyphaema in sports. A review of presentations to the Royal Victorian Eye and Ear Hospital

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Purpose: Traumatic hyphaema is a common presenting clinical finding following ocular trauma. The nature and extent of the hyphaema determines management. Participation in sport is a high-risk occasion for ocular trauma to occur. The aim of this paper is to assess patterns of trauma and further characterise cases requiring surgical management across various sports presentations of traumatic hyphaema to the Royal Victorian Eye and Ear Hospital.
Methods: Retrospective case series auditing the electronic medical records of acute presentations of traumatic hyphaema to the Royal Victorian Eye and Ear Hospital from January 2018 to March 2021. These presentations were filtered by sports as activity when injured.

Results: A total of 903 presentations sports-related traumatic hyphaema were identified. The average age of patients was 37.3 years and there was a strong male predominance (88.8%) with slight laterality to right eye (58%). Subgroup analysis by activity at time of injury yielded sports as the trigger in 39.5% cases. Further subgroup analysis by sport revealed many major causes including soccer (23.4%), Australian rules football (17.1%), badminton (14%), cricket (14%), basketball (9%), tennis (7.8%) and squash (3.1%). Other causes included field hockey, golf and paintball. Only 3.1% of cases required acute surgical intervention.
Conclusion: Sports related traumatic hyphaema is a common presentation in young males. Contact sports including soccer and Australian rules football pose the highest risk followed by were by other ball sports. Surgical intervention is rarely required. We hope that this data will encourage sporting bodies to increase eye safety awareness.

Utility of portable perimetry in ophthalmic emergency: A pilot study on usability and integration into workflow

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Purpose: Visual field testing is a crucial diagnostic tool for a variety of ophthalmic presentations seen in the emergency department (ED), including glaucoma, disc swelling and stroke. Conventional perimetry utilises expensive, stationary equipment requiring a trained operator which limits access in the emergency setting. Novel portable perimetry methods offer a quick, reliable and convenient alternative, but have not been trialled in an emergency department. We aim to evaluate the usability and integration of three portable perimetry devices; Eyeonic (computer-based), Melbourne Rapid Fields (computer-based) and Olleyes (virtual reality head-set) into the workflow of a metropolitan ophthalmic ED.
Methods: In this prospective study, all three portable perimetry devices were trialled for a period of one month each within the Sydney Eye Hospital ED. All patients with acute presentations requiring visual field testing underwent portable visual field assessment. Data on user-experience, acceptability and perceived barriers were collected via survey from both patients and clinicians.
Results: All three portable perimetry devices demonstrated ease-of-use and integration into the ED workflow with high user satisfaction rates. All devices were able to identify a normal and abnormal visual field in a significant proportion of patients. However, perceived barriers included learning curve, motion-sickness caused by virtual-reality technology, difficult positioning in laptop-based devices and interruption from noise in a busy ED environment.
Conclusion: Portable perimetry devices have potential to be used as an alternative to traditional devices in the ophthalmic ED. Each device had its own strengths and weaknesses and further evaluation will help determine its position in the ED setting.

Controlling fluid flow in non-valved glaucoma drainage devices

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Purpose: Current non-valved glaucoma drainage devices require a flow restrictor method to be utilised, particularly for the first 6-8 weeks while there is minimal bleb resistance surrounding the tube plate. During this period, if flow is allowed to occur in an unrestricted method, there is a risk of severe hypotony. Conversely, zero flow during this period is often associated with intraocular hypertension until the flow restrictor is removed. We experimented with methods to modulate the flow in this early period by using different methods of ligating silicone tubing to achieve a low degree of flow which was predictable and repeatable.
Method: We used a syringe pump with a pressure transducer attached via a three way tap, to create an artificial anterior chamber with a physiological flow rate of 3 μL/min. Tying methods tested included semi-loose ligation (tied by a single surgeon), using a releasable 'wicking' suture and incorporation of nylon segment into a knot which was then pulled.
Results: Mean intraocular pressure (IOP) achieved with semi-loose ties was highly variable (mean 73 mmHg, SD 28 mmHg). Using a 10-0 nylon to create a 'wick' yielded lower IOPs but was also highly unpredictable (mean 11 mmHg, SD 9 mmHg). Incorporation of nylon into the knot appeared to completely occlude the tubing, even after removal of nylon.
Conclusion: Standardisation of semi-loose ties is difficult and yields highly unpredictable IOPs. Wicking achieved lower IOPs, however these were also very variable. Other methods are currently being tested.

Comparing matrix frequency-doubling technology perimetry with the Swedish interactive thresholding algorithms

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Purpose: This study aimed to compare second-generation frequency-doubling technology (FDT) perimetry with standard automated perimetry (SAP) in mild eyes with glaucoma.
Method: Forty-seven eyes of 47 participants who had mild visual field defect by SAP were included in this cross-sectional study. All participants were examined using SITA 24-2 (SITA-SAP) and matrix 24-2 (Matrix-FDT). The correlations of global indices and the number of defects on pattern deviation plots were determined. Agreement between two sets regarding the stage of visual field damage was assessed. Pearson's correlation, intra-cluster comparison, paired t-test and 95% limit of agreement were calculated.
Result: The mean spherical equivalent of refractive error and best-corrected distance visual acuity of -0.21 ± 1.88 D and 0.14 ± 0.08 logMAR, respectively. Despite no significant difference between global indices, the agreement between the two devices regarding the global indices was weak (the limit of agreement for mean deviation was -6.08 to 6.08 and that for pattern standard deviation was -4.42 to 3.42). The agreement between SITA-SAP and Matrix-FDT regarding the glaucoma hemifield test and the number of defective points in each quadrant and staging of the visual field damage was also weak.
Conclusion: Because of the weak correlation between SITA-SAP and Matrix-FDT regarding global indices, glaucoma hemifield test, number of defective points, and stage of the visual field damage in mild glaucoma, Matrix-FDT cannot be used interchangeably with SITA-SAP in the early stages of glaucoma.

Correlation between central corneal thickness and optic disc parameters in primary open-angle glaucoma

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Purpose: Primary open-angle glaucoma (POAG) is a slowly progressive, chronic optic neuropathy. Although an elevated intraocular pressure is a major risk factor but not cause of all glaucoma damage. A low central corneal thickness (CCT) could increase risk of POAG, but exact pathogenesis is yet to be determined. We aimed to determine the relationship between CCT and optic disc parameters measured quantitatively using spectral domain optical coherence tomography.
Method: In this cross-sectional study we included patients with POAG attended the ophthalmology clinic, Amialmomenin Hospital, Rasht, Iran. All eyes underwent a comprehensive ophthalmic examination, optic disc imaging with spectral domain optical coherence tomography and ultrasound pachymetry to measure CCT.
Result: Overall, 168 eyes of patients with POAG with a median age of 61.13 years, median CCT of 54.22 μm, and a median optic disc size of 2.21 mm^2 were recruited. We detected a low significant negative correlation between CCT and vertical cup-to-disc ratio ($r = -0.19$; $p = 0.04$), mean cup-to-disc ratio ($r = -0.173$; $p = 0.025$) and cup volume ($r = -0.169$; $p = 0.028$). However, there was no significant correlation between CCT and optic disc area, rim area and average retinal nerve fiber layer thickness (all $p > 0.05$).
Conclusion: CCT was inversely correlated with vertical cup-to-disc ratio, mean cup-to-disc ratio and cup volume. But not with optic disc area, rim area and average retinal nerve fiber layer thickness. Further longitudinal studies could shed light on changes in this correlation through the progression of POAG.

Validation of a novel glaucoma implant in rabbits

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Purpose: Pre-clinical validation of novel prototype glaucoma drainage implants in an established rabbit model of glaucoma filtration surgery.
Method: Prototype microfluidic glaucoma implants were developed using an engineering design control process, with identification of user needs informing design inputs. Twenty New Zealand White rabbits underwent

subconjunctival placement of prototype implants in one eye without antimetabolite application, with institutional ethics approval. Validation of design outputs was performed, with assessment of: ease of implantation; tolerability; ability to create a fluid seal around the anterior chamber entry component; biocompatibility based on histological examination of tissue capsules at one and six months post-op; and fluid drainage using an adapted technique of whole eye outflow measurement.

Results: The novel implants were straight-forward to implant and tolerated well by the New Zealand White rabbits with a formed anterior chamber from day 1, minimal post-op inflammation and no complications. Final designs demonstrated ability to prevent fluid leak external to the component accessing the anterior chamber. Histological examination at one and six months post-op demonstrated minimal capsule formation or foreign body tissue response. Implants demonstrated continued function with fluid drainage from the eye and significantly improved whole eye outflow at both one month and six months post-op compared to control eyes (and to prior work with tube-plate glaucoma drainage device).

Conclusion: Novel glaucoma implant designs demonstrated biocompatibility, continued fluid drainage, feasibility of insertion and fluid seal at anterior chamber entry in a rabbit model. Preclinical validation of these design outputs informed development of the VW-50 implant and supports further research in humans.

Uptake of polygenic risk testing for glaucoma among unaffected individuals

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Purpose: Despite increasing evidence to support the utility of polygenic risk testing for glaucoma risk stratification, potential uptake of such testing has not yet been investigated. This study assess the uptake of polygenic risk score (PRS) testing for glaucoma within an Australian population between individuals who had previously reported being interested or uninterested.

Method: This observational cohort study included individuals who had previously participated in a questionnaire-based study evaluating attitudes towards polygenetic testing for glaucoma. Individuals were invited to participate in a research project for which they will undergo polygenic risk testing for glaucoma between April and November 2021 if they were over the age of 50 years. Uptake was assessed by decision to consent to the research project and provide a sample for testing.

Results: Of 341 eligible individuals, 142 enrolled, yielding a response rate of 41.6%. Overall, the mean age of the enrolled cohort was 67.7 years, with 65.5% being female, 78.9% being from an urban residency, and 56.3% having a family history of glaucoma. 44.2% of those who participated had previously indicated being interested in testing in the initial questionnaire. A positive family history was the only predictor of participation (OR 1.615, 95%CI (1.031-2.530), p 0.036).

Conclusion: This study demonstrates the potential uptake of PRS testing for glaucoma among an unaffected population. The results suggest that intention towards testing does not reflect uptake. These findings provide useful insights into the future implementation of glaucoma PRS testing into clinical practice.

Glaucoma polygenic risk score determines glaucoma status in individuals with pseudoexfoliation syndrome

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Purpose: To establish whether the previously validated glaucoma polygenic risk score (GPRS) enables risk stratification in pseudoexfoliative (PEX) cohorts.

Method: Cross-sectional analysis of 626 participants in the Australian and New Zealand Registry of Advanced

Glaucoma with PEX (n = 386 participants with PEX glaucoma, n = 100 PEX and ocular hypertension, n = 142 PEX without glaucoma or ocular hypertension). GPRS was expressed as a percentile of a normative population distribution. Clinically relevant glaucoma outcomes were examined with multivariable regression models. Results were replicated within the separate Blue Mountains Eyes Study (n = 16 with PEX glaucoma, n = 62 with PEX alone).

Results: Within the discovery cohort, PEX cases with glaucoma had a mean GPRS 16 percentiles higher than those with PEX alone (p<0.001). PEX cases in the top quintile were at 3.7-fold risk (95% CI 2.00 - 6.98, p<0.001) of developing glaucoma than those in the bottom quintile. Mean age of glaucoma diagnosis was 4 years (95% CI 0.69-7.05, p=0.018) younger in the top quintile compared to the bottom quintile. In the BMES replication cohort, PEX cases with glaucoma had a mean GPRS higher than PEX cases without glaucoma (p<0.001). In both cohorts, patients with PEX who had not developed glaucoma had a GPRS lower than population average (p=0.035).

Conclusion: A glaucoma polygenic risk score can be used to identify patients at risk of developing glaucoma secondary to pseudoexfoliation. Patients with pseudoexfoliation without subsequent glaucoma have a lower glaucoma polygenic risk than the average person.

iTrack Global Data Registry to support the role of canaloplasty for treatment of glaucoma

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Purpose: The iTrack Global Data Registry (iTGDR) aims to collate efficacy and safety data for canaloplasty including: intraocular pressure (IOP) reduction, number of medications, endothelial cell count, adverse events and complications, in addition to canaloplasty-specific treatment parameters. Setting: Cloud based International Glaucoma Surgery Registry.

Methods: Prospective multicenter cloud-based database, real-world study including patients with primary and secondary open angle glaucoma undergoing canaloplasty. The iTGDR is a surgeon-led initiative conducted in collaboration with the International Glaucoma Surgery Registry. It collects longitudinal data of efficacy (IOP, number of medications, retinal nerve fibre layer analysis, Humphrey Visual Field) and safety (endothelial cell loss, adverse events and complications). The iTGDR started in January 2022 in the USA, Canada, Europe, Asia and Australia.

Results: A total of 313 eyes have been enrolled up to April 2023; 70.3% were primary open angle glaucoma and 96.8% were phakic. Glaucoma stage was early (63.3%), moderate (20.6%), severe (8.7%) and advanced (7.3%). Ab-interno canaloplasty was performed in 100% of the eyes. Mean baseline IOP and medications were 18.42 ± 6.13 and 2.07 ± 1.20. Mean 12-month IOP and medications (n = 39) were reduced to 13.44 ± 4.37 and 0.95 ± 1.23. Combined phaco-canaloplasty was done in 87.5%. 360 degree catheterisation was achieved in 88.2% of the eyes. Microhyphema (≤ 10% of the anterior chamber) occurred in 30 eyes (9%) and hyphema (> 10% of the anterior chamber) in seven eyes (2%).

Conclusion: The iTGDR will make a major contribution to understanding the clinical effectiveness of canaloplasty to guide evidence-based decision making for surgeons to achieve improved outcomes in the treatment of their glaucoma patients.

Healthcare professionals' attitudes towards polygenic risk testing for glaucoma

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Purpose: Clinical implementation of polygenic risk testing for glaucoma will rely on healthcare professionals' general acceptance and sound understanding of this form of testing. Clinicians will also be required to accurately interpret the significance of results and communicate findings to patients. Given the potential for broad population screening, these aspects will rely on professionals beyond those directly involved in polygenic risk score testing.

Method: This was a cross-sectional, questionnaire-based study assessing the attitudes of various groups of healthcare professionals in Australia towards polygenic risk testing for glaucoma. The questionnaire assessed knowledge and

confidence in general concepts of genetics and glaucoma, and attitudes towards polygenic risk testing for glaucoma.
Results: In total, 101 participants completed the questionnaire. Overall, 61.2% were female, 69.9% were of European ancestry and 74.8% were under the age of 50 years. Ophthalmologists made up the largest group who completed the questionnaire, with individuals with glaucoma making up a mean of 44% of their patients. Recommendations or guidelines from medical societies and published clinical data were the most important factors which would affect healthcare professionals' decision to recommend polygenic risk testing for glaucoma.
Conclusion: Healthcare professionals are not familiar nor confident with the concept of glaucoma polygenic risk testing. Strong evidence of the clinical utility of the test, as well as clear recommendations to guide decision making, and effective methods of communicating risk are crucial factors healthcare professionals' indicate must be addressed before implementation into clinical practice.

High polygenic risk is associated with earlier trabeculectomy in primary open-angle glaucoma

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Purpose: Trabeculectomy is a treatment option for primary open-angle glaucoma, but is usually considered only in advanced cases. Predicting which patients may require this procedure remains a clinical challenge. It is unknown if genetic risk scoring aids predicting which patients will need earlier surgery.
Method: The ocular surgical history was reviewed for all participants of the Australian and New Zealand Registry of Advanced Glaucoma with primary open-angle glaucoma. A glaucoma polygenic risk score was calculated for each individual. Multivariate linear regression analyses assessed the correlation between glaucoma polygenic risk score and age at trabeculectomy.
Results: One hundred and eighty-seven participants had undergone a trabeculectomy. Participants in the top decile were diagnosed with glaucoma at a younger age ($p < 0.001$). Linear regression correlated a higher polygenic risk score with a younger age at first trabeculectomy ($p = 0.014$). Participants in the top decile underwent their first trabeculectomy approximately seven years earlier than participants in the lowest decile ($p = 0.002$). Participants in the top decile underwent trabeculectomy 5.8 years earlier than participants in the bottom decile ($p = 0.022$). Finally, participants in the top decile were observed to be 1.41 fold more likely to require bilateral trabeculectomy than participants in the bottom decile ($p = 0.021$).
Conclusion: Trabeculectomy may be considered earlier in higher-risk individuals, potentially avoiding vision loss resulting from failed trials of more conservative options and may help prevent unnecessary surgery, or delay surgery, in those who are deemed to be low risk.

Changes in central corneal thickness over time in a cohort of glaucoma suspects and glaucoma patients

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Purpose: Thin central corneal thickness (CCT) is a known risk factor for developing primary open angle glaucoma (POAG). Patients with POAG often present with thinner corneas than average. However it is unknown whether the corneal thinning in POAG patients is physiological, or if the thinning is related to the glaucoma disease process. This study aims to describe the changes in central corneal thickness over time and how they relate to glaucoma severity and rates of glaucoma progression.
Method: The rates of corneal thickness changes were calculated in patients in the PROGRESSA study with ≥ 6 CCT measurements over ≥ 36 months follow-up. The rates of corneal thinning were compared in patients who were glaucoma suspects ($n = 110$) and patients with established glaucoma ($n = 177$). The account for CCT changes secondary to prostaglandin use, a sub analysis was done in patients who were prostaglandin naïve.
Results: Rates of corneal thinning in patients with glaucoma (-0.37 um/year) are faster compared to glaucoma suspects (-0.95 m/year; $p = 6.8e\text{-}06$). Previous studies have shown that topical prostaglandin analogues affect corneal thinning and this held true in our study ($p < 0.001$). Subgroup analysis of prostaglandin analogues-naive patients showed that rates of CCT thinning in glaucoma cases were faster than suspects.
Conclusion: Glaucoma patients may show central corneal thickness thinning, despite no history of prostaglandin use.

Sydney Eye Drop Project: A novel introduction of a dedicated ophthalmic medication chart and Sydney Eyedrop App: A pilot study

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Purpose: To improve patient adherence to ophthalmic therapies in glaucoma at Sydney Eye Hospital
Method: Sydney Eyedrop chart, a simple and visual eyedrop chart and Sydney Eyedrop App, a eyedrop regime planner and reminder smartphone application have been developed, supported by the Sydney Eye Hospital Foundation. Glaucoma patients at the Sydney Eye Hospital outpatient clinic were recruited over a trial period of two weeks and were instructed on ophthalmic therapy regime using the Sydney Eyedrop chart, Patient satisfaction rate was evaluated via feedback form. Concurrently, the Sydney Eyedrop App was tested in Sydney Eye Hospital on staff and emergency department patients. Initial patient satisfaction was received via NSW Health Consumer Feedback form.
Results: One hundred percent of patients (n = 18) reported that the Sydney Eye Drop chart was easy to understand and has a clear layout. Ninety-four percent patients (n = 17) reported easy to use and found pictures helpful; 89% (n = 16) of patients stated it answered main questions. Twenty testers tested the Sydney Eye App simulator and feedback has been sought. They found it is simple and easy to use and reported the reminder function as a main function which may assist patients daily eyedrop use.
Conclusion: This study demonstrates dedicated ophthalmic therapy chart and app can be simple and powerful tool to assist patients with their daily eyedrop use. Patients reported high satisfaction rates for both Sydney Eyedrop chart and Sydney Eyedrop App. This cost-effective method may suggest a powerful solution to promote ophthalmic therapy adherence and serve as a guide in a patient's journey. Further studies may be warranted to evaluate ongoing use.

NEURO-OPHTHALMOLOGY

Cogan's lid twitch for myasthenia gravis: A systematic review

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Purpose: Myasthenia gravis is an autoimmune condition affecting the neuromuscular junction of skeletal muscles and may be difficult to diagnose. Several clinical signs may have diagnostic utility, including Cogan's lid twitch. This systematic review aimed to synthesise the literature on the accuracy of Cogan's lid twitch for diagnosing myasthenia gravis.
Method: A systematic search of the databases PubMed/MEDLINE, Embase and CENTRAL was performed from inception to August 2022. Risk of bias analysis and data extraction were performed in accordance with the PRISMA 2020 guidelines.
Results: Seven articles satisfied the inclusion criteria. The results showed that for the diagnosis of myasthenia gravis, Cogan's lid twitch has sensitivity between 50-99% and specificity between 75-100%.
Conclusion: Cogan's lid twitch is a physical examination finding with moderate diagnostic performance in the diagnosis of myasthenia gravis with ocular involvement. Future studies may seek to evaluate the performance of Cogan's lid twitch in conjunction with other signs of myasthenia gravis with ocular involvement, such as fatigable ptosis or a positive icepack test.

Oral versus intravenous methylprednisolone for the treatment of optic neuritis: A systematic review

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Purpose: Optic neuritis may occur in a variety of conditions, including as a manifestation of multiple sclerosis. Despite significant research into the efficacy of corticosteroids as a first line treatment, the optimal route of administration has not been well defined. This review aims to explore the efficacy, adverse effects and economic implications of using oral versus intravenous methylprednisolone to treat acute optic neuritis.

Methods: A systematic search of the databases PubMed/MEDLINE, Embase and CENTRAL was performed to July 2022, prior to data collection and risk of bias analysis in accordance with the PRISMA guidelines.
Results: Six articles fulfilled the inclusion criteria. The results showed that in the treatment of acute optic neuritis, oral methylprednisolone has a non-inferior efficacy and adverse effect profile in comparison to intravenous methylprednisolone. In a cost analysis, oral methylprednisolone to be more cost effective than intravenous methylprednisolone.
Conclusion: Oral methylprednisolone has comparable efficacy and adverse effect profiles to intravenous methylprednisolone for the treatment of optic neuritis. The analysis suggests oral administration is more cost effective than intravenous administration; however, further analyses of the formal cost-benefit ratio are required.

Homonymous hemianopia in hyperglycaemia-induced occipital lobe seizures

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Purpose: Visual changes secondary to hyperglycaemia in diabetes are not uncommon. While blurred vision is a well established sequela of chronic pathological hyperglycaemia, homonymous hemianopia with or without electroclinical seizures is much rarer and can be mistaken for migraine, temporal arteritis or ischaemia of the central nervous system.
Method: This article analysed case studies for three patients (67 male, 68 male and 52 female) presenting with complex visual phenomena, from 3 to 42 days duration, including pathogenesis, clinical findings, neurological imaging and investigations, management and follow up.
Results: Examinations demonstrated dense left homonymous hemianopias in two patients and a left inferior homonymous quadrantanopia in one, with no other abnormalities. Patients described vivid, non-stereotyped intermittent hallucinations in the affected fields. Blood glucose levels ranged from 13.5–35.0 mmol/L without ketosis, and HbA1c from 14.6–16.8%. Computed tomography of the brain showed no acute intracranial pathology. Magnetic resonance imaging of the brain either detected no abnormalities or demonstrated changes consistent with seizure activity. Electroencephalogram (EEG) demonstrated focal epileptiform discharges over the right occipital region in each patient. EEG episodes coincided with patient's perception of symptoms, while maintaining consciousness, providing unequivocal evidence that symptoms were due to focal aware seizure activity. Oral hypoglycaemic and antiepileptic medications were commenced with rapid and complete reversal of the seizures and visual field deficits, with surveillance for cerebral oedema or central pontine myleinolysis. Resolution was confirmed by repeat Humphrey 30-2 and magnetic resonance imaging neuroimaging.
Conclusion: Hyperglycaemia-induced occipital lobe seizures with visual hallucinations and interictal homonymous visual field defects is a rare but clinically important diagnosis. This paper highlights the importance of prompt recognition of pathognomonic findings on EEG and neuroimaging, and rapid hypoglycaemic therapy.

Clinical characteristics and diagnostic approaches in giant cell arteritis: A metro south experience

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Purpose: To investigate the impact of steroid exposure and post fixation specimen length on the positivity rates for temporal artery biopsy (TAB) for patients with giant cell arteritis (GCA). Additionally, we aim to evaluate the diagnostic accuracy of temporal artery ultrasound (USS).
Methods: An eight-year retrospective study of all patients who had undergone TAB or USS imaging of the temporal arteries at the Princess Alexandra Hospital from 2015-2023.
Results: A total of 211 TABs were performed on 199 patients and 47 temporal artery ultrasounds were performed. GCA patients were predominantly female (63.8%), the average age was 73.5 years and the youngest patient 52 years old. Headache (49.3%), decreased visual acuity (17.4%) and transient vision loss (13.0%) were common, while jaw claudication was reported in only 39.1% of GCA patients. Erythrocyte sedimentation rate and C-reactive protein were higher in GCA patients. Elevated erythrocyte sedimentation rate had a sensitivity of 85.3% and specificity of 25.0%. Elevated C-reactive protein had a sensitivity of 95.5% and specificity of 0.8%. A post-fixation specimen length > 10 mm improved the

likelihood of a positive result by 14-fold ($p = 0.003$), while the timing of TAB relative to steroid use did not significantly affect the results ($p = 0.24$).
Conclusion: Results showed that post-fixation specimen length >10 mm improved the likelihood of a positive result, while the timing of TAB relative to steroid use did not significantly affect the results. Additionally, The study analysed the incidence of biopsy-proven GCA and compared the diagnostic accuracy of TAB and USS.

Oblique muscle involvement in dysthyroid optic neuropathy

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Purpose: To determine the extent of superior oblique and inferior oblique enlargement in dysthyroid optic neuropathy (DON).
Method: Thyroid eye disease patients who had computed tomography of the orbits were retrospectively reviewed. Data collected included demographics, thyroid function tests and clinical presentation including the presence of DON. The extraocular muscle volumes were calculated by manual segmentation in consecutive slices.
Results: A total of 200 orbits from 100 patients were included in the study. The mean age of participants was 55 ± 15 years (ranging from 25 to 91 years), and 66% of them were female. The majority of patients (93%) had Graves' disease, and 26% were current smokers. Forty-five (94%) had raised thyroid stimulating hormone-receptor antibody levels. The superior oblique muscle volume was significantly larger in orbits with DON compared to orbits without DON (552 vs. 376 mm^3, $p < 0.01$). However, there was no significant difference in the inferior oblique muscle volumes between orbits with and without DON ($p = 0.15$).
Conclusion: Superior oblique enlargement is more common in orbits with DON. This may be a marker of more severe disease.

Myelin oligodendrocyte glycoprotein antibody associated disease in a paediatric population

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Purpose: Myelin oligodendrocyte glycoprotein antibody-associated disease (MOGAD) is an inflammatory central nervous system demyelinating disease, with a predilection for the paediatric population. Our purpose is to describe the clinical characteristics of paediatric (< 16 years old) MOGAD patients in a New Zealand setting.
Method: Data of all paediatric patients (age of onset < 16 years) referred to the tertiary neuro-ophthalmology service with confirmed MOG-IgG antibody serology were collected from 2017. The study captured patient demographics, clinical features, treatment summary, serology results, magnetic resonance imaging results and ophthalmology clinic visit summaries.
Results: Twenty-eight cases were identified and comprised of 17 (61%) females. Average age was 9 (0-16). Ethnicity distribution was New Zealand European (n = 14; 50%), Samoan (n = 6; 21%) and other (n = 8; 29%). Neurological findings at first presentation were isolated optic neuritis (n = 9; 32%); other central nervous system syndromes (n = 19; 69%) including acute disseminated encephalomyelitis, cortical encephalitis or transverse myelitis. Eight (29%) had both optic neuritis and central nervous system syndromes. Eleven (39%) had relapsing disease, seven (25%) of which had optic neuritis at onset. All patients were commenced on intravenous methylprednisolone therapy at disease onset, with 12 (43%) requiring additional steroid-sparing immunosuppression. Intravenous immunoglobulin was used in 10 (36%) patients and plasma exchange in one case. Twelve (43%) had vision of 20/200 (HM-20/20) or worse at initial presentation, with a mean 5-line improvement in visual acuity post-treatment.
Conclusion: Optic neuritis is the most common disease phenotype of paediatric MOGAD, which occurred more frequently in relapsing disease. Vision can be adequately restored with timely treatment.

The role of positron emission tomography – computed tomography in the diagnosis of temporal arteritis

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Purpose: The timely diagnosis of temporal arteritis (TA) is critical to preserve vision and life. Temporal artery biopsy (TABx) is the gold standard for its diagnosis. This study investigated the role of positron emission tomography – computed tomography (PET-CT) in diagnosing TA.
Methods: This retrospective observational case series study included four patients. Each patient had a TABx and PET-CT scan in the context of presenting with symptoms and signs suggestive of TA.
Results: PET-CT reliably excluded two cases of the four of possible recurrent TA. In the third case, PET-CT confirmed the diagnosis of recurrence of TA. In the fourth case, it contributed to the diagnosis of an atypical presentation of recurrent TA. The reasons that TABx remains the gold standard of diagnosis are because it is diagnostically highly specific, is a straightforward procedure, and is available to any surgeon any day of the week. TABx is inexpensive. It can be performed immediately in remote regions, facilitating optimal patient management. It does not require sourced isotope, and is diagnostically still possible after three days of systemic corticosteroids, in contrast to PET-CT. However, PET-CT appears to have a role in the diagnosis of recurrent or atypical TA.
Conclusion: While TABx remains the gold standard for diagnosis of TA, PET-CT may be best indicated in recurrent TA. When clinical suspicion for the diagnosis of TA is possible, investigations are inconclusive, or the TABx is negative, PET-CT may be indicated. However, the definitive role of PET-CT in the diagnosis of TA remains unclear.

Personal computer-based visual field testing as an alternative to standard automated perimetry

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Purpose: Standard automated perimetry is the gold standard of visual field (VF) assessment. Recent advances in technology have paved the way for monitoring of VF defects with computer-based softwares. One such software is 'Specvis'. The objectives of this study was to compare Specvis and Humphrey Field Analyzer (HFA) VF reports in the graphical domain and to estimate the ease of use and test duration of Specvis and HFA.
Method: A total of 218 eyes were included. Standard automated perimetry was done on the VF 30-2 program using HFA 3. VF assessment was then performed on a PC with Specvis. VFs from these were then coupled and sent to three different ophthalmologists. Greyscale VF printouts were compared in the graphical domain and scored based on a 5-point Likert scale which were then analysed for inter-observer reliability. After each test, subjects were asked to rate the difficulty level of performing the test on HFA and Specvis based on a 5-point Likert scale. The duration of the test was also noted.
Results: Advanced glaucoma was the commonest disease (n = 22, 10.09%). HFA test duration had an average of 213.33 seconds (SD 33.49) as compared to Specvis test duration average of 267.36 seconds (SD 35.98). A significant positive correlation was observed between score 1, 2 and 3 given by three ophthalmologists. A significant negative correlation was observed between ease of using both HFA and specvis with age.
Conclusion: Specvis can give promising results in diagnosing and monitoring the progression of VF defects. It is also cost-effective and readily available.

Smartphone colour vision testing as an alternative to the conventional ishihara booklet

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Purpose: Colour vision testing was first tested in the 1700s. A colour vision assessment was made simply by comparing the colour perception of the patient and examiner. The most used tools today are Ishihara colour plates. However, smartphone applications such as Eye Handbook allow easier access to colour vision testing. We compared colour vision testing on Android and iOS devices to the standard Ishihara booklet.
Method: A cross-sectional validation study was performed on patients presenting to a tertiary care ophthalmology centre. The sample size was 162 with a 95% confidence interval. A colour vision assessment was performed using the Ishihara colour plates and smartphones (iPhone or Android). The collected data was then entered into IBM SPSS 25 for analysis.
Results: The gender distribution was predominantly male (69.14%). The average age of the participants was 35.94 (SD = 12.04). The result of the two-tailed paired sample z-test was not significant based on a p-value of 0.565, suggesting the difference between the mean of

Ishihara and the mean of the smartphones (iPhone or Android) was not significantly different from zero.

Conclusion: The two-tailed paired sample t-test in our study showed no significant difference between either of the smartphone groups (iPhone or Android) and the Ishihara booklet group, indicating that smartphones present a viable alternative to standard Ishihara booklet testing. However, different types of smartphone screens present a challenge in standardisation while testing colour vision. Contrarily, smartphones are more widely available, more versatile, and present far greater ease of access.

OCULAR ONCOLOGY

Experiences of primary vitreoretinal lymphoma in North Queensland

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Purpose: To report the occurrence of primary vitreoretinal lymphoma (PVRL), a rare ocular neoplasm with high morbidity and mortality, in a North Queensland cohort.

Method: A retrospective case series of patients seen at a tertiary referral centre in North Queensland between 2019-2022.

Results: Five patients (four male, 80%) were diagnosed with PVRL. Three had significant bilateral vitritis, one had unilateral vitritis and optic nerve head swelling, and one had bilateral subretinal deposits. Two patients presented with a background of primary central nervous system lymphoma, both diffuse large B-cell lymphoma (DLBCL) morphology; one patient presented with a brain lesion and vitritis, and biopsies of both were positive for DLBCL morphology. Two patients were diagnosed with probable PVRL with negative vitreous biopsy and flow cytometry; one patient later developed brain lesions with DLBCL morphology. Four patients underwent vitreous biopsy, finding one case of biopsy proven PVRL; one patient did not undergo vitreous biopsy as the ocular findings were considered unlikely to be PVRL, but they resolved with systemic treatment for primary central nervous system lymphoma. Two patients responded to systemic MATRIX chemotherapy alone; two patients with probable PVRL responded to intravitreal rituximab; one patient had PVRL recurrence that responded to intravitreal methotrexate and rituximab; the last patient had partial remission but was palliated due to functional decline and died three years after diagnosis.

Conclusion: We report five cases of PVRL in North Queensland. Four patients were diagnosed with DLBCL in keeping with previous studies. Two cases without significant vitritis responded to systemic treatment alone.

Pre and postnatal diagnosis of retinoblastoma in children with affected parents

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Purpose: To present the methods used to diagnose retinoblastoma where there is a positive family history in a parent. To outline the options available to screen for retinoblastoma in the setting of a positive family history of retinoblastoma and to raise awareness of their importance in an era where genetic testing/counselling are more readily accessible.

Method: Retrospective case series of five children (patients A-E) with familial retinoblastoma diagnosed and treated between 2015 and 2020 in Queensland. We present the age, modality of diagnosis, treatment and outcomes at most recent follow up.

Results: Five children with familial retinoblastoma (patients A-E) were born to four affected parents. The four affected parents (two male, two female) all had history of bilateral retinoblastoma. One patient (patient B) was diagnosed in-utero at 30 weeks gestation using amniocentesis and magnetic resonance imaging. Patients A (C, D dichorionic twins) and E were diagnosed postnatally at age ranging from 7-16 weeks of age. Modalities of treatment used included systemic chemotherapy, local retinal laser and cryotherapy, intra-arterial chemotherapy and enucleation. All five patients were stable, with no active eye disease, at their most recent review.

Conclusion: In the setting of a positive family history of retinoblastoma, it is important for medical practitioners (general practitioners, obstetricians and ophthalmologists) to be aware of the developments in prenatal diagnostic options available and recommendations for screening. The role of prenatal testing for retinoblastoma shows potential for early detection, treatment and improved outcomes in retinoblastoma.

OCULOPLASTIC / ORBIT

Paediatric orbital juvenile xanthogranuloma: Case series and literature review

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Purpose: Juvenile xanthogranuloma (JXG) is a rare histiocytic disorder that typically presents as a cutaneous nodule in children. Orbital involvement of JXG in children is rare with only 19 reported cases in literature. We present three paediatric cases from two tertiary children's hospitals in Australia and provide a comprehensive literature review of this condition.
Methods: Clinical, radiologic and histopathological review was conducted on three cases of orbital JXG from the Children's Hospital Westmead in Sydney and Royal Children's Hospital in Melbourne, Australia. A systematic literature review is presented on all published cases of orbital JXG (19 cases).
Results: Our three cases had ages between two months to three years, with two cases presenting with proptosis and one case with ptosis. Magnetic resonance imaging showed lesions to be isointense on T1 and T2 with contrast enhancement and diffusion restriction. Histopathology showed foamy histiocytes with rapid maturation in two cases on repeat biopsies. Surgical debulking and steroid therapy were used in two cases and additional chemotherapy in one case with intracranial extension. All patients were in remission at three year follow up.
Conclusion: Orbital JXG is rare with variable presentation and respond well to surgical debulking and intralesional steroids. Advances in molecular genetics and mutations in cellular pathways will further our knowledge of these histiocytic lesions and management of treatment resistant cases.

Asymmetrical thyroid eye disease

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Purpose: To investigate the prevalence of asymmetrical thyroid eye disease (TED) and its associated clinical and imaging features.
Method: A retrospective review was conducted on patients with TED who underwent computed tomography of the orbits and clinical assessment, including Hertel exophthalmometry. Asymmetry was defined as an anterior globe position difference of 3 mm or greater using Hertel. The assessment was performed by oculoplastic fellows and consultants. Extraocular muscle volumes were calculated by manual segmentation in consecutive slices and multiplying by interslice thickness. The total extraocular muscle volume was the sum of individual muscle volumes in that orbit.
Results: A total of 172 orbits from 86 patients were included in the study, and 28 patients (33%) had asymmetrical TED. The mean age was 54 $\pm$ 16 years, with 57 females and 29 males. No significant differences were found in mean age ($p = 0.79$) or gender ($p = 0.07$) between the asymmetrical and non-asymmetrical groups. Similarly, no significant differences were observed in thyroid hormone status ($p = 0.16$), anti TPO levels ($p = 0.38$), TSH receptor antibody levels ($p = 0.14$), disease activity ($p = 0.37$) or dysthyroid optic neuropathy ($p = 0.26$) between the two groups. The extraocular muscle volumes of the medial rectus ($p < 0.01$), lateral rectus ($p < 0.01$), superior muscle group ($p < 0.01$), inferior rectus ($p < 0.01$), superior oblique ($p = 0.02$) and sum of all muscles ($p < 0.01$) were significantly higher in the asymmetric orbit compared to its contralateral orbit.
Conclusion: Asymmetrical TED was present in one-third of studied patients. It is not associated with any significant differences in clinical or imaging features compared to non-asymmetrical TED.

Differentiating bacterial orbital cellulitis and diffuse non-specific orbital inflammation on magnetic resonance imaging

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Purpose: To examine and characterise the radiological differences between bacterial orbital cellulitis (OC) and diffuse non-specific orbital inflammation (DNSOI) on magnetic resonance imaging (MRI).
Methods: Retrospective study of patients with OC and DNSOI who underwent an MRI orbital scan. Patients with localised orbital inflammation (e.g. non-specific dacryoadenitis and myositis), inactive orbital inflammation or pre-septal cellulitis were excluded.
Results: This study included 32 patients presenting between 2008 and 2023. OC comprised of 21 patients (mean age: 42.5 ± 24.9 years, male: 6), while DNSOI comprised of 11 patients (mean age: 52.3 ± 17.8 years, male: 16). Orbital fat involvement in OC and DNSOI may both demonstrate contrast-enhancement on fat-suppressed contrast-enhanced T1-weighted imaging, however different T2 signals were observed in DNSOI and OC (i.e., high signal in OC, and variable signal in DNSOI). In OC, there may be loss of distinct margins of the lacrimal gland, while gross enlargement was more common in DNSOI. Diffuse multiple extraocular muscle (EOM) involvement was more common in OC, with peripheral contrast-enhancement and indistinct margins in areas of contiguous orbital fat involvement. DNSOI may show variable contrast-enhancement throughout the affected EOM. Contralateral radiological changes such as lacrimal gland enlargement and EOM involvement are more suggestive of DNSOI.
Conclusion: There are various radiological differences in the qualitative parameters between OC and DNSOI on MRI. These differentiating factors include the pattern of orbital fat signal intensity, EOM and/or lacrimal gland involvement, along with changes in the contralateral orbit.

Magnetic resonance imaging of idiopathic orbital myositis

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Purpose: To characterise the radiological features of idiopathic orbital myositis (IOM) on magnetic resonance imaging (MRI).
Methods: Multi-centre retrospective study with inclusion of patients diagnosed with IOM with MRI during active disease. Patients with incomplete clinical records, poor-quality scans, interval scans without active myositis, and specific orbital myositis were excluded.
Results: Inclusion of 23 patients (mean age: 44.4 ± 17.8 years, Male: 11) between 2011 and 2022. One case (4.2%) was paediatric (17-years-old), and 6 cases presented with recurrence. Diplopia and/or restricted ocular motility (100%), pain (82.6%) and proptosis (47.8%) were most common. Active IOM was typically characterised by fusiform enlargement of the extraocular muscle (EOM), high signal on fat-suppressed T2-weighted imaging and contrast-enhancement on fat-suppressed contrast-enhanced T1-weighted imaging. Average maximal diameters for the enlarged recti muscles ranged from 4.6 to 7.7 mm (enlargement ratio 1.4 to 2.2). Seventeen (73.9%) patients had single EOM involvement, most commonly the medial rectus (9/23, 39.1%). Other ipsilateral orbital structures were affected including the orbital fat and lacrimal gland. Contralateral radiological changes in the EOM and lacrimal gland were also observed. Patients who presented with recurrence of pre-existing disease was associated with developing ongoing recurrent episodes ($p = 0.003$).
Conclusion: Various typical MRI features of IOM have been characterised. Additionally, a range of atypical features have been described and IOM remains a heterogenous spectrum of acute and chronic clinico-radiological presentations. Inflammation may involve other ipsilateral or contralateral orbital structures or may be bilateral in nature. Quantitative measurements may have utility in differentiating IOM from other causes of orbital myositis.

Qualitative and quantitative magnetic resonance imaging in bacterial orbital cellulitis

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Purpose: To explore qualitative and quantitative parameters of bacterial orbital cellulitis (OC) on magnetic resonance imaging (MRI).
Methods: Multi-centre retrospective study with inclusion of patients of all ages diagnosed with OC who underwent an MRI. Isolated pre-septal cellulitis, bilateral disease and poor-quality scans were excluded. Simple

quantitative parameters included proptosis measurements and maximal extraocular muscle (EOM) diameters. An EOM enlargement ratio was calculated as a comparison of maximal EOM diameters between the affected and contralateral side.

Results: Twenty MRI scans from 20 patients (mean age: 40.8 ± 24.3 years, male: 15) between 2011 and 2022. Three (15.0%) cases were paediatric (< 18 years old). The most common clinical features were periorbital oedema and erythema (95.0%) and orbital pain (90.0%). All cases had both pre-septal and orbital fat involvement. The EOM were affected in 19 cases, with the superior muscle complex (94.7%) most commonly affected. Mean enlargement ratio was greatest for the medial rectus on axial views (1.30, range 1.04-1.82), while less pronounced enlargement was observed for the inferior oblique (1.02, range 0.9-1.08), on both T1 weighted imaging and fat-suppressed contrast-enhanced T1 weighted imaging sequences. Optic peri-neuritis and optic neuritis was present in 11 (55.0%) and two (9.5%) cases, respectively. A greater degree of proptosis was observed in patients with optic neuropathy and those who underwent surgical intervention compared to those without ($p = 0.002$ and $p = 0.002$, respectively).

Conclusion: MRI remains important for evaluating OC complications. Simple quantitative parameters, such as proptosis and EOM measurements, may correlate with high-risk clinical features and have utility in predicting clinical course.

Lacrimal gland stones: Experience from Sydney, Australia

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Purpose: Lacrimal gland stones (LGS) are exceedingly rare, but have been recognised in 20 cases in literature reports. They are usually asymptomatic but may present due to inflammation in the lacrimal gland, related to localised dacryoadenitis.

Methods: Two patients presented with presumed lacrimal gland stones. Histopathology of each presumed lacrimal gland stone was carried out. In Case 1, the patient presented with persistent unilateral ocular congestion and unilateral discharge with a sinus visible on the surface of the palpebral lobe of the lacrimal gland. Excision of the sinus and surrounding tissue demonstrated a LGS, which underwent light microscopy. In Case 2, the patient presented one month following severe Herpes Zoster Ophthalmicus and complained of pain in the region of the lacrimal gland. Examination of the region led to ejection of his presumed LGS onto the consulting room floor. The LGS underwent scanning and transmission electron microscopy along with mass spectroscopy of the contents.

Results: In Case 1, light microscopy demonstrated an inflamed cystic lesion, with a hair shaft within the sinus. Surgery resulted in definitive cure. In Case 2, electron microscopy of the ejected presumed LGS demonstrated typical somatic stone material containing herpes virus. Mass spectroscopy demonstrated calcium, sodium and sulphur.

Conclusion: While LGSs are extremely rare, they should be considered as possibilities in the differential diagnosis of lacrimal gland lesions, not only for ophthalmic plastic surgeons, but also for comprehensive ophthalmologists. LGSs may be addressed surgically when necessary.

Extraocular muscle enlargement in carotid cavernous fistulas

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Purpose: To evaluate the prevalence and pattern of extraocular muscle enlargement and proptosis in patients with carotid cavernous fistulas (CCF).

Method: We conducted a retrospective study on patients with digital subtraction angiography confirmed CCFs with neuroimaging (computed tomography or magnetic resonance imaging) performed prior to the digital subtraction angiography. The maximum extraocular muscle diameters were recorded. Extraocular muscles were considered enlarged if they were greater two standard deviations above the normal muscle diameters. Proptosis was

defined as the distance between the interzygomatic line to the anterior globe of ≥ 2 mm compared to the contralateral orbit, or ≥ 21 mm.

Results: Forty orbits from 20 patients were included. The mean age of participants was 65 ± 15 years and 13 (65%) were female. Thirteen (65%) fistulas were indirect and seven (35%) were direct. There was enlargement of at least one muscle in 11 (27.5%) orbits and this was not correlated with the type of fistula (direct/indirect). The inferior rectus was most commonly enlarged in seven orbits (17.5%), followed by the medial rectus in five orbits (12.5%). Proptosis was found in 17 (43%) orbits and was more common ipsilateral to the fistula ($p < 0.01$).

Conclusion: Extraocular muscle enlargement is an uncommon feature of CCFs. When enlarged, the inferior and medial rectus muscles are most commonly involved. Proptosis is a more common finding. These findings may help clinicians and radiologists when evaluating the CT or MRI scans of patients with suspected CCFs.

Inferior ophthalmic fissure fat prolapse in thyroid eye disease

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Purpose: To investigate the prevalence of fat prolapse through the inferior ophthalmic fissure (IOF) in patients with thyroid eye disease (TED).

Method: A retrospective review was performed on TED patients who had non-contrast computed tomography scans of their orbits. Data collected included patient demographics and evidence of IOF fat prolapse, which was defined as an inferior extension of intraorbital fat from a horizontal line between the maxillary bone and greater wing of the sphenoid bone in the coronal plane. The CT scans were viewed using a soft tissue window with a level of 60 HU and a width setting of 400 HU to determine the presence of IOF fat prolapse.

Results: A total of 182 orbits from 96 patients met the inclusion criteria for the study. The mean age was 54.7 ± 15.7 years, ranging from 25 to 91 years, with 63.5% being female. The documented diagnoses of the patients were Graves' disease (89.6%), Hashimoto's disease (4.17%) and toxic adenoma (2.08%). Nine patients (9.38%) had evidence of IOF fat prolapse in at least one orbit. Eleven orbits (6.04%) showed presence of IOF fat prolapse: two patients (22.2%) had bilateral fat prolapse; four patients (44.4%) had right IOF fat prolapse; and three patients (33.3%) had left IOF fat prolapse. There was no significant association between IOF fat prolapse and age, sex or proptosis.

Conclusion: IOF fat prolapse in at least one orbit was present in approximately one in 10 patients with TED, with most cases being unilateral.

Identifying malignancy in the caruncle: A multicentre case series of 270 biopsied caruncular lesions

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Purpose: Lesions of the lacrimal caruncle can range from various benign to malignant pathologies and historically, clinical diagnosis accuracy is often low due to the heterogenicity of the tissue. This study aimed to analyse a large series of lacrimal caruncular biopsies from three centres in Australia and the United Kingdom to help better understand the prevalence and spectrum of histopathological diagnoses.

Method: A retrospective study on the histopathological findings of caruncle lesions from three centres (Adelaide, South Australia; Sydney, New South Wales; and Brighton, United Kingdom) between and including the years 2000 to 2022. We included all patients with the term 'caruncle' or 'caruncular' in their tissue biopsy request.

Results: A total of 270 caruncle biopsies were identified in the study period. The average age of patients with benign diagnoses was 50.44 years (range of 5-96 years) while those with a malignant lesion was 74.22 years (range of 61-91 years). The most common diagnoses were naevi (n = 132, 48.89%), followed by squamous papilloma (n = 43, 15.93%) and cysts (n = 34, 12.59%). The malignant lesions (n = 9, 3.33%) had diagnoses of lymphoma, melanoma and squamous cell carcinoma. A suspected clinical diagnosis was reported in 137 biopsies and of these, 102 (74.45%) matched the histopathological diagnosis. The suspected clinical diagnosis was correct in only four (44.44%) of the malignant lesions.

Conclusion: Although most caruncular lesions are benign, our study shows that clinical diagnosis of malignant lesions is difficult. Clinicians should have a low threshold for biopsy to exclude malignancy, especially in older patients.

Dacryocystorhinostomy videos on YouTube as a source of patient education

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Purpose: This study aims to determine the quality and reliability of dacryocystorhinostomy (DCR) YouTube videos as patient education resources and identify any associated factors predictive of video quality.
Methods: A YouTube search was conducted using the terms "Dacryocystectomy, DCR, surgery" on 12 January 2022, with the first 50 relevant videos selected for inclusion. For each video the following was collected: video hyperlink, title, total views, days since video was posted, video length, total likes/dislikes, authorship (i.e. surgeon, patient experience or media companies) and number of comments. The videos were graded independently by a resident, a registrar and an oculoplastic surgeon using three validated scoring systems: the Journal of the American Medical Association (JAMA), DISCERN and Health on the Net (HON).
Results: The average number of video views were 22,992, with the mean length being 488.12 seconds and having 18 comments per video. The consensus JAMA, DISCERN and HON scores were 2.1 ± 0.6, 29.1 ± 8.8 and 2.7 ± 1.0, respectively. This indicated the included videos were of a low quality, however, only DISCERN scores had good inter-observer similarity. Videos posted by surgeons were superior to non-surgeons when considering mean JAMA and HON scores. No other factors were associated with the quality of educational content.
Conclusion: The quality and reliability of DCR related content for patient education is relatively low. Based on this study's findings, patients should be encouraged to view videos created by surgeons or specialists in preference to other sources on YouTube.

Anterior clinoid process mucocele with compressive optic neuropathy: Case study and review of literature

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Purpose: Anterior clinoid process (ACP) mucoceles account for less than 1% of paranasal sinus mucoceles and often present with compressive optic neuropathy. We present a case of ACP mucocele and a literature review of all reported cases.
Method: A retrospective case review of a 49-year-old with ACP mucocele and compressive optic neuropathy, managed at Liverpool Hospital, Sydney. A literature review on the topic was conducted through an electronic literature search on the PubMed/MEDLINE platform. The terms 'mucocele', 'sphenoid', 'anterior clinoid', 'sphenoid sinus' and 'anterior clinoid process' were used. Inclusion criteria were case studies with a focus on anterior clinoidal mucoceles. Exclusion criteria were review articles with no new case studies, lack of pre- or post-operative visual acuity, or history of significant ophthalmic comorbidities.
Results: A 49-year-old presented with worsening left optic neuropathy due to ACP mucocele. His visual acuity deteriorated to no light perception and recovered (to 6/6) with a combination of medical management and image-guided endoscopic drainage of the mucocele. There are 29 reported cases of ACP mucoceles in the literature with a mean age of 48 and male to female ratio of 2:1. Two-thirds of patients present with compressive optic neuropathy. Surgical management varied from endoscopic or craniotomy approaches for drainage of mucocele. Visual recovery is variable post-surgery.
Conclusion: ACP mucoceles need to be considered in patients presenting with compressive optic neuropathy. Neuro-orbital imaging is critical in diagnosis and emergent surgical management is important to salvage vision.

Management of thyroid eye disease in New Zealand survey: Insight into current practice patterns

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Purpose: To evaluate the current practice patterns in the management of thyroid eye disease (TED) in New Zealand by conducting a survey among New Zealand ophthalmologists.

Methods: An online survey was sent to all practicing ophthalmologists and ophthalmology trainees in New Zealand in April 2021. The survey encompassed background, training and experience of participants as well as methods of investigations and management for thyroid eye disease. Specifics on dosing regimens of steroids, radiotherapy dose and types of decompression used were queried.
Results: Eighty (50%) responses were received. Participants included general ophthalmologists (19%), oculoplastic or orbital specialists (12.5%), other ophthalmic subspecialists (41%) and trainees (27.5%). Of those that have completed ophthalmology training 66% see less than one case per month. Most ophthalmologists utilise a grading system for assessing TED activity (63%) and severity (73%). For management of active or severe TED, intravenous steroid (methylprednisolone) is the preferred first line modality. Oculoplastic/orbital surgeons and endocrinologists are commonly consulted and a large majority (72%) of respondents view a multidisciplinary team as beneficial.
Conclusion: This study offers useful insights into the current practice patterns of TED management in New Zealand. Intravenous steroids are the preferred first line treatment for active or severe TED. Our survey highlights that TED case encounters are infrequent for most of New Zealand ophthalmologists. We propose there may be benefit in creating a nationwide oculoplastic and orbital subspecialists consultation group for provision of optimal management of TED cases across the country.

Reconstruction of full thickness lower eyelid defects using a lateral advancement flap with Z-plasty and periosteal strip

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Purpose: To describe a single stage technique of reconstruction of full thickness lower eyelid defects using a lateral advancement flap and Z-plasty combined with a lateral periosteal strip.
Methods: A retrospective case series of six patients who underwent reconstruction using this technique is presented documenting surgical technique, clinical photographs and post-operative outcomes.
Results: All six patients demonstrated good eyelid position and cosmesis following reconstruction.
Conclusion: A lateral advancement flap with Z-plasty combined with a periosteal strip is an effective technique to close lower eyelid defects of up to 80% of eyelid width, providing a good structural and aesthetic outcome.

Transorbital puncture for the treatment of cavernous sinus dural arteriovenous fistulas

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Purpose: Endovascular embolisation of carotid-cavernous sinus dural arteriovenous fistulas (CCF) is most commonly performed via a transfemoral-transvenous approach. Surgical cut-down of the superior ophthalmic vein is an alternative, well-described route. When these prove inaccessible, a transorbital approach can be used to reach the fistula. We describe the recent experience – including indications, surgical technique, radiological findings and post-operative outcomes – in Melbourne of a series of patients in whom a percutaneous, transorbital direct puncture of the cavernous sinus enabled successful embolisation of dural arteriovenous fistulas.
Methods: Three patients with CCFs were treated under general anaesthetic as combined procedures with the interventional neuroradiologists. By a percutaneous approach through the lower lid, the cavernous sinus was accessed with a catheter advanced from the inferolateral orbit under image intensifier control into the cavernous sinus via the superior orbital fissure. Coil embolisation was subsequently performed with confirmation of complete fistula obliteration with cerebral angiography.
Results: Each of three patients achieved successful embolisation of their CCFs in a single procedure. All patients experienced symptomatic relief. There were no perioperative complications.
Conclusion: Transorbital puncture of cavernous sinus dural arteriovenous fistulas is a safe and effective technique when anatomical constraints preclude more traditional transvenous approaches. It offers less invasive access to previously described methods of direct visualisation of the cavernous sinus and avoids potential complications associated with a craniotomy or deep orbital dissection.

Idiopathic granulomatous orbital inflammation

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Purpose: Idiopathic granulomatous orbital inflammation is an uncommon histological finding that remains poorly defined due to its overlap with specific causes of granulomatous orbital inflammation such as orbital sarcoidosis. We aim to identify clinico-radiological features that may differentiate it from other aetiologies of granulomatous inflammation.
Methods: Retrospective case series involving 11 patients and review of the literature.
Results: Seven patients (63.6%) were female. The mean age at presentation was 57.9 ± 9.5 years of age. Ten cases were unilateral (90.9%). The most common presenting symptoms and signs were palpable mass (n = 9, 81.8%), lid swelling (n = 9, 81.8%) decreased extraocular movements (n = 4, 36.4%) and proptosis (n = 4, 36.4%). One patient (9.1%) had signs consistent with optic neuropathy on presentation. The lacrimal glands were involved in five (45.5%) cases. For initial management, two patients (18.2%) underwent observation only, eight (72.7%) were managed with immunosuppressive drugs and two (18.2%) were managed with surgical excision or debulking. Two patients (18.2%) required additional management with either methotrexate or intralesional triamcinolone. Patients were followed up for a mean of 68.1 months. At last follow up, seven patients (63.6%) had complete resolution and four (36.4%) had stable disease without further progression.
Conclusion: We present a case series of idiopathic granulomatous orbital inflammation. We found that those with idiopathic disease often had unilateral presentation and appeared to present at a later age than those with orbital sarcoidosis in the literature. Although the differentiation between orbital sarcoidosis and idiopathic disease remains difficult, the features described in this series contribute to a greater understanding of the latter condition.

OTHER

Documentation and treatment decisions at first specialist ophthalmology appointments for diabetic retinopathy

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Purpose: Ethnic disparities have been observed in treatment at first specialist appointments within New Zealand. This study aimed to examine documentation and treatment decisions for diabetic retinopathy by ethnicity.
Method: Retrospective audit of first specialist diabetic retinopathy clinic appointments for 213 patients at Greenlane Clinical Centre, Auckland. Multiple domains of care were assessed, including comprehensiveness of history taking, examination, investigations and treatment decisions.
Results: Caucasians comprised 38% of patients, Māori 9.4%, Pasifika 19.2%, Asian 22.5% and other 10.8%. The comprehensiveness of history taking ($p = 0.252$), examination ($p = 0.252$), investigations ($p = 0.204$) and proportion of eligible treatments ($p = 0.707$) provided was similar but did not reach the gold standard of care across all ethnicities. Māori patients were eligible for a significantly greater number of treatments ($p = 0.003$).
Conclusion: The standard of care provided in first specialist appointments for diabetic retinopathy appear to be similar across all ethnic groups. Māori were underrepresented in first specialist appointments and had a higher disease burden at presentation. Our data highlights the need to reduce barriers faced by Māori in accessing eye services in Auckland and improving local consultation and treatment guidelines.

Investigating the efficiency of the acute ophthalmology service at the largest tertiary centre in Victoria

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Purpose: The Acute Ophthalmology Service provides access to patients who have acute eye conditions. While most patients are referred from our eye emergency department, referrals are accepted from local primary care providers and local acute hospitals. The service is not intended for the management of chronic conditions. A maximum of three visits are normally allocated to each patient before they are discharged or referred on to other appropriate specialists. Recently it was found that half of all patients referred to the service received more than three visits and so an audit was performed in order to identify why this is the case.

Method: A respective list of patients was provided for the month of February 2023. A case-by-case investigation was performed to identify what diagnoses were responsible for multiple visits and what grade of ophthalmologist decided upon further follow up post-three clinic visits.
Results: Microbial keratitis and acute anterior uveitis were the prominent conditions that required further follow-up past three clinic visits, with certain patients requiring up to six consultations for guided management. The more junior the ophthalmologist, the more likely to request further follow-up despite the three-visit rule.
Conclusion: Overbooked clinics are common in many hospital services as the demand for care increases overtime. Microbial keratitis and acute anterior uveitis are common eye emergencies that present to the Acute Ophthalmology Service. Further pathways are currently in discussion to assist in improving efficiency to the service. In addition, further educational support to more junior medical staff on clinical guidelines are being deployed.

The types of visual defects and associated factors in patients with pituitary adenomas

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Purpose: Pituitary adenomas comprise up to 16% of intracranial neoplasms. The majority of these are asymptomatic. Ophthalmic symptoms of this pathology include monocular and chiasmal visual field defects. We aimed to assess the demographics, type and associated factors of visual field defects in these patients and their progression with treatment.
Methods: A retrospective review of a cohort of patients with pituitary adenomas presenting to an endocrine clinic between April 2022-2023 was performed. Data was analysed and resulting visual field outcomes assessed. Eyes were investigated separately.
Results: One hundred patients were included in our study (mean age 60 years, SD ± 14). Fifty-two (52%) patients were managed surgically, with non-functioning tumours presenting most frequently (n = 37, 37%). The average size of tumours at presentation was 19 mm (SD ±10) with 38 (38%) tumours impinging on the optic chiasm. Sixty-nine (69%) patients underwent Humphrey visual field testing. Of 138 eyes screened, 74 (54%) had no visual defects. The most common defects were hemianopias (n = 30, 22%) and superior temporal defects (n = 17, 12%). Hemianopias were most prevalent in patients with prolactinomas and non-functioning tumours. Of affected eyes, visual fields improved during monitoring in 37 (58%) eyes, declined in 24 (37%) and remained stable in three (5%) eyes.
Conclusions: Our study highlights the importance of visual field testing in monitoring progression and response to treatment in patients with pituitary adenomas. We also investigated their various types of visual field defects. Fifty-four of patients who underwent visual field testing had normal visual fields. If a defect was present it was most likely to be a hemianopia in a non-functioning tumour.

A prospective observational study of a smartphone-based indirect ophthalmoscope in a large rural general practitioner practice

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Purpose: Health systems across the world are under pressure, which affects eye separtments. For many of these patients who often present to a general practitioner (GP), a view of the fundus could reveal diagnostically valuable signs and is recommended by guidelines. Direct ophthalmoscopy, however, is a difficult skill to master. The use of a smartphone-based indirect ophthalmoscope offers a point-of-care diagnostic support tool, capable of acquiring images of the retina that can be transmitted via teleophthalmology forspecialist referral, triage or acute advice.
Methods: Patients presenting to Dargaville Medical Centre with visual disturbance, headache, hypertensive urgency, TIA or stroke, were consented and enrolled (n = 152). Direct ophthalmoscopy as well as fundus photographs were taken. Images were assessed by the attending GP and by an ophthalmologist. Demographic and clinical data was collected and analysed.
Results: GPs using the non-mydriatic fundus camera were able to achieve an adequate view of the fundal structures of interest 95.5% of the time, compared to 68% of the time when using direct ophthalmoscopy. Examining the retina/macula is particularly challenging with direct iphthalmoscopy, and atracted an inadequate view in 45.8% of examinations. A total of 11 patients (7.2%), four of which were Māori, would potentially have missed

out on ophthalmologist referral were it not for the specialist review of photos.

Conclusion: The smartphone-based indirect ophthalmoscope significantly improved the likelihood of visualising the fundal structures of interest and streamlined access to specialist eye services. The study highlighted the role of ophthalmologist review of fundal photos and reduced inequity by improving access and referral rates for Māori.

A comparative evaluation of deep learning approaches for ophthalmology

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Purpose: With multiple image modalities and architectures to choose from, selecting the best performing artificial intelligence-dataset combo will depend on the specific problem that needs solved and the type of ophthalmic images available. This paper sets out to explore some of these nuances and discuss the strengths and weaknesses of these combinations following training.

Methods: Relevant architectures for machine learning tasks were selected using the papers with code leader board. Image modalities: colour fundus photography; optic coherence tomography (OCT). Architectures included transformers, transformer hybrids and convolutional neural networks (CNN): Efficientnet; Regnet; CoatNet' DaVit; Resnest; Cotnet; MLP Family; Inceptionv3; NFNet; Beit; Vit; VOLO. Datasets: Eyepacs; Messidor2; Messidor; Acrima; AEI2018; OCT201; OCTID. Training was performed on the datasets selected using an 80/20% split. K-fold cross validation was also used for smaller datasets. Tasks included classification, heatmaps and grading.

Results: Efficientnet had higher performance in terms of accuracy, training time, ability to work with smaller datasets; Regnet for was better for grading. For OCT scans using 2D architectures a high accuracy with all dataset-architecture combinations was achieved except when trying to detect glaucoma; in the latter case, 3D-CNN performed better.

Conclusion: Some architecture-dataset combinations do perform better than others on a given task. Despite recent popularity of transformer-type architectures, such as ChatGPT, transformers tended to overfit on smaller datasets, which currently reduces their effectiveness for ophthalmic research. For fundus image classification, Efficientnet performed the best having good training time, easily quantisable and generating heatmaps, working well with small datasets and high accuracy. For 3D volume classification, 3D-CNN performed best despite being the simplest architecture.

PAEDIATRIC OPHTHALMOLOGY

Childhood myopia is associated with significant deficits in sleep-related cognitive function

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Purpose: Myopia is a multifactorial eye disorder of increasing prevalence and public health concern. Changes in sleep behaviour and cognition have been associated with myopic refractive error. We examined the impact of natural sleep propensity on cognitive functions of sustained attention and working memory directly in myopic children.

Method: Twenty-six myopic (mean refraction ± standard error mean, -2.06 ± 0.23 D) and 18 emmetropic children (-0.06 ± 0.04 D) with mean age of 11.74 ± 2.31 years completed a battery of tests measuring sustained attention (psychomotor vigilance task) and working memory (forward/backward digit span; DS) at two sessions overnight in a sleep laboratory. Both tests were completed between 7:00–8:00 pm and repeated after three hours. For psychomotor vigilance task, mean and median reaction times (RT) were calculated. For DS, maximum digit span length (TE-ML), and total number of trials for reaching TE-ML (TE-TT) were calculated.

Results: Myopic children showed a significant increase in successive RT at the second session at night (two-way repeated measures analysis of variance, $p = 0.014$). Increase in mean RT at the second session in myopes was ~4 times greater than emmetropes (emmetropes and myopes, 6.89 ± 3.71 vs. 28.15 ± 6.74 ms, $p < 0.05$). For forward DS alone, there was a significant drop in TE-ML and TE-TT at the second session ($p < 0.05$), but these changes were similar across the two refractive groups.

Conclusions: Myopic children demonstrated significant cognitive deficits in sustained attention and alertness compared with emmetropes, suggesting an association between cognition and childhood myopia.

PREPP-II study (Primary Eye care in Paediatrics Population – II Study): Study of satisfaction of vision centre services

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Purpose: This study was aimed to assess parents' satisfaction with paediatric-eye-care services across six vision centres (VC) of a tertiary eye hospital in Southern India. The barriers among the parents for not attending the base hospital (BH) when referred from these VCs were also evaluated.
Methods: Standard-Validated-Satisfaction-Questionnaire (VSQ) was used to assess patient satisfaction. Responses were assessed on a 5-point Likert-scale: 0 (very dissatisfied) to 4 (very satisfied) against each response. Responses were expressed as percentage with 0 (very dissatisfied) and 100% (very satisfied). Patients were referred with a form mentioning reasons of referral (urgent/non-urgent). All referrals were evaluated by principal investigator. In case of failure to reporting, parents were enquired about the barrier based on the validated-barrier-questionnaire over telephonic conversation
Results: All 250 patients of the PREPP-1 study were included for the Satisfaction study. Different domains were evaluated using the Validated-Satisfaction-Questionnaire (accessibility of VC, waiting-hours, financial aspects, spectacle dispensing service and tele-ophthalmology). Overall satisfaction was 75%. Most common reason for dissatisfaction was lack of meeting the ophthalmologist in person followed by waiting time. Thirty-eight patients wanted to visit BH to consult paediatric ophthalmologist in person (57%). For Barrier study, 14 out of 47 referrals didn't report, and were evaluated using validated-barrier-questionnaire (knowledge, physical, time and financial barriers). Majority had financial barrier (43%) followed by knowledge (28.6%) and time barrier (14%).
Conclusion: PREPP-II demonstrated that 3/4th of paediatric patients were happy to be treated at VCs with tele-ophthalmology services. But significant percentage (25%) wanted to consult specialist at BH. One-fourth of total referrals didn't report to BH due to financial constraints and lack of awareness of the child's condition.

PREPP-I Study (Primary Eye care in Paediatrics Population – I) : Demographic and clinical profile

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Purpose: The study intends to evaluate the demographic and clinical profile of paediatric patients (0-18 years) attending six vision centres (VC) of a tertiary-eye-care facility in Southern India.
Methods: It is a cross-sectional observation study at six major peripheral vision centres of a tertiary eye care facility in South-India from June 2020-December 2020. All children presenting at VCs under the base hospital in Pondicherry whose parents gave consent were included. Data were entered by the ophthalmic assistants in VC and cross checked by the principle investigator at base hospital.
Results: A total of 250 paediatric patients were brought to VCs during the study-period, predominantly males (60.8%), with mean age 8.2 ± 4.5 years (0-18 years). Half of them were staying within 5 km from VCs. Most children were escorted by their parents (88%) and the expenditure of travel to VC was convenient for most of the parents (75%). 53.6% patients were in their primary school while 28% children had no schooling started. Visual acuity (VA) could be assessed only for school going and older ones, due to lack of age-matched VA assessment tools. Most children (91.3%) had uncorrected VA better or equal to 6/18 in better eye, and approximately 3% had VA worse than 6/60. All patients had best corrected VA of 6/6-6/18 after cycloplegic refraction. Most children reported to VC for allergic conjunctivitis (25%) followed by refractive error (13%) and squint (10.4%). Urgent referral to base hospital was given for 47 children.
Conclusion: PREPP-I showed that most children can be treated at VCs & only one-fifth require active intervention at higher referral centres. Further study on satisfaction of services provided for pediatric patients in these VCs and barriers of not reporting to the BH when referred are considered for the PREPP II study.

Visual acuity and neurodevelopmental outcomes in children with treated retinopathy of prematurity

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Purpose: Retrospective review of visual acuity (VA) and neurodevelopmental outcomes in children who received

treatment for retinopathy of prematurity (ROP) across several hospitals in New South Wales over 10 years.
Methods: Data was retrospectively collected for children who received treatment for ROP. VA was compared to VA norms by age and test type. Differences in VA of ≥ 2 lines between eyes were reported as amblyopia. Neurodevelopmental scores were reported based on standard deviation from the mean as mild, moderate or severe impairments.
Results: There were 150 participants. The mean gestational age (GA) was 24.98 ± 1.61 weeks, 37.9% were female and birth weight was 748 ± 173.1 g. ROP was bilateral in 145. The frequency of ROP stages 2, 3 and 4 were 26, 107 and 1, respectively. The average GA at first treatment was 37.52 ± 6.95 weeks; secondary treatment was required in 17 children (11.3%). Subnormal VA was present in 59.5% of participants and amblyopia in 17.9%. Neurodevelopmental data from 12, 24 and 60 months of corrected of age were included. Neurodevelopmental impairment was mild or less in 70-80% of participants across all domains and time points. There was no statistically significant relationship between neurodevelopmental outcome and GA, birth weight, ROP status or ROP treatment type.
Conclusions: In summary, we found no association between neurodevelopmental outcomes and treatment type or severity of ROP for our cohort of infants. This may reflect the positive effect of high-quality neonatal care and early intervention available to ex-prematurely born children in tertiary care centres.

Intraocular pressure measurements using three different tonometry instruments in healthy children

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Purpose: We aimed to explore the relationship between different parameters of the ocular response analyzer (ORA) and Corvis ST tonometry (CST) in a sample of healthy Iranian school-aged children and the relationship between parameters of these instruments against intraocular pressure (IOP), measured by Goldmann applanation tonometer (GAT), age and gender, and find possible correlation and agreement between ORA and CST with GAT.
Method: This cross-sectional study included 90 healthy children. Following successful GAT-IOP measurement, ORA and CST were conducted. The CST parameters were A 1/2 length, A 1/2 velocity, highest concavity deformation amplitude, a radius of curvature, peak distance, central corneal thickness and IOP. The ORA parameters were corneal hysteresis (CH), corneal resistance factor (CRF), Goldmann-correlated IOP and corneal compensated IOP (IOP-CC). Extracted data were analysed using Statistical Package for Social Science software.
Result: In total, 39 boys and 51 girls were included. Many CST parameters were significantly correlated with CH, CRF, Goldmann-correlated IOP and IOP-CC. Some CST parameters had a significant correlation with GAT-IOP, including IOP-CST in both eyes and highest concavity deformation amplitude, A2L, peak distance and radius of curvature in the left eye, but none with age, except A2L in the right eye. The CRF measurement showed a significant correlation with GAT-IOP in both eyes and CH in the right eye, yet, none with age.
Conclusion: The study finds the highest IOP overestimation by CST and the lowest by IOP-CC compared with GAT. Overall, either a low positive correlation or negligible correlation is found between IOP measurements by the three instruments.

Infantile cataract outcomes in Perth Children's Hospital

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Purpose: To describe trends and outcomes of congenital and infantile cataract surgery in Perth Children's Hospital(PCH).
Methods: Retrospective chart review of children < 1 yr who underwent cataract surgery at PCH from 2005-2021. The number of children having cataract surgery and trends over the study period was calculated. Characteristics of the study population described included demographics, timeliness of referral, surgical factors and postoperative visual rehabilitation. Outcomes evaluated over 10 years of follow-up included postoperative complications, need for repeat surgery, and visual acuity.
Results: 113 eyes of 79 patients were included, 42% (N=33) were bilateral cataracts. There was a mean of 6.65 cases per year (2.03 cases per 10,000 births). Most

cases were referred from private ophthalmologists for surgery (33%) followed by neonatal units (18%) and direct GP referral(10%). Of those with referral data, 88%(N=52) were seen in clinic within a month. 98% of cases were left aphakic. Vision was 6/12 or better in 18%(n=9), and better than 6/60 in 68%(n=34) at 5 years follow-up. Patching compliance was spread evenly between good (n=19, 37%), fair (n=12, 24%) and poor (n=10, 20%). The main complications were strabismus (n=41, 48%), ocular hypertension/glaucoma (n=17,19%) and visual axis opacification (n=15,16%).

Conclusion: The incidence and visual outcomes of infantile cataract surgery at PCH is similar to that found elsewhere in the country. Of note, we found a higher rate of strabismus than similar studies and the delay to clinic review in 10% of cases warrants review.

Epidemiology of monocanalicular stenting in paediatric lacrimal canalicular trauma

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Purpose: To summarise the epidemiology and surgical outcomes of the largest paediatric cohort to undergo primary Mini-Monoka stenting for traumatic canalicular laceration repair.

Method: A retrospective study was conducted of all patients who underwent eyelid laceration repair at the Queensland Children's Hospital between November 2014 and August 2022. Collected data included patient demographics, mechanism of injury, laceration characteristics, associated injuries, time to repair, stent removal timing, post-operative follow-up and complications.

Results: A total of 54 patients were included in this study. The study population had a male predominance and a median age of five years (interquartile range 3-9). A high frequency of dog bite injuries and lower lid involvement was observed. Surgical repair was undertaken within 48 hours for 93% of our patients. Delayed repair was not found to be associated with long-term epiphora ($p = 0.529$). Early extrusion was observed in 10 (18.5%) cases but was not found to be associated with poor functional outcome ($p = 0.3425$). Overall, nine (17%) patients reported chronic epiphora of whom, one went on to have a dacryocystorhinostomy.

Conclusion: Excellent functional success can be achieved with Mini-Monoka stents despite surgical delay and early extrusion.

Intra ocular pressure and central corneal thickness in healthy children

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Purpose: Elevated intraocular pressure (IOP) is still a foremost risk factor in development and progression of glaucoma. Central corneal thickness (CCT) may play as the risk factor for the progression of glaucoma, closely associated with IOP, especially in the pediatric age group. This study performed a pioneering investigation combining the outcomes of multiple studies using a meta-analytic approach.

Method: Nineteen published articles were designated by searching Scopus, PubMed and Google Scholar and analysed with random effects model while I^2 statistics employed to find out heterogeneity.

Result: The mean IOP has been documented to 16.22 mmHg (95% confidence interval [CI] 15.48-16.97) in all races subgroups. Analysing the data by race-based subgroups revealed the lowest IOP of 12.02 mmHg (95% CI 11.40-12.64) in Indian children while IOP of 17.38 mmHg (95% CI 15.77-18.98) documented in Black children as the highest measurement. The mean CCT was 553.69 micrometer (95% CI 551.60-555.78) among all races. Lowest CCT of 536.60 mm (95% CI 531.82-541.38) has been documented in mixed Malay-Indian children whereas Chinese children ought to the highest CCT value of 557.68 mm (95% CI 553.10-562.25).

Conclusion: Findings of published studies were inconsistent when considered independently; however, meta-analysis of these results showed a significant correlation between CCT and IOP. Owing to non-uniform methods used to measure IOP and CCT in studies, data were stratified into various subgroups according to the instruments used to measure IOP and CCT.

Paediatric open globe injuries: Epidemiology, visual outcomes, surgical intervention, prognostic models and socioeconomic costs

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Purpose: To report the epidemiology, visual outcomes, surgical interventions, prognostic models and costs of paediatric open globe injuries.
Method: This was a retrospective, consecutive, non-comparative interventional case series. A total of 88 eyes of patients aged ≤17 years over an 11-year period (2011-2021) were included. Outcome measures included best-corrected visual acuity, operating theatre visits and direct/indirect cost evaluation. The Revised Globe and Adnexal Trauma Terminology, that updates the Birmingham Eye Trauma Terminology, was used to record the mechanism and zone of injury. Factors associated with poor visual outcomes and multiple operating theatre visits were identified. The sensitivity and specificity of prognostic models: the Paediatric Ocular Trauma Score, Ocular Trauma Score and Toddler/Infant Ocular Trauma Score were compared. Hospital and direct societal costs were calculated for this study and estimated for Australia annually.
Results: Data collection is ongoing and the full results will be presented at the conference. From preliminary data, the average age was 11 years with a 2.4:1 male to female ratio. The most common location was in the home due to sharp objects, resulting in lacerations. The lens was commonly involved. Time interval between admission and surgery was 3.5 hours. Many patients required multiple operating theatre visits (mean 3.5 per patient) for subsequent procedures. Final mean logMAR improved to 0.9 [6/48] from 1.14 [6/90] on presentation.
Conclusions: Paediatric open globe injuries remain a significant cause of injury, with poor visual outcomes and high surgical morbidity.

REFRACTIVE SURGERY

The Brain cornea artificial intelligence method to assess the risk of ectasia after laser refractive surgery

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Purpose: To assess the applicability of the Brain cornea artificial intelligence risk scoring system to assess the risk of post-operative ectasia in patients with thin corneas or high refractive error, using real case examples.
Method: Assessment of 300 consecutive patients requesting laser refractive surgery for risk of post-operative ectasia using the Brain cornea ectasia scorring system from the Brazilian Study Group of Corneal Analysis and Artificial Intelligence (http://braincornea.com). Four different methods of gaining data can be utilised (Oculyzer, Keratograph, Pentacam or General Topography). These were compared to traditional methods such as the Randleman Ectasia Risk Score System and the use of the Belin/Ambrosio Enhanced Ectasia Display.
Results: Thirty patients (10%) were identified as having a clinically significant risk of post-operative ectasia that were not detected using the Belin/Ambrosio Enhanced Ectasia Display on the Oculus Pentacam. Alternative options were discussed with these patients such as avoiding any surgery, thinner flap laser in situ keratomileusis, photorefractive keratectomy or implantable contact lenses.
Conclusion: The risk of post-operative ectasia is difficult to quantify and involves many variables and high false positives. The use of artificial intelligence is designed to improve sensitivity and specificity and will identify patients that may be otherwise missed if purely based on traditional variables.

Real-world visual outcomes of a non-diffractive extended depth of focus intraocular lens implanted in Australian sites

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Purpose: To report final outcomes of a real world multicentre, ambispective registry study of subjects bilaterally implanted with AcrySof IQ Vivity™ extended vision intraocular lens in Australia and New Zealand.
Method: After a minimum of three months of follow-up, subjects underwent visual performance analysis of binocular uncorrected visual acuities at distance, intermediate (66 cm) and near (40 cm). Patient satisfaction, spectacle independence and visual disturbances were also assessed. This is a sub-analysis of subjects participating in this study from New Zealand and Australian sites. The study was conducted in Australia, New Zealand and Europe
Results: In total, 910 subjects have been enrolled globally with 198 subjects (21.7%) among 10 New Zealand and Australian sites. Binocular mean (SD) logMAR uncorrected visual acuities at distance was 0.016 (0.092), uncorrected intermediate visual acuity 0.097 (0.110) and uncorrected near visual acuity 0.304 (0.158). Most subjects never or rarely needed to wear spectacles at distance (94.9%), intermediate (87.4%) and near (63.7%). More than 73% of the subjects reported no difficulty to perform daily

activities and 92.5% of the subjects were satisfied with their sight. In addition, 90.4%, 90.4% and 93.4% of subjects were not reporting halos, starbursts or glare, respectively.

Conclusion: In this assessment of subjects bilaterally implanted with AcrySof IQ Vivity intraocular lenses in Australia and New Zealand, we have observed very good distance, intermediate and functional near vision. Subjects also reported high levels of satisfaction with their vision, good levels of spectacle independence and low levels of visual disturbances.

Visual and refractive outcomes following sulcus piggyback lens insertion in pseudophakic post-penetrating keratoplasty patients

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Purpose: To report visual and refractive outcomes in pseudophakic post-penetrating keratoplasty patients who underwent insertion of the 1st Q Addon sulcus piggyback intraocular lens (IOL).

Method: Data were retrospectively collected for pseudophakic post-penetrating keratoplasty patients who underwent insertion of the 1st Q Addon sulcus piggyback IOL at a private ophthalmology practice. Visual and refractive outcomes were reported and analysed using the standard graphs for reporting refractive surgery outcomes.

Results: Twenty-seven eyes of 24 patients (age 66.0 $\pm$ 10.9 years) underwent insertion of the 1st Q Addon sulcus piggyback IOL. Mean LogMAR uncorrected visual acuity improved from 0.56 $\pm$ 0.31 preoperatively to 0.21 $\pm$ 0.19 post-operatively ($p < 0.05$). Seventeen of 27 eyes (63%) achieved post-operative uncorrected visual acuity within one line of preoperative best-corrected visual acuity. Twenty-two eyes (81%) achieved post-operative spherical equivalent within 1D of target emmetropia. Only 13 of the 27 eyes (48%) yielded a post-operative astigmatic error $\leq$ 1D. However, mean refractive cylinder improved from -3.87D $\pm$ 1.69D preoperatively to -1.22D $\pm$ 0.69D post-operatively ($p < 0.05$).

Conclusion: In this patient cohort, the 1st Q Addon sulcus piggyback IOL resulted in reliable improvements in visual and refractive outcomes. Despite a high incidence of post-operative residual astigmatism, 1st Q Addon IOL insertion appeared to consistently improve astigmatic magnitude. This IOL appears to be a suitable treatment option for pseudophakic post-penetrating keratoplasty patients with residual refractive error.

Retinal pigment epithelium and outer retinal atrophy in TREX-AMD trial: Post hoc analysis of TREX-AMD Trial (Withdrawn)

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Purpose: To compare the enlargement rate of complete and incomplete retinal pigment epithelium and outer retinal atrophy (RORA) (ERORA) in dry versus wet age-related macular degeneration (AMD) receiving monthly versus treat-and-extend ranibizumab.

Methods: Sixty patients with unilateral treatment-naïve neovascular AMD randomised 1:2 to monthly or TREX ranibizumab were followed for 36 months. Atrophy lesions were quantified on fundus autofluorescence with spectral domain optical coherence tomography confirmation. Eyes that developed new complete RORA during the study were analysed to determine the first visit of incomplete RORA and complete RORA to quantify progression

Results: Final cohort included 99 eyes: 20 monthly, 40 TREX and 39 control fellow eyes. Mean ERORA over 36 months was 0.3 $\pm$1.23, 0.75 $\pm$ 2.37 and 0.76 $\pm$ 2.41 mm^2 respectively ($p = 0.61$). Mean ERORA per group among the 18% (n = 18) of baseline patients with complete RORA was 0.71, 1.31 $\pm$ 1.45, and 3.12 $\pm$ 6.13 mm^2, ($p = 0.76$). Incidence rate of incomplete RORA in the three groups was 20%, 20% and 12.8%.

Conclusion: Ranibizumab did not play a statistically significant role in new formation of complete RORA lesions in eyes with neovascular AMD, whether monthly or per TREX protocol

RETINA

Effect of treatment cost on persistence and adherence of anti-vascular endothelial growth factor treatment for diabetic macular oedema

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Purpose: Anti-vascular endothelial growth factor treatment for diabetic macular oedema (DMO) involves multiple injections at regular intervals until the oedema is resolved. Treatment regime requires numerous clinic visits and is a burden on patients and carers. Factors related to treatment non-adherence are known to be multifactorial. The aim of this study was to investigate the effect of out-of-pocket cost of treatment with regards to persistence/adherence and document patients' stated reasons for non-persistence/adherence.
Method: Retrospective single-center retrospective observational study of patients undertaking anti-vascular endothelial growth factor injections for DMO from the period of 1 January 2020 to 30 July 2021.
Results: Seventy-nine eyes of 53 patients were included in this study. Fifty-six eyes (70.9%) persisted with treatment. The most common reason for non-persistence was loss to follow up and in the case of seven eyes, the patients made a choice to have a break from the prescribed treatment protocol. Only 39 eyes (29.7%) had persisted with treatment by 12 months. Common reasons for non-persistence were issues with living too far from the treating clinic or patients not being contactable after not returning for follow up.
Conclusion: Patient adherence to intravitreal injections in DMO is a significant determinant of clinical outcomes. The determination of adherence rates and reasons for non-attendance is crucial for health care professionals to identify patients who are at an increased risk of treatment non-adherence. This study provides some insight, however further research in this area is warranted.

Exploring the correlation between age, gender, ethnicity and diabetic retinopathy severity in Fiji

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Purpose: To investigate the association between age, gender, ethnicity and severity of diabetic retinopathy (DR) in Fiji.
Method: Cross-sectional analytical study was done using electronic medical records from the Diabetes Eye Clinic at the Pacific Eye Institute in Fiji. Individual eyes of newly diagnosed DR patients were analysed between 2018 and 2022. Exposure group was categorised by age (40 years), gender, and ethnicity. Outcome (DR severity) was classified as sight-threatening or non-sight-threatening according to the Pacific DR guidelines. The chi-square test was used to examine the association between the exposure and outcomes.
Results: The study included 2,988 newly diagnosed diabetic eyes among which 31.1% had sight-threatening DR. Majority of DR cases (93.8%) were in the > 40 age group, and Fijian-Indians were more affected (59.2%) than Indigenous Fijians (33.8%). The proportion of DR was higher in females than in males (1.5). The chi-square test showed that young age ($p = 0.041$) and male gender ($p = 0.001$) were significantly associated with a higher likelihood of developing sight-threatening DR.
Conclusion: This novel study in Fiji shows that DR is more prevalent among middle-aged and older individuals, females, and the Fijian-Indian ethnic group in Fiji with more severe disease in young population and male gender. Though the study does not establish temporal causation, it highlights the importance of early detection and prevention of diabetes and DR, particularly in high-risk groups. Further research is needed to identify the underlying causes of severe DR and inform effective prevention and management strategies.

Brolucizumab for neovascular age-related macular degeneration in treatment non-naive patients from the Fight Retinal Blindness! Registry

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Purpose: This study reports 12 month outcomes of neovascular age-related macular degeneration (nAMD) in

eyes switched to brolucizumab in routine clinical practice.

Method: Retrospective analysis of data from the prospectively designed observational Fight Retinal Blindness! registry. Eyes that switched to brolucizumab with at least 12 months of follow-up after the first brolucizumab injection were included. Only patients with at least two injections of brolucizumab were analysed.

Results: We identified 79 eyes that were switched to brolucizumab and had at least 12 months of follow-up after the first brolucizumab injection. Of this group, 66 had received at least two injections of brolucizumab. Disease quiescence was achieved in over a third of participants (from 5% to 39%; $p < 0.001$). There was a trend for slight improvement in mean (95% confidence interval) visual acuity of 1.7 (-1, 4.3) letters, however this was not statistically significant, $p = 0.222$. Median treatment intervals were extended from 45 days to 63 days ($p < 0.001$). Nearly a quarter (24%) of eyes were switched away from brolucizumab at 12 months. There were eight cases of intraocular inflammation recorded.

Conclusion: Switching to brolucizumab resulted in a substantial reduction in the proportion of lesions that were active on treatment and a significant extension of the mean injection interval.

Faricimab: Robust anatomical control and visual outcomes with up to every 16 weeks dosing in neovascular age-related macular degeneration patients

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Purpose: Year 2 data from the phase 3 TENAYA/LUCERNE (NCT03823287/NCT03823300) trials demonstrated that faricimab, a dual Ang-2/vascular endothelial growth factor-A inhibitor, maintained anatomical and functional outcomes with fewer injections versus aflibercept in neovascular age-related macular degeneration patients. The purpose of this analysis was to evaluate patient-level imaging biomarkers and visual outcomes in neovascular age-related macular degeneration patients.

Method: TENAYA/LUCERNE were double-masked, active comparator–controlled, 112-week trials. Treatment-naïve patients (pooled N = 1329) were randomised 1:1 to faricimab 6.0 mg up to Q16W (n = 665) based on protocol-defined disease activity criteria, with fixed up to Q16W dosing in the first year and a personalised treat and extend regimen in the second, or aflibercept 2.0 mg Q8W (n = 664).

Results: Mean change in best corrected visual acuity and central subfield thickness (averaged over weeks 104–112) were: faricimab, 4.4 letters and −148.4 μm; aflibercept, 4.3 letters and −144.0 μm, respectively. In patients with intra-retinal fluid and/or sub-retinal fluid at baseline, first absence of intra-retinal fluid and sub-retinal fluid was achieved faster and with fewer injections with faricimab versus aflibercept (75th percentile: week 8 vs. week 12; corresponding median number of injections: 2 vs. 3). Faricimab-treated patients received fewer injections than aflibercept-treated patients overall (week 108 median: 10 vs. 15). At week 112, > 60% of faricimab-treated patients achieved Q16W dosing and 77.8% achieved ≥ Q12W dosing. Faricimab was well tolerated, with a safety profile comparable to aflibercept.

Conclusion: Dual inhibition of Ang-2 and vascular endothelial growth factor-A with faricimab resulted in robust anatomical control and visual outcomes, with more patients achieving Q16W dosing in year 2 of TENAYA/LUCERNE.

Assessment of pegcetacoplan treatment on geographic atrophy progression in the phase 3 OAKS and DERBY Trials

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Purpose: To assess the efficacy of pegcetacoplan in patients with geographic atrophy (GA) from pooled subgroup analyses of the phase 3, randomised, double-masked, sham-controlled OAKS (NCT03525600) and DERBY (NCT03525613) trials.

Methods: Patients (N = 1258) ≥ 60 years of age with best-corrected visual acuity ≥ 24 ETDRS letters, GA area of 2.5–17.5 mm^2, and nonsubfoveal or subfoveal lesions were included. Primary endpoint at month 12 was change from baseline in total GA lesion area by fundus autofluorescence. Patient subgroups were based on baseline demographics (age, sex) and clinical characteristics (best-corrected visual acuity, GA lesion location, focality, laterality).

Results: At month 24, GA lesion growth across subgroups in the sham arms was comparable with natural history studies. Change from baseline in GA lesion growth at month 24 consistently favored pegcetacoplan monthly (PM) and pegcetacoplan every other month (PEOM) versus sham across subgroups, including those with nonsubfoveal (PM 26%, $p < 0.0001$; PEOM 22%, $p < 0.0001$), subfoveal (PM 19%, $p < 0.0001$; PEOM 16%, $p = 0.0003$), unifocal (PM 26%, $p < 0.0001$; PEOM 21%, $p = 0.0007$) and multifocal lesions (PM 20%, $p < 0.0001$; PEOM 17%, $p < 0.0001$). In a post hoc analysis of patients with GA lesions further from foveal center (≥ 250 μm), pegcetacoplan slowed vision loss (5.6 fewer ETDRS letters lost) and preserved quality of life (4.1 points higher for visual function questionnaire]-25 composite change from baseline) versus sham over 24 months.
Conclusion: These findings support the consistent efficacy of PM and PEOM across patient subgroups. Furthermore, reduced lesion growth with pegcetacoplan treatment is associated with preserved visual function and quality of life in patients with lesions ≥250 μm away from foveal center.

Intravitreal expansile gas kinetics in pneumatic retinopexy for rhegmatogenous retinal detachment

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Purpose: To study the behaviour of expansile intravitreal gases and air used in treating rhegmatogenous retinal detachment.
Methods: A validated mathematical model in human eyes was used to simulate the effect of varying volume of pure air, SF6, C2F6 and C3F8 injected into the vitreous cavity. Three different vitreous cavity volumes (4.7 ml, 6.7 ml, 8.7 ml) were used to represent hypermetropic, emmetropic and myopic eyes.
Results: The time course of varying volumes of pure air and fluorinated gases injected into vitreous cavity were tabulated, with parameters including volume of gas, percentage gas fills and retinal contact angles. Duration to achieve maximum size and the corresponding increase in size are 14 hours (x2.5 initial volume) for SF6, 1.5-2 days (x3.5 initial volume) for C2F6, and 2.5-4 days (x4 initial volume) for C3F8 respectively. There were notable differences in percentage fill and total duration of bubbles regarding gas expansion in different sized eyes, but no differences in absolute sizes and expansion time were observed. For example, 0.6ml of SF6 would expand to a maximum of 32% fill and lasts for 12 days in a 4.7ml eye, compared to maximum of 17% fill and lasts for 11 days in a larger 8.7ml eye. Mean total duration of air, SF6, C2F6, C3F8 in a 6.7ml eye were approximately 5.5 days, 9.5 days, 20.3 days and 34.3 days, respectively.
Conclusion: A comprehensive compilation of expansile gas kinetics was produced to facilitate appropriate selection of gas and volume use in rhegmatogenous retinal detachment surgery by surgeons according to individual patient needs.

Interpericyte tunneling nanotube complexity in the retina

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Purpose: Neurovascular coupling (NVC) is the dynamic process in which retinal blood flow is preferentially diverted to metabolically active neurons. While communication between neurons and blood vessels is key to NVC, the precise mechanism through which this coupling is achieved remains unclear. Recently, we have identified inter-pericyte tunneling nanotubes (IPTNT), thin tubes that connect the pericytes of distal capillaries and facilitate coordinated blood distribution[1]. Much remains unknown about IPTNTs including their complexity and organisation. Characterisation of IPTNTs will improve our understanding of NVC. Furthermore, models of glaucoma and retinal ischemia induce IPTNT rupture and neurovascular dysfunction. A greater understanding of IPTNTs may reveal new avenues of therapeutic intervention.
Method: Explanted mouse retinas were labelled with antibodies specific to IPTNTs/vessels (anti-lama2) and neurons (anti-Brn3a). Unbiased stereology was used to quantify IPTNT density and IPTNT branch points/complexity in the superficial, intermediate and deep retinal vascular plexus.

Results: The intermediate and deep plexus have a significantly higher IPTNT density than does the superficial plexus (superficial: 24.5±1.7 IPTNT/mm^2; intermediate: 87.8±5.1 IPTNT/mm2; deep: 114.9±7.2 IPTNT/mm^2; N = 5 mice, two-tailed ANOVA Tukey's t-test $p < 0.0001$). Furthermore, IPTNT complexity is greater in the deep plexus than in the superficial and intermediate plexus, which coincides with higher neuronal density (superficial: 4.3±0.6 branch point/mm^2; intermediate: 20.6±2.5 branch point/mm^2; deep: 59.6±8.5 branch point/mm^2; N = 5 mice, two-tailed analysis of variance Tukey's t-test $p < 0.001$).

Conclusion: Our findings show a direct relationship between IPTNT complexity and neuronal density, consistent with the hypothesis that IPTNTs play a central role in retinal NVC.

Reference

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Use of Faricimab in the real-world clinical practice for non-treatment naive neovascular age-related macular degeneration patients

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Purpose: The novel vascular endothelial growth factor-A (VEGF) and angiopoietin-2 bispecific antibody inhibitor Faricimab was recently approved in Australia for the treatment of neovascular age-related macular degeneration (nAMD). TENAYA and LUCERNE demonstrated non-inferiority to aflibercept with the potential to reduce injection burden in treatment naïve nAMD patients. Here, we report on whether intravitreal injection intervals of non-treatment naïve nAMD patients can be extended after switch to Faricimab in the real-world clinical practice.

Method: Cohort study of nAMD patients, who were treated for at least six months before and after switch to Faricimab, were identified from a regional ophthalmic practice's medical records. Injection interval six months post-Faricimab switch will be compared to six months pre-switch.

Results: Eighty-five eyes (46 left, 54%) of 66 patients (46 female, 70%) were included. At the time of switch, mean age was 80.4 years (SD 7.5) and 49 (58%) eyes demonstrated active disease on optical coherence tomography. Baseline median visual acuity (VA) was 6/9 (interquartile range [IQR] 6/6-6/18), similar to six months pre-switch (median VA 6/9, IQR 6/6-6/12). Median injection interval was six weeks (IQR 4.9-6.9) at switch, similar to six months prior (median six weeks, IQR 5-7). Before switch to Faricimab, median duration of intravitreal therapy was 47 months (IQR 24-80) and most eyes (N = 40, 47%) received two different anti-VEGF drugs.

Conclusion: Preliminary data suggests a relatively high treatment burden in nAMD patients despite years of anti-VEGF injections on multiple agents. This study will present VA and treatment interval six months post-switch to Faricimab in nAMD patients in real-world practice.

Saving clinician's time using the Fight Retinal Blindness! registry with a modern interoperable 'SMART on FHIR' approach

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Purpose: To reduce data entry duplication for the Fight Retinal Blindness! (FRB!) registry through an integrated Substitutable Medical Applications and Reusable Technologies (SMART) on Fast Health Interoperability Resources (FHIR) electronic health record (EHR) application.

Methods: The FRB! age-related macular degeneration (AMD) module interface was enhanced with 'SMART on FHIR' capabilities. Enabling this was the bidirectional mapping of data fields to and from a popular ophthalmic EHR and the existing web-based FRB! portal. Data flow was facilitated through an intermediary FHIR server.

Results: Each of the 28 AMD module fields were mapped to and from the EHR. Wherever feasible, data populated structured fields or otherwise was documented automatically as free text. All FHIR-based implementation was validated against the international ophthalmology implementation guide or base specification as necessary. In addition to EHR write back functionality, this solution also (i) maintains legacy data flows into the

registry and (ii) enables data migration to cloud destinations to facilitate additional data-linkages. This process identified 22 conceptual gaps in the Australian extension of the Systematised Medical Nomenclature for Medicine–Clinical Terminology which could not sufficiently capture the AMD module's clinical concepts, resulting in updated terminology recommendations.
Conclusion: This 'SMART on FHIR' approach enables a scalable platform-agnostic system to minimise data entry duplication for clinicians contributing to the FRB! registry. The system architecture holds potential for improved efficiency by increasing health data connectivity through an 'enter once use everywhere' design paradigm.

Effects of slit lamp-delivered retinal laser photobiomodulation in a rat model of choroidal neovascularisation

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Purpose: Photobiomodulation targets mitochondria and has the potential to modulate the up-stream hypoxic and pro-inflammatory drivers of choroidal neovascularisation. We investigated the effect of laser photobiomodulation on choroidal neovascular membrane size and leakage in a rodent model.
Methods: Choroidal neovascularisation was induced using a 532 nm fd Nd:YAG laser. Rats received either 32 mW/cm^2 of 670 nm photobiomodulation or sham treatment for 90 seconds every three days from six days prior to 12 days after induction of choroidal neovascularisation. Fluorescein angiography and optical coherence tomography was performed at seven and 14 days after induction for analysis of choroidal neovascularisation size and permeability. Eyes were harvested and processed for retinal flatmount immunohistochemistry of endothelial marker, isolectin-B4 for secondary analysis of membrane size. Some eyes were harvested at day 3 and a 5 mm punch of the retina was used to measure vascular endothelial growth factor levels with an enzyme-linked immunosorbent assay.
Results: Photobiomodulation-treated eyes had significantly reduced isolectin-B4 staining, smaller lesion volume on optical coherence tomography, and stabilisation of capillary leakage on fluorescein angiography from day 7-14 compared to sham-treated rats. There was no significant difference in vascular endothelial growth factor levels.
Conclusions: Laser photobiomodulation promoted regression and normalisation of vascular barrier function in this rat model of laser-induced choroidal neovascularisation. This was not associated with lower vascular endothelial growth factor levels, suggesting an alternative mechanism. Further translational research could target clinical choroidal neovascularisation and assess the effect of retinal photobiomodulation as an adjunctive therapy combined with routine intravitreal anti-vascular endothelial growth factor therapy.

Survey to understand the imaging devices and electronic medical records used by Australian Fight Retinal Blindness! users

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Purpose: To understand what imaging devices and electronic medical record (EMR) systems are being used by clinicians in the Fight Retinal Blindness! (FRB!) registry to help inform future image-linkage projects.
Method: All Australian FRB! registry users were anonymously surveyed using a structured Google form.
Results: Out of 55 active Australian users in the FRB! registry, 25 (46%) responded to the survey. Clinicians either used Zeiss Cirrus (52%) or Heidelberg Spectralis (48%) models as their primary optical coherence tomography (OCT) device. OCT angiography was available in 60% of practices. Fundus fluorescein angiography was available in 96% of practices, while indocyanine green angiography was only available in 48% of practices. Wide-field colour fundus photography was available in 68% of practices, and Optos models were the preferred choice (71%), followed by Zeiss Clarus 700 (24%). The vast majority of users (84%) do not have microperimetry at their practice. The survey showed that most users (96%) had an EMR system with 38% of respondents using Best Practice, followed by Zedmed (29%) and Genie (21%).
Conclusion: This survey demonstrated that clinicians use either Zeiss Cirrus or Heidelberg Spectralis models as their primary OCT device. Optos was the leading choice for wide-field colour fundus photography. While most users had an EMR, there is considerable variation in choice of vendor. These findings will inform future FRB! image-linkage projects, particularly as we aim to track macular atrophy treatment outcomes.

Outcome of anti-vascular endothelial growth factor treatment for diabetic macular oedema during the COVID pandemic (Withdrawn)

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Purpose: The management of diabetic macular oedema (DMO) is based on strict time-specific follow-up with the assessment of patient's visual acuity and retinal thickness to guide treatment. During the COVID pandemic ophthalmic services worldwide were severely hampered. The aim of the audit was to ascertain the impact of the pandemic on the management, follow-up and ensuing outcomes of newly recruited DMO patients for anti-vascular endothelial growth factor (VEGF) treatment.
Method: A retrospective study, assessing patients who were referred for anti-VEGF injections from March 2019 to March 2021 was undertaken. A sample size of 100 patients was selected. Primary outcome of mean follow up was measured, in addition secondary outcomes of visual acuity, mean change in central macular thickness were also assessed. Nice guidance on anti-VEGF treatment, (12-monthly follow ups with first three injections at four week intervals) along with guidance on diabetic macular oedema published by the *British Medical Journal* were used as standards.
Result: It was found that on average the patients were followed up at 4.2 weekly intervals with a mean change in visual acuity of +8.5 letters and mean reduction in fluid of 104.3 microns over approximately 12 months from first injection.
Conclusion: Outcome of patients with DMO are heavily reliant on time based management. Delays during the pandemic could have had a significant impact on visual outcomes for the patient. It is essential to study the effects to improve services in the future as well as to identify potential adherence issues during the pandemic.

Diabetic retinopathy in patients referred to a tertiary referral hospital, an experience from Iran

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Purpose: Diabetic retinopathy (DR) is a main ocular complication of diabetes mellitus (DM) that could cause irreversible visual impairment if left untreated. Screening for DR can reduce blindness by timely detection and proper treatment. We aimed to evaluate the prevalence of DR in asymptomatic patients with DM.
Method: This descriptive cross-sectional study was performed in a 12-month period on patients with DM who were referred to Meybod Imam Sadegh Diabetes Center, Yazd, Iran and those with no ocular symptoms were included. Demographic data and duration of DM were recorded. All participants underwent a dilated fundus examination using an indirect ophthalmoscope with auxiliary lenses. In certain circumstances a detailed macular examination was performed under slit-lamp with a + 78 D non-contact fundus lens. Examination results and other relevant data were recorded and analysed.
Result: Of the 152 screened patients, 38 (25%) were male and 114 (75%) were female. The median and range of age of patients, diabetic duration, fasting blood sugar, cholesterol level, triglyceride level, systolic blood pressure and diastolic blood pressure were 53.2 (34 to 72) years, 6.2 (1 to 30) years, 289 (69 to 480) mg/dL, 215 (93 to 490) mg/dL, 238 (66 to 1303) mg/dL, 140 (120 to 170) mmHg, and 80 (70 to 100) mmHg. Overall, the frequency of DR was 11% (17).
Conclusion: DR was found in 11% of patients with known DM but without ocular complains. This indicates importance of screening programs for early detecting DR that could significantly decrease the complications of DR.

Switching patients requiring high frequency anti-vascular endothelial growth factor injections to faricimab

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Purpose: Landmark studies characterised faricimab efficacy in treatment naïve patients, but outcomes in those switched from other anti-vascular endothelial growth factor therapies are lacking. We reviewed patients switched to faricimab who previously had a partial response or required high frequency anti-vascular endothelial growth factor injections for neovascular age-related macular degeneration and diabetic macular oedema.
Method: Retrospective study, Oxford Eye Hospital.

Results: Seventy-three patients (91 eyes) were treated with faricimab (190 injections). Neovascular age-related macular degeneration: 44 patients (52 eyes) were treated. Prior to switch, a mean of 27 ± 18 injections were given/eye (ranibizumab/aflibercept/brolucizumab). Visual acuity per treated eye was 64 ± 15 ETDRS letters at baseline, and 63 ± 16 after follow-up of 68 ± 24 days, with a mean of 2.0 injections/eye (total 103 injections). Optical coherence tomography data available for 35 eyes showed central subfield thickness (CST) reduced from 323.6 ±116.3mm at baseline to 284.3 ± 100.7mm after follow-up ($p = 0.009$). CST reduction was noted in 31/35 eyes. Diabetic macular oedema: 29 patients (39 eyes) were treated. Prior to switch, a mean of 22 ± 11 injections were given/eye (ranibizumab/aflibercept). Visual acuity per treated eye was 72 ± 12 ETDRS letters at time of switch and 73 ± 12 after follow-up of 69 ± 25 days with a mean of 2.2 injections/eye (total 87 injections). Optical coherence tomography data available for 19 eyes showed CST reduced from 345.0 ± 92.5mm at baseline to 325.2 ± 84.4 mm after follow-up ($p = 0.017$). CST reduction was noted in 12/18 eyes. No significant adverse events occurred.

Conclusion: Initial injections of faricimab maintained vision and resulted in some CST reduction in the majority of eyes. Follow up is ongoing to evaluate real-world outcomes in this group of difficult to treat patients.

An audit of ocular follow-ups received by patients on iron chelation therapy

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Purpose: This is an audit of the ocular follow-up and complications in patients on iron chelation therapy at a large tertiary hospital.

Method: Haemoglobinopathy patients on iron chelation treatment at the Royal Prince Alfred Hospital who have received eye clinic follow-up were included (n = 43). Additionally, abnormal ocular findings were analysed. Paper and electronic medical records were used for the audit.

Result: Commonly utilised investigations in clinic included optical coherence tomography (60%), Humphrey visual fields analysis (56%), Ishihara testing (46.5%) and fundus photography (18%). The most common abnormal examination findings were pigment changes (scars, hyper- or hypopigmentation) in the retina (23%). Only two patients displayed acute retinal toxicity attributed to iron chelation therapy. Although the recommendation from the haematology and ophthalmology teams were for yearly follow-ups, this was often not possible due to non-compliance and the COVID-19 pandemic.

Conclusion: It is well-established that iron chelation therapy may result in ocular complications. While the incidence of ocular toxicity is relatively low in this cohort of patients, it is nonetheless a serious side effect of iron chelation that needs regular follow-up. As there is no set gold standard for the investigations to be undertaken in ocular screening of patients on iron chelation, a purpose of the audit was to suggest appropriate modalities of visual assessment to identify ocular complications. This could pave way for the creation of a virtual clinic, which would help to reduce the overall burden on busy outpatient clinics or circumvent clinic restrictions in future pandemics.

Macular thickness in healthy eyes using Cirrus high-definition optical coherence tomography

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Purpose: We aimed to determine normal macular thickness using Cirrus high-definition optical coherence tomography.

Method: In this study, 112 subjects were selected using random sampling. All subjects underwent complete eye examinations. Both eyes of each patient were evaluated. The creation of a macular thickness map using a macular cube 512 × 128 combo was optional. The average retina thickness was determined in nine regions. To assess reproducibility and system reliability, the thickness of the retina was measured up to five times in 10 healthy subjects.

Result: The coefficient of variation of macular thickness within 1 mm of the center was 0.15 to 1.33%. The means and standard deviations of central subfield thickness, macular thickness (MT) and macular volume were 245.44 ± 20.39 μm, 277.9 ± 12.0 μm and 9.98 ± 0.43 mm^3, respectively. The mean central subfield thickness ($p < 0.0001$), MT ($p = 0.038$), and macular volume ($p = 0.030$) were significantly higher in men. In addition, regardless of age or sex, macular thickness increased when moving from within 1 mm of the center to 3 mm and 6 mm away from the center, so that the upper 3 mm (S3) was the thickest region, and the temporal 6 mm (T6) was the thinnest region in the ETDRS regions. The mean MT of healthy subjects was 280.67 ± 12.79 μm in men and 276.63 ± 11.61 μm in women.

Conclusion: We found a thicker macular thickness in healthy men than in women. Macular thickness has regional differences.

Intravitreal methotrexate in resistant diabetic macular oedema

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Purpose: We aimed to evaluate the effect of intravitreal injection of methotrexate in managing resistant diabetic macular oedema (DMO).
Method: This study was conducted on cases with a definite diagnosis of diabetes who had resistant DMO. Thirty-three eyes with resistant DMO who did not respond to three consecutive injections of Avastin plus one combined injection of Avastin-triamcinolone at an interval of 4 to 6 weeks or to three consecutive injections of Avastin with a single laser treatment were included in the study. Patients were subjected to complete eye examinations and macular optical coherence tomography. Then, each eye underwent methotrexate injection. The cases were followed up in one, three and six months after the injection.
Result: Visual acuity, macular thickness and intraocular pressure in diabetic patients did not show statistically significant differences ($p > 0.05$) in the times before injection, the first month, the third month and the sixth month. Central subfield thickness (CST) before injection, at one, three and six months' post-injection showed a statistically significant difference ($p = 0.014$). The frequency distribution of gender did not a significant difference in terms of changes in best corrected visual acuity, macular thickness, CST, and intraocular pressure ($p < 0.05$). The comparison of CST between the time points showed a significant difference between pre-treatment CST and CST of the sixth month, and this reduction was found to be statistically significant ($p = 0.008$).
Conclusion: According to the presented results, intravitreal injection of methotrexate was not effective in the treatment of resistant macular oedema caused by diabetes.

Refractive errors in infants treated for retinopathy of prematurity with laser versus anti-vascular endothelial growth factor agents

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Purpose: We investigated the association of pretreatment refraction and the refractive error changes in treatment requiring premature infants with retinopathy of prematurity.
Method: Out of 360 eyes of 181 treatment-requiring premature infants, 165 eyes received laser therapy, 195 eyes received an anti-vascular endothelial growth factor (VEGF) intravitreal injection.
Result: Mean gestational age and birth weight (BW) were 29 ± 2 weeks and 1241 ± 403 grams, respectively. Male to female ratio was 107 (59.1%) / 74 (40.9%); 47 (56.6%) / 36 (43.4%) received anti-VEGF therapy and 60 (61.2%) / 38 (38.8%) underwent laser treatment. In the pretreatment assessment, 30 (8.33%) eyes were emmetropic, 112 (31.11%) eyes were myopic and 218 (60.56%) eyes were hyperopic. In the anti-VEGF group, 15 (9.09%) eyes were emmetropic, 63 (38.18%) were myopic eyes and 87 (52.73%) were hyperopic eyes. In the laser therapy group 15 (7.69%) eyes were emmetropic, 49 (25.13%) eyes were myopic and 131 (67.18%) eyes were hyperopic. Changes in the spherical equivalent at 6 months' post-treatment in both treatment groups was significant in the BW group 1501–2000 grams) (both $p < 0.05$). Change in the sphere or spherical equivalent refraction measurements in the laser treatment group was more myopic than in the Anti-VEGF group and was less hyperopic or more myopic compared to the pre-treatment.
Conclusions: The refractive error changes in treatment requiring premature infants at six months' post-laser or anti-VEGF therapy was associated with pre-treatment refraction and BW, but not gestational age. Male sex and anti-VEGF treatment were significantly associated with the incidence of anisometropia at six months' post-treatment follow-up.

Validation of portable hand-held fundoscopy against ultrawide and standard retinal photography in retinal pathology

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Purpose: Retinal photography is a complementary diagnostic tool to easily visualise, document and manage

ocular disease. Recent technological advancements have increased the quality of images produced, but equipment can be bulky and require specialised training for optimal images. Handheld fundus cameras are cost-effective, portable devices which can be used by non-specialists.

Methods: Patients with active retinal pathology who presented to a private ophthalmology clinic had sequential retinal imaging performed under mydriasis using the Zeiss Visuscout 100, Optos California P200DTX and Canon CR-2 Plus AF. The diagnostic ability of single on-axis photographs from each device was examined by an ophthalmic registrar and compared to the clinical examination by a consultant ophthalmologist using a combination of multimodal imaging and indirect ophthalmoscopy.

Results: Thirty-eight eyes from 35 patients with a mean age of 66.4±15.6 were included into this study. Conditions were categorised into pathology of the retina (42.1%), macula (26.3%), vitreous (18.4%), optic disc (7.8%) and lens (5.2%). Thirteen patients (34%) presented with an acute ophthalmic condition requiring emergency intervention. The percent agreement of each imaging modality was compared to the ophthalmic clinical examination and described as follows: Zeiss (62.2%), Canon (81.2%) and Optos (97.4%). Of note, the Zeiss handheld camera was able to identify 100% of retinal detachments.

Conclusion: The Zeiss Visuscout 100 identified acute retinal photography on a level comparable to modern imaging modalities including gold-standard colour fundus imaging. Handheld retinal photography devices may be utilised as a screening tool in non-specialist settings following adequate imaging.

Baseline characteristics and three-month data from patients receiving Faricimab or Port Delivery System for neovascular age-related macular degeneration or diabetic macular oedema in the real-world VOYAGER Study

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Purpose: Vision outcomes with anti–vascular endothelial growth factor agents are often poorer in clinical practice than in clinical trials. The VOYAGER (NCT05476926) study will gather long-term clinical data among patients receiving faricimab or the Port Delivery System with ranibizumab (PDS) for neovascular age-related macular degeneration (nAMD) or diabetic macular oedema in routine clinical practice globally.

Methods: VOYAGER is a prospective, observational, multicentre study that will include at least 5,000 patients who are receiving faricimab or the PDS for their approved indications across 500 sites/31 countries. Patients will be observed for up to five years. The primary outcome is visual acuity (VA) change from baseline at month 12 per eye, by indication and per product. Key secondary outcomes will determine how real-world treatment regimens, treatment patterns and tolerance to fluid correlate with VA change over time. The effectiveness of faricimab or the PDS on neovascular age-related macular degeneration- and diabetic macular oedema-pre-specific disease features and their correlation with VA will also be evaluated. Safety outcomes include the incidence, severity, duration and outcome of ocular and non-ocular adverse events.

Results: Enrolment began, in the US and Japan, 21 November 2022. As of 28 February 2023, 94 patients have been enrolled. Data from baseline and three-month analysis time points, including patient and lesion characteristics, will be reported.

Conclusion: By collecting long-term real-world clinical data in patients treated with faricimab or the PDS for their approved indication(s), VOYAGER will generate new insights into treatment patterns, factors driving treatment decisions, VA outcomes and safety on global and regional levels.

Perspectives of carriers of inherited retinal diseases on genetic testing, genetic counselling, and gene therapy: A global survey

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Purpose: Female carriers of X-linked inherited retinal diseases (IRDs) are burdened with the possibility of passing their disease-causing gene to future generations, as well as exhibiting signs of retinal disease themselves. This study aimed to investigate carriers' experiences of genetic testing, emotions relating to having affected children, and knowledge regarding genetic testing and gene therapy.
Method: An online survey was advertised to self-identified carriers worldwide by appropriate support groups and associations, clinicians, and social media.
Results: Two hundred and twenty-seven carriers completed the survey with mean age of 51 years (SD ± 15.0). The majority of respondents resided in the United States of America (51%), Australia (19%), and United Kingdom (14%). Respondents agreed that their eyecare provider and general practitioner helped them understand their condition (63%), however, few carriers reported receiving psychological counselling (9%) or family planning advice (5%). Most carriers identified with feelings of guilt (70%), concern (91%), and anxiety (88%) for their child. Additionally, over half of the respondents (52%) also reported feeling anxious about their own vision. Respondents showed significant interest in treatment options, with most respondents (78%) agreeing that gene therapy should be available to carriers of IRDs.
Conclusion: This study emphasises the importance of providing appropriate counselling to female carriers and illustrates the motivation of some to participate in emerging treatment options, such as gene therapy.

Diabetic screening via teleophthalmology at Lions Outback Vision: A retrospective audit for 2022

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Purpose: The primary aims of the study was to determine the number of screening episodes of care provided by the screening program in Western Australia.
Methods: Participants include individuals with diabetes mellitus who underwent screening as a part of the annual diabetic screening program. Retrospective data is collated over one year period (1 January 2022 to 31 December 2022) for Indigenous and non-Indigenous Australians with diabetes mellitus.
Results: Of the total 546 screening episodes of care, which included 'store-and-forward' grading service and real-time videoconference, 160 (29.3%) presented with diabetic retinopathy (DR). Of these, 92 (57.5%) had mild, 40 (25%) moderate, 12 (7.5%) severe, 16 (10%) proliferative DR and 45 (28.1%) diabetic macular oedema. In a metropolitan Aboriginal Medical Service (AMS), 34 (23.4%) Indigenous patients had DR detected of the 145 assessable images. The highest rates of DR were seen in the Kimberley region, with 61 (38.1%), followed by metropolitan AMS and Goldfield.
Conclusion: Diabetic screening by telehealth for regional areas of Western Australia and AMS remains an important component of access in towns with limited eye health workforce.

Basal linear deposit: Part of normal physiological ageing or a disease defining pathological lesion of age-related macular degeneration?

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Purpose: Continuous basal laminar deposit (BLamD) is the defining histopathological lesion of age-related macular degeneration, with patchy BLamD being seen in normal aged eyes. Basal linear deposit (BLinD) is always present in eyes with age-related macular degeneration and is a precursor for soft drusen. We investigated whether BLinD can be found independently to continuous BLamD.

Method: Transmission electron microscopy images of resin-embedded macula retinal specimens from clinically and histologically validated normal aged eyes (Sarks Archive; Group II) were examined. Lipid vesicles external to the macular retinal pigment epithelium (RPE) basement membrane were defined as BLinD and quantified as follows: (i) no continuous layer; (ii) continuous layer less than the thickness of RPE basement membrane (BM) (0.3 um); (iii) 0.3 to 0.9 um (1-3x BM); (iv) 0.9 um to 1.5 um (3-5x BM); (iv) >1.5 um (>5x BM).
Results: Fifteen eyes (mean age = 74 years, 87% male) were included. Macular sections were confirmed as being from normal aged eyes by the presence of patchy BLamD on either light microscopy and/or semithin resin sections. BLinD was inferred by the presence of a linear separation of RPE from Bruch's membrane on light microscopy and in semithin sections in six eyes (40%). BLinD was found in transmission electron microscopy images from 13/15 eyes (87%).
Conclusion: BLinD of varying thickness was seen in the macula of normal ageing eyes suggesting that a continuum of lipid accumulation occurs within Bruch's membrane over time. This may reach a pathological threshold when BLamD becomes continuous, with consequences for macula disease

Intravitreal Aflibercept 8 mg in patients with polypoidal choroidal vasculopathy: PULSAR subgroup analysis

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Purpose: To assess efficacy of intravitreal aflibercept in patients with treatment-naïve neovascular age-related macular degeneration and polypoidal choroidal vasculopathy (PCV) in a post-hoc subgroup analysis.
Methods: In the ongoing, double-masked PULSAR trial (NCT04423718), patients were randomised 1:1:1 to receive aflibercept 8 mg every 12 or 16 weeks (8q12, 8q16) vs. 2 mg every 8 weeks (2q8) after three initial monthly injections. PCV was confirmed on optional indocyanine green angiography by the central reading center undertaken in 297 patients.
Results: PCV was present in 141 (47.5%) patients (2q8: n = 54; 8q12: n = 45; 8q16: n = 42). For these 141 PCV patients, observed mean ± SD best corrected visual acuity change from baseline at W48 was; 8q12: 9.3 ± 13.2 (baseline 56.7 ± 13.4); 8q16: 8.5 ± 7.8 (baseline 60.1 ± 11.3); and 2q8: 9.5 ± 11.7 (baseline 57.6 ± 15.4) ETDRS letters. Central subfield intra-retinal fluid/sub-retinal fluid was absent in 68% of patients in the pooled 8 mg group and 63% in 2q8 at W16. More than 85% of PCV patients on 8q12 or 8q16 maintained these extended injection intervals. No new safety signals were identified.
Conclusion: In PCV patients, aflibercept 8 mg provides similarly robust improvements in best corrected visual acuity and fluid resolution as observed at W48 in the overall cohort.

Baseline characteristics in patients maintaining q12 and q16 dosing vs. those with shortened dosing intervals – Phase3 PULSAR trial

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Purpose: To compare baseline characteristics of patients maintained on their original randomised dosing regimens versus those who had shortened intervals according to prespecified dose regimen modification criteria.
Methods: PULSAR (NCT04423718) is an ongoing, double-masked, 96-week trial: Patients with treatment-naïve neovascular age-related macular degeneration were randomised 1:1:1 to receive aflibercept 8 mg every 12 (8q12) or 16 (8q16) week vs. 2 mg every 8 week (2q8), each after three monthly injections.
Results: The primary endpoint (week 48 best-corrected visual acuity change from baseline) was met with aflibercept 8q12 vs. 2q8 and 8q16 vs. 2q8 (non-inferiority margin at 4 letters). Mean ± SD baseline best corrected visual acuity was 59.4 ± 13.7 letters in those who were maintained on 8q12 (n = 251/361), 60.8 ± 12.0 letters maintained on 8q16 (n = 239/312), and 59.6 ± 13.9 letters in those who shortened to q8 dosing from either 8q12 or 8q16 (n = 105) at week 48.
Conclusions: The baseline characteristics were similar in those who maintained 8q12 or 8q16 dosing and those who had shortened dosing intervals. The need for treatment intervals shorter than q12 or q16 does not appear to be influenced by baseline characteristics in patients with nAMD.

Multimodal image-linkage with the Fight Retinal Blindness! registry to enhance its research potential – The beginning of "FRB! 2.0"

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Purpose: To demonstrate connectivity between the Fight Retinal Blindness! (FRB!) registry's high quality clinical data with corresponding images.
Methods: Adhering to RANZCO's ethics approval, two FRB! sites in Sydney piloted this project initially including deceased patients (cohort 1). Living, enrolled patients – not requiring renewed consent – were given an opt-out option via information pamphlets and explanation (cohort 2). The pseudonymised tabular information (demographic and clinical data) routinely collected in FRB!'s age-related macular degeneration module was migrated to a secure Australian-based cloud destination from locally hosted servers. Multimodal images from Heidelberg Engineering® devices, including ocular coherence tomography (OCT), infra-red and autofluorescence were exported from pilot clinics. Corresponding FRB! pseudonymised identifiers were computationally inserted enabling linkage. Other personal information was removed.
Results: Cohort 1 contained 168 patients comprised of 6,189 visits in total. Cohort 2 was enrolled on an ongoing basis. Tabular data was successfully moved to the cloud, captured as standardised SNOMED-CT concepts and converted to FHIR® (Fast Healthcare Interoperability Resource) format facilitating multiple interoperable capabilities. Images were exported in both 'e2e' and Digital Imaging and Communications in Medicine formats from Heyex 1 and Heyex 2 platforms respectively. Via a cloud-based instance of Heyex 2, each macular OCT produced two Digital Imaging and Communications in Medicine files; an image and an 'ePDF', which contained 22 OCT computer-readable measurements. These were also converted to FHIR and linked to FRB! tabular data.
Conclusion: This process demonstrated successful image linkage at the patient-visit level, to enrich FRB! research possibilities including structure-function relationships and artificial intelligence.

Postoperative refractive outcomes in eyes undergoing combined phacovitrectomy surgery for epiretinal membrane

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Purpose: To evaluate the post-operative refractive outcomes from three different intraocular lens power prediction protocols for combined phacovitrectomy for epiretinal membranes.
Methods: This single-center retrospective cohort outcome study of combined phacovitrectomy surgery performed by one surgeon. Eyes were divided into three protocols depending on the biometer (Zeiss IOL Master 500 and the Heidelberg Anterion), and the strategy to determine the posterior (retinal pigment epithelium; RPE) peak. Protocol 1 accepted the proprietary software determination vs. manual RPE identification in Protocols 2 and 3. The primary outcomes were the post-operative refractive prediction error (PE) and mean absolute error.
Results: Seventy-five eyes of 67 patients were included; 24 eyes (32%) were in Protocol 1, 11 eyes (15%) in Protocol 2 and 40 (53%) in Protocol 3. The average PE of Protocol 1 (PE -0.24). trended for myopia consistent with current literature. The PE for Protocol 2 and 3 combined was 0.008 D. A Mann-Whitney U test revealed a significant difference in the distribution score for mean absolute error between Protocol 1, and Protocol 2 and 3 combined ($U = 163.0$, $z = 0\text{-}4.676$, $p \leq 0.001$).
Conclusion: This study demonstrated that post-operative refractive outcomes were more consistent and accurate from Protocols 2 and 3 where the biometry scans were interrogated to ensure the RPE peak was identified and not the ERM peak. A refraction of ± 0.25 in 90% ($n = 9$) in Protocol 2 and 72% in Protocol 3 ($n = 72$) is comparable to standalone cataract surgery. That only 18% of Protocol 1 eyes achieved that is consistent with the literature.

Widefield optical coherence tomography angiography of the retinal capillary bed in diabetic retinopathy during pregnancy

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Purpose: Diabetic retinopathy (DR) in pregnancy is challenging to manage due to potential for rapid progression and foetal treatment effects. Although commonly used for DR assessment, intravenous fluorescein angiography (FA) is relatively contraindicated in pregnancy due to

potential for teratogenicity. Optical coherence tomography-angiography (OCT-A) is an emergent, non-invasive method of monitoring retinal/choroidal vasculature during pregnancy. Widefield OCT-A could be a viable alternative to FA in assessing DR in pregnant women. This study aimed to investigate longitudinal changes in retinal microvasculature in pregnant women with DR using widefield OCT-A.

Methods: This was a retrospective case series of 5 patients with DR during pregnancy. Widefield OCT-A (PlexElite 9000, Zeiss) imaging was performed prior to, during and following completion of pregnancy. We included 6x6 mm, 12x12 mm and widefield montage OCT-A images of five women assessed during their pregnancies.

Results: All five patients had moderate to severe non proliferative diabetic retinopathy mostly without diabetic macular oedema. Prominent dilatation of central and peripheral capillary beds was observed that increased during pregnancy and reversed following delivery. There were signs of intraretinal vascular abnormalities within superficial and deep plexi. Dilatation was evident in both superficial and deep capillary beds.

Conclusion: We observed progressive and severe dilatation of the capillary bed in patients with moderate to severe non proliferative diabetic retinopathy that increased during pregnancy, and generally resolved after delivery. These longitudinal changes have not previously been reported due to scarcity of FA during pregnancy. The retinal changes may be related to vascular fluid shifts during pregnancy or progressive capillary-level retinal ischaemia during

Central serous chorioretinopathy treated with subthreshold 3 ns laser: A retrospective case series

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Purpose: We tested the hypothesis that selective retinal pigment epithelium (RPE) treatment by focal subthreshold 3 ns laser can achieve resolution of symptomatic central serous chorioretinopathy in a consecutive case series.

Method: All patients were managed by one retinal specialist (WJH) at the Retinology Institute. Written consent was obtained and the audit approved by the uman Research Ethics Committee of La Trobe University, Melbourne, Australia. All patients fulfilled the major diagnostic criteria of central serous chorioretinopathy. After detailed informed consent, 2-4 threshold determining spots of the 3 ns laser (2RT® AlphaRet) were applied near a major arcade and then the leaking focus directly treated. Patients were reviewed at 6 and 12 weeks. Data Analysis was with IBM SPSS Version 27 software.

Results: Of the 86 eyes (83 patients), 72 (84%) had elimination of subretinal fluid after a mean of 42.36 days. Fifteen were retreated; 11 with focal alone, four with supplemental grid in dependent fluid only. Complete resolution at 3 m occurred in 93% of eyes. No complications occurred.

Conclusion: These findings support the original hypothesis that limited RPE specific treatment alone can resolve active central serous chorioretinopathy in the majority of cases, while avoiding treating otherwise well-functioning RPE. An interventional randomised study with the Centre for Eye Research Australia has commenced.

OCTAVA – Open-source software for analysing retinal optical coherence tomography angiography images

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Purpose: Visualisation and assessment of retinal microvasculature using optical coherence tomography angiography (OCTA) are important in managing ocular and systemic diseases. Current challenges include the lack of native software in some commercial and lab-based OCTA instruments to quantify retinal microvasculature and comparing different study outcomes from instruments with in-built software but using different processing methods, which is common. We advanced and validated the open-source toolbox OCTAVA with the goal of contributing to retinal OCTA data analysis standardisation.

Methods: The software was advanced to deliver seven microvascular metrics and five foveal avascular zone metrics within the whole image and zones defined

by the ETDRS grid. OCTAVA was validated using 120 OCTA images of healthy volunteers (retinal scans of superficial vascular plexus, 3x3 mm, 30 images per instrument) collected using Cirrus 5000 (Zeiss, Germany), RTVue-XR (Optovue, US), Revo NX 130 (Optopol, Poland) and Spectralis OCT2 module (Heidelberg, Germany).

Results: We identified the Fuzzy means segmentation algorithm combined with a Frangi filter with a maximum kernel size of 3 as the best segmentation method for all images. We showed that applying OCTAVA to images obtained by different devices reduces the differences in metrics values. For example, mean vessel area densities generated by in-built software in Cirrus 5000 and RTVue-XR were 36% and 50%, respectively, and 37% and 32% in OCTAVA for study groups of similar demographic and ocular biometry.

Conclusion: We demonstrated that OCTAVA can be applied to OCTA images from various instruments, achieving metrics values with lower variation between instruments.

STRABISMUS

Visual outcome in strabismic versus non-strabismic infants post cataract surgery

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Purpose: To assess the visual outcome in children who developed strabismus post cataract surgery.

Method: A single centre retrospective chart review of all children aged less than 12 months who underwent lensectomy from 1 January 2014 to 1 January 2021 was conducted. Cases with strabismus prior to cataract surgery were excluded. The selected cases were grouped into those that developed strabismus after the cataract surgery and those that never developed strabismus.

Results: Seventy-five children were included, 36 (48%) had unilateral cataract surgery while 39 (52%) had bilateral. The mean age at time of cataract surgery was 3.0 ±2.5 months (range 1–10 months). The mean follow-up period was 41.2 ± 22.8 months (range 2–72 months). Nineteen out of 75 patients (25%) developed strabismus. The post-operative best corrected visual acuity was significantly different ($p = 0.02$; < 0.05) between the unilateral and bilateral lensectomy groups with average of 0.4 logMAR ± 0.3 for the bilateral group and 0.7 logMAR ± 0.5 for the unilateral group. The best corrected visual acuity was similar in the strabismic and non-strabismic ($p = 0.22$; $< 0.0\ 5$) aphakic eye. The mean interocular difference in visual acuity in the non-strabismic group is 0.32 logMAR ± 0.58 and in strabismic group is 0.97 logMAR ± 0.81, and this difference is statistically significant.

Conclusion: Understanding the incidence of strabismus and interocular visual acuity post cataract surgery, is essential to guide careful monitoring for strabismus development and early treatment of amblyopia to prevent permanent vision loss. Further research is needed to better understand the mechanism of vision loss in the strabismus population post cataract surgery.

Outcomes from the surgical management of inferior oblique overaction in a paediatric cohort

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Purpose: To report the outcomes of surgical treatment of inferior oblique overaction in a paediatric cohort.

Method: A retrospective review of 105 eyes of 68 paediatric patients who underwent inferior oblique muscle (IO) surgery by a single surgeon at Queensland Children's Hospital between April 2014 and March 2021. Patient demographics, orthoptic examination results and surgical details were reviewed. Primary outcome was IO action score at final follow-up, with surgical success defined as scores of -1, 0 or +1. Secondary outcomes included resolution of V-pattern, vertical deviation and anomalous head position. Surgical complications were recorded.

Results: Mean age at time of surgery was 5.9 years. Mean preoperative IO score was 2.4 ± 0.7. Myectomy was performed in 60.0% of eyes (63/105 eyes), Recession in 24.8% (26/105 eyes) and anterior transposition in 15.2% (16/105 eyes). Mean duration of follow-up was 2.6 years following surgery. Mean post-operative IO score was -0.02 ± 0.9 with 84% (89/105 eyes) of eyes attaining surgical success. Surgical success was obtained in 92.1% and 92.3% of myectomy and recession subgroups, respectively. Comparatively, mean IO score following anterior transposition was 0.1 ± 1.7 with 43.8% attaining surgical success ($p < 0.001$). Collapse of V-pattern occurred in 95% of patients (39/41 patients). Resolution of preoperative vertical strabismus to ≤4Δ occurred in 79% (26/33 eyes) by final follow-up. Anomalous head position resolved in 84% (16/19) of patients.

Conclusion: For the treatment of inferior oblique overaction in paediatric patients, IO myectomy and IO

recession both have high rates of success and yield more predictable outcomes than IO anterior transposition.

Strabismus surgery associated scleritis and suture granuloma: A Victorian case series

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Purpose: Despite scarcely poor outcomes, strabismus surgery can be complicated by scleritis and suture granulomas. Scleritis specifically describes inflammation of the scleral tissue, whilet suture granuloma describes the granulomatous inflammation that surrounds a suture. Suture granuloma has been known to mimic true scleritis in clinical practice. Although rare, infectious scleritis can occur in the acute post-operative period. Herein we report three cases of true scleritis and two cases of suture granuloma post strabismus surgery in patients managed by Victorian ophthalmological healthcare practices.
Methods: Patients were recruited from private ophthalmology clinics and an eye hospital in Victoria. Data collection included operative details, demographics, medical history, ophthalmological history, clinical features, investigation results and photographs.
Results: Five participants were recruited in the study. Two of the participants were diagnosed with surgically induced necrotising scleritis (SINS) and their initial symptoms started two- and three-weeks post strabismus surgery. Another participant was diagnosed with biopsy-proven *Pseudomonas aeruginosa* infectious scleritis and their initial symptoms started two-weeks post-surgery. The other two participants were diagnosed with biopsy-proven suture granulomas at least four decades after their last strabismus surgery.
Conclusion: Clinicians would be wise to always consider infectious causes of scleritis in the acute post-operative period, despite only one documented case of strabismus surgery associated *Pseudomonas aeruginosa* infectious scleritis mentioned in the literature. SINS, like suture granuloma, can occur decades after strabismus surgery, but both cases of SINS occurred in the acute post-operative period in this case series.

SUSTAINABILITY

The range of intravitreal injection practices in Australia and New Zealand

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Purpose: To describe the range of techniques and consumable materials used by RANZCO Fellows for intravitreal injections (IVI) in Australia and Aotearoa New Zealand.
Method: An online survey of RANZCO Fellows (population ~1100 active Fellows) was performed using the Zoho Survey platform, with three reminder emails over a three-week survey period in May 2022. The study was anonymous, voluntary and ethically approved by the RANZCO human ethics committee.
Results: A total of 379 of 1140 fellows participated (~33% of cohort) in the online survey. This survey finds that there are 4-11% of users who are performing IVIs in a theatre setting and has demonstrated that their use of operating theatres for IVI is associated with more than twice the amount of personal protective equipment than those in office-based and procedure rooms. This study also found that use of a customised IVI pack resulted in an approximately 60% increase in the number of single-use disposable items. A large majority (78.4%) of responders reported sterile minims for topical anaesthetic, with 61% using a single minim per patient. Only 24.6% of respondents stated they used antibiotics post injection.
Conclusion: There is variation in technique and consumption for IVIs across Australia and Aotearoa New Zealand. This study empowers ophthalmologists to think about how their techniques can be modified to reduce single-use item consumption, while maintaining safety and quality evidence-based practice, to reduce costs and the environmental impact.

The environmental impact of single-dose eye drops

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Purpose: Single-use eye drops are associated with considerable environmental and financial cost. This study outlines the environmental and financial implications associated with single-use eye drops in the ophthalmology outpatient setting and reviews the current literature on the efficacy of single-use eye drops versus multidose bottles.
Method: A single-centre prospective observational study of the environmental and financial waste generated from single-use disposable eye drops was conducted over a period of two weeks at the ophthalmology outpatient clinic of a large tertiary referral centre (Royal Adelaide Hospital, Australia). Descriptive statistics were employed to determine the mean unused quantity (in mL and number of drops) of each single-use eye drop medication and costs of unused pharmaceuticals.
Results: The total amount of waste generated from the use of single-use eye drops during the study period was 1.997 kg, of which 64.5% was preventable; 71% of pharmaceuticals by weight were disposed at the ophthalmology outpatient clinic during the surveillance period, equating to approximately $57,840 in wasted pharmaceutical content per year.
Conclusions: This study has demonstrated that the utilisation of single-use eye drops is associated with significant financial, pharmaceutical and environmental waste. Future studies examining the recyclability of single-use eye drops and investigating systematic strategies to mitigate this waste are required.

Reducing the use of fluorinated gases in vitreoretinal surgery

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Purpose: To investigate feasibility of air, 8% C2F6, and 6% C3F8 as potential substitutes for 20% SF6 in rhegmatogenous retinal detachment repair. Sulphur hexafluoride (SF6) gas is commonly used in rhegmatogenous retinal detachment repair due to its short tamponade duration but is a potent greenhouse gas compared to alternative gases.
Method: A validated mathematical model in human eyes was used to predict various gas dynamics parameters of air, C2F6, C3F8 and SF6 post-operatively, assuming 75% fill of vitreous cavity at time of surgery. Three different vitreous cavity volumes (4.0 ml, 7.2 ml, 10.0 ml) were used to represent hypermetropic, emmetropic and myopic eyes.
Results: Twenty percent SF6 achieves a greater gas fill initially, whereas 8% C2F6 and 6% C3F8 maintain a greater fill for significantly longer and last approximately twice and three times as long respectively. Six percent C3F8 takes twice as long as 8% C2F6 to achieve similar maximum volumes and lasts approximately 1.7 times longer in vitreous cavity. The duration taken to be < 5 0% gas fill is three days for air, seven days for 20% SF6, 11 days for 8% C2F6, and 18 days for 6% C3F8. Air, 20% SF6, 8% C2F6 and 6% C3F8 last approximately 17 days, 22 days, 42 days and 70 days respectively in vitreous cavity.
Conclusion: Although tamponade characteristics of 20% SF6 cannot be mimicked completely with weaker concentrations of C2F6 and C3F8, they offer substantially reduced greenhouse gas effects. Surgeons should consider C2F6, C3F8 and air as alternative tamponade agents to replace SF6 use in selected cases.

Focus on reuse: Reducing waste associated with topical preoperative antiseptics

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Purpose: Topical antiseptics have significant environmental and financial implications. This study outlines the environmental and financial costs associated with single-use topical antiseptic (5% povidone-iodine [PVI] solution) in the ophthalmology theatre setting and explores potential methods of repurposing topical antiseptics.
Method: A single-centre prospective observational study of the environmental and financial waste generated from single-use disposable topical povidone-iodine preparations was conducted over a period of three weeks at the ophthalmology operating theatre of a large tertiary referral centre (Flinders Medical Centre, Australia). Descriptive statistics were employed to

determine the mean unused quantity (in mL) and cost of the single-use topical PVI solution and costs of unused antiseptic.

Results: The total amount of waste generated from the use of single-use PVI bottles during the surveillance period was 10.823 kg, of which 21.9% was preventable; 72% of unused PVI by weight were discarded during the study period, equating to approximately $21857.60 in wasted pharmaceutical content per year. One hundred percent of the discarded PVI was successfully redirected and reused at a local wildlife rescue organisation and diverted from landfill.

Conclusion: This study has demonstrated that the utilisation of single-use topical preoperative PVI preparations is associated with significant financial, pharmaceutical and environmental waste. Future studies examining the recyclability of single-use PVI bottles and investigating systematic strategies to recycle and repurpose this waste are required.

Salvageable waste associated with intravitreal injections: A local medical waste management approach

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Purpose: Healthcare waste management is a globally challenging issue with an increased prevalence of disposable, single use materials in developed countries and a rapidly ageing population continuing to drive an increase in the use of medical resources. One manifestation of this within ophthalmology is the increasing number of intravitreal injections given for conditions such as age-related macular degeneration and diabetic macular oedema.

Methods: A prospective controlled cohort study was performed over five weeks in 2021 during which two sites were selected to compare different approaches to sorting the waste generated by intravitreal injections. At Site A all waste associated with these injections was placed in standard hospital waste bins. Site B was the intervention arm where a real-time sorting of waste occurred. The number of injections given and waste amounts were recorded.

Results: A total of 116 and 286 injections were given at Sites A and B respectively over the study period. Site A generated an average of 470.7 g of waste per injection compared to 175.1 g at our intervention site. This represents a 62.8% reduction ($p < 0.001$). At Site B, where waste was sorted, a total of 50.1 kg of medical waste was generated from these injections during the study period of which 33.8kg (67.5%) was salvageable.

Conclusion: This is the first quantification of the medical waste associated with intravitreal injections, a burgeoning treatment for macular degeneration and diabetic retinopathy amongst other conditions. This study demonstrates a significant reduction in the amount of medical waste produced using an easily implementable real-world methodology.

Evaluation of safety of same day follow up for uncomplicated cataract surgery

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Purpose: To evaluate the safety of same day post-operative follow-up as a substitute for the common practice of the next day follow up in India.

Methods: Retrospective examination of the record of patients after uncomplicated cataract surgery, who had their first post-operative examination on the same day of the surgery and the second examination after one week, during two years in a private clinic.

Results: A total of 2,678 patients who underwent uncomplicated phacoemulsification with posterior chamber intraocular lens were included in the study. Thirty-four patients had intraocular pressure above 30 mmHg during the same day examination. Sixty-five patients had corneal edema which resolved by one week follow up except in three patients who had pre-existing Fuchs endothelial dystrophy. Two patients with descemet membrane detachment underwent intracameral gas injection. Two patients had vitrectomy for endophthalmitis and one had conservative treatment for toxic anterior segment syndrome; all ended up with good visual acuity. All three patients arrived after calling the surgeon early without any delay in diagnosis.

Conclusion: Same day follow-up protocol after cataract surgery did not increase the risk for sight threatening complications. It is safe, economical and convenient to the patient.

TRAINING AND EDUCATION

Development of a CPD education course about dementia-friendly eyecare

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Purpose: People living with dementia are less likely to see eyecare professionals and are at greater risk of treatable vision impairment, the causes of which are commonly detected during routine eye examinations. Seeing well helps people with dementia take part in activity and social programs for their wellbeing. To support people with dementia to have regular eye tests, we have developed an online education course for primary eyecare professionals about dementia-friendly eyecare.
Methods: Qualitative research study using semi-structured interviews exploring experiences of the routine eye examination, from the perspectives of 13 people living with dementia, 15 carers and 18 optometrists. Transcripts underwent framework analysis to integrate perspectives.
Results: We identified practitioner learning needs in relation to dementia and accommodating this during testing, and key messages for eyecare professionals from the perspective of people with dementia and their carers. Dementia advocates are supporting course development by reviewing learning objectives, embedded quotes and case studies, derived from real world experiences of people with dementia and carers. Course topics include: dementia types; communication difficulties; specialist vision function testing; adapting testing/management to accommodate cognitive impairment; and managing responsive behaviours. Dementia advocates have provided feedback to improve the quality of the course and ensure key messages are conveyed.
Conclusion: The training course will launch in September. We plan to evaluate whether course completion changes knowledge, attitudes and practice in relation to provision of dementia-friendly eyecare. We would like to adapt the course to support provision of dementia-friendly tertiary eyecare alongside primary care.

How can motivation theory be applied to ophthalmology education in medical school?

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Purpose: Ophthalmology education in medical school has historically neglected the impact of student motivation on learning and wellbeing. Self-Determination Theory (SDT) suggests that stimulating students' autonomy, competence and relatedness fosters greater levels of autonomous motivation, which improves academic performance. This study aims to apply SDT to identify student-dependent and educator-dependent factors that affect student motivation and provide actionable recommendations for ophthalmology educators to foster motivation in medical students.
Methods: Lead ophthalmology educators from Australian and New-Zealand medical schools and penultimate year medical students undertaking an ophthalmology placement participated in semi-structured in-depth interviews. Transcripts were analysed by thematic analysis using SDT as the theoretical framework.
Results: Six ophthalmology educators and 10 medical students agreed to participate in the study. Sixteen educator-dependent factors and seven student-dependent factors affected students' motivation. Six factors impacted students' sense of autonomy, relatedness and competence – lack of explicit consideration of motivation by ophthalmology educators, guidance, growth mindset, assessment, curricular pressure and extracurricular pressure. These findings suggest four actionable recommendations for educators: be informed on the importance of autonomous motivation; consider motivation explicitly and implicitly; address modifiable factors outlined in this study to foster students' motivation; and longitudinally review student motivation.
Conclusion: The majority of developments in undergraduate ophthalmology education do not purposefully consider the impact of student motivation. However, the identification of factors that affect motivation in medical students studying ophthalmology provides an exciting opportunity for educators to improve student learning outcomes and wellbeing.

The New South Wales *Eye Emergency Manual*

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Purpose: The Agency for Clinical Innovation *Eye Emergency Manual* is for medical, nursing and allied health staff across New South Wales. Clinicians can use the

manual to assist in recognising important signs and symptoms and managing common eye emergencies. The manual is also designed to assist in triaging patients to the appropriate care. An app of the *Eye Emergency Manual* was reviewed in 2023 and updates reflect changes in practice and improve functionality and user experience.

Methods: The manual is the result of consensus opinion determined by an expert working group (Provision of Hospital Services Subcommittee and Nurse Standing Committee). It has not undergone a formal process of evidence-based clinical practice guideline development. The content is not intended as a definitive statement on the correct procedures, but rather a general guide to be followed subject to the clinician's judgment in each case. A rapid evidence check of peer-reviewed and grey literature was conducted in 2023 to accompany the app update.

Results: The manual has a high graphic content and includes basic ophthalmic diagnostic techniques, treatment and management of common eye presentations. For each of the presenting conditions, the manual includes: immediate action; history; examination
treatment; and follow-up and when to refer.

Conclusion: The *Eye Emergency Manual* has been endorsed by the New South Wales Faculty of the Australasian College of Emergency Medicine; the Australian College of Emergency Nursing; RANZCO; and the Save Sight Institute, The University of Sydney.

Surgical learning: A survey of how ophthalmologists learn new surgical techniques

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Purpose: To evaluate different approaches and attitudes ophthalmologists have towards learning new surgical techniques.

Methods: An anonymous voluntary web-based survey was created to evaluate how RANZCO Fellows learn new surgical techniques. Following ethics approval, the survey was distributed to the Fellows via the RANZCO e-campaign. The collected data included, but was not limited to: demographics, training background, fellowship details, practice details, impact of COVID and different resources utilised.

Results: There were 75 completed surveys (7.1% of 1,050 members). 71.3% of respondents were working in urban centres. The vast majority of the respondents (94.7%) had subspecialty fellowship training experience, with anterior segment being most popular. Overall, 82.6% of respondents felt confident in teaching oneself and performing a new surgical technique. YouTube was reported to be the most used (96%) as well as the most useful (41.3%) resource for learning new surgical techniques, followed by hands-on teaching from another specialist (38.7%). Over 90% of the respondents felt fear of adverse outcomes as well as already having a good technique that gives good results to be barriers in learning and implementing new surgical techniques. Thirty-six percent felt COVID-19 and its restrictions had a negative impact on their learning experience.

Conclusion: This is the first study to investigate the ways ophthalmologists learn and adopt new surgical techniques. It suggests video platform with collaborators and quality controlled by RANZCO could have a complementary role in surgical learning for their Fellows.

Nasal mucosal rotational flap for construction of a bypass lacrimal channel – An experimental surgical technique

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Purpose: Severe lacrimal canalicular obstruction conventionally mandates a bypass surgery of conjunctivo-dacryocystorhinostomy with a Lester Jones tube. However, discomfort and cumbersome maintenance of a Lester jones tube often leads to patient dissatisfaction. An alternative approach is doing dacryocystorhinostomy and retrograde intubation and pseudo-punctum generation. But this violates the natural pathway leading to formation of false passages. Our novel surgical technique aims at creation of an alternate passage for outflow of tears using nasal mucosa.

Method: We did conjunctivo-dacryocystorhinostomy and threaded a tongue of nasal mucosal flap into conjunctiva through partially excised caruncle. This was converted into a tube around a silicon stent passing form caruncle to nasal cavity.

Results: Copious flow of fluid was demonstrated on irrigating the newly constructed passage.

Conclusion: This method is considered far superior to a Lester Jones tube as it is a living mucosa with inherent ciliary action facilitating the flow towards nose. This method is expected to have promising long-term results of functional success in terms of alleviation of epiphora, excellent cosmesis and an optimal patient satisfaction.

Can ChatGPT help me teach? Using ChatGPT to prepare teaching material. The process and pitfalls

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Purpose: ChatGPT is an advanced conversational artificial intelligence language model, which has potential to generate content for medical teaching. If efficient and reliable it can reduce the work and time required to create material to present. If inaccurate and the content requires careful revision, there is significantly less benefit in using the tool. To document and present the process of using ChatGPT as a tool to assist preparing teaching material for a presentation on landmark glaucoma journal articles.
Method: ChatGPT was asked to produce a list of significant journal articles related to glaucoma using its message tool. ChatGPT was asked to provide specific information about each of the articles, including key findings and weaknesses. It was asked to refine the output into a presentable format for slides.
Results: ChatGPT performed variably depending on the task. It could find the relevant articles and explore related articles but had difficulty when details of the studies were required, providing wrong information regularly. The content provided required heavy revision which limited the application of the tool.
Conclusion: While ChatGPT is a valuable tool for accessing and generating text-based information, its limitations in terms of access to current research and the ability to evaluate the quality and significance of articles make it currently unsuitable for providing teaching material. There may be other language models available that would be better suited and ChatGPT is very likely to improve its performance to a significantly higher standard for this task.

Predictors of skill acquisition in cataract surgery simulation

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Purpose: The Eyesi (Haag-Streit GmbH, Mannheim, Germany®) cataract surgery simulator has been implemented globally to train ophthalmic registrars. Consisting of a Cataract Challenge Course, the program is a virtual reality simulation of cataract surgery. In this study we aimed to determine if there is any correlation between the parameters measured on the Eyesi virtual reality cataract surgery simulator and if these parameters can inform the mindset to microsurgical skill acquisition and development amongst ophthalmology trainees.
Methods: The performance of 56 trainees at the Royal Victorian Eye and Ear Hospital was analysed for five years from 2018 to 2022. The trainees experience ranged from 1st to 4th year. Analysed parameters included Initial Task Performance, Time-to-Gate (the time to reach a threshold score) and Peak Performance. Relationships between the parameters were analysed with Pearson R and significance of difference between correlations was analysed with the psych package in R.
Results: The strongest correlation was found between initial and peak performance ($r = 0.810$) which was significantly greater than the correlation between Initial Task Performance and Time-to-Gate ($r = 0.553$, $p = 0.03$). Time-to-Gate was only weakly correlated with Peak Performance ($r = 0.475$). The average Total Training Time was 1123 minutes, ranging from 252 to 2039, and the mean peak Cataract Challenge Course score was 442, ranging from 166 to 496.
Conclusion: Our data indicated that Time-to-Gate, Initial Task Performance and Peak Performance are interlinked, indicating those with the highest level of initial performance remain ahead in ability and acquire surgical skills in a simulated microsurgical environment most rapidly.

Knowledge of eye donation: Room for improvement among the population in the Sydney area

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Purposes: To assess the relationship between demographic factors and high knowledge of eye donation, determine gaps in eye donation knowledge and identify the source of donation information most cited by the participants.

Methods: The study was conducted in an eye clinic in the Sydney area in February and March 2020. A total of 190 participants were recruited for the study. Participants aged 16 years or over who were patients at the clinic or their carers and were able to communicate in English were included in the study as convenient samples. Participants were required to complete a questionnaire comprising questions about demographics, eye donation knowledge and source of eye donation information. Data analysis was conducted using the SPSS program. Univariate logistic regression and Pearson chi-square were used to identify the relationship between the variables, source of donation information and high eye donation knowledge.
Results: The study found that 80% of the participants had high eye donation knowledge. Bivariate logistic regression found no significant difference in the relationship between high eye donation knowledge and demographics variables. The three questions about eye donation knowledge that were most often answered incorrectly by the participants were about the timing of donation, eye disease not being a barrier to donation and religious support for eye donation. Chi-square found a weak but significant relationship between high eye donation knowledge and the source of eye donation information.
Conclusion: The outcomes of the study can be used to guide the development of interventions or tools to improve eye donation knowledge.

Game-based ophthalmology teaching for medical students

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Purpose: COVID-19 has allowed for the rapid emergence of online tertiary education. There is an increasing trend in gamification as a novel online teaching technique amongst medical institutions. Gamification allows learning to be cognitively challenging yet dynamic and fun, enhancing motivation and increasing voluntary adherence to training. This study investigates the effect of gamification on the motivation, confidence and knowledge in ophthalmology of medical students, as well as its effectiveness in learning.
Method: Participants were medical students from both undergraduate and graduate medical schools Australia-wide. Multiple web-based gamification learning modules were developed on core ophthalmology knowledge and skills, with incorporated gamified case-based learning. Ophthalmological emergent cases were integrated into games with points accrued for successful assessment and management of life-threatening and vision-threatening conditions. Effectiveness of learning was analysed through pre- and post- module knowledge testing. Student acceptance, confidence and perceptions of the web-based gamification modules were analysed through Likert-scale questions in the post-module assessment.
Results: Gamified case-based teaching was suggested to be both engaging and user-friendly, and demonstrated an improvement in ophthalmic knowledge. Strongly positive feedback from students suggests it may be a well-favoured tool in the armamentarium of methods of ophthalmic education in medical school.
Conclusion: In this prospective cohort study, Australian medical students found gamified case-based teaching engaging and user-friendly and demonstrated an increase in knowledge. As such, gamification in ophthalmic education during medical school should be considered in Australia to ensure more effective ophthalmic teaching and ultimately, better eye care.

A tap and inject technique described by ChatGPT: How we can incorporate AI tools to augment ophthalmology training

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Purpose: The use of artificial intelligence (AI) chatbots, such as ChatGPT, have amplified in 2023. ChatGPT generates sophisticated responses across a wide range of topics, when prompted with a question. Its role as a teaching tool in medical education is emerging. We tested and evaluated ChatGPT in describing a tap and inject technique that could be used as a basic guide for ophthalmology trainees.
Methods: A serious of questions were input into ChatGPT to obtain a tap and inject technique for endophthalmitis. Questions input into ChatGPT aimed to generate a list of items required to perform the procedure, preparation of intravitreal antibiotics, and the

procedure steps. Responses from ChatGPT were then verified against RANZCO's published, "Guidelines for Performing Intravitreal Therapy: Endophthalmitis pack".

Results: ChatGPT described a basic tap and inject technique for endophthalmitis, including the procedural items required as well an accurate dilutional preparation of intravitreal antibiotics. Compared to RANZCO's published guide, ChatGPT's initial technique did not include subconjunctival local anaesthetic injection,
nor laboratory analysis of the aspirated sample. Subsequent targeted questions into ChatGPT produced responses describing local anaesthetic techniques options, and the laboratory analysis required of the aspirate. ChatGPT also described generic post-procedure care of patients.

Conclusion: ChatGPT is a powerful AI writer able describe a basic tap and inject procedure for endophthalmitis, with appropriate input data. ChatGPT can be used to augment education and training of ophthalmology trainees when prompted with ophthalmic-theme input, where its applications are wide. However, its output should not be used in place of appropriate clinical judgement.

UVEITIS

Quantitative assessment of vitreous inflammation in uveitis using optical coherence tomography-based vitreous

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Purpose: To investigate the use of optical coherence tomography (OCT) based vitreous dots analysis for the quantification of vitreous inflammation.

Methods: This cross-sectional study included 46 patients with anterior, intermediate, posterior or panuveitis and 48 healthy controls. OCT B-scans cutting across the fovea were used for analysis. One eye per patient was included. The COIN website (www.ocularimaging.net), a collaborative portal for ocular image analysis, was used. Segmentation of vitreous was achieved semi-automatically using the inbuilt region of interest tool. Identification of vitreous dots was performed by a trained grader based on their size, shape and reflectivity. The number and total area of vitreous dots were measured. Vitreous dots density index (VDDI) was calculated as the ratio between total area of vitreous dots to total vitreous area. Comparison between uveitis and control group was performed using mutivariate regression, accounting for age and gender.

Results: Mean age in the uveitis and control group was 49.8 ± 12.6 and 50.3 ± 12.9 years, respectively. Compared to control eyes, the mean number of vitreous dots was higher in uveitis eyes (2.15 vs. 0.44, $p = 0.001$) with a larger total vitreous dots area (8.54E-6 vs. 1.47E-6 mm^3, $p = 0.007$). Mean VDDI was higher in uveitis eyes (0.01% vs. 0%, $p = 0.004$). For subgroup analysis, non-anterior uveitis group (intermediate, posterior and panuveitis) had more vitreous dots, larger vitreous dots area and higher VDDI when compared to anterior uveitis group.

Conclusion: Vitreous inflammation could be quantitatively assessed using OCT based vitreous dots analysis. Further studies are required for validation and correlation with clinical grading.

Hypofluorescent dark dots in uveitis: A comparative indocyanine green angiography study

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Purpose: To examine indocyanine green angiography (ICGA) features of hypofluorescent dark dots in uveitis.

Methods: All subjects with a diagnosis of sarcoidosis, tuberculosis, birdshot chorioretinopathy (BCR), Vogt-Koyanagi Harada (VKH) syndrome, multifocal choroiditis (MFC) or sympathetic ophthalmitis with ICGA performed from 2015 to 2022 were included in the study. ICGA was analysed for the presence of hypocyanescent dark dots, number of lesions, size of lesions, heterogeneity of lesion size, confluence, distribution and change in lesion parameters over time.

Results: A total of 859 ICGA images from 74 eyes of 43 patients were included in the study. Significant differences were observed between hypofluorescent dark dots observed in the different uveitis aetiologies. The number of spots observed was greatest in BCR and lowest in sarcoidosis and tuberculosis ($p < 0.001$). Total spot area was highest in BCR and MFC ($p = 0.055$). Average area differed significantly between aetiologies, with the smallest lesions seen in VKH and sympathetic ophthalmitis, and the largest lesions seen in MFC ($p = 0.047$). Lesions in

sarcoid, tuberculosis, BCR and MFC were more likely to be confluent in areas, whereas in VKH and sympathetic ophthalmitis they were clearly demarcated.

Conclusion: Our study analysed the features of hypofluorescent dark dots in six different uveitic conditions. Significant differences were observed in the ICGA characteristics of the spots in these different diseases. This study highlights the importance of identifying these features, as it may help in the diagnosis and management of these ocular diseases.

Ocular syphilis in Victoria from 2017–2022: A return to peak levels

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Purpose: Ocular syphilis was increasing in Victoria prior to 2016. It is unknown whether case numbers have continued to increase since then, including during the COVID-19 pandemic. We aimed to explore ocular syphilis and syphilis cases in Victoria from 2017–2022, and investigate the possible impact of COVID-19.

Method: We retrospectively analysed Royal Victorian Eye and Ear Hospital ocular syphilis admissions, and Victorian National Notifiable Diseases Surveillance System syphilis notifications, from 2017–2022. We examined ocular syphilis and syphilis rates by year and sex.

Results: From 2017–2019, Royal Victorian Eye and Ear Hospital ocular syphilis cases increased from 10 to 17, then decreased in 2020 and 2021 to 11 and 8 cases, respectively, before increasing in 2022 to 16 cases. Victorian syphilis notifications displayed a similar trend, increasing from 32.9 to 39.9 cases per 100,000 people from 2017–2019, decreasing to 32.8 and 33.2 cases per 100,000 people in 2020 and 2021, respectively, and subsequently increasing to 39.6 cases per 100,000 in 2022. Ocular syphilis cases varied mostly in males during the study period (range 5–13 cases), while female cases were more stable (range 3–5 cases).

Conclusion: Ocular syphilis and syphilis decreased in Victoria in 2020 and 2021, which likely reflects the impact of COVID-19. While lockdowns may have reduced syphilis transmission in the community, another plausible and more concerning explanation is decreased detection due to reduced healthcare-seeking behaviour. Ophthalmologists should remain alert however, given ocular syphilis has increased to peak levels again in 2022.

Diabetes mellitus related anterior uveitis – An overlooked clinical entity

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Purpose: This study aimed to evaluate the characteristics of anterior uveitis in patients presenting with poorly controlled diabetes mellitus and with no other identifiable cause for their uveitis.

Method: A retrospective study of 121 eyes in 89 patients who presented at Auckland District Health Board with idiopathic acute respiratory anterior uveitis and uncontrolled diabetes between September 2009 and January 2022.

Results: The diagnosis of diabetes mellitus was known prior to presentation in 80 subjects (89.9%) and was discovered as a result of screening tests in the remainder. Mean HbA1c at presentation was 117.3 mmol/mol. Most uveitis was severe with 3+ (30 eyes, 25.4%) or 4+ cells (30 eyes, 25.4%) in the anterior chamber. Recurrence occurred in 22 eyes (18.2%) and was associated with elevated HbA1c. The visual prognosis was good with median visual acuity at 12 months of 6/7.5.

Conclusion: Poorly controlled diabetes can be associated with acute anterior uveitis.

Predictors of visual outcome in Vogt-Koyanagi-Harada: A multi centre series

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Purpose: To analyse the predictors of visual outcome in Vogt-Koyanagi-Harada (VKH) disease.

Method: Retrospective study. Setting: Multicentre clinics (New Zealand, Australia and Israel). Study population: 351 eyes of 178 subjects with VKH were evaluated between 2000 and 2022. Procedures: Clinical and demographic data were analysed from a database. Outcome measures were treatment modalities and success of

therapy, complications and risk of recurrence of VKH, risk factors for vision loss.

Results: A total of 351 eyes of 178 subjects were included for analysis with a mean follow up of 6.9 years. Mean age was 38.8 years ± 14.9 and 123 were female (69.1%). Disease-modifying anti-rheumatic drugs were used in 84 patients (47.2%). Recurrence occurred in 109 patients (61.2%) with a median time to first recurrence of 904 days (95% confidence interval 414-1410). Choroidal neovascular membrane occurred in 12 patients (6.7%), optic neuropathy in 6 patients (3.4%), scleritis in 14 patients (7.9%), glaucoma in 31 patients 17.4%) and cataract in 54 patients (30.3%). Vision loss ≤ 6/15 occurred in 39 patients (21.9%). Vision loss was associated with poorer presenting vision (odds ratio 2.882, $p = 0.001$) and recurrence (odds ratio 5.948, $p = 0.001$).

Conclusions: VKH is a distinct clinical entity with various known complications leading to poor visual outcome. Timely detection of the condition and initiation of immunosuppressive treatment is crucial. Poorer presenting vision and recurrence disease were associated with loss of vision.

To treat, or not to treat after striking gold

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Purpose: To describe the clinical presentations and treatment outcomes of ocular tuberculosis in Western Australia, a low-endemic setting.

Method: A retrospective review of ocular tuberculosis cases diagnosed and treated in Western Australia from 2007 to 2018 was completed. The minimum follow-up period was two years following completion of anti-tuberculosis treatment (ATT).

Results: A total of 33 patients met the inclusion criteria, of which 96.96% were born overseas. No patients had symptomatic systemic tuberculosis outside the eye. Patients were treated with three or four anti-tuberculosis medications. Retinal vasculitis was the most common, followed by anterior, panuveitis and choroiditis serpiginous-like. Full resolution of ocular inflammation following ATT without recurrence occurred in 66.66% of patients. Partial treatment success, defined as reduced ocular inflammation without progressive chorioretinal or retinovascular damage or further vision loss, was seen in 27.27% of patients. In this subgroup, seven patients required one or more courses of topical steroids, and two patients required systemic immunosuppression. There was no improvement in ocular inflammation following ATT and systemic immunosuppression in 6.06% of patients. Jarisch-Herxheimer reaction was seen in 27.27% of patients.

Conclusion: In this setting, ATT had a full or partial success rate of 93.93%. The need for ongoing systemic immunosuppression in four patients and topical anti-inflammatory treatment in seven patients illustrates the immunological spectrum of tubercular disease in the eye thought to be either triggered by active infection, resultant from permanently post-inflammatory disrupted blood-ocular barrier, or represent an ongoing reaction to uncleared tubercular antigens.

Infectious endophthalmitis isolates and sensitivities in a tertiary Australian centre: A 6-year review

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Purpose: The purpose of this study is to describe an updated microbiology spectrum and antibiotic sensitivities of organisms causing infectious endophthalmitis in Queensland, Australia and compare this to other parts of Australia and countries. It will assess the role of tap and inject verse early and late pars-plana-vitrectomy in the management of infectious endophthalmitis in relation to final visual acuity obtained.

Method: A retrospective consecutive cohort study was performed on all patients who underwent an anterior or vitreous chamber paracentesis between January 2014 and December 2019. Outcome measures were endophthalmitis aetiology, vitreous isolates, antibiotic sensitivities and final visual acuity.

Results: One hundred and two cases of endophthalmitis were identified (74 exogenous, 28 endogenous). Forty-nine cases returned culture positive vitreous isolates with gram-positive (69%), fungal (21%), gram-negative (10%). Most common organisms cultured were *Staphylococcus epidermidis* (23%), *Candida* species (12%), Coagulase-negative *Staphylococcus* (10%) and *Staphylococcus aureus* (10%). Vancomycin and co-trimoxazole were 100% sensitive against gram-positive and ceftazidime and gentamicin were 100% sensitive against gram-negative cultured organisms. Amphotericin and voriconazole were 100% sensitive for fungal isolates. There was no difference in

final visual acuity outcomes between early (within 72 hours) verse late vitrectomy. However, both were significantly better than tap and injection alone.

Conclusion: The microbiological spectrum and antibiotic sensitivities of infectious endophthalmitis in Queensland, Australia is comparable to other parts of Australia and North America. Medical treatment may not be as effective as vitrectomy in improving final visual acuity in these patients while early and late vitrectomy have similar outcomes.

Quality of life in herpes zoster ophthalmicus and uveitis

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Purpose: The aim of this study was to identify and compare the quality of life of patients with herpes zoster ophthalmicus (HZO) and uveitis based on their vision and general health.

Methods: A cross-sectional observational study of eligible participants over 18 years old with a clinical diagnosis of acute HZO, uveitis or healthy controls. Data was collected using the National Eye Institute Visual Function Questionnaire-25 (VFQ-25) and World Health Organization Quality of Life brief questionnaire.

Results: Seventy-nine participants were recruited including 55 with uveitis, six with HZO and 18 control participants. Mean age was 40.56- ± -16.71 for controls, 61.33 ± 17.44 for participants with HZO, and 49.55 ± 15.39 for participants with uveitis. On univariate analysis, age ($p = 0.036$), uveitis ($p = 0.001$) and binocular visual acuity ($p < 0.001$) were predictive of VFQ-25. Significant differences in VFQ-25 scores were observed between the three groups in all domains except for vision-related social function and colour vision. Patients with HZO had higher visual function quality of life measurements than uveitis patients, and poorer than the control group, except for ocular pain. In the World Health Organization Quality of Life brief questionnaire, no significant differences were observed in general quality of life between the two groups.

Conclusion: The study concluded that patients with uveitis had a greater decrease in vision-related quality of life than those with HZO. Both had a lower mean composite score in the VFQ-25 compared to control participants. This study highlights the importance of understanding the impact of ocular disease on patients' quality of life.

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CATARACT

Automated decompression of the capsular bag to avert the Argentine flag

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There are several ways to employ in order to try and avoid the Argentine flag. In this video we show how an automated technique which is more controllable can be used to try and avoid the flag in intumescent cataracts during surgery.

When horror strikes the next day

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Many a time we as cataract surgeons are shocked and frankly terrified on seeing our well executed cataract surgery the next day at review. The dreaded thought of infection is the first thought that comes across our mind and rightly so at times. In a series of three such presentations we show briefly the surgery the post op presentation and how we rationalized our further management to get good outcomes.

A surgical technique for managing iris coloboma

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A 36-year-old male with bilateral iris coloboma, left eye microcornea and deep amblyopia was referred for cataract extraction and pupilloplasty in his right eye. Simply closing the iris defect may result in a decentred pupil since the iris sphincter tissue is connected to the angle and the iris base. To avoid this a surgical technique previously described by Dr Robert Cionni was utilised. This technique involves cutting of the iris sphincter to separate the central sphincter from the iris periphery. The iris sphincter is then sutured using a modified Siepser sliding knot, with additional sutures to close the iris defect. This resulted in a round and better-centred pupil.

Attempted fixation of subluxed IC-8 intraocular lens

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A patient presented three months after uncomplicated RE femtosecond-laser-assisted cataract surgery/ intraocular lens (IOL) with IC-8 implantation complaining of blurring of vision. It was noted that the IC-8 IOL was inferotemporally subluxed with complete zonular loss from 11 to 4 o'clock with significant capsular phimosis. Patient also had fuchs endothalial cell dystrophy with an endothelial cell count density of 500.

The patient was very keen to keep her original IOL and the plan was to insert a capsular tension segment to hoist the IOL into its original position, allowing the optic to be centralised. Unfortunately, the anterior and posterior capsules were stuck together posterior to the IOL, making it almost impossible to separate them. The anterior capsule was enlarged and capsular tension segment only partially inserted after which it remained stuck and could not be removed without causing further zonulysis.

At this point, as previously discussed with the patient, the surgery was converted to a removal of IOL, vitrectomy scleral fixed IOL using the yamane technique.

One month post operation, the patient's best corrected visual acuity is 20/20 with no corneal decompensation.

As her refractive error is -2D, she has good reading ability and is pleased with the outcome. Complications well managed can lead to acceptable outcomes

Righting a wrong – Resuturing a capsular tension segment with pupilloplasty

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A cab driver presents with a cataract and 8 hours of zonulysis and mydriasis. He undergoes phacoemulsification and intraocular lens implant with a capsular tension ring and segment fixed to the sclera with goretex via a hoffman pocket. During surgery, the iris is inadvertently caught and sutured, worsening the mydriasis

Post-operatively, while his vision is 20/25, he complains that he constantly sees a "diamond" within his field of vision.

Six weeks after the initial surgery, he underwent a second surgery where the capsular tension segment is resutured with goretex using the suture snare technique. The initial suture is cut and it is noted that there is iris tissue within the hoffman pocket which is released. A 4 throw pupilloplasty is performed to reduce mydriasis over the area of the capsular tension segment. No further pupilloplasty is performed.

The patient is seeing 20/20 post-operatively and no longer complaining of seeing a diamond in his field of vision.

Complicated cataract surgery can lead to suboptimal outcomes, but can be easily corrected if performed within a reasonable time frame. In this case, peripheral anterior synaechiae may have formed if left too long.

CORNEA

Descemet membrane endothelial keratoplasty

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Descemet membrane endothelial keratoplasty is now one of the most popular surgical choices for the management of corneal endothelial diseases. Its popularity can be attributed to a lower rejection rate, faster visual recovery, better visual outcome and lower long-term endothelial cell loss. Descemet membrane endothelial keratoplasty is a technically more challenging procedure with a steep learning curve for novice corneal surgeons. However, attention to its nuances is well worth the time and effort required to learn this procedure as it will increase success rates while reducing complication rates. Our video presents a variety of surgical techniques for the preparation of the tissue, marking the orientation of the graft and the insertion of the graft.

Loose surface – Beware!

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Crescentic superior corneal epithelial instability appears to be common and can cause issues in many clinical and surgical situations. This film will demonstrate the nature of crescentic superior corneal epithelial instability and its presence in a number of clinical scenarios.

GLAUCOMA

Insertion techniques of the VW-50 glaucoma implant

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VW-50 is a novel subconjunctival microfluidic implant developed in Melbourne, currently being evaluated in a first-in-human clinical feasibility study of

10 participants with glaucoma. This video outlines the surgical implantation technique for VW-50 including conjunctival peritomy, dissection, diathermy, mitomycin-C application, VW-50 body insertion, access to the anterior chamber via a 27-gauge needle track, placement of the VW-50 entry cannula into the anterior chamber, fixation and closure. The use of a scleral flap or graft is also shown.

Revising failed Preserflo stent with PAUL tube

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This surgical video demonstrate a method of revising a failed Preserflo stent that is caused by subconjunctival scarring. It involves exposing the Preserflo stent by removal of overlying subconjunctival scar tissue and fibrosed tenon to established new flow to the Preserflo stent. It is followed by placing a PAUL implant in the superior temporal area and the Preserflo stent is tucked under the PAUL implant plate. The plate for the PAUL implant acts as a plate for the Preserflo stent to prevent reformation of subconjunctival scarring around the stent.

OCULOPLASTIC / ORBIT

Rapid progression of orbital cellulitis

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This is a case of a 56-year-old female with a frontal sinusitis-associated subperiosteal abscess and radiographic evidence of rapid worsening within two hours. The patient developed orbital compartment syndrome with no light perception vision. The video demonstrates computerised tomography findings of an evolving orbital abscess, drainage of the abscess and a trans orbital endoscopic view of an osseous defect of the right orbital roof. This case highlights the potential for rapid progression of rhino sinusitis-associated orbital cellulitis and emphasises the importance of close monitoring and emergent surgical intervention.

A novel surgical technique to repair lamellar bone absorption associated with osteo-odonto-keratoprosthesis

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Osteo-odonto-keratoprosthesis (OOKP) is a surgical procedure reserved for severe end-stage corneal blindness. We present a short video of a novel surgical technique to repair laminar resorption associated with OOKP using autologous split-pedicle orbicularis oculi. To our knowledge the technique described is not reported in the literature and may benefit the ophthalmic community and improve our knowledge base in the management of rare complications associated with OOKP.

OTHER

This is how things are, with my glaucoma

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"This is how things are, with my glaucoma" is a six-minute musical parody of David Bowie's iconic "Life on Mars." The narrative follows Gloria, a elderly lady living with primary open-angle glaucoma. Drawing from insights of the Patient Experience of Eye Examination evaluation Study, Gloria melodiously recounts her journey filled with struggles and anxieties of living with this condition. Through performance and humour, the film aims to convey the nuances of patient experiences across the ophthalmic care journey.
Siyuan (Jabelle)
Lu

A fully interactive augmented reality based app for fitting glasses; an innovation

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Our innovation, named OptoFitting, measures the specific parameters of progressive and multifocal glasses. This app is available in android- and iOS-based stores and it could be considered an advantage to be able to use this on mobile phones, not only in tablets. This is a user-friendly app with fully interactive augmented reality for evidence-based consultation. This app has been found to be accurate and user friendly at the same time. The preliminary study outcome on user satisfaction rate showed more than 90 percent affordability, accuracy and user satisfaction (p value < 0.05). The end users may realise the difference in performance between lenses in "real life" and opticians are aware of the fitting parameters at the same time in an online portal. The cost-effectiveness and ability to save ocular exam results for unlimited cases may be considered as unique advantages of this innovation. Furthermore, this app could establish a real time communication between eye care professionals and end-users. The app has other useful features such as measurement of corneal reflex to obtain pupillary distance diameter, ability to calculate the fitting height based on the pantoscopic tilt, and the possibility of checking the parameters of the glasses after dispensing on a real-size diagram on the screen of a phone or tablet with the capability to share the measurements in an online based feature. Evidence from our setting suggests that this innovation may be a cost-effective and time-saving.

PAEDIATRIC OPHTHALMOLOGY

Challenges and triumphs: The story of retinopathy of prematurity

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The arrival of a new life into the world is a joyous event, but when that moment comes too soon, it can usher in a world of immense challenges and uncertainty for families. Every passing hour becomes a precious victory, with each day bringing renewed hope and the promise of progress. As families cling to optimism, the looming threat of a potentially blinding condition casts a dark shadow over their fragile world. The possibility of retinopathy of prematurity (ROP) can be a crushing blow, causing anxiety and despair among parents and caregivers.

ROP was first brought to light by the esteemed Dr T. L. Terry in 1942. As medical advancements improve neonatal survivability the incidence of ROP has increased. Today, ROP is the leading cause of blindness in children worldwide.

The emergence of ROP as a significant health concern has inspired researchers and clinicians to innovate and develop new methods for managing the condition. Thanks to their tireless dedication and unyielding innovation, ROP has now become a treatable condition, sparing countless children from the burden of permanent disability.

In this short film, we will take a journey through the storied history of ROP, marvelling at the extraordinary progress made in treating this once debilitating condition and pay homage to the awe-inspiring work of medical researchers and clinicians, who have turned the tide in the fight against ROP bringing hope to countless families around the world.

REFRACTIVE SURGERY

Hold your breath: Sub-plasma threshold small incision lenticule extraction dissection

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Small incision lenticule extraction surgery case presentation of sub-plasma threshold dissections in both eyes.

Sub-threshold dissections are notoriously difficult to dissect and potentially dangerous, as they can lead to false plain creation and poor outcomes.

This case occurred due to user error and is a lesson for others using the Visumax 800 system.

RETINA

Shades of vitreous

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This film will demonstrate how vitreous has different shades and can help in anticipating difficulties that may occur during surgery. Retinal surgeries performed which were recorded after thorough patient consent are combined in a video. Different vitreous shades

during surgery can give you a fair idea and anticipate challenges you may face during surgery and thus allow you to be prepared to tackle the situation. Vitreous removal is the key in all the vitrectomies for a good surgical outcome. Preoperatively assessing the vitreous shade give you a fair idea of the challenges you may face intraoperatively, which may help improve surgical outcome.

Two-staged surgery for complicated retinal detachment

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Retinal detachment associated with complications like choroidal detachment, hypotony, giant retinal tear, proliferative vitreoretinopathy etc. usually have poor surgical outcomes. The golden standard procedure of choice in such complicated retinal detachments is giving steroids to resolve hypotony and then scleral buckling combined with vitrectomy with intra-operative perfluoro-carbon liquids (PFCL) and silicone oil tamponade. However, sometimes waiting for hypotony to resolve before operating may cause delay which may lead to proliferative vitreoretinopathy and in turn increase the chances of failure. The latest weapon in the armamentarium of the vitreoretinal surgeon is the use of short- and intermediate-term post-operative PFCL tamponade. This technique has shown promising results for the treatment of chronic and complicated rhegmatogenous retinal detachment. This video shows management of a complicated rhegmatogenous retinal detachment associated with choroidal detachment, hypotony and giant retinal tear in two stages. The first stage is vitrectomy with short term use of PFCL tamponade for four days, followed by the second stage of PFCL exchange and silicone oil tamponade.

Gore-Tex to the rescue: Techniques to fixate dislocated intraocular lenses to sclera

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Dislocated intraocular lenses (IOL) are commonly managed with IOL explantation and replacement with a new IOL. This requires significant anterior segment manipulation and, in the setting of a dislocated polymethyl methacrylate lens, requires a large incision for removal. Gore-Tex has demonstrated longevity in cardiac surgery and has recently gained popularity in scleral fixated IOL surgery.

Here we demonstrate multiple techniques of fixating dislocated IOLs to sclera in-vivo using Gore-Tex suture material in multiple settings including fibrillin-mutation connective tissue disorders, retinal detachment, previous suture erosion and damaged scleral-fixation haptics.

These techniques allow preservation of the existing IOL, avoidance of large incision for explantation, and reduced anterior segment manoeuvring.

SUSTAINABILITY

Through green coloured lenses: A sustainable vision for cataract surgery

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Climate change poses a significant threat to public health, prompting review and action to mitigate carbon emissions. The Australian Government intends to reduce carbon emissions in all sectors to a net of zero by 2050, with health care currently contributing to 7% of total greenhouse gas emissions in Australia. Within ophthalmology, cataract surgery is a fantastic opportunity to reduce carbon emissions with high surgical volume and disposable use, meaning even small changes can have a large accumulative impact. A recent prospective analysis of 31 consecutive cataract surgery cases at The Royal Melbourne Hospital in Australia found consumable supply to be the greatest source of carbon emissions in cataract surgery. We aim to provide a visual representation of the current carbon footprint of cataract surgery at The Royal Melbourne Hospital as well as to demonstrate projected improvements based on changes to current processes including equipment and recycling.

TRAINING AND EDUCATION

A patient educational video on the drinking-bird manoeuvre for post-pneumatic vitreolysis

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The drinking bird manoeuvre is often prescribed to encourage release of vitreomacular traction following pneumatic vitreolysis, or encourage the displacement of submacular haemorrhage. Written or verbal counselling may not convey the manoeuvre as effectively as demonstration. We have created a patient information video that illustrates the proper execution of the drinking bird manoeuvre. The video aims to enhance patient confidence and understanding of the technique to encourage compliance.

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