The American Ophthalmological Society

ONE HUNDRED SIXTY-SECOND ANNUAL MEETING

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MAY 21–23, 2026
LA FONDA ON THE PLAZA
SANTA FE, NEW MEXICO

The American Ophthalmological Society

Office of the Executive Vice President
Portland, Oregon
May 2026

THE ONE HUNDRED SIXTY-SECOND ANNUAL MEETING
of the Society will be held at La Fonda on the Plaza in Santa Fe, New Mexico

Thursday through Saturday
May 21–23, 2026

COMMITTEE ON PROGRAMS

M. Roy Wilson, Chair
Peter S. Hersh
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Joel S. Schuman

The American Ophthalmological Society

THE ONE HUNDRED SIXTY-SECOND ANNUAL MEETING

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This activity is jointly provided by the American Academy of Ophthalmology and the American Ophthalmological Society.

TARGET AUDIENCE

This activity has been designed to meet the educational needs of ophthalmologists across all subspecialties involved in clinical or surgical eye care, academic, and leadership who are actively involved in or previously cared for patients.

MEETING OBJECTIVES

The objectives of the 2026 Annual Meeting are to:

- Describe the epidemiology, genetics and environmental risk factors, and pathophysiologic mechanisms contributing to the development and progression of myopia.
- Apply current clinical guidelines and emerging research findings to optimize treatment and longitudinal monitoring of patients with myopia.
- Describe the structure of federal health policy decision-making and how changes in executive leadership may affect ophthalmology practice and academic medicine.
- Identify strategies for ophthalmology academic departments and private practices to adapt to an evolving federal policy environment.
- Recognize and describe new information about diagnosis and treatment of various categories of ophthalmic diseases, including pediatrics, cornea, glaucoma, ocular oncology and near-ophthalmogy and retina.

ACCREDITATION STATMENT

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the American Academy of Ophthalmology and The American Ophthalmological Society. The American Academy of Ophthalmology is accredited by the ACCME to provide continuing medical education for physicians.

PHYSICIAN CREDIT DESIGNATION STATEMENT

The American Academy of Ophthalmology designates this live activity for a maximum of 13.0 *AMA PRA Category 1 Credits*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

FINANCIAL DISCLOSURE / CONFLICTS OF INTEREST

Relevant financial relationships of all presenting authors, staff, and members of the Committee on Programs are listed on pages 7-8 in the program book. If the presenter has a relevant financial relationship, the disclosure will be stated verbally and presented on the first slide of their presentation. Audience participants are required to state their financial disclosure before they join a discussion of a paper or poster. All relevant financial relationships have been mitigated.

FDA STATUS DISCLAIMER

Some material on recent developments may include information on drug or device applications that are not considered community standard, that reflect indications not included in approved FDA labeling, or that are approved for use only in restricted research settings. This information is provided as education only so physicians may be aware of alternative methods of the practice of medicine, and should not be considered endorsement, promotion, or in any way encouragement to use such applications. The FDA has stated that it is the responsibility of the physician to determine the FDA status of each drug or device he or she wishes to use in clinical practice, and to use these products with appropriate patient consent and in compliance with applicable laws.

The Society provides the opportunity for material to be presented for educational purposes only. The material represents the approach, ideas, statement, or opinion of the presenter and/or author(s), not necessarily the only or best methods or procedure in every case, nor the position of the Society. The material is not intended to replace the physician's own judgment or give specific advice for case management. The Society specifically disclaims any and all liability for injury or other damages of any kind for any and all claims that may arise out of the use of any technique demonstrated or described in any material by any presenter and/or author(s), whether such claims are asserted by a physician or any other person.

PARTICIPATION AND CONSENT TO BE RECORDED

The entire 2026 Annual Meeting will be recorded for subsequent posting on the Society's website, including discussion. Submitting questions to discuss a presentation is considered implicit consent to the participant's discussion being included in this recording. Attendees who do not wish to be recorded should refrain from submitting questions.

BYLAWS

The following Bylaws are published each year in the program as a reminder to the members of the Society:

ARTICLE IX, Section 3 – Any member who shall be absent from meetings for three consecutive years without acceptable excuse shall be dropped from the roll, except for Honorary Members, Emeritus Members, Members of twenty years standing or those then serving in the armed forces. An excuse for absence is acceptable only when a member is ill, or when there is illness of a member of his or her immediate family and may not be considered approved until received in written form and acted upon by the Council. The Council shall have the authority to approve other excuses only upon a finding of exceptional circumstances. This Bylaw shall be printed in every call for the Annual Meeting.

MEMBER THESES APPROVED AFTER THE 2025 ANNUAL MEETING:

Brenda Bohnsack	Chicago, IL
Brian Brooks	Bethesda, MD
Alex Huang	La Jolla, CA
William Katowitz	Philadelphia, PA
Ian Christopher Lloyd	London, United Kingdom
Mark Pennesi	Dallas, TX
J. Bradley Randleman	Westlake, OH
Nailyn Rasool	San Francisco, CA
Yang Sun	Palo Alto, CA

IN MEMORIAM

The Executive Vice President has received notice of the deaths of the following members during the past year:

Ivan R. Schwab	Fair Oaks, CA	Joined in 1999
Jerry A. Shields	Philadelphia, PA	Joined in 1981
Daniel M. Taylor, Sr. *(passed in 2022)*	Kensington, CT	Joined in 1972
Mark O.M. Tso	Baltimore, MD	Joined in 1987

FINANCIAL DISCLOSURES

The following are the relevant healthcare-related financial disclosures of those involved in the preparation or presentation of this AOS event. The AOS Committee on Programs gathered this information to plan the program and has attempted to manage relevant conflicts of interest to present a balanced program. The presenter will indicate on the first slide and verbally at the beginning of the talk, if any of the financial disclosures listed has a relationship to the specific presentation. Participants that might speak from the floor are required to state their financial disclosures before they speak.

CATEGORY	CODE	DESCRIPTION
Consultant/ Advisor	C	Consultant fee, paid advisory boards or fees for attending a meeting (for the past 1 year)
Employee	E	Employed by a commercial entity
Lecture Fees	L	Lecture fees (honoraria), travel fees or reimbursements when speaking at the invitation of a commercial entity (for the past 1 year)
Equity Owner	O	Equity ownership/stock options of publicly or privately traded firms (excluding mutual funds) with manufacturers of commercial ophthalmic products or commercial ophthalmic services
Patents/Royalty	P	Patents and/or royalties that might be viewed as creating a potential conflict of interest
Grant Support	S	Grant support for the past 1 year (all sources) and all sources used for this project

* = Planning Committee

BIOUSSE, Valerie
C – Phelcom, Topcon

CHAN, RV Paul
C - AbbVie, Adverum, Alcon, Eyepoint

CLARK, Robert
C – CooperVision, Sydnexis, Vyluma

HARTNETT, Mary Elizabeth
C – FELIQs, Johnson & Johnson Surgical Vision, Ray Therapeutics

KEMPEN, John
S – AbbVie

KOCH, Douglas
C – Johnson & Johnson Surgical Vision, Perfect Lens, Zeiss

KRUEGER, Ronald
C – Alcon, Bausch + Lomb
O – Alcon, Staar Surgical
S – Bausch + Lomb

KUCHTEY, Rachel
C – Guidepoint, Regeneron

LIM, Jennifer
C – AbbVie, Eyepoint, Genentech, Ocular Therapeutix, Opthea, Regeneron
S – Eyepoint, Genentech, Ocular Therapeutix, Regeneron

OLSEN, Timothy
C – Amgen, Aura Bioscience

SINGER, Michael
C – ANI, Regeneron
L – ANI, Regeneron
S – Regeneron

TSAI, James
C - AI Nexus Healthcare, Eyenovia, Ophthalmic Therapeutic Innovation, Smartlens

WEISS, Jayne
C – Sydnexis

NO RELEVANT FINANCIAL RELATIONSHIPS TO DISCLOSE

ACHARYA, Nisha

BERRY, Jesse

CAPÓ, Hilda

CHAN, Clement

CHAN, Shirley*

CHIANG, Michael

COLEMAN, Anne

COLEMAN-BELIN, Janet

COLLINS, Mary Louise
CORREA, Zelia
DANA, Reza
DIRANI, Karim
FAHHOUM, Josiah
FOSTER, Michael
FULLERTON, Holly*
GHASIA, Fatema
GORDON, Shefa
GROSSNIKLAUS, Hans
HANNEKEN, Anne*
HERSH, Peter
HUANG, Alina
JAYASUNDERA, Thiran
JONAS, Jost
KERR, Natalie
KIM, Stephen
KITAYAMA, Ken
LEFFLER, Christopher
LUJAN, Brandon
MCLEOD, Stephen
MENDEZ, Amber*
MIELER, William
MILMAN, Tatyana
NETLAND, Peter
NOURI-MAHDAVI, Kouros
PAN, Carolyn
RAMSHEKAR, Aniket
ROBIN, Alan
SCHUMAN, Joel*
SEAMON, Kimberly
SEDDON, Johanna
SIEGFRIED, Carla
SIMUNOVIC, Matthew
SKORTON, David
SMALL, Kent
SPAIDE, Richard
SUN, Deyu Fred
TAKEUCHI, Alissa*
TSENG, Victoria
TYCHSEN, Lawrence
VANDERVEEN, Deborah
VOLPE, Nicholas
WALLACE, David
WILSON, David
WILSON, M. Roy*
XU, Christine
YAZBECK, Hady
YOUNG, Terri

AOS 2026 Program

American Ophthalmological Society
Meeting Schedule

THURSDAY, MAY 21

11:30 AM – 5:00 PM	**Registration Desk Open**	*Mezzanine*
12:00 PM – 1:00 PM	**New Member Luncheon (by invitation)**	*La Terraza Room*
1:30 PM – 3:00 PM	**New Member Spotlight Presentations**	*Lumpkins Ballroom*
3:00 PM – 5:00 PM	**Scientific Program – Paper Session I**	*Lumpkins Ballroom*
6:30 PM – 8:30 PM	**Reception Welcoming New Members (formal)**	*La Terraza & Garden Terrace*

FRIDAY, MAY 22

7:00 AM – 12:00 PM	**Registration Desk Open**	*Mezzanine*
7:00 AM – 8:30 AM	**Breakfast**	*Mezzanine*
7:00 AM – 11:00 AM	**Spouse / Guest Hospitality Lounge Open**	*Santa Fe Room*
7:30 AM – 9:30 AM	**Scientific Program – Paper Session II**	*Lumpkins Ballroom*
9:30 AM – 10:15 AM	**Guided Poster Session I – Coffee Break**	*Mezzanine*
10:15 AM – 12:15 PM	**Knapp Symposium/Schwab Lecture**	*Lumpkins Ballroom*
12:15 PM – 1:00 PM	**"Meet the Speakers" (Open Q&A and Extended Discussion)**	*Lumpkins Ballroom*
1:00 PM – 5:30 PM	**Golf Tournament**	*Las Campanas Golf Club*
6:00 PM – 7:30 PM	**AOS Reception (business casual)**	*La Terraza & Garden Terrace*

American Ophthalmological Society
Meeting Schedule

SATURDAY, MAY 23

6:00 AM – 12:00 PM	**Registration Desk Open**	*Mezzanine*
6:00 AM – 7:30 AM	**Breakfast**	*Mezzanine*
6:30 AM – 7:15 AM	**Executive Session (members only)**	*Lumpkins Ballroom*
7:00 AM – 11:00 AM	**Spouse / Guest Hospitality Lounge Open**	*Santa Fe Room*
7:30 AM – 9:30 AM	**Scientific Program – Paper Session III**	*Lumpkins Ballroom*
9:30 AM – 10:15 AM	**Guided Poster Session II – Coffee Break**	*Mezzanine*
10:15 AM – 12:15 PM	**Verhoeff Lecture/Saturday Symposium**	*Lumpkins Ballroom*
12:15 PM – 1:00 PM	**"Meet the Speakers" (Open Q&A and Extended Discussion)**	*Lumpkins Ballroom*
1:00 PM – 2:30 PM	**Emeritus Luncheon (by invitation)**	*Santa Fe Room*
2:30 PM – 5:00 PM	**Pickleball Tournament**	*Fort Marcy Park*
6:00 PM – 6:45 PM	**Closing Reception (formal)**	*Mezzanine*
7:00 PM – 9:00 PM	**Gala Banquet (formal)**	*Lumpkins Ballroom*

**Subject to change*

FRIDAY, MAY 22, 2026
10:15 AM – 11:20 AM

Herman Knapp Symposium

MYOPIA: CAUSES, TREATMENTS, AND COMPLICATIONS

WHY IS MYOPIA IMPORTANT?
EPIDEMIOLOGY, GENETICS, AND COMPLICATIONS OF MYOPIA
Mary Louise Z. Collins, MD
Baltimore, MD

ENVIRONMENTAL INFLUENCES ON MYOPIA
Deborah K. VanderVeen, MD
Boston, MA

STRATEGIES TO REDUCE MYOPIA PROGRESSION
Robert A. Clark, MD
Long Beach, CA

CORRECTION OF MYOPIA –
REFRACTIVE SURGERY IN ADULTS
Ronald R. Krueger, MD, MSE
Omaha, NE

CORRECTION OF MYOPIA –
PEDIATRIC REFRACTIVE SURGERY
R. Lawrence Tychsen, MD
Saint Louis, MO

MYOPIA AND GLAUCOMA
Peter A. Netland, MD, PhD
Norfolk, VA

FRIDAY, MAY 22, 2026
11:20 AM – 11:50 AM

Ivan R. Schwab Lecture

MYOPIA AND THE LENS

Douglas D. Koch, MD
Houston, TX

The AOS Named Lecture was established in 2013 and is designed to evolve every few years to reflect the legacy and inspiration of leaders in our field. The lecture was previously named in honor of Dr. Frederick C. Blodi from 2015 to 2017, and most recently in honor of Dr. Marilyn T. Miller from 2021 to 2025. Beginning with the 2026 Annual Meeting, the lecture transitions to honor **Dr. Ivan R. Schwab**, in recognition of his distinguished career, commitment to scientific inquiry, and longstanding service to the Society.

Presented at each Annual Meeting, the Named Lecture offers an overall perspective on a subject of the lecturer's choice. A manuscript may be prepared in conjunction with the lecture for publication in the *Transactions of the American Ophthalmological Society*.

This year, **Dr. Douglas Koch** delivers the inaugural Ivan R. Schwab Lecture, presenting *Myopia and the Lens*, offering a timely perspective on this rapidly evolving area of clinical importance.

SATURDAY, MAY 23, 2026
10:15 AM – 10:45 AM

Frederick H. Verhoeff Lecture

IMPACT OF CHANGES IN WASHINGTON ON THE HEALTH OF OUR NATION

David J. Skorton, MD
Washington, DC

Frederick Verhoeff, MD was a prominent member of the AOS. One of the first graduates of Johns Hopkins Medical School, he served on the faculty of the Massachusetts Eye and Ear Infirmary as an ophthalmologist and ophthalmic pathologist. He joined the Society in 1905, served as President in 1938, and remained a member for 63 years.

The Verhoeff Lecture was established in his honor and first delivered in 1961. Periodically featured at the Annual Meeting, the lecture reflects the presenter's clinical and research interests and is open to non-members of the Society. A manuscript may be submitted in conjunction with the lecture for online publication in the *Transactions of the American Ophthalmological Society*.

The 2026 Verhoeff Lecture will be delivered by Dr. David Skorton, President and CEO of the AAMC, who will present Impact of Changes in Washington: Hospitals, Physician Practices, and Research, examining how federal decisions are shaping hospitals, physician practices, and research.

SATURDAY, MAY 23, 2026
10:45 AM – 12:15 PM

Saturday Symposium

IMPACT OF CHANGES IN WASHINGTON: A NEW REALITY FOR OPHTHALMOLOGY

MEDICAID FUNDING CUTS: IMPACT ON VISION CARE OF VULNERABLE POPULATIONS
Carla J. Siegfried, MD
Wildwood, MO

OPHTHALMIC DRUGS AND DEVICES: WILL FDA REGULATORY CHANGES AFFECT EYE HEALTH?
Jayne S. Weiss, MD
New Orleans, LA

IS EYE RESEARCH IN PERIL: WHAT'S HAPPENING AT THE NIH AND NEI?
Shefa Gordon, PhD
Washington, DC

GME FUNDING AT RISK: STRATEGIES TO MAINTAIN OUR COMMITMENT TO THE NEXT GENERATION OF OPHTHALMOLOGISTS
Terri L. Young, MD, MBA
Madison, WI

AOS 2026

Paper Abstracts

The following abstracts of papers selected to be presented at the meeting are printed in presentation order. The order of presentations has been arranged as follows by the Committee on Programs.

Papers presented at this meeting may be published in other medical journals after this meeting PROVIDED THE AUTHORS ADHERE TO THE STRICT GUIDELINES IN THE AUTHOR INSTRUCTIONS LISTED AT aosonline.org AND CONSULT WITH THE EDITOR OF THE TRANSACTIONS.

Papers are limited to 7 minutes and the first discussant to 3 minutes.
General discussion will be limited to 9 minutes.

PLEASE NOTE THE FOLLOWING PROGRAM KEY:

Bold = *AOS Member*
* = *Presenter*
♦ = *Financial Disclosure*

(Presenters will indicate their financial disclosure verbally and in the first slide.)

PAPER SESSION I — THURSDAY, MAY 21

3:00 PM – 3:20 PM	RISK OF MYOPIC MACULAR DEGENERATION AND HIGH MYOPIA-ASSOCIATED OPTIC NEUROPATHIES	*Presenter:* Jost Jonas *Discussant:* Nicholas Volpe
3:20 PM – 3:40 PM	INNER RETINAL FUNCTION IS PRESERVED AFTER THY1-TARGETED VEGFR2 DELETION FOLLOWING OXYGEN-INDUCED RETINAL HYPOXIA	*Presenter:* *Aniket Rameshekar* *Discussant:* RV Paul Chan
3:40 PM – 4:00 PM	DAVIO 2 TRIAL: A PHASE 2 STUDY OF EYP-1901 VERSUS AFLIBERCEPT FOR THE TREATMENT OF NEOVASCULAR AGE-RELATED MACULAR DEGENERATION	*Presenter:* Jennifer Lim *Discussant:* Mary Elizabeth Hartnett
4:00 PM – 4:20 PM	DEMYSTIFYING CORTICOSTEROID-RELATED ADVERSE EVENTS AND DISEASE TRAJECTORY OUTCOMES: INSIGHTS FROM THE NEW DAY PHASE 4 CLINICAL TRIAL OF A FLUOCINOLONE ACETONIDE INTRAVITREAL IMPLANT FOR DIABETIC MACULAR EDEMA	*Presenter:* Michael Singer *Discussant:* Kent Small
4:20 PM – 4:40 PM	SPHERICAL EQUIVALENT REFRACTION VERSUS AXIAL LENGTH FOR PREDICTING CHILDHOOD MYOPIC PATHOLOGY: A SYSTEMATIC REVIEW AND META-ANALYSIS	*Presenter:* Robert Clark *Discussant:* Natalie Kerr
4:40 PM – 5:00 PM	DIGITAL PHENOTYPING: REAL-TIME ASSESSMENT OF FUNCTIONAL CONSEQUENCES OF GLAUCOMA WITH SMARTPHONES	*Presenter:* Kouros Nouri-Mahdavi *Discussant:* Carla Siegfried

PAPER SESSION II — FRIDAY, MAY 22

7:30 AM – 7:50 AM	EVALUATING THE NEED FOR AN ANESTHESIA PROVIDER DURING ROUTINE CATARACT SURGERY FOR RELATIVELY HEALTHY INDIVIDUALS	*Presenter:* Alan Robin *Discussant:* James Tsai
7:50 AM – 8:10 AM	PROSPECTIVE IMPLEMENTATION OF AN AQUEOUS HUMOR LIQUID BIOPSY PLATFORM INFORMS CLINICAL DIAGNOSIS AND MANAGEMENT OF RETINOBLASTOMA AND OTHER INTRAOCULAR LESIONS	*Presenter:* Jesse Berry *Discussant:* Tatyana Milman
8:10 AM – 8:30 AM	THE AGING EYE: WHEN METABOLIC CONTROL IS NOT ENOUGH	*Presenter:* Reza Dana *Discussant:* Nisha Acharya
8:30 AM – 8:50 AM	BLOOD FLOW AFTER INTRAVITREAL INJECTION USING A NEW SPECKLE BASED OCT ANALYSIS	*Presenter:* Richard Spaide *Discussant:* Jennifer Lim

8:50 AM – 9:10 AM	CLASSIFICATION OF DIABETIC MACULAR EDEMA WITH INFLAMMATORY BIOMARKERS	*Presenter:* Stephen Kim *Discussant:* Timothy Olsen
9:10 AM – 9:30 AM	THE NATIONAL EYE INSTITUTE IN 2026	*Presenter:* Michael Chiang *Discussant:* Stephen McLeod

PAPER SESSION III SATURDAY, MAY 23

7:30 AM – 7:50 AM	AMBLYOPIA CLASSIFICATION THROUGH AI-BASED FEATURE SELECTION IN LIMITED, HIGH-DIMENSIONAL EYE TRACKING DATA	*Presenter:* Fatema Ghasia *Discussant:* R. Lawrence Tychsen
7:50 AM – 8:10 AM	COMPARISON OF FELLOW NON-TREATED EYES WITH BILATERAL GA AS WELL AS SHAM EYES AND PROJECTED SHAM WITH PEGCETACOPLAN TREATED EYES IN PATIENTS WITH NONEXUDATIVE AMD, INCLUDING ASSESSMENT OF ELLIPSOID ZONE (EZ) AND RPE LOSS IN OAKS, DERBY, GALE STUDIES	*Presenter:* Clement Chan *Discussant:* Anne Hanneken
8:10 AM – 8:30 AM	EVALUATION OF A RISK PREDICTION MODEL FOR PROGRESSION TO ADVANCED AGE-RELATED MACULAR DEGENERATION: VALIDATION IN AN EXTERNAL COHORT	*Presenter:* Johanna Seddon *Discussant:* William Mieler
8:30 AM – 8:50 AM	COMPARATIVE IMPACTS OF SOCIAL VULNERABILITY INDEX AND RACE ON GLAUCOMA PROGRESSION	*Presenter:* Karim Dirani *Discussant:* Anne Coleman
8:50 AM – 9:10 AM	MANAGING STEROID-INDUCED GLAUCOMA: BEYOND STANDARD-OF-CARE	*Presenter:* Rachel Kuchtey *Discussant:* Peter Netland
9:10 AM – 9:30 AM	COMPARING DIFFERENT CURVATURE METRICS FOR MODELING CORNEAL EPITHELIAL THICKNESS VARIATION	*Presenter:* Hady Yazbeck *Discussant:* Douglas Koch

THURSDAY 3:00 PM – 3:20 PM

RISK OF MYOPIC MACULAR DEGENERATION AND HIGH MYOPIA-ASSOCIATED OPTIC NEUROPATHIES

Jost Jonas*, Songhomitra Panda-Jonas, Mukharram M. Bikbov, Gyulli M. Kazakbaeva, Ya Xing Wang, Vinay Nangia, Rahul A. Jonas

Purpose: To develop a risk calculator for myopic macular degeneration (MMD), high myopia-associated glaucomatous/glaucoma-like optic neuropathy (GLON) and non-glaucomatous optic neuropathy (NGON).

Methods: The project included the population-based investigations of the Beijing Eye Study (BES)(n=3325;age:40+years), the Russian Ural Eye and Medical Study (UEMS)(n=5586 participants;age:40+years), Ural Very Old Study (UVOS)(n=541;age:85+ years) and Ural Children Eye Study (UCES;n=4255;age:6+years), and the Central India Eye and Medical Study (CIEMS) (n=4467;age:30+years). MMD was defined according to the Meta-analysis for Pathologic Myopia Study Group. Based on binary regression analyses, risk score equations were formulated.

Results: The total study population included 36123 (18174 individuals) (age:47.1±23.2 years; range:6-100 years) (axial length:23.2±1.0mm; range: 18.08-34.20 mm). The total study population was randomly divided in a ratio of 1:1 into a development subgroup and a validation subgroup. In the development subgroup, the risk score equation for MMD stage 2+ was: -64.039 + 2.182 x Axial Length (mm) + 0.070 x Age (Years) + 0.717 x Sex (male=0; female=1) – 1.097 x Chinese Ethnicity (0/1) + 1.360 x Indian Ethnicity. The risk score equation for MMD stage 3+ was: -59.161 + 1.911 x Axial Length(mm) + 0.085 x Age (Years) + 1.266 x Indian Ethnicity. In the validation subgroup, these equations had an area under the receiver operator curve (AUR) for MMD stage 2+ prevalence and MMD stage 3+ prevalence of 0.997 and 0.997, respectively. Applying the risk calculator, MMD stage 2+ risk for a female myope with an axial length of 28mm and 30mm increased from age 30 years to 75 years from 45.7% to 95.1%, and from 69.9% to 99.3%, respectively. MMD stage 3+ risk at an axial length of 28mm and 30mm increased from age 30 years to 75 years, from 4.8% to 74.4%, and from 69.9% to 99.3%, respectively. In the development subgroup, the GLON risk score equation was: -20.221 + 0.359xAxial L + 0.083xAge + 0.706xIndian Ethnicity + 0.198xIOP + 0.780xNGON-Presence. The NGON risk score equation was: -38.136 + 1.202xAxial Length + 0.038xAge-2.745xIndian Ethnicity + 0.566xMyopic Macular Degeneration Stage+1.300xGLON Presence. In the validation subgroup, these equations had an area under the receiver operator curve for GLON prevalence and NGON prevalence of 0.881 and 0.964, respectively. Applying the risk calculator, a non-Indian individual (axial length:28 mm; IOP: 22 mm Hg) had a GLON risk of 3.5% and 60.2% at the ages of 30 years and 75 years, respectively, and a NGON risk of 3.42% and 16.4%, respectively. With an axial length of 30 mm, GLON risk and NGON risk increased from 6.9% to 75.6%, and from 28.2% to 68.4% from age 30 years to 75 years.

Conclusion: The MMD risk calculator and GLON (NGON risk calculator offer a rough estimate of the risks of MMD and GLON/NGON at present and at older age, based on axial length (assuming its constancy), sex, ethnicity, and IOP. The calculated risk of MMD stage 3+ at an age of 75 years at an axial length of 28mm and 30mm was 74.4% and 99.3%. The calculated risk of GLON and NGON (IOP:22 mm Hg, age: 75 years) at an axial length of 28mm were 60.2% and 16.4%, respectively, and 75.6% and 68.4%, respectively, for an axial length of 30mm.

Discussant: **Nicholas Volpe**

THURSDAY 3:20 PM – 3:40 PM

INNER RETINAL FUNCTION IS PRESERVED AFTER THY1-TARGETED VEGFR2 DELETION FOLLOWING OXYGEN-INDUCED RETINAL HYPOXIA

Aniket Ramshekar*, **Mary Elizabeth Hartnett**

Purpose: Anti-vascular endothelial growth factor (VEGF) therapy is used for type 1 retinopathy of prematurity (ROP), but effects on developing inner retinal neurons remain unclear. Prior studies using rodent oxygen-induced retinopathy (OIR) models suggest VEGF is involved in retinal ganglion cell (RGC) survival. We postulated that VEGF receptor 2 (VEGFR2) signaling in RGCs is required for RGC survival and preservation of inner retinal function in OIR (a translational model relevant to aggressive ROP). We tested this by conditionally deleting Vegfr2 in Thy1-expressing retinal cells using a tamoxifen-inducible Cre driver in the mouse OIR.

Methods: Mouse pups underwent OIR (75% oxygen exposure on postnatal days 7–12 [P7-P12], followed by room air exposure, creating relative retinal hypoxia). Tamoxifen (100 µg/day, P12–P14) induced Thy1-CreERT2-mediated Vegfr2 deletion. At P17, full-field electroretinograms ([ERG] scotopic a- and b-waves and photopic negative responses) were recorded, and eyes were enucleated. Retinas were lectin-stained, flat-mounted, and imaged (11×, 44×). Thy1+ cell density was quantified in central avascular and peripheral vascular regions. Analyses used mixed-effects linear regression with animals nested within litter.

Results: Thy1-specific Vegfr2 deletion increased Thy1+ cell density at P17 in both central avascular and peripheral vascular retina compared to littermate controls (each $p<0.001$). ERG amplitudes (a-wave, b-wave, and photopic negative response) did not significantly differ between groups (all $p>0.05$) at P17.

Conclusion: Following relative hypoxia, Thy1-targeted Vegfr2 deletion increased Thy1+ cell density and did not alter global ERG responses at P17. These findings suggest VEGFR2 is not required for RGC cell survival. Further studies are warranted to determine whether the change in Thy-1-labeled cell density reflects altered RGC survival and to test potential mechanisms involving signaling pathways in Thy1 neurons.

Discussant: **RV Paul Chan**♦

THURSDAY 3:40 PM – 4:00 PM

DAVIO 2 TRIAL: A PHASE 2 STUDY OF EYP-1901 VERSUS AFLIBERCEPT FOR THE TREATMENT OF NEOVASCULAR AGE-RELATED MACULAR DEGENERATION

Jennifer Lim[*♦], Ramiro Ribeiro

Purpose: EYP-1901 is a bioerodible, sustained-release intravitreal insert that delivers the highly selective tyrosine kinase inhibitor, vorolanib, a pan-vascular endothelial growth factor receptor (VEGFR) inhibitor, for at least 6 months. DAVIO 2 is a phase 2, multicenter, prospective, randomized, double-masked study which compared the efficacy and safety of a single EYP-1901 injection to intravitreal injections of aflibercept 2 mg every 8 weeks (q8W) in previously treated eyes with wet AMD (nAMD).

Methods: After 3 aflibercept loading doses (day 1, weeks 4 and 8), patients with nAMD were randomized at week 8 to receive one injection of EYP-1901 2 mg, one injection of EYP-1901 3 mg, or a sham injection for the aflibercept 2 mg q8W arm. Supplemental aflibercept injection was permitted per prespecified best-corrected visual acuity (BCVA) and/or anatomic criteria or investigator discretion. The primary endpoint was the mean change in BCVA from Day 1 to Week 28/32, averaged.

Results: 156 eyes were randomized to a single dose of EYP-1901 2 mg (n = 50) or 3 mg (n = 52), or aflibercept 2 mg q8W (n = 54). Baseline mean BCVAs were 73.9, 74.9 (EYP-1901 2 mg & 3 mg), and 73.4 (aflibercept 2 mg) letters. Mean [SD] changes from baseline BCVA were +1.0 [6.4] and +0.9 [4.2] for EYP-1901 2 mg & 3 mg and +1.3 [6.8] for aflibercept q8W. Similar proportions of eyes gained ≥5, ≥10, and ≥15 letters for EYP-1901 arms versus aflibercept q8W (difference vs aflibercept: ≥5 letters: -3.3, -9.1; ≥10 letters: +4.6, -1.9; ≥15 letters: +0.2, -1.9). Fewer eyes in the EYP-1901 arms than the aflibercept arm lost ≥10 letters. No EYP-1901-related ocular or systemic serious adverse events occurred.

Conclusion: A single dose of EYP-1901 was non-inferior to aflibercept q8W over 6 months and safely resulted in similar proportions of eyes with visual acuity improvement.

Discussant: **Mary Elizabeth Hartnett**[♦]

THURSDAY 4:00 PM – 4:20 PM

DEMYSTIFYING CORTICOSTEROID-RELATED ADVERSE EVENTS AND DISEASE TRAJECTORY OUTCOMES: INSIGHTS FROM THE NEW DAY PHASE 4 CLINICAL TRIAL OF A FLUOCINOLONE ACETONIDE INTRAVITREAL IMPLANT FOR DIABETIC MACULAR EDEMA

Michael Singer[*♦]

Purpose: NEW DAY was a prospective, randomized, active-controlled, multicenter, Phase 4, 18-month study evaluating the efficacy and safety of fluocinolone acetonide (FAc; 0.19 mg) intravitreal implant as a baseline therapy in participants with center-involving DME.

Methods: The study compared two treatment regimens: FAc implant followed by supplemental aflibercept (2 mg/0.05 mL) vs intravitreal aflibercept (AFL) loading (2 mg every 4 weeks for five consecutive doses) followed by supplemental aflibercept (2 mg/0.05 mL). Inclusion criteria were adult participants with type 1 or 2 diabetes, center-involving DME, and treatment-naïve/nearly naïve (≤1 intravitreal ranibizumab or bevacizumab for 12 months preceding screening or ≤4 intravitreal anti-vascular endothelial growth factor (VEGF) injections >12 months before screening). The primary endpoint was the mean number of supplemental aflibercept injections. Efficacy and safety were assessed in all randomized participants.

Results: 517 participants were screened and 306 randomized. Mean (standard deviation, SD) supplemental aflibercept injections were similar between groups (FAc: 2.4 [3.17] vs aflibercept: 2.5 [3.07], P=0.756); mean time to first supplemental injection was 185 and 133 days (P<0.001), respectively. Vision and central subfield thickness outcomes were similar between groups. Cataract procedures occurred in 27.9% (FAc) and 6.6% (aflibercept). Intraocular pressure (IOP) events (increase ≥10 mmHg from baseline) occurred in 15.6% (FAc) and 3.3% (aflibercept). While IOP remained largely stable over time with aflibercept, FAc gradually increased IOP from months 12 to 18, with a steeper rise in participants exceeding the 25 mmHg threshold (3.9%, 6.5%, 14.1%, and 18.1%) than 30 mmHg (1.3%, 2.6%, 5.4%, and 7.7%) at months 3, 6, 12, and 18, respectively. Most IOP elevations were controlled medically; laser or incisional surgery was uncommon in participants receiving FAc (2.6% and 1.3%, respectively). Throughout the study, Diabetic Retinopathy Severity Score (DRSS) regression was similar between FAc and aflibercept groups.

Conclusion: In NEW DAY, functional, anatomic measures and DRSS regression were similar between FAc and aflibercept groups. Safety findings were consistent with previous FAc implant studies. Given the predictability of the timing of IOP elevation, patients should be evaluated at 1 month, month 3 and then every 3 months in order to detect and manage any potential significant IOP increases.

Discussant: **Kent Small**

THURSDAY 4:20 PM – 4:40 PM

SPHERICAL EQUIVALENT REFRACTION VERSUS AXIAL LENGTH FOR PREDICTING CHILDHOOD MYOPIC PATHOLOGY: A SYSTEMATIC REVIEW AND META-ANALYSIS

Robert Clark[*♦], Rupa Wong

Purpose: To determine whether spherical equivalent refraction (SER) or axial length (AL) better predicts myopia related pathology to guide monitoring of childhood myopia progression.

Methods: We performed a PROSPERO-registered systematic review and meta-analysis (CRD420251123893) of population-based studies (≥200 eyes; 1990–2025) reporting AL and/or SER with retinal, cataract, or primary open angle glaucoma (POAG) outcomes. Reviewers screened studies, extracted data, and assessed risk of bias (Newcastle–Ottawa Scale). When ≥3 comparable estimates were available, we pooled odds, risk, or hazard ratios using random effects models with DerSimonian–Laird tau^2 and Hartung–Knapp confidence intervals; smaller blocks were synthesized descriptively.

Results: Seventy studies met the inclusion criteria. Normal AL varied strongly with age, sex, height, and ethnicity, while SER showed much weaker demographic dependence. A small tail of emmetropic eyes reached AL ≥26 mm without pathology. For any myopic retinopathy (prevalence), AL per +1mm conferred an odds ratio (OR) 3.85 (95% CI 1.70–8.72), and AL ≥26 mm was associated with approximately 25-fold higher odds but comprised <10% of myopes. SER data showed retinal risk increasing by OR 1.5–1.8 per –1 D and OR 2–12 for high myopia. For cataract prevalence, SER defined moderate/high myopia yielded OR 3.09 (1.38–6.91) for nuclear and 4.58 (1.35–15.55) for posterior subcapsular cataract, whereas AL-based effects were null or modest. For POAG prevalence, AL per +1mm showed OR 1.37 (1.29–1.46), whereas SER defined moderate/high myopia showed OR 2.95 (1.93–4.51).

Conclusion: Absolute AL thresholds clearly identify a small tail of very long eyes at high retinal risk, but SER better captures cataract and POAG risk gradients across the myopic range that most children will reach. For childhood myopia control, SER should remain the primary progression and risk metric, with AL used selectively to flag and monitor children entering truly pathologic axial length elongation.

Discussant: **Natalie Kerr**

THURSDAY 4:40 PM – 5:00 PM

DIGITAL PHENOTYPING: REAL-TIME ASSESSMENT OF FUNCTIONAL CONSEQUENCES OF GLAUCOMA WITH SMARTPHONES

Sajad Besharati, Vahid Mohammadzadeh, Mahshad Rafiee, Reza Alizadeh, Esteban Morales, Man Kwong, **Joseph Caprioli**, Victoria L. Tseng, JoAnn Giaconi, Simon K. Law, **Kouros Nouri-Mahdavi***

Purpose: Digital phenotyping (DP) is a novel approach that utilizes passive and active smartphone data for continuous, objective collection of behavioral, mobility, and communication measures in human subjects. We investigated DP's ability to assess functional metrics in individuals with definite or suspected glaucoma.

Methods: 24 glaucoma patients and 20 glaucoma suspects (GS) with no cognitive or musculoskeletal affections were monitored over a median (IQR) of 38 (24-63) days using the Beiwe app (Onnela lab, Harvard). Main outcomes were accelerometer data (steps, walking time, cadence), mobility indicators (distance traveled), and behavioral measures (time spent at home). We analyzed smartphone-derived data using descriptive statistics and linear mixed-effects models, adjusting for body mass index (BMI) and age. We used Spearman's rank correlation to assess relationships among disease severity and DP metrics.

Results: The mean (SD) age and mean (SD) worse eye visual field mean deviation (MD) in glaucoma and GS groups were 57.3 (11.9) and 61.2 (9.8) years and −5.4 (8.1) and −0.2 (1.6) dB, respectively. In linear mixed-effects models adjusting for age, BMI, and participant-level repeated-measures data, GS subjects showed higher daily activity than glaucoma patients, walking approximately 691 more steps/day (2131 vs. 1440; +48%, p=0.03) and spent 384 more seconds/day in walking activity (1172 vs. 788 seconds; +49%, p=0.03). Median home stay was 15.7 h/day in glaucoma patients and 13.7 h/day in suspects (p=0.17). Each 1 dB improvement in better-eye MD was associated with 9% more daily walking time and steps (p=0.22).

Conclusion: Our pilot study demonstrated that glaucoma patients were less active and spent more time at home than GS subjects. This study provides proof of concept for digital phenotyping's potential as a novel, scalable tool for real-time monitoring of mobility and behavior in glaucoma and beyond, enabling early detection of functional decline and facilitating personalized care.

Discussant: **Carla Siegfried**

FRIDAY 7:30 AM – 7:50 AM

EVALUATING THE NEED FOR AN ANESTHESIA PROVIDER DURING ROUTINE CATARACT SURGERY FOR RELATIVELY HEALTHY INDIVIDUALS

Madeline Rocks, Usha Kim, Srinivasan Kavitha, Kamatchi Nagu, **Alan Robin***

Purpose: Cataract surgery is the most frequently performed surgical procedure worldwide. In the US, it is common practice for an anesthesia provider (AP) to be present and provide sedation during the procedure. We question the need for an AP, as well as the concomitant expenses and associated material waste.

Methods: We retrospectively evaluated a consecutive patient cohort at the Aravind Eye Care System who underwent cataract surgery from January 1, 2024, through December 31, 2024. Procedures were performed either under general anesthesia (GA), with a sub-tenon's injection (STA), or topical anesthesia (TA) with proparacaine eyedrops. STA and TA groups were not monitored by anesthesia providers without indwelling IV lines; heart rates and oxygen saturations were monitored intraoperatively by the surgeon. Cooperative, healthy patients received TA. Patients with a chronic illness received STA. Uncooperative or medically complicated patients received GA. Incidence of intraoperative serious adverse events (SAE) was the primary outcome. We used descriptive statistics to characterize results.

Results: We evaluated 304,010 cataract surgeries during the study period. Hypertension (35.4%) and diabetes (33.4%) were the most common systemic comorbidities. TA was used in 24.6% of cases (n=74,648), STA in 75.4% (n=229,162), and GA in 0.07% (n = 200). Only 237 patients (0.08%) received intravenous (IV) sedation. SAEs were rare, as only 60 complications occurred (0.02% of all surgeries). The most frequent SAEs were pulmonary edema (32 cases total cases (0.01%); 14 patients with pre-existing cardiopulmonary disease) and allergic or anaphylactic reactions (18 cases total cases). Among patients with complications, 70% had at least one systemic comorbidity.

Conclusion: Most surgeries were uneventful without AP monitoring or the placement of an IV. Our results suggest that anesthesia monitoring may only be necessary in a select minority of patients. Limiting IV sedation and intraoperative anesthesia care will lead to significant cost savings, greatly limit the amount of operative waste, and improve postoperative patient safety.

Discussant: **James Tsai**♦

FRIDAY 7:50 AM – 8:10 AM

PROSPECTIVE IMPLEMENTATION OF AN AQUEOUS HUMOR LIQUID BIOPSY PLATFORM INFORMS CLINICAL DIAGNOSIS AND MANAGEMENT OF RETINOBLASTOMA AND OTHER INTRAOCULAR LESIONS

Jesse Berry*, Laura Kagami, Liya Xu, Jaclyn Biegel

Purpose: LBSeq4Kids is a clinically validated liquid biopsy platform combining low passage whole genome sequencing (LP-WGS) for copy number alterations (CNAs) and a custom cancer targeted sequencing panel (TSP) to detect sequence variants in cell-free DNA from the aqueous humor (AH) of the eye, cerebrospinal fluid, and plasma. The purpose of this study is to evaluate the clinical implementation of this test, prospectively, for retinoblastoma, RB-simulating lesions, and other ocular cancers.

Methods: We present LBSeq4Kids results for the detection of circulating tumor DNA (ctDNA) from a prospective cohort of 60 ocular oncology patients, including 41 with retinoblastoma (RB),13 with non-malignant RB simulating lesions and six with other intraocular malignancies.

Results: Ninety-four percent of baseline retinoblastoma samples obtained at diagnosis were positive for copy number alterations (CNAs) by Low Pass -Whole Genome Sequencing and 83% were positive for pathogenic variants by Targeted Sequencing Panel analysis for RB1 variants. All samples obtained at clinical recurrence were positive for ctDNA, whereas none of the eyes in remission had a positive finding. The presence of CNAs detected by serial sampling in patients being treated for RB was correlated with clinical disease status. None of the patients with RB-simulating lesions had a positive finding by LP-WGS. The sensitivity of the assay to detect ctDNA in the setting of active RB was 98%.

Conclusion: LBSeq4Kids represents a groundbreaking improvement for intraocular malignancies and is highly effective in informing accurate diagnosis based on molecular findings, risk stratification, response to therapy, and surveillance for intraocular disease.

Discussant: **Tatyana Milman**

FRIDAY 8:10 AM – 8:30 AM

THE AGING EYE: WHEN METABOLIC CONTROL IS NOT ENOUGH

Reza Dana*, Rohan Bir Singh, Shweta Sandhu, Seokjoo Lee

Purpose: In the healthy eye, immune homeostasis is maintained by a predominantly tolerance-maintaining microenvironment where specialized immune cells, including antigen-presenting cells and regulatory T cells, act in concert to preserve immune quiescence. Our previous work has shown that this balance is lost in diabetes. In this study, we examine the contribution of advancing age to the disruption of these tolerogenic mechanisms, highlighting the role of aging in dysregulated ocular immunity and increased susceptibility to inflammatory pathology.

Methods: Diabetes was induced in young (4-6 weeks) and old (46-48 weeks) mice using intraperitoneal streptozotocin (STZ) administered daily for 5 consecutive days. Blood glucose was monitored longitudinally, and hyperglycemia was defined as a blood glucose concentration >300 mg/dL. To modulate glycemic status, a subcutaneous insulin pellet was implanted (day 8), and animals with blood glucose <150 mg/dL by day 11 were included in the experiments. The corneas and draining lymph nodes were harvested, single-cell suspensions were prepared, and flow cytometry was performed to assess the cellular markers.

Results: On inducing diabetes, both young and old mice exhibited a marked increase in mature, activated CD11c+ antigen-presenting cells (APCs) in the cornea, characterized by significantly higher expression of MHC-II (young: $p=0.021$; old: $p=0.0009$) and co-stimulatory molecule CD86 (young and old: $p<0.0001$). These changes were accompanied by enhanced migration of APCs from the eye to draining lymph nodes, where they can sensitize T cells, as evidenced by increased $CCR7^+$ expression (young: $p=0.0061$; old: $p=0.0013$). These age-associated changes correlated with a pronounced expansion of interferon gamma–secreting $CD4^+$ cells in the lymphoid tissues (young: $p=0.042$; old: $p=0.0081$), indicating heightened pro-inflammatory T cell priming in both young and aged diabetic animals. In young mice, insulin treatment (and resultant normoglycemia) effectively restored normal immune cell phenotype, fully reversing diabetes-associated increases in MHC-II ($p<0.0001$) and CD86 ($p=0.0017$) expression and markedly reducing APC migration. In contrast, aged mice exhibited only partial responsiveness to insulin therapy. While insulin moderately reduced APC maturation and co-stimulatory marker expression in aged diabetic mice, these effects were incomplete, with persistently elevated frequencies of MHC-II^+ and $CD86^+$ APCs compared to age-matched non-diabetic controls ($p>0.05$). Collectively, these findings demonstrate an age-dependent loss of metabolic regulation across both innate and adaptive immune compartments.

Conclusion: Advanced age fundamentally alters immune responsiveness to metabolic intervention, rendering insulin insufficient in fully restoring ocular immune homeostasis in diabetes. While insulin effectively suppresses APC maturation, migration, and downstream T cell activation in young mice, these regulatory effects are blunted with advancing age, resulting in persistent innate activation and sustained adaptive immune dysregulation. These findings identify aging as a critical modifier of immune-metabolic crosstalk at the ocular surface and suggest that adjunctive, immune-targeted therapies will likely be required to overcome age-associated inflammation and restore immune homeostasis in older individuals with metabolic disease.

Discussant: **Nisha Acharya**

FRIDAY 8:30 AM – 8:50 AM

BLOOD FLOW AFTER INTRAVITREAL INJECTION USING A NEW SPECKLE-BASED OCT ANALYSIS

Richard Spaide*, Kyungmoo Lee, Jen-wei Kuo, Masahiro Akiba, Amir Naderi, Mary Durbin, Tony Ko

Purpose: To describe a novel optical coherence tomography (OCT)–based method for quantifying retinal blood flow using speckle pattern analysis and to apply it to assess the effect of acute intraocular pressure (IOP) elevation following intravitreal injection.

Methods: OCT B-scans were analyzed for speckle structure within vascular lumens. Flow velocity was derived from the horizontal derivative of speckle intensity, which increases as erythrocyte motion produces finer speckle patterns. The mean derivative value within the vessel was used as a relative flow index. The method was first validated in a model eye using human blood pumped through 150-µm capillary tubing at known velocities. Subsequently, retinal blood flow was measured in 20 eyes of 20 patients undergoing anti-VEGF injection for neovascular retinal disease. Flow and IOP were recorded before and serially after injection. A linear mixed model evaluated flow as a function of IOP and age.

Results: In vitro testing showed a power-law correlation between speckle-derived and actual flow velocities ($r^2 = 0.98$) without signal saturation up to 70 mm/s. In patients, mean IOP rose from 14 mmHg pre-injection to 50 mmHg immediately after injection, then decreased to 24 mmHg after 15 minutes. Blood flow remained stable for IOP ≤40 mmHg. Above this level, flow declined 3.6% per mmHg ($P < 0.001$). Age alone had no effect, but in the arteries of older subjects, the reduction in flow with elevated IOP was slightly attenuated.

Conclusion: Speckle-based OCT analysis enables quantitative, depth-resolved measurement of blood velocity without requiring phase data or Doppler angle correction. Using this approach, retinal flow was shown to be well maintained during moderate IOP elevations but to decrease once IOP exceeded approximately 40 mmHg. The study demonstrates both the feasibility of this new method and its application to a common clinical scenario involving millions of patients each year

Discussant: **Jennifer Lim♦**

FRIDAY 8:50 AM – 9:10 AM

CLASSIFICATION OF DIABETIC MACULAR EDEMA WITH INFLAMMATORY BIOMARKERS

Stephen Kim*, Rachel Liu, Sapna Gangaputra, **David Wallace**

Purpose: To evaluate the association of aqueous inflammatory cytokines with three optical coherence tomography (OCT)-based definitions of diabetic macular edema (DME).

Methods: The INflammatory MediatorS in the PathophysIology Diabetic REtinopathy (INSPIRE) study is a prospective, controlled R01-funded trial that enrolled 328 eyes from 164 adults with type II diabetes. At baseline, participants underwent multimodal imaging and aqueous biopsies. DME was classified using three OCT-based definitions: (1) presence of any intraretinal fluid (IRF) in the central 6 mm, (2) central subfield thickness (CST) > 320 μm, and (3) CST > 320 μm with IRF. Aqueous samples were analyzed for 24 inflammatory cytokines using a multiplex bead-based assay. Associations between cytokine levels and DME classifications were analyzed using proportional odds models.

Results: At baseline, IL-6, IL-8, FLT-3L, and IL-10 were significantly elevated in eyes with DME across all three definitions ($p < 0.05$). VEGF-A showed weaker and non-significant associations. The combined definition (CST > 320 μm with IRF) demonstrated the strongest and most consistent correlation with cytokine elevation: IL-6 (odds ratio [OR] 2.93, $p < 0.001$), IL-8 (OR 2.73, $p = 0.003$), FLT-3L (OR 2.27, $p = 0.010$), FGF-2 (OR 1.74, $p = 0.029$), and IL-10 (OR 2.79, $p = 0.001$). In contrast, VEGF-A was not significantly associated with any DME definition ($p > 0.05$). Baseline best corrected visual acuity (BCVA) did not differ significantly among DME classifications, highlighting the limitations of current structural definitions in capturing functional vision loss.

Conclusion: Inflammatory cytokines are strongly associated with DME and may serve as physiological biomarkers that reflect underlying disease activity more accurately than structural OCT metrics alone.

Discussant: **Timothy Olsen**♦

FRIDAY 9:10 AM – 9:30 AM

THE NATIONAL EYE INSTITUTE IN 2026

Michael Chiang*

Purpose: The National Eye Institute (NEI) has been a world leader in directing and funding eye and vision research since 1968, when Congress and President Lyndon Johnson established it as an independent entity within the National Institutes of Health to manage national efforts in vision science. The current annual NEI budget is $896 million. The purpose of this presentation is to communicate current and future NEI priorities and initiatives.

Methods: In November 2021, the NEI published a five-year strategic plan outlining directions and priorities. This incorporated perspectives from researchers, clinicians, professional societies, patient advocates, and the general public. The 2021 NEI strategic plan was organized around seven cross-cutting areas of emphasis (genetics, neuroscience, immunology, regenerative medicine, data science, quality of life, population health & health disparities). Now, NEI is developing a new 2026-2031 strategic plan that will define key initiatives in foundational science, translational science, clinical & population science, and metascience & training.

Results: This presentation will discuss key initiatives that NEI has developed to implement elements of the 2021 strategic plan and discuss a framework-in-progress for the 2026-2031 strategic plan.

Conclusion: Through communication and discussion of priorities, the NEI hopes to work with the community toward its mission of eliminating vision loss and improving quality of life through vision research.

Discussant: **Stephen McLeod**

SATURDAY 7:30 AM – 7:50 AM

AMBLYOPIA CLASSIFICATION THROUGH AI-BASED FEATURE SELECTION IN LIMITED, HIGH-DIMENSIONAL EYE TRACKING DATA

Fatema Ghasia*, Stefano Ramat

Purpose: Amblyopia is a neurodevelopmental disorder caused by early-life binocular decorrelation, leading to deficits in visual acuity, stereopsis, and fixation stability. Current diagnostic methods primarily rely on subjective visual acuity tests, which are often challenging in young children and can result in delayed detection and treatment. Beyond sensory impairment, amblyopia also disrupts ocular motor control, manifesting as abnormal fixational eye movements (FEM). While small FEM are typical, excessive movements indicate fixation instability (FI), offering a promising objective, non-verbal biomarker for amblyopia. This study proposes an AI-driven framework that integrates eye-tracking technology with advanced machine learning to enable accurate, objective detection of amblyopia.

Methods: We analyzed fixation recordings from 135 participants (99 amblyopic, 36 controls), extracting 510 FEM features. Data were split into training (60%) and testing (40%) sets. A custom genetic algorithm (GA) optimized feature selection using a two-layer neural network as the fitness function, prioritizing minimal feature sets for efficiency.

Results: Nine discriminative FEM features spanning fast and slow dynamics were identified. Using these, the classifier achieved 100% accuracy on both training and test sets. Robustness was confirmed via 5-fold and 10-fold cross-validation (accuracy: 0.98 ± 0.02 and 0.99 ± 0.03, respectively), demonstrating strong performance in small-sample, high-dimensional contexts.

Conclusion: AI tools based on FEM metrics offer a powerful, objective approach for amblyopia diagnosis. Automated pipelines can quantify fixation stability, saccadic dynamics, and intersaccadic drifts across viewing conditions, eliminating subjective bias. Unlike conventional deep-learning models requiring large datasets, this hybrid computational-intelligence strategy efficiently navigates complex feature spaces, providing a scalable framework for data-driven clinical decision support in amblyopia management.

Discussant: **R. Lawrence Tychsen**

SATURDAY 7:50 AM – 8:10 AM

COMPARISON OF FELLOW NON-TREATED EYES WITH BILATERAL GA AS WELL AS SHAM EYES AND PROJECTED SHAM WITH PEGCETACOPLAN TREATED EYES IN PATIENTS WITH NONEXUDATIVE AMD, INCLUDING ASSESSMENT OF ELLIPSOID ZONE (EZ) AND RPE LOSS IN OAKS, DERBY, GALE STUDIES

Clement Chan*, Sunir Garg, Diana Do, **SriniVas Sadda**, Robyn Guymer, Gregor Reiter, Jason Lin, Kineta Naidu, Emma Foos, Song Yu, Caroline Baumal, **Ursula Schmidt-Erfurth**

Purpose: Analysis of fellow non-treated eyes in patients with bilateral GA and sham/projected sham with pegcetacoplan-treated eyes in these trials.

Methods: In the 24-month (M) phase-3 OAKS/DERBY (O/D) studies, if both eyes met the inclusion criteria, the eye with worse BCVA was selected as the study eye. In GALE, a 3-year open-label extension study, eyes that received pegcetacoplan continued the same treatment regimen (monthly [PM] or every-other-month [PEOM]) while sham eyes switched to pegcetacoplan at their previous intervals. In GALE, projected sham was used to compare treatment effects. A post hoc analysis compared GA growth rates between treated eyes and pooled untreated fellow eyes. Ellipsoid zone (EZ) and retinal pigment epithelium (RPE) loss in study eyes versus untreated fellow eyes were quantified with Spectralis OCT (Heidelberg) using AI-based algorithms (RetInSight).

Results: At baseline, 589 patients (58%) had bilateral GA with the fellow eye meeting GA inclusion criteria. Fellow and study eyes had similar baseline characteristics (mean GA size: 8.3 mm+/-3.8^2; subfoveal: 58%, non subfoveal: 41%; unifocal: 30%). In sham patients with bilateral GA (n=196/589), a strong correlation in GA growth rate was observed between study and untreated fellow eyes (ρ [Spearman] = 0.70). Over 24M, GA of both subgroups progressed at the same rate (mean: 4.1 mm^2, CI: 3.8, 4.4). Over 36M, reduction in GA growth rates in pegcetacoplan eyes compared to untreated fellow eyes were PM: 23%, PEOM: 19% (both $p < 0.0001$). Similar reductions in GA growth rates were noted in pegcetacoplan eyes compared with sham/projected sham (PM: 25%, PEOM: 20% (both $p<0.001$). Regarding AI analysis of O/D eyes at 24M (897/1258 patients), PM reduced SQRT EZ and RPE loss by -41.1% and -27.3%, respectively, compared to the untreated fellow eye.

Conclusion: Similarly, worse growth rates were noted between sham/projected sham and fellow non-treated eyes, with worse EZ loss, highlighting the robustness of pegcetacoplan efficacy.

Discussant: **Anne Hanneken**

SATURDAY 8:10 AM – 8:30 AM

EVALUATION OF A RISK PREDICTION MODEL FOR PROGRESSION TO ADVANCED AGE-RELATED MACULAR DEGENERATION: VALIDATION IN AN EXTERNAL COHORT

Johanna Seddon*, Dikha De, Bernard Rosner

Purpose: To validate a model to predict progression to advanced age-related macular degeneration (AMD) in an independent external cohort, to ensure generalizability for implementation of an online risk calculator.

Methods: The advanced AMD (AAMD) risk prediction model included baseline demographics, lifestyle factors, ocular variables, family history of AMD, and genetic variants. The clinical age-related maculopathy staging system (CARMS) categorized eyes at baseline as 1-no AMD; 2-early; 3-intermediate; and the outcome was progression to advanced stages (4-geographic atrophy or 5-neovascular). We used beta estimates from a regression model derived from the Age-related Eye Disease Study (AREDS) data. This AAMD risk score was applied to the Seddon Longitudinal Cohort Study (SLCS), which originated in 1985 to study risk and protective factors for AMD progression. We assessed discrimination by the AUC = the probability that a risk score from a progressing eye is higher than for a non-progressing eye over 5 and 12 years. Calibration, assessed by the expected number of eyes that progress (E) divided by the observed number (O), was also determined.

Results: In the derivation cohort, 2738 subjects, 937 of 5027 eyes progressed to AAMD (19%). In the validation cohort (SLCS), 3669 subjects, 1224 of 5767 eyes, progressed to AAMD (22%). The derivation cohort prediction model had an AUC (5-year) = 0.83 and AUC (12-year) = 0.88. In the validation cohort, the AUCs were comparable [AUC (5-year) = 0.85 and AUC (12-year) = 0.89]. The E/O ratio was 0.88 (95%CI=0.83–0.95), supporting good overall calibration.

Conclusion: The AAMD risk prediction model was externally validated in SLCS with good discrimination and calibration. The risk score, incorporating demographic, lifestyle, ophthalmic, and genetic variables, accurately differentiates between progressing and non-progressing eyes and assesses the level of risk. This validated model can be implemented via an online calculator for early prevention, personalized monitoring, and educational strategies.

Discussant: **William Mieler**

SATURDAY 8:30 AM – 8:50 AM

COMPARATIVE IMPACTS OF SOCIAL VULNERABILITY INDEX AND RACE ON GLAUCOMA PROGRESSION

Karim Dirani*, Justin Bennie, Felipe Medeiros, Douglas Costa, Mark Juzych, **M. Roy Wilson**

Purpose: To assess the association between the Social Vulnerability Index (SVI), a census tract–level composite proxy for social determinants of health, and glaucoma progression measured by longitudinal change in Humphrey Visual Field (HVF) mean deviation (MD) and optical coherence tomography (OCT) average peripapillary retinal nerve fiber layer (pRNFL) thickness.

Methods: Retrospective cohort of all glaucoma patients evaluated over 15 years at a tertiary ophthalmology center serving a diverse, urban population. SVI, assigned from residential address, was assessed alongside covariates for glaucoma progression (intraocular pressure, age, sex, race). Glaucoma severity was classified using a modified Mills Glaucoma Staging System based on HVF testing. Linear mixed-effects models evaluated longitudinal MD and pRNFL change, overall and stratified by severity, adjusting for covariates.

Results: After reliability filtering, 76,340 HVFs from 12,238 eyes and 82,366 OCTs from 14,667 eyes were included. In adjusted models, higher SVI was associated with faster pRNFL thinning ($\beta = -0.067$, $P = .015$) and faster MD decline ($\beta = -0.071$, $P < .001$) in the overall cohort. Stratified analyses included ocular hypertension (OHT; n = 9,987), early/moderate glaucoma (n = 51,439), and advanced/severe glaucoma (n = 14,914). Increasing SVI was associated with greater annual MD decline in early/moderate ($\beta = -0.034$, $P = .005$) and advanced/severe glaucoma ($\beta = -0.188$, $P = .004$), but not in OHT ($\beta = 0.000$, $P = .985$), with larger effects at greater disease severity. Race was not associated with progression after adjustment for SVI.

Conclusion: Higher SVI was independently associated with faster structural and functional glaucoma progression, with stronger effects at greater disease severity. To our knowledge, this is the first study to link higher SVI to longitudinal functional visual loss and to demonstrate a stepwise increase in its prognostic value with worsening glaucoma severity, supporting the incorporation of social risk into glaucoma risk stratification and longitudinal management.

Discussant: **Anne Coleman**

SATURDAY 8:50 AM – 9:10 AM

MANAGING STEROID-INDUCED GLAUCOMA: BEYOND STANDARD-OF-CARE

Rachel Kuchtey[*♦], Ryan Xavier, Samuel Insignares, John Kuchtey

Purpose: We previously demonstrated that Dexamethasone (Dex) strongly induces expression of Angiopoietin-Like 7 (ANGPTL7) in both in vitro and ex vivo models. Here, we test the hypothesis that ANGPTL7 is a biomarker and potential therapeutic target in steroid-induced glaucoma (SIG).

Methods: Human aqueous humor (AH) samples were obtained from SIG patients at the time of their intraocular surgeries as well as from controls during their cataract surgery. We used two complementary approaches – Western Blotting (WB) and enzyme-linked immunosorbent assay (ELISA) to quantify ANGPTL7 protein in AH. Post-translational modification (PTM) of ANGPTL7 protein glycosylation was investigated by treatment of AH with the glycosidase PNGase F followed by WB. As a mouse model, corneoscleral explants, including trabecular meshwork, were dissected from adult normal mice and incubated in Dex for 3 days. Medium was collected each day, and ANGPTL7 WB was performed. Unpaired Student t test with Welch's correction was used for statistical analyses.

Results: Compared to controls, SIG AH showed a statistically significant increase of ANGPTL7 detected by ELISA ($p=0.03$). WB confirmed the findings, but more interestingly, it revealed discernible differences in ANGPTL7 band migration patterns in AH samples from glaucoma patients compared to controls, suggesting abnormal PTM. Consistent with this hypothesis, treatment of AH with PNGase F normalized migration patterns in AH of glaucoma patients. The mouse model showed time-dependent elevation of ANGPTL7 in corneoscleral explants treated with Dex.

Conclusion: Altered ANGPTL7 banding patterns and elevated levels in SIG AH suggest that ANGPTL7 could serve as a biomarker for identifying patients with adverse responses of elevated intraocular pressure caused by steroid treatment. Recent reports of protective effects from glaucoma in human patients carrying loss-of-function of ANGPTL7 alleles suggest that reducing ANGPTL7 could be a novel treatment for SIG. Our mouse model offers pre-clinical testing for the safety and efficacy of this approach.

Discussant: **Peter Netland**

SATURDAY 9:10 AM – 9:30 AM

COMPARING DIFFERENT CURVATURE METRICS FOR MODELING CORNEAL EPITHELIAL THICKNESS VARIATION

Hady Yazbeck*, Jad Assaf, Jiachi Hong, Yan Li, **David Huang**

Purpose: Corneal epithelial thickness is known to vary in response to corneal curvature. Our study aimed to compare sub-epithelial axial, tangential, and mean curvature metrics for their ability to model epithelial thickness in keratoconus eyes.

Methods: This retrospective observational study included 40 keratoconus eyes from 26 patients with Kmax > 48D. Epithelial thickness and corresponding sub-epithelial curvature values (axial, tangential, and mean) were sampled across 5.5mm-diameter OCT maps. Curvature was converted to diopter (D) units using the keratometric index. For each curvature metric, a sigmoid function was fit to predict epithelial thickness. Model performances were evaluated between (1) curvature-based models and (2) against a null model of uniform epithelial thickness. Models were compared using population-level fit R-squared, and test-fold root-mean-square error (RMSE) averaged across 100 iterations of 5-fold cross-validation.

Results: RMSE is reported as mean (95% confidence interval). The null model yielded an RMSE of 4.63 (4.54–4.72) μm. The axial-curvature model achieved an RMSE of 4.10 (4.03–4.20) μm with R-squared=0.23; the tangential-curvature model achieved an RMSE of 3.43 (3.37–3.41) μm with R-squared=0.47; and the mean-curvature model achieved an RMSE of 3.31 (3.26–3.40) μm with R-squared=0.51. All curvature-based models outperformed the null model ($P<0.001$), and the mean-curvature model outperformed all other models ($P<0.001$). The slope parameter of the mean-curvature model was −0.18 μm/D.

Conclusion: Epithelial thickness responds to sub-epithelial mean curvature. The observed fit (R-squared=0.51) is moderate. The residual variance may be explained by inter-individual variability in epithelial curvature response and other processes that affect epithelial thickness. Limitations include restricted spatial sampling from the OCT protocol (across 8 meridians) and a keratoconus-only cohort, which may limit generalizability to eyes with other types of surface irregularity, or where epithelial changes are driven by other processes such as the lid-wiper effect, dry eye or contact lens warpage.

Discussant: **Douglas Koch**♦

AOS 2026

Poster Abstracts

Posters will be displayed on Thursday, May 21 through Saturday, May 23.

Poster authors will be available to discuss their work during guided poster sessions scheduled on Friday, May 22 from 9:30 AM–10:15 AM and on Saturday, May 23 from 9:30 AM–10:15 AM.

PLEASE NOTE THE FOLLOWING PROGRAM KEY:

Bold = *AOS Member*
* = *Presenter*
♦ = *Financial Disclosure*

(Posters will indicate relevant financial relationships.)

POSTER SESSION I — FRIDAY, MAY 22

MONITOR 1		
9:30 AM – 9:52 AM	THE 1-STEP VERSUS 2-STEP SUBRETINAL INJECTION TRIAL (1,2-SIT): A RANDOMIZED CONTROLLED TRIAL TO COMPARE DRUG REFLUX FOLLOWING SUBRETINAL INJECTION	Matthew Simunovic
9:53 AM – 10:15 AM	INTRAOCULAR PRESSURE CHANGES WITH GAS TAMPONADE: ELEVATOR AND FREEWAY MODELS	Kent Small
MONITOR 2		
9:30 AM – 9:52 AM	ARTIFICIAL INTELLIGENCE-GUIDED PERSONALIZED ESCALATION OF THERAPY IN OPEN-ANGLE GLAUCOMA	Deyu Fred Sun
9:53 AM – 10:15 AM	CLINICALLY SIGNIFICANT FINDINGS AND NEIGHBORHOOD DEPRIVATION IN AN ARTIFICIAL INTELLIGENCE-BASED DIABETIC RETINOPATHY DETECTION PROGRAM IN NORTHERN CALIFORNIA	Carolyn Pan
MONITOR 3		
9:30 AM – 9:52 AM	HOW LOW CAN WE GO? COMPARATIVE OUTCOMES OF PATIENTS WITH LARGE POSTERIOR UVEAL MELANOMA TREATED WITH STANDARD 85 VERSUS 75 GY BRACHYTHERAPY TO THE TUMOR APEX	Zelia Correa
9:53 AM – 10:15 AM	A MULTIDIMENSIONAL PATIENT-REPORTED OUTCOMES MEASURE FOR DIABETIC RETINAL DISEASES	Thiran Jayasundera
MONITOR 4		
9:30 AM – 9:52 AM	THE AMERICAN BOARD OF OPHTHALMOLOGY AND ITS FOUNDING ORGANIZATIONS: THEN AND NOW	Alina Huang
9:53 AM – 10:15 AM	EFFECTS OF CLINIC REDESIGN AND PATIENT DEMOGRAPHIC FACTORS ON IMAGING WAIT TIME AND TOTAL VISIT TIME IN AN ACADEMIC OPHTHALMOLOGY PRACTICE	Christine Xu
MONITOR 5		
9:30 AM – 9:52 AM	EVALUATION OF FLUOROMETHOLONE AS ADJUNCTIVE MEDICAL THERAPY FOR TRACHOMATOUS TRICHIASIS SURGERY (FLAME): A PARALLEL, DOUBLE-BLIND, RANDOMISED CONTROLLED FIELD TRIAL IN THE JIMMA ZONE, ETHIOPIA	John Kempen
9:53 AM – 10:15 AM	TRIALS AND TRIBULATIONS OF CROSS-CULTURAL CLINICAL TRIAL RESEARCH	John Kempen
MONITOR 6		
9:30 AM – 9:52 AM	THRESHOLDS FOR MEDICAL OUTCOMES AS A SAFEGUARD FOR QUALITY, SAFETY AND PROFESSIONALISM	David Wilson

POSTER SESSION II — SATURDAY, MAY 23

MONITOR 1		
9:30 AM – 9:52 AM	INCLEMENT WEATHER PATTERNS AND INCIDENCE OF GLAUCOMA SURGERY IN THE CALIFORNIA MEDICARE POPULATION	Victoria Tseng
9:53 AM – 10:15 AM	RACIAL AND ETHNIC PARITY AND SOCIOECONOMIC DISPARITY IN LASER TRABECULOPLASTY OUTCOMES AMONG CALIFORNIA MEDICARE BENEFICIARIES	Ken Kitayama
MONITOR 2		
9:30 AM – 9:52 AM	MANAGEMENT OF ACUTE CENTRAL RETINAL ARTERY OCCLUSION (CRAO) IN 2026	Valerie Biousse
9:53 AM – 10:15 AM	CARDIOVASCULAR RISK BY POOLED COHORT EQUATIONS SCORE AND INCIDENT ISCHEMIC OPTIC NEUROPATHY IN THE ALL OF US RESEARCH PROGRAM	Janet Coleman-Belin
MONITOR 3		
9:30 AM – 9:52 AM	OCT SCAN TILT CONFOUNDS PHOTORECEPTOR BIOMARKERS	Brandon Lujan
MONITOR 4		
9:30 AM – 9:52 AM	THE FIRST SMALL-INCISION INTRAOCULAR LENS SURGERIES BY MAZZOCCO AND BLAYDES IN 1984	Christopher Leffler
9:53 AM – 10:15 AM	SURGERY FOR ESOTROPIA: THE "LEGEND" OF THE DOSE-RESPONSE CURVE REVISITED AND THE OPTIMAL SURGICAL STRATEGY	Christopher Leffler
MONITOR 5		
9:30 AM – 9:52 AM	MODIFIED BLEPHAROTOMY FOR UPPER EYELID RETRACTION IN THYROID EYE DISEASE	Kimberly Seamon
9:53 AM – 10:15 AM	HOW DOES GENDER-AFFIRMING HORMONE THERAPY AFFECT THE OCULAR TEAR SYSTEM AMONG TRANSGENDER PATIENTS?	Michael Foster
MONITOR 6		
9:30 AM – 9:52 AM	A CONTEMPORARY RETROSPECTIVE CASE SERIES TO IDENTIFY ETIOLOGIES AND CHARACTERIZE OUTCOMES OF ADULT STRABISMUS SURGERY	Josiah Fahhoum
9:53 AM – 10:15 AM	INFLUENCE OF AGE AND UNDERLYING ETIOLOGIES ON OUTCOMES OF STRABISMUS SURGERY IN THE ELDERLY POPULATION	Hilda Capó

***POSTER ABSTRACTS ARE LISTED IN ALPHABETICAL ORDER BY PRESENTING AUTHOR'S LAST NAME.**

SESSION II | MONITOR 2 | 9:30 AM – 9:52 AM

MANAGEMENT OF ACUTE CENTRAL RETINAL ARTERY OCCLUSION (CRAO) IN 2026

Valerie Biousse[*♦], Madhuri Akella, Fadi Nahab, Nancy Newman

Purpose: The acute treatment of CRAO remains limited by delayed/missed diagnosis in emergency departments (ED), mostly because of no immediate ophthalmology access. Eye-Stroke protocols, including remote CRAO diagnosis with non-mydriatic color fundus photography and OCT (NMFP-OCT,) have dramatically accelerated diagnosis. Recent meta-analyses and two randomized clinical trials evaluating intravenous thrombolysis within 4.5 hours of vision loss have shown conflicting results, generating confusion in current recommendations. We review our Eye-Stroke protocol and provide up-to-date recommendations for the acute management of CRAO based on recent clinical trials (THEIA and TenCRAO) and interim analysis of another ongoing trial (REVISION).

Methods: Prospective consecutive series of CRAO/BRAO patients (onset <1 week) between 06/2023-12/2025 who received NMFP-OCT in our ED, and review of current treatment recommendations.

Results: Among 90 acute CRAO/BRAO eyes, 15 (16.6 %) had vision loss <4.5hours and 46 (51.1%) 4.5-≤24hours. Median times from presentation to NMFP-OCT waere30 minutes (IQR,17.5-78/ range,10-330) and 95.5minutes (IQR,51-180.75/range,9-442), respectively. Diagnosis was made remotely: color+OCT, 70/90 eyes; OCT only, 16/90 eyes; 4/90 uninterpretable imaging. 6/15 eyes presenting within 4.5hours received IV-thrombolysis. Brain MRI (85 patients) showed concurrent cerebral infarctions in 17/85 (20%); immediate stroke workup demonstrated major causes of CRAO/BRAO in 58 patients (64.4%).

Conclusion: Despite our ED Eye-Stroke protocol facilitated by NFMP-OCT, only 15/90 (15.3%) of acute CRAO/BRAO eyes were diagnosed early enough to be considered for IV-thrombolysis, administered to only 6/15 (40%); delay was primarily because of transfers from other EDs/eye care providers. Two recent underpowered clinical trials did not demonstrate superiority of IV-thrombolysis over 300mg aspirin in acute CRAO; however recent meta-analyses are encouraging, suggesting that off-label IV-thrombolysis can still be considered within 4.5hours until interim results of the REVISION trial are available. Meanwhile, deployment of NMFP-OCT in EDs for remote diagnosis/treatment of CRAO is necessary to reduce time to diagnosis, avoid transfers, and improve patient outcomes.

SESSION II | MONITOR 6 | 9:53 AM – 10:15 AM

INFLUENCE OF AGE AND UNDERLYING ETIOLOGIES ON OUTCOMES OF STRABISMUS SURGERY IN THE ELDERLY POPULATION

Hilda Capó*, Charlotte Tibi

Purpose: To evaluate the outcomes of strabismus surgery in older adults and assess whether increasing age or underlying etiology affects surgical success.

Methods: Retrospective review of medical records of patients aged ≥60 years who underwent strabismus surgery at a tertiary referral center. Motor success was defined as a vertical deviation of ≤5 Δ and a horizontal deviation of ≤10 Δ in primary gaze, and sensory success as resolution of pre-operative diplopia. Outcomes were assessed after initial and final surgeries. Associations between age, etiology, surgical factors, and outcomes were analyzed.

Results: A total of 562 patients were included (mean age 71.7 ± 6.6 years; 56.1% female). Preoperative diplopia was present in 85.9% of patients. The most common etiologies were paralytic strabismus (27.9%), adult-onset esotropia (19.0%), and thyroid eye disease (16.4%). Following initial surgery, motor success was achieved in 65.1% and sensory success in 62.9% of patients. After reoperation in 82 patients (14.6%), motor success increased to 78.1% and sensory success to 73.3%. No significant differences in mean age were observed based on sensory success (P = .8529), motor success (P = .1670), or etiology (P = .1069). In contrast, underlying etiology (P = .0008) predicted sensory success, and etiology (P = .0670) and use of adjustable sutures (P = .0003) predicted motor success. Use of adjustable sutures was independently associated with higher motor success (OR 2.15; 95% CI 1.42–3.25).

Conclusion: Strabismus surgery in the elderly population frequently results in favorable motor alignment and resolution of diplopia. Increasing age does not negatively impact surgical outcomes. Etiology and the use of adjustable sutures are important predictors of success. These findings support offering strabismus surgery to appropriately selected elderly patients.

SESSION II | MONITOR 2 | 9:53 AM – 10:15 AM

CARDIOVASCULAR RISK BY POOLED COHORT EQUATIONS SCORE AND INCIDENT ISCHEMIC OPTIC NEUROPATHY IN THE ALL OF US RESEARCH PROGRAM

Janet C. Coleman-Belin*, Deyu Fred Sun, Fei Yu, **Anthony. C. Arnold**, Victoria L. Tseng

Purpose: To examine associations between cardiovascular risk by Pooled Cohort Equations (PCE) score and incident ischemic optic neuropathy (ION) in the All of Us (AoU) Research Program.

Methods: The study population included all PCE-eligible participants in AoU v7 between 2009 and 2018 without a history of atherosclerotic cardiovascular disease (ASCVD) or ION. The PCE score, a measure from the American College of Cardiology and American Heart Association designed to predict 10-year risk of ASCVD, was defined using age, sex, blood pressure, cholesterol levels, and smoking status. Incident ION was defined as the first ION diagnosis occurring after baseline. Time-to-event was calculated from baseline to the earliest of ION diagnosis, last EHR date, or June 30, 2022. Cox proportional hazards models were used to estimate hazard ratios (HRs) for incident

ION by PCE category (Low, Borderline, Intermediate, High), adjusting for education level and chronic kidney disease (CKD). Proportional hazards assumptions were assessed using Schoenfeld residuals.

Results: Of 52,847 included participants, there were 50 (0.09%) incident ION events during the study period. Mean age for the study population was 56.4±9.6 years, and the largest proportion of participants were female (n=33,542; 63.5%). In adjusted multivariable proportional hazards regression, intermediate (hazards ratio [HR]=4.23, 95% confidence interval [CI]=2.03, 8.79) and high (HR=3.79, 95% CI=1.48, 9.70) versus low PCE risk categories were associated with increased incidence of ION. Similar trends were observed in sensitivity analyses stratified by baseline year.

Conclusion: In the AoU population, intermediate and high-risk PCE categories were associated with increased long-term incident ION. Further investigation of the PCE score as a screening tool for increased monitoring and ION risk factor mitigation may be of benefit to modulate long-term ION risk.

SESSION I | MONITOR 3 | 9:30 AM – 9:52 AM

HOW LOW CAN WE GO? COMPARATIVE OUTCOMES OF PATIENTS WITH LARGE POSTERIOR UVEAL MELANOMA TREATED WITH STANDARD 85 VERSUS 75 GY BRACHYTHERAPY TO THE TUMOR APEX

Zelia Correa*, Gustavo Gameiro, Matthew Studenski, William Jin, **J. William Harbour**

Purpose: To compare the therapeutic outcome of patients with large posterior uveal melanoma (PUM) treated by I-125 plaque brachytherapy (I-125) using low dose (75 Gy) versus standard dose (85 Gy).

Methods: Retrospective chart review of patients with large PUM that underwent treatment with low and standard dose I-125 brachytherapy. Patients treated with low-dose Gy were matched with patients treated at a standard dose of 85Gy. Data abstracted included: age, sex, ethnicity, baseline clinical features, baseline tumor measurements, total radiation dose to tumor apex, sclera, fovea, and optic nerve, tumor measurements following treatment, complications such as toxic tumor syndrome, radiation retinopathy, cataract, need for anti-VEGF injection, scleral necrosis, rate of enucleation, final BCVA, tumor recurrence, metastasis-free survival, and follow up interval.

Results: Our study included 33 patients. 16 patients received 75 Gy to the tumor apex, and 17 patients received 85 Gy. There were no statistically significant differences between the two groups regarding all baseline and follow-up variables. Although the baseline best corrected visual acuity (BCVA) (LogMAR) was slightly worse in the lower dose group, 0.77 ± 0.72 [0.50] compared to the standard dose 0.54 ± 0.66 [0.30], the final BCVA was better in the low dose group 1.40 ± 1.01 [1.10] compared to the standard dose group 2.25 ± 1.14 [2.50] (nominal P = 0.04). There was a trend towards a higher rate of secondary enucleation due to treatment complications in the standard dose group, but this was not statistically significant (3 in the standard dose versus none in the lower dose group, nominal P = 0.087). Six patients in the standard dose group have developed metastasis, and 3 expired. Only 3 patients in the lower dose group developed metastasis, all of whom are still living. The lower dose group has a shorter follow-up average of 18.80 months (± 14.76) compared to the standard dose of 37.94 months (± 19.22) because we started treating at a lower dose in an effort to improve globe retention.

Conclusion: Low dose I-125 using 75Gy to the tumor apex appears to be equally effective in achieving tumor regression in large uveal melanomas compared to standard 85Gy with possibly better final visual acuity and a trend towards lower complication rate. A larger prospective study with a longer duration of follow-up is warranted to confirm findings from this study.

SESSION II | MONITOR 6 | 9:30 AM – 9:52 AM

A CONTEMPORARY RETROSPECTIVE CASE SERIES TO IDENTIFY ETIOLOGIES AND CHARACTERIZE OUTCOMES OF ADULT STRABISMUS SURGERY

Josiah Fahhoum*, Hanan Fakhruddin, Ellis Ann Jackson, Andrew Manley, Lauren Ditta, Mary Ellen Hoehn, **Natalie Kerr**

Purpose: Surgical management of adult strabismus is evolving as the population ages and new, underlying disease processes emerge. This study characterizes etiologies and surgical outcomes among adults who underwent strabismus surgery at the Hamilton Eye Institute in Memphis, TN.

Methods: This retrospective case series included 320 adults (≥18 years) who underwent strabismus surgery by three fellowship-trained surgeons between 2016 and 2024. Electronic medical records were reviewed for demographics, strabismus etiology, prior treatments, and pre- and postoperative sensorimotor outcomes.

Results: The cohort was predominantly female (61.6%), with a mean surgical age of 51 years. Childhood-onset strabismus was present in 143 patients (44.7%), while 177 (55.3%) had adult-onset disease. Prior strabismus surgery was more common in childhood-onset patients than adult-onset patients (19.6% vs 11.9%; $p<0.001$). The most common adult-onset etiologies were thyroid eye disease (14.7%) and sagging eye syndrome (11.9%). Preoperatively, 59.2% of patients reported diplopia, 89.7% lacked sensory fusion, and 69.4% lacked stereoacuity. Postoperatively, childhood-onset patients demonstrated higher rates of diplopia resolution compared with adult-onset patients (83.8% vs 52.4%; $p<0.001$). In contrast, adult-onset patients had greater odds of achieving sensory fusion (30.2% vs 18.8%; $p=0.036$) and stereoacuity (55.6% vs 36.2%; $p=0.026$). Horizontal motor success (≤10 prism diopters) was more common in adult-onset patients (83.6% vs 52.8%; $p<0.001$), while vertical motor success (≤5 prism diopters) did not significantly differ between the groups.

Conclusion: Adults undergoing strabismus surgery demonstrate distinct clinical characteristics and outcomes based on childhood versus adult-onset disease, informing expectations as to presenting symptoms and outcomes. Further, this study highlights emerging entities, such as sagging eye syndrome, which lack CPT codes and are not represented in CPT-based databases, underscoring the value of institutional case series like ours.

SESSION II | MONITOR 5 | 9:53 AM – 10:15 AM

HOW DOES GENDER-AFFIRMING HORMONE THERAPY AFFECT THE OCULAR TEAR SYSTEM AMONG TRANSGENDER PATIENTS?

Michael Foster*, Keith Arnold, Tomasz Tabernacki, Chase Turner, **Peter Netland**, Kirtishri Mishra

Purpose: Gender-affirming hormone therapy (GAHT), including androgens and estrogens, is a key component of care for transgender individuals. Receptors for these hormones are present in various ocular structures, including the tear system. While estrogen's effects on dry eyes have primarily been studied in postmenopausal cisgender women and cisgender women on hormonal contraception, the impact of GAHT on tear system disorders in transgender populations remains unclear. This study aimed to determine whether GAHT influences tear system health in transgender individuals.

Methods: This observational study analyzed de-identified data from 47,246 transgender men and 31,866 transgender women ages 18 years and older via the TriNetX database. Cohorts were divided into transgender men on hormone therapy (TMHT) and transgender women on hormone therapy (TWHT), and those not on hormone therapy (TMn; TWn). Propensity score matching was performed based on age, race, and known risk factors for dry eye. Kaplan-Meier survival analysis assessed development of primary tear system disorders including lacrimal system disorders, meibomian gland dysfunction, keratoconjunctivitis sicca, and the associated pathologies, blepharitis and chalazion.

Results: 23,623 transgender men and 15,933 transgender women on hormone therapy were compared to age matched controls. There were no significant differences in the rates of any dry eye-associated diagnosis. Among transgender men, cumulative disorders with associated pathologies occurred in 0.90% (TMHT) vs. 0.90% (TMn; $p = 0.211$). Among transgender women, cumulative tear disorders with associated pathologies occurred in 0.94% (TWHT) vs. 1.17% (TWn; $p = 0.072$).

Conclusion: Neither masculinizing nor feminizing GAHT impacted the risk of tear disorders in transgender individuals. These findings support the ocular safety of GAHT and highlight the need for further research in patients with preexisting tear system disease and across gender-diverse populations.

SESSION I | MONITOR 4 | 9:30 AM – 9:52 AM

THE AMERICAN BOARD OF OPHTHALMOLOGY AND ITS FOUNDING ORGANIZATIONS: THEN AND NOW

Alina Huang*, Meghan McGowan, **George Bartley**, **Hans Grossniklaus**

Purpose: To examine the historical and current missions of the founding organizations of the American Board of Ophthalmology (ABO): the American Academy of Ophthalmology and Otolaryngology (AAOO), the American Medical Association (AMA), and the American Ophthalmological Society (AOS).

Methods: We conducted a comparative organizational analysis using archival records, society publications, and publicly available documents. Organizational missions and governance models were reviewed from 1914 to the present. This was a non-clinical organizational analysis without human subjects or patient data.

Results: The ABO was established in 1916 as the American Board for Ophthalmic Examinations by the AAOO, the Ophthalmology Section of the AMA, and the AOS in response to inadequate educational and practice standards in ophthalmology. It was the first medical certifying board in the United States and was a founding member of the Advisory Board of Medical Specialties in 1933. Over time, the AAOO amicably separated into ophthalmic and otolaryngologic organizations, with the AAO developing major educational, advocacy, and service activities; the AMA increasingly focused on national policy and advocacy; and the AOS retained a selective professional role centered on academic leadership and scholarship. The ABO was governed by representatives of its founding organizations until 1982, when it became fully autonomous. Although the relationships between the ABO and AAO and the AOS have remained strong, other organizations, such as the ABMS, ACGME, and AUPO, have become more relevant than the AMA for the ABO.

Conclusion: The ABO and its founding organizations have evolved considerably since the early 1900s. Each plays an important role in serving the public and the profession.

SESSION I | MONITOR 3 | 9:53 AM – 10:15 AM

A MULTIDIMENSIONAL PATIENT-REPORTED OUTCOMES MEASURE FOR DIABETIC RETINAL DISEASES

Thiran Jayasundera*

Purpose: The development of a multidimensional Patient-reported Outcomes Measure (PRO) uniquely tailored to Diabetic Retinal Diseases (DRD), one that integrates assessment of the full clinical spectrum of DRD and its visual dysfunction, psychological well-being, quality of life, and associated burdens.

Methods: A PRO was developed for individuals aged 18 and older with DRD. Transcripts of In-Depth Interviews (IDI) were quantitatively analyzed in Atlas.ti software. Quotations were coded and analyzed using grounded theory of selective coding. Psychometric modeling (graded response model) examined dimensionality, estimated item information, and scored participant latent traits.

Results: A total of 114 patients with diabetic retinopathy, 91 for In-Depth Interviews (IDI) and focus groups, and 23 for cognitive interviews were interviewed for content generation. Another 300 patients had the parent PRO administered for the application of Item Response Theory and measurement of test-retest variability. PRO items were based on the recurrent themes derived from codes and reflected the common language used by participants in the IDIs. The domains were: central vision (CV), CV-mesopic, CV-scotopic, contrast sensitivity (CS), CS-mesopic, CS-scotopic, color vision, dark adaptation, depth perception (DP), DP-mesopic, DP-scotopic, light adaptation, metamorphopsia, motion sensitivity, photosensitivity, peripheral vision (PV), PV-mesopic, PV-scotopic, mesopic, scotopic, vision variability, diabetes burnout, DRD burnout, diabetes insight, DRD insight, diabetes self-efficacy, DRD self-efficacy, diabetes resiliency, guilt, negative thinking/rumination, perceived ableism, shame, vision-related loneliness, vision-related social anxiety,

vision-related worry, self-regulation, diabetes treatment adherence, DRD treatment adherence, diabetes treatment satisfaction, DRD treatment satisfaction, diet habits, attitudes and emotions, exercise attitude and support, intravitreal injection anxiety/tolerability, and retinal laser anxiety/tolerability.

Conclusion: This PRO is intended to serve as a standardized endpoint for future DRD clinical trials as well as clinical care. A holistic and integrated approach aims to recognize the interconnectedness of visual, physical, and psychological health in supporting patient-centered care.

SESSION I | MONITOR 5 | 9:30 AM – 9:52 AM

EVALUATION OF FLUOROMETHOLONE AS ADJUNCTIVE MEDICAL THERAPY FOR TRACHOMATOUS TRICHIASIS SURGERY (FLAME): A PARALLEL, DOUBLE-BLIND, RANDOMISED CONTROLLED FIELD TRIAL IN THE JIMMA ZONE, ETHIOPIA

John H. Kempen[*♦], FLAME Trial Research Group

Purpose: In trachoma, trachomatous trichiasis (TT) mediates visual impairment. TT surgery has an unacceptably high relapse incidence. We hypothesized that anti-inflammatory therapy with fluorometholone 0·1% suspension ("fluorometholone") eyedrops perioperatively twice daily for 28 days would safely, efficaciously, and cost-effectively reduce postoperative TT relapse (PTT).

Methods: This randomized 1:1, parallel design, placebo-controlled trial of participants (≥15-year-olds) compared placebo (artificial tears) vs. fluorometholone for eyes undergoing TT surgery in rural health center/post sites, Jimma zone, Ethiopia between August 19, 2021, and November 30, 2024. Treatment randomization was stratified/blocked by surgeon. Participants, surgeons, and outcome assessors were masked to treatment assignment. Outcomes were evaluated at four weeks, six months, and 12 months postoperatively. The primary outcome was cumulative 12-month incidence of PTT, defined ≥1 lash touching the globe; evidence of epilation; and/or occurrence of repeat TT surgery.

Results: Amongst 2,410 participants (1,692 females and 718 males; 3,235 eyes) with ~even treatment allocation, 34·1% had bilateral TT surgery. Baseline treatment group characteristics were similar; 98.0% were evaluated at the 12-month time point. In the intent-to-treat analysis, the cumulative incidences of PTT during 12-month follow-up were 13·4% (218/1625 eyes) and 13.4% (213/1593 eyes) in the placebo and fluorometholone groups, respectively (95% confidence interval for difference, -2% to +2%). Pre-specified secondary efficacy and safety outcomes were not statistically different between groups (all p≥0.10). The incidence of adverse events attributed to study treatment was 9 (0.7%) in placebo group, and 4 (0.3%) in the fluorometholone group (p=0.17); ≥99% of participants were satisfied with surgery. Health economic considerations did not favor programmatic use of fluorometholone given its inefficacy.

Conclusion: Fluorometholone twice daily for four weeks was safe but not (cost-) efficacious for reducing PTT and hence is not recommended for programmatic use.

SESSION I | MONITOR 5 | 9:53 AM – 10:15 AM

TRIALS AND TRIBULATIONS OF CROSS-CULTURAL CLINICAL TRIAL RESEARCH

John H. Kempen*♦, Aida Abashawl, Ahlam Awad Mohammed, Sarity Dodson, Wondu Alemayehu, Maureen G. Maguire, Matthew J. Burton, Gui-shuang Ying, FLAME Trial Research Group

Purpose: Clinical trials provide the highest level of treatment-related evidence amongst alternative potential study designs. However, successful implementation of such studies is foundational if the evidence is to be obtained and can be challenging. In more-developed and less-developed country collaborations, a wider spectrum of difficulties may be encountered, providing an opportunity to learn from the experiences of trial implementation. We undertook a review of challenges encountered in implementing the FLuorometholone as Adjunctive MEdical Therapy for TT Surgery (FLAME) Trial conducted in rural Ethiopia in a largely illiterate population by a US-UK-Australia-Ethiopia team and funded by the National Eye Institute.

Methods: Narrative review of challenges encountered in study implementation for learning purposes.

Results: Challenges encountered included: 1) multiple governing IRBs with potentially conflicting expectations; 2) obtaining truly informed consent and participant buy-in across big cultural differences; 3) inter-institutional differences in assumed definition of legal terms, particularly "trial sponsor"; 4) Reorganizations of implementing, funding, and regulatory organizations during the trial's life cycle; 5) different expectations about clinical trial insurance amongst countries; 6) occurrence of the COVID epidemic during the course of the study; 7) Civil War affecting the country where the study was being conducted; 8) regulatory challenges in importing study drug product; 9) extent of study control over surgical treatment related to but not randomized in the study; 10) perils of using smart phones for data collection; 11) challenges of publicizing the results of the study in multiple languages and cultures. Some advantages of conducting work in Ethiopia were also identified.

Conclusion: Review of the lessons learned from the FLAME Trial in resolving these challenges may help others in conducting clinical trials in less developed and more developed countries so that we can continue to supply Level 1 data about appropriate treatment questions.

SESSION II | MONITOR 1 | 9:53 AM – 10:15 AM

RACIAL AND ETHNIC PARITY AND SOCIOECONOMIC DISPARITY IN LASER TRABECULOPLASTY OUTCOMES AMONG CALIFORNIA MEDICARE BENEFICIARIES

Ken Kitayama*, Victoria L. Tseng, Fei Yu, **Anne L. Coleman**

Purpose: Prior studies have demonstrated racial and ethnic and socioeconomic disparities in glaucoma surgical outcomes; however, studies examining these inequities in laser trabeculoplasty (LTP) are lacking. The goal of this study was to compare LTP outcomes by race and ethnicity and socioeconomic status (SES) among California (CA) Medicare patients.

Methods: A retrospective cohort was constructed using the entire sample of 2016 fee-for-service CA Medicare beneficiaries with a claim for LTP. We excluded beneficiaries with non-CA residence, age <65 years, or missing eye laterality modifier code. The primary exposure was beneficiary race and ethnicity, stratified into: Non-Latinx White, Black, Latinx, Asian/Pacific Islander (API), and Other. The primary outcome was LTP failure, defined as time to glaucoma surgical intervention (e.g., trabeculectomy, glaucoma drainage implant, trabecular microbypass shunt, cyclophotocoagulation, canaloplasty, goniotomy, and trabeculotomy). Follow-up time extended through 2019. Time-to-event was modeled using Cox proportional hazards regression. After assessing for statistical interaction between race and ethnicity and SES, models were stratified by SES, as defined by dual-Medicaid eligibility. A fully adjusted model included covariates for age, sex, systemic disease burden as estimated by the Charlson comorbidity index (CCI) score, and glaucoma severity.

Results: A total of 3,861 beneficiaries met the inclusion criteria, contributing 10,937 person-years of follow-up time. Approximately 54.3% (n=2,096) identified as non-Latinx White, 5.6% (n=215) as Black, 16.5% (n=638) as API, 20.7 % (n=800) as Latinx, and 2.9% (n=112) as other race and ethnicity. About 33.5% (n=1,294) had low SES. The incidence rate of LTP failure was 5.76 events per 100 person-years for the entire cohort. In the higher SES stratum, there was statistical parity in LTP outcomes across race (Black adjusted hazard ratio [aHR]: 0.87, 95% confidence interval [CI]: 0.55-1.37; Latinx aHR: 1.15, 95% CI: 0.87-1.54; API aHR: 0.91, 95% CI: 0.65-1.28; and Other aHR: 0.76, 95% CI: 0.51-1.63). In the low SES stratum, all racially and ethnically minoritized groups had reduced risk of surgical intervention (Black aHR: 0.49, 95% CI: 0.26-0.93; Latinx aHR: 0.40, 95%: 0.27-0.59; API aHR: 0.40, 95% CI: 0.26-0.60) except Other race and ethnicity beneficiaries (Other aHR: 0.72, 95% CI: 0.35-1.48), as compared to non-Latinx White beneficiaries.

Conclusion: In this retrospective cohort of 2016 CA Medicare beneficiaries, there was relative parity in racial and ethnic outcomes for LTP within beneficiaries with higher SES. However, within those with low SES, racially and ethnically minoritized groups had lower rates of subsequent glaucoma intervention, perhaps a result of lack of access or surgical hesitancy. Additional studies are necessary to further evaluate early interventions for glaucoma to work toward more equitable outcomes.

SESSION II | MONITOR 4 | 9:53 AM – 10:15 AM

SURGERY FOR ESOTROPIA: THE "LEGEND" OF THE DOSE-RESPONSE CURVE REVISITED AND THE OPTIMAL SURGICAL STRATEGY

Christopher Leffler*, Emilia Varrone, Satya Siri Paruchuri, Catherine Phan

Purpose: To determine clinical predictors of surgical failures following horizontal strabismus surgery for esotropia, in order to estimate the optimal surgical strategy.

Methods: A retrospective pooled observational case series of published cases was performed. Patients having horizontal strabismus surgery for esotropia, published between 1940 and 2025, with known preoperative deviation, surgical approach, and outcome. Clinical data from individual patients having strabismus surgery for esotropia were recorded from published case series and analyzed using multivariable logistic regression to predict over- and under-correction. The main outcome measure was surgical failure, as determined by reoperation, suture adjustment, or postoperative strabismus of 10 prism diopters or more.

Results: We abstracted individual patient data for 3518 surgeries from 163 publications. Binocular (as compared with monocular) surgery was associated with fewer under-corrections (odds ratio [OR] 0.75, 95% CI 0.61 to 0.92, p=0.005) and more over-corrections (OR 1.87, 95% CI 1.26 to 2.79, p=0.002, n=3266). Increasing preoperative deviation was associated with more under-corrections (OR 1.06/°, 95% CI 1.05/° to 1.07/°, p<0.0001) and fewer overcorrections (OR 0.97/°, 95% CI 0.95/° to 0.99/°, p=0.001, n=3266). Increasing surgical dose was associated with fewer under-corrections (OR 0.95/mm, 95% CI 0.91/mm to 0.99/mm, p=0.01), and more over-corrections (OR 1.08/mm, 95% CI 1.01/mm to 1.16/mm, p=0.02, n=3266). The failure rate was minimized with a large per-muscle surgical dose. As the preoperative deviation increases, one progresses from unilateral recessions to unilateral recession-resections, and then bi-medial recessions. Under a range of assumptions, bi-medial recessions of 6 mm are optimal for preoperative deviations of 45 to 50 prism diopters.

Conclusion: Larger doses for esotropia surgery do produce a larger response. Most models predicted the lowest failure rates with large recessions or resections, with additional muscles operated for larger preoperative deviations. Thus, the analysis supports the approach of Scobee (1951) over that of Parks (1975). The preferred surgical strategy depends on multiple factors.

SESSION II | MONITOR 4 | 9:30 AM – 9:52 AM

THE FIRST SMALL-INCISION INTRAOCULAR LENS SURGERIES BY MAZZOCCO AND BLAYDES IN 1984

Christopher Leffler*

Purpose: To determine the timing of the first small-incision cataract surgeries with intraocular lens implantation in humans.

Methods: Review of newspapers and journals, and oral history interviews with surgical innovators.

Results: Richard Packard and Eric Arnott published their idea of "rolled up lenses" in rabbits in August 1981. The same month (Aug. 1981), ophthalmologist Thomas Mazzocco of California proposed folding soft intraocular lenses to Thomas Waggoner. The two started Staar Surgical and began developing a soft, foldable silicone lens. On April 6, 1984, Mazzocco performed a small-incision cataract surgery, and inserted a soft intraocular lens. The surgical film was shown at a medical meeting in Los Angeles that same day. J. Elliott Blaydes of West Virginia inserted the soft silicone lens on May 23, 1984, one day prior to the Greenbrier meeting he hosted. Blaydes later wrote that the highlight of his career was performing the second and third folded intraocular lens insertions through small incisions in 1984, after Mazzocco had performed the first such case. By the end of summer 1984, the FDA had placed a moratorium on folding the lenses. Mazzocco stated in January 1985 that permission to fold the lenses had not been granted by the FDA, but also Mazzocco stated that one unnamed investigator had already inserted folded lenses through small incisions because that investigator had misunderstood the protocol. Permission to insert the lenses folded through a small incision was granted by the FDA on March 1, 1985.

Conclusion: By most contemporaneous accounts, Thomas Mazzocco and J. Elliott Blaydes performed small-incision cataract surgery with folded silicone intraocular lenses in 1984.

SESSION II | MONITOR 3 | 9:30 AM – 9:52 AM

OCT SCAN TILT CONFOUNDS PHOTORECEPTOR BIOMARKERS

Brandon Lujan*, Justin Grassmeyer, Elizabeth White, **Clement Chan**, Glenn Yiu, Maziar Lalezary, **Michael Elman**, Prema Abraham, Yali Jia

Purpose: The thickness of the outer nuclear layer (ONL), which contains photoreceptor nuclei, is an appealing optical coherence tomography (OCT) biomarker for macular disease. Precise ONL measurements can be obtained by intentionally acquiring off-axis images using Directional OCT to clearly visualize the Henle Fiber Layer (HFL) boundary. However, instead of utilizing this technique in clinical trials, ONL+HFL, "ONL+", or "ONL complex" have been reported. These more expedient approaches confound ONL measures and may be corrupted by the variable inclusion of HFL in segmentations of unintentional off-axis images.

Methods: Using Zeiss OCT data from the PREVENT trial—which evaluated prophylactic ranibizumab for preventing neovascular age-related macular degeneration—we quantified apparent scan tilt in the horizontal and vertical B-scans acquired concurrent with each macular volume. An automated algorithm to measure scan tilt was developed, validated, and applied to the PREVENT OCT dataset. We then compared the extent of scan tilt with quantification of the ONL using Voxeleron software.

Results: Of 1,608 B-scans, 76 were excluded due to poor quality. In a subset of 100 manually measured scans, the automated tilt algorithm demonstrated excellent agreement with manual assessments (ICC = 0.987). Automated analysis showed that only 47% of B-scans had less than ±5° of horizontal or vertical tilt (Figure 1)—a conservative threshold where HFL becomes visible and may confound ONL measurements. Strong linear associations were observed between tilt and horizontal and vertical ONL measurements (R^2 = 0.80 and 0.78, respectively; both $p < 0.001$).

Conclusion: Off-axis OCT acquisition was common, even by trained and certified imagers, and significantly affected ONL measurements. To preserve the validity of ONL thickness as a biomarker, clinical trial protocols should incorporate Directional OCT or explicitly account for scan tilt. In addition, OCT manufacturers should implement acquisition tools that detect and flag off-axis imaging in real time.

SESSION I | MONITOR 2 | 9:53 AM – 10:15 AM

CLINICALLY SIGNIFICANT FINDINGS AND NEIGHBORHOOD DEPRIVATION IN AN ARTIFICIAL INTELLIGENCE-BASED DIABETIC RETINOPATHY DETECTION PROGRAM IN NORTHERN CALIFORNIA

Carolyn Pan*, Houri Esmaelikhanian, Megan Chung, Christopher Or, Karen Wai, Theodore Leng, Sophia Wang, John Xiang, **Mary Elizabeth Hartnett**, David Myung

Purpose: The Stanford Teleophthalmology Autonomous Testing and Universal Screening (STATUS) program implemented artificial intelligence (AI)-based DR screening in primary care and endocrinology clinics in Northern California. This study was developed to assess the incidence of actionable ocular pathology detected through STATUS and examine the relationship between neighborhood deprivation and screening outcomes.

Methods: We conducted a retrospective study of STATUS-screened patients from 2020 to 2024. Patients screening positive for more than mild diabetic retinopathy (MTMDR) or with insufficient exam quality were referred for ophthalmologic evaluation, and subsequent procedures were recorded. Doubly ungradable eyes (ungradable by both AI and a retinal specialist), underwent a chart review of post-screening clinical examinations. Residential addresses were geocoded and linked to 2023 national percentile area deprivation index (ADI) scores, a neighborhood socioeconomic metric. ADI scores were grouped into quintiles by value, with higher quintiles indicating greater disadvantage. ADI quintiles were compared for distribution and referral rates.

Results: Of 4853 STATUS-screened patients, 2740 (56.5%) were negative for DR, 584 (12.0%) were positive for MTMDR, and 1529 (31.5%) had insufficient AI readings requiring specialist review, including 338 doubly ungradable cases. Among MTMDR patients, 331 completed referrals, and 99 underwent ocular procedures, most commonly intravitreal injections, cataract surgery, and laser posterior capsulotomy. Among doubly ungradable eyes with documented examinations, lens opacification was present in 157 of 184 eyes (85.3%), with cataract surgery or laser capsulotomy performed in 21 eyes. ADI data were available for 3785 patients (range from 1 to 90; mean ADI of 6.8 ± 9.2). 93.7% belonged to the least disadvantaged quintile ($p<0.001$), with no significant differences in referral rates across quintiles.

Conclusion: AI-assisted DR screening may facilitate the timely detection and treatment of clinically significant ocular disease. These findings support expanding such programs to socioeconomically disadvantaged populations with higher diabetes burden and lower DR screening rates.

SESSION II | MONITOR 5 | 9:30 AM – 9:52 AM

MODIFIED BLEPHAROTOMY FOR UPPER EYELID RETRACTION IN THYROID EYE DISEASE

Kimberly Seamon*, Nickisa Hodgson, Jessica Chang, **Timothy McCulley**

Purpose: Eyelid retraction is the most common feature of thyroid eye disease, and a wide variety of surgical repair methods have been described to address this problem. The full-thickness anterior blepharotomy described by Elner is effective; however, flattening of eyelid contour is an adverse outcome. Many modifications to this technique have been proposed to improve eyelid contour. We describe a method of further graded repair by dissection of Mueller's off the central conjunctival bridge. Additionally, we present a modification to prevent the creation of an elevated or second upper eyelid crease by incising the orbital septum to allow the prolapse of pre-aponeurotic fat.

Methods: This is a retrospective chart review of patients with thyroid eye disease who underwent upper eyelid retraction repair from January 1, 2013, to June 30, 2018.

Results: We present outcomes from 18 eyelids of 11 patients (4 males, 7 females, average age 46.7 years) who underwent the modified full thickness blepharotomy technique. All patients had improvement in MRD1 with good eyelid contour and without a double or elevated crease. Two patients were overcorrected and required ptosis repair. There were no patients who were under-corrected.

Conclusion: Separating and recessing Mueller's muscle from the conjunctival bridge allows for effective and controlled lowering of the overall eyelid height without sacrificing contour or requiring additional sutures. Incising the septum allows the pre-aponeurotic fat to prolapse forward and prevents an elevated or extra eyelid crease. These are helpful modifications that may improve the outcomes for blepharotomy without sacrificing efficiency.

SESSION I | MONITOR 1 | 9:30 AM – 9:52 AM

THE 1-STEP VERSUS 2-STEP SUBRETINAL INJECTION TRIAL (1,2-SIT) – A RANDOMIZED CONTROLLED TRIAL TO COMPARE DRUG REFLUX FOLLOWING SUBRETINAL INJECTION

Matthew Simunovic*, Zak Prime, Rhuen Chow, Emily Shao, Zeid Madanat, Perach Osaadon, Tun Hang Yeo, Khin Thida Oo, Lay Khoon Too

Purpose: Accurate estimation of drug retention is increasingly important for subretinal delivery of high-cost therapies, including emerging gene and cell therapies, where dosing margins are limited and drug loss may be clinically and economically significant. We therefore aimed to estimate, in humans and in vivo, drug retention within the subretinal space following either a one-step or two-step subretinal injection (SRI) technique.

Methods: This was a single-masked, randomized, controlled clinical trial. Patients presenting with submacular hemorrhage secondary to age-related macular degeneration were randomized to receive subretinal tissue plasminogen activator (tPA; 50 μg in 0.1 mL) mixed with sodium fluorescein (10 μg in 0.1 mL) as an optical tracer using either a one-step SRI technique, in which the drug defined the subretinal space (n = 6), or a two-step technique, in which balanced salt solution was first used to create the subretinal bleb prior to drug delivery (n = 6). All procedures followed pars plana vitrectomy and concluded with air–fluid exchange, 20% sulfur hexafluoride gas, and intravitreal bevacizumab. Reflux of subretinally injected drug was quantified using fluorophotometry of fluid collected during air–fluid exchange. Patients received intravitreal anti-VEGF therapy at 4-week intervals and were followed for 12 weeks. The primary outcome was proportion of drug reflux. Secondary outcomes included surgical duration, change in best-corrected visual acuity (BCVA), final BCVA, and change in foveal thickness. To assess translational relevance, quantitative PCR was used to evaluate adeno-associated viral (AAV) titers following exposure to sodium fluorescein, and retinal progenitor cell (RPC) viability was assessed in vitro.

Results: Mean drug reflux was 4.8 ± 3.1% (range 0.4–19.5%) for one-step SRI and 3.9 ± 0.9% (range 1.7–5.3%) for two-step SRI, with no significant difference in mean reflux but significantly greater variance in the one-step group (P = 0.0155). There were no significant differences between groups in surgical duration, final BCVA, change in BCVA, or foveal thickness. Sodium fluorescein did not affect AAV titers or RPC viability in vitro.

Conclusion: Drug loss following SRI ranged from 0.4% to 19.8% (mean 4.3%). While mean reflux did not differ between techniques, the two-step SRI demonstrated significantly lower variability, suggesting greater consistency in drug delivery in a cohort size mirroring those used in Phase I/II trials of subretinal therapies. Sodium fluorescein appears suitable for quantitative tracking of subretinal drug, gene, and cell therapies, and a two-step SRI approach may be preferable for ensuring reproducible subretinal dosing.

SESSION I | MONITOR 1 | 9:53 AM – 10:15 AM

INTRAOCULAR OCULAR PRESSURE CHANGES WITH GAS TAMPONADE: ELEVATOR AND FREEWAY MODELS

Kent Small*, Joanna Im, Anthony de Beus

Purpose: The purpose of this study is to project intraocular pressure (IOP) changes and safety with different travel trajectories in patients with intraocular gas.

Methods: Using a Fortran implementation of an established intravitreal gas bubble model [1-2], we simulated travel for eyes with 20%, 50%, 65%, and 80% gas fill during elevator and Grapevine driving scenarios. We simulated the fastest elevator in downtown Los Angeles in the elevator scenario, which ascends to a peak elevation of 335.3 m at 487.7 m/min. In the Grapevine model, we modeled two scenarios: a nonstop trajectory and a model with a 1-hour pause midway through ascent, with a peak elevation of 1,263 m at 35 mph, 45 mph, and 65 mph.

Results: Maximum modeled IOP was 35.81 mmHg in the elevator scenario, 51.89 mmHg in the non-stop Grapevine scenario, and 39.16 mmHg in the "rest stop" Grapevine scenario, each value observed with the 80% gas bubble and 65 mph speed. Slower speeds reduced peak and trajectory-wide IOP in both Grapevine models. Additionally, inserting pauses into ascent resulted in lower peak IOPS across all volume and speed scenarios.

Conclusion: Model projections indicate that the rate of elevation change may be key determinant of IOP rise and suggest that absolute altitude by itself may be a poor standalone predictor. IOP rises from elevator use has not been a previously voiced concern. The rate of change of elevation in a high-rise building is substantial but brief. Incorporating pauses between rapid elevation changes reduced both the magnitude and rate of IOP rise. These findings support postoperative counseling that incorporates ascent rate and duration, in addition to gas fill volume and baseline IOP. Our results suggest that tamponade choice should remain guided by surgical judgment rather than a patient's residence or transit elevation.

SESSION I | MONITOR 2 | 9:30 AM – 9:52 AM

ARTIFICIAL INTELLIGENCE-GUIDED PERSONALIZED ESCALATION OF THERAPY IN OPEN-ANGLE GLAUCOMA

Deyu Fred Sun*, Fei Yu, Esteban Morales, Victoria L. Tseng, **Joseph Caprioli**, **Anne L. Coleman**

Purpose: Treatment escalation in open-angle glaucoma (OAG) often occurs infrequently even when intraocular pressure (IOP) is elevated, reflecting uncertainty about who will meaningfully benefit from intensification. We developed and evaluated an Artificial Intelligence (AI)-guided individualized escalation policy to target intensification to visits with the highest expected short-term IOP reduction.

Methods: We analyzed 82,841 encounters from 53,492 OAG eyes with IOP ≥18 mmHg (2010–2024). Using state–treatment–outcome patterns and leveraging reinforcement learning techniques, we estimated the expected percent IOP change at the next visit under two strategies: treatment maintenance vs intensification. State features included current IOP, recent IOP change, number

of medications, demographics, smoking, and prior SLT/MIGS/incisional surgery. Treatment was maintenance or intensification (defined as adding ≥1 medication class or performing SLT/MIGS/incisional surgery within 30 days). The outcome was the percent IOP change at the next visit. The policy recommended intensification only when the predicted additional IOP reduction versus maintenance exceeded a prespecified threshold (primary: ≥20 percentage points [pp]).

Results: Under observed care for individuals with IOP ≥18 mmHg, intensification occurred in 2.2% of visits and mean percent IOP change was –7.69% (95% CI –7.83, –7.55). The ≥20-pp policy recommended intensification in a lower rate of visits compared to observed care (0.88% vs 2.2%) and achieved IOP change of –7.90% (95% CI –7.95, –7.85). At higher IOP cutoffs, estimated gains in percent IOP reduction increased (~–0.28 to –0.41 pp at ≥19–20 mmHg) with modest recommended intensification rates (~1.27–1.85% at the ≥20-pp threshold).

Conclusion: An AI-guided escalation policy trained on real-world state–treatment–outcome patterns can maintain similar short-term IOP control to observed care without increasing frequency of treatment intensification. This approach illustrates how precision decision support may reduce treatment burden and support clinician decision-making in glaucoma care.

SESSION II | MONITOR 1 | 9:30 AM – 9:52 AM

INCLEMENT WEATHER PATTERNS AND INCIDENCE OF GLAUCOMA SURGERY IN THE CALIFORNIA MEDICARE POPULATION

Victoria L. Tseng*, Ken Kitayama, Ying Zheng, Deyu Pan, Fei Yu, **Anne L. Coleman**

Purpose: To examine association between inclement weather patterns and incidence of glaucoma surgery in California (CA) Medicare beneficiaries with glaucoma.

Methods: The study population included 2019 CA Medicare beneficiaries ≥65 years old with Part A and Part B coverage, at least one Part B claim, and a diagnosis of any glaucoma based on claims. The California Health Interview Survey (CHIS) was used to assess exposure to any extreme weather, flooding/mudslides, wildfires, extreme heat waves, and mental/physical harm due to extreme weather, and was merged with CA Medicare data by county. Incidence of any glaucoma surgery (trabeculectomy, tube shunt, minimally invasive glaucoma surgery, cyclophotocoagulation) was assessed by claims. Covariates included age, sex, race and ethnicity, Charlson Comorbidity Index, and Centers for Disease Control and Prevention Social Vulnerability Index score. Logistic regression assessed associations between exposure to each weather pattern and incidence of any glaucoma surgery, adjusting for all covariates.

Results: The study population included 215,771 beneficiaries with glaucoma, of whom 10,134 (4.7%) had glaucoma surgery. In multivariable regression, highest versus lowest quartile exposure to any extreme weather (adjusted odds ratio [OR]=1.13, 95% confidence interval [CI]=1.06, 1.21), extreme heat waves (aOR=1.23, 95% CI=1.16, 1.31), wildfires (aOR=1.11, 95% CI=1.05, 1.17), and harm to mental health (aOR=1.25, 95% CI=1.17, 1.35), physical health (aOR=1.27, 95% CI=1.20, 1.36), and property/finances (aOR=1.13, 95% CI=1.07, 1.20) due to extreme weather were associated with increased incidence of glaucoma surgery.

Conclusion: In 2019, CA Medicare beneficiaries with glaucoma, exposure to multiple types of inclement weather was associated with increased incidence of glaucoma surgery. Further

investigation of biologic stress response changes after inclement weather exposure, and the subsequent effects on glaucoma disease trajectory, is needed to identify strategies for optimal management of glaucoma after extreme weather events.

SESSION I | MONITOR 6 | 9:30 AM – 9:52 AM

THRESHOLDS FOR MEDICAL OUTCOMES AS A SAFEGUARD FOR QUALITY, SAFETY, AND PROFESSIONALISM

David Wilson*, Hemakshi Adke, Lauer Andreas

Purpose: Recent developments within the US Health Care system could pose a threat to the quality of eyecare: employed physicians, alternative providers, and cost-driven institutional decision making. Establishing threshold outcome measures could provide a needed safeguard. We analyzed a program that evaluates ophthalmic surgical outcomes in a real-world setting.

Methods: In concert with subspecialty faculty at OHSU Casey Eye Institute (CEI), a modified Delphi approach was used to develop performance measures for various surgical procedures. Outcome measures included visual acuity following cataract surgery, intraoperative complications during cataract surgery, single operation retinal reattachment rate, macular hole closure rate, endophthalmitis rate following intravitreal injection, and corneal transplant success rate. Individual physician performances for the calendar years 2023 and 2024 were obtained by chart abstraction. Predefined exclusion criteria were applied, specifically to eliminate cases with identifiable complicating factors predicting a poorer than usual outcome.

Results: For cataract surgery, the defined outcome measure for visual acuity was achieved by 11/11 comprehensive, 4/5 cornea, 4/5 glaucoma, and 0/6 retina surgeons. For retinal detachment and macular hole repair, the outcome threshold was achieved by 6/6 retina surgeons, with one surgeon at the minimum threshold for macular hole surgery. 4/4 corneal surgeons met the criteria for keratoplasty. The outcome measure for post-injection endophthalmitis was easily met by all retina specialists, suggesting the threshold should be adjusted more restrictively.

Conclusion: Performance below the expected threshold is not of itself a cause for concern, but rather a reason for additional investigation. As is done in a more mature outcome review in Thoracic Surgery, the following expected outcomes should be examined for cause, with remediation addressed if necessary. Predefined surgical outcome measures, which evolve, provide an assessment of the quality of care within an organization, patient safety, and could be a tool for credentialing and continuing board certification.

SESSION I | MONITOR 4 | 9:53 AM – 10:15 AM

EFFECTS OF CLINIC REDESIGN AND PATIENT DEMOGRAPHIC FACTORS ON IMAGING WAIT TIME AND TOTAL VISIT TIME IN AN ACADEMIC OPHTHALMOLOGY PRACTICE

Christine Xu*, David Chen, Daniel Jones, Kareem Moussa, **Michele Lim**

Purpose: An aging U.S. population in the face of ophthalmology workforce shortages has created a need for prioritizing clinic efficiency. Imaging in an ophthalmology practice can be a significant

bottleneck in clinic flow. [1] We harnessed an unprecedented move to a new eye institute to evaluate the impact of improved imaging resources and clinic design on patient visit flow and assessed related sociodemographic factors.

Methods: The study population included 5,475 patient visits evaluated in the glaucoma and retina services of an academic institution during a 3-month period before and after the clinic's move to a new eye institute. Workflow redesign during the move included increasing imaging-related resources (number of personnel and devices) and shifting to a decentralized imaging model in the glaucoma clinic. A preexisting electronic health record feature was used to track patient time spent in each component of the visit. We compared imaging wait time and total visit time before and after the move. We also analyzed the relationship between demographic factors and visit times.

Results: For combined glaucoma and retina services, imaging wait time decreased significantly from 24.0 to 14.6 minutes post-move ($p<0.001$). Glaucoma visits increased in total duration (100.4 to 105.5 minutes, $p=0.014$), while retina visits decreased (109.4 to 104.2 minutes, $p<0.001$). A decentralized imaging workflow in the glaucoma clinic resulted in shorter visits (68.0 vs. 100.7 minutes, $p<0.001$). Older age was correlated with shorter wait times for imaging but longer visual field-testing time (both $p<0.001$). Higher BMI was associated with longer total visit time ($p=0.03$). Race and language were not significantly associated with visit time.

Conclusion: While large-scale clinic redesigns are not always possible, our findings suggest that directing resources towards improving imaging efficiency can shorten overall patient appointment times.

Notes

Notes

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