The American Ophthalmological Society

ONE HUNDRED SIXTIETH ANNUAL MEETING

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MAY 16–18, 2024
THE LODGE AT TORREY PINES
LA JOLLA, CALIFORNIA

The American Ophthalmological Society

Office of the Executive Vice President
Portland, OR
May 2024

THE ONE HUNDRED SIXTIETH ANNUAL MEETING
of the Society will be held at The Lodge at Torrey Pines in La Jolla, California

Thursday through Saturday
May 16–18, 2024

COMMITTEE ON PROGRAMS

Jennifer I. Lim, Chair
Carol L. Karp
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The American Ophthalmological Society

THE ONE HUNDRED SIXTIETH ANNUAL MEETING

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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 2024 Annual Meeting are to:

- Explain how artificial intelligence applications to imaging modalities can improve diagnosis and evaluation of patients with anterior segment, retinal, glaucoma, and other ophthalmic diseases.
- Assess the application of genetic assessments and treatment in the clinical practice of ophthalmic patient care.
- Recognize and describe new information about diagnosis and treatment of various categories of ophthalmic diseases, including pediatrics, cornea, glaucoma, ocular oncology and retina.
- Assess the impact of new research in the evaluation and management of ophthalmic disease.
- Recognize the risks and benefits of gene therapy in patients with inherited retinal disease.
- Recognize age-related specifics of visual function.
- Describe new mechanistic approaches to treatment of ocular diseases.

ACCREDITATION STATEMENT

In support of improving patient care, this activity has been planned and implemented by Medical Education Resources (MER) and the American Ophthalmological Society. MER is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

PHYSICIAN CREDIT DESIGNATION STATEMENT

Medical Education Resources designates this live activity for a maximum of 12.0 *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

Medical Education Resources ensures balance, independence, objectivity, and scientific rigor in all our educational activities. In accordance with this policy, MER identifies relevant financial relationships with its instructors, content managers, and other individuals who are in a position to control the content of an activity. Reported relevant financial relationships are mitigated by MER to ensure that all scientific research referred to, reported, or used in a CE activity conforms to the generally accepted standards of experimental design, data collection, and analysis. MER is committed to providing

learners with high-quality CE activities that promote improvements or quality in health care and not the business interest of an ineligible company.

Relevant financial relationships of all presenting authors, staff, and members of the Committee on Programs are listed on pages 7–9 in the program book. If the presenter has a financial relationship related to the specific presentation, 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.

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 2024 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 2023 ANNUAL MEETING:

Nisha Acharya, MD, MS	San Francisco, CA
Jesse L. Berry, MD	Los Angeles, CA
Valerie L. Biousse, MD	Atlanta, GA
Michael S. Ip, MD	Pasadena, CA
Byron L. Lam, MD	Miami, FL
Michael A. Singer, MD	San Antonio, TX

IN MEMORIAM

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

Leonard M. Parver, MD	Washington, DC	Joined in 2000
Richard M. Robb, MD	Boston, MA	Joined in 1974
C. Gail Summers, MD	Golden, CO	Joined in 1996
Stephen R. Waltman, MD	St. Louis, MO	Joined in 1984

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

AZAR, Dimitri
E - Twenty Twenty Therapeutics
O - Twenty Twenty Therapeutics
P - Twenty Twenty Therapeutics

BAKRI, Sophie
C – Abbvie, Adverum, Allergan, Amgen, Annexon, Apellis, Aviceda, Cholgene, Eyepoint, Ilumen, Iveric Bio, Kala, Genentech, Neurotech, Novartis, Ocular Therapeutix, Outlook, Pixium, RegenXBio, Regeneron, Rejuvitas, Revana, Roche, VoxelCloud, Zeiss

BERRY, Jesse
C - World Care Clinical
L - iVista Medical Education
P - Aqueous humor cell free DNA for diagnostic and Prognostic evaluation of Ophthalmic Disease, Diagnostic Aqueous Humor Proteome Predicts metastatic potential in uveal melanoma, Protein biomarkers in the aqueous humor liquid biopsy exhibit diagnostic potential for uveal melanoma, Springer
S - Alex's Lemonade Stand Foundation Grant #23-27881, Children's Oncology Group, Knights Templar Eye Foundation, National Cancer Institute of the National Institute of Health Award, St. Baldrick's Foundation, The Wright Foundation

CHEN, Teresa
S - Alcon, Fidelity Charitable Fund, NIH

DANA, Reza
O - Sightstream Biotherapeutics

HUANG, David
P - Genentech, Visionix
S - Canon, Cylite, Intalight, Visionix

HUBSCHMAN, Jean Pierre
E - Horizon Surgical Systems
O - Horizon Surgical Systems
P - Horizon Surgical Systems

HUMAYUN, Mark
C - Intellimicro/GEB, Regenerative Patch Technologies
O - Intellimicro/GEB, Regenerative Patch Technologies
P - Intellimicro/GEB, Regenerative Patch Technologies, Vivani Medical, Inc.

IP, Michael
C - Adverum, Alimera, Allergan, Amgen, Apellis, Astellas, Clearside Biomedical, Genentech, Novartis, Regeneron, Regenxbio
P - Adverum, Apellis, Astellas, Biogen, Genentech, Lineage Cell Therapeutics, ONL Therapeutics, Regeneron, Regenxbio, Splice Bio, 4DMT

NOURI-MAHDAVI, Kouros
L - Topcon Healthcare
S - Heidelberg Engineering

OLSEN, Timothy
C – Aura Bioscience
O – EyeMacular Regeneration, iMacular Regeneration

SADDA, Srinivas
C - Alexion, Apellis, Astellas, Genentech, Heidelberg Engineering, iCare, IvericBio, NotalVision, Novartis, Optos, Topcon,
L - Nidek
S - Carl Zeiss Meditec

SEBAG. J.
C - Alcon, Quantel Medical

SEDDON, Johanna M.
C - Laboratoires Théa

SINGER, Michael
S - Oysterpoint

SINHA, Supriyo
E - Twenty Twenty Therapeutics
O - Twenty Twenty Therapeutics
P - Twenty Twenty Therapeutics

SOUIED, Eric
C - Novartis

SUH, Donny
P - Suh Hermsen Glasses
S - NIH

TRABOULSI, Elias
C - SparingVision

TSAI, James
C - AI Nexus Healthcare

TSENG, Victoria
S - American Glaucoma Society Mentoring for the Advancement of Physician Scientists Award, Research to Prevent Blindness and American Academy of Ophthalmology Award for IRIS Registry Research, Research to Prevent Blindness Career Development Award

WIGGS, Janey
S - NIH/NEI

NO RELEVANT FINANCIAL RELATIONSHIPS TO DISCLOSE

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BAUDOUIN, Christophe
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STOUT, Timothy
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THIEL, Cassandra
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TRAVERSO, Carlo
VANDERBEEK, Brian
VOLPE, Nicholas
WILSON, M. Edward
WILSON, M. Roy

*Members of the Committee on Programs

AOS 2024 Program

American Ophthalmological Society
Meeting Schedule

THURSDAY, MAY 16

11:30 AM – 5:00 PM	Registration Desk Open	*Maurice Braun Foyer*
12:00 PM – 1:00 PM	**New Member Luncheon** (by invitation)	*Alfred Mitchell*
1:30 PM – 3:00 PM	**New Member Spotlight Presentations**	*Maurice Braun*
3:00 PM – 5:00 PM	**Scientific Program** - Paper Session I	*Maurice Braun*
6:30 PM – 8:30 PM	**Reception Welcoming New Members** (formal)	*Charles Reiffel/Fries*

FRIDAY, MAY 17

6:30 AM – 12:00 PM	Registration Desk Open	*Maurice Braun Foyer*
6:30 AM – 7:30 AM	Breakfast	*Maurice Braun Foyer*
7:00 AM – 11:00 AM	Spouse / Guest Hospitality Lounge Open	*Charles Fries*
7:30 AM – 9:15 AM	**Knapp Symposium**	*Maurice Braun*
9:15 AM – 10:15 AM	**Guided Poster Session I** - Coffee Break	*Charles Reiffel*
10:15 AM – 12:15 PM	**Scientific Program** - Paper Session II	*Maurice Braun*
1:00 PM – 5:30 PM	**Golf Tournament**	*Golf Course*
6:00 PM – 7:30 PM	**Reception** (business casual)	*Arroyo Terrace*

American Ophthalmological Society
Meeting Schedule

SATURDAY, MAY 18

6:00 AM – 12:00 PM	Registration Desk Open	*Maurice Braun Foyer*
6:00 AM – 8:00 AM	Breakfast	*Maurice Braun Foyer*
6:30 AM – 7:15 AM	**Executive Session** (members only)	*Maurice Braun*
7:00 AM – 11:00 AM	Spouse / Guest Hospitality Lounge Open	*Charles Fries*
7:30 AM – 8:00 AM	**Marilyn T. Miller Lecture**	*Maurice Braun*
8:00 AM – 9:30 AM	**Saturday Symposium**	*Maurice Braun*
9:30 AM – 10:30 AM	**Guided Poster Session II** - Coffee Break	*Charles Reiffel*
10:30 AM – 12:30 PM	**Scientific Program** - Paper Session III	*Maurice Braun*
1:00 PM – 2:30 PM	**Emeritus Luncheon** (by invitation)	*Charles Fries*
1:00 PM – 3:30 PM	**Pickleball Tournament**	*Hilton Courts*
6:00 PM – 6:45 PM	**Closing Reception**	*Charles Fries*
7:00 PM – 9:00 PM	**Gala Banquet** (formal)	*Maurice Braun*

**Subject to change*

FRIDAY, MAY 17, 2024

Herman Knapp Symposium

TECHNOLOGY'S IMPACT ON OPHTHALMOLOGY: THE FUTURE IS NOW

ROBOTIC SURGERY
Jean-Pierre Hubschman, MD
Los Angeles, CA

AI DIAGNOSTICS
Aaron Y. Lee, MD
Seattle, WA

INNOVATIVE THERAPEUTICS AND CELL-BASED THERAPY
Mark S. Humayun, MD, PhD
Los Angeles, CA

NEW TECHNOLOGY IN THE TREATMENT OF AMBLYOPIA AND STRABISMUS
Donny W. Suh, MD, FAAP, MBA, FACS
Irvine, CA

NEW TECHNOLOGY IN OCULOPLASTIC AND RECONSTRUCTIVE SURGERY
Tamara R. Fountain, MD
Northbrook, IL

CURRENT STATE OF GENE THERAPY IN OPHTHALMOLOGY
Elias I. Traboulsi, MD, MEd
Cleveland, OH

SATURDAY, MAY 18, 2024

Marilyn T. Miller Lecture

EQUITY AND EQUAL OPPORTUNITY: FINDING BALANCE IN OPHTHALMOLOGY

George B. Bartley, MD
Rochester, MN

Saturday Symposium

PARALLEL POPULATIONS – INSTITUTIONALIZING INEQUITY?

EFFECT OF SCOTUS DECISION ON AFFIRMATIVE ACTION AND STATE DEI PROHIBITIONS ON HIGHER EDUCATION
OiYan A. Poon, PhD, MEd
Chicago, IL

AFRICAN HERITAGE AND GLAUCOMA: A DEEPER DIVE
Louis R. Pasquale, MD
New York, NY

RISK OF AI INSTITUTIONALIZING INEQUITY AND BIAS
Dimitri T. Azar, MD, MBA
Chicago, IL

RISKS OF GENOMIC EDITING AND GENERATIONAL GENOMIC ADVANTAGE
Lainie F. Ross, MD, PhD
Rochester, NY

AOS 2024

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 16

3:00 PM – 3:20 PM	***ARAVIND PSEUDOEXFOLIATION STUDY: 10 YEAR POST-OPERATIVE RESULTS***	Presenter: Alan Robin Discussant: Shahzad Mian
3:20 PM – 3:40 PM	***THERAPEUTIC POTENTIAL OF THE NEUROPEPTIDE ALPHA-MELANOCYTE STIMULATING HORMONE (A-MSH) IN FUCHS DYSTROPHY***	Presenter: Reza Dana Discussant: Bennie Jeng
3:40 PM – 4:00 PM	***DETECTION OF OCULAR SURFACE SQUAMOUS NEOPLASIA USING ARTIFICIAL INTELLIGENCE WITH HIGH-RESOLUTION ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY***	Presenter: Carol Karp Discussant: James Chodosh
4:00 PM – 4:20 PM	***APPLICATION OF A DEEP LEARNING SYSTEM TO DETECT PAPILLEDEMA ON NONMYDRIATIC OCULAR FUNDUS PHOTOGRAPHS IN AN EMERGENCY DEPARTMENT***	Presenter: Valerie Biousse Discussant: James Tsai
4:20 PM – 4:40 PM	***VISUAL OUTCOMES FOLLOWING PLASMA EXCHANGE FOR OPTIC NEURITIS: AN INTERNATIONAL MULTICENTER RETROSPECTIVE ANALYSIS OF 395 OPTIC NEURITIS ATTACKS***	Presenter: John Chen Discussant: Nicholas Volpe
4:40 PM – 5:00 PM	***BLINDNESS FROM THE LHON MTDNA MUTATION 3460A>G STARTS WITH ND1 TRAPPING OF COQ10 AND EXCESSIVE ROS***	Presenter: Alfredo Sadun Discussant: Steven Feldon

PAPER SESSION II — FRIDAY, MAY 17

10:15 AM – 10:35 AM	***SCREENING BY GLAUCOMA POLYGENIC RISK SCORE TO IDENTIFY PRIMARY OPEN-ANGLE GLAUCOMA IN TWO BIOBANKS: AN INTERIM REPORT***	Presenter: Janey Wiggs Discussant: Anne Coleman
10:35 AM – 10:55 AM	***PREDICTION OF FUNCTIONAL GLAUCOMA PROGRESSION FROM BASELINE CLINICAL AND STRUCTURAL DATA WITH DEEP LEARNING***	Presenter: Kouros Nouri-Nahdavi Discussant: Teresa Chen
10:55 AM – 11:15 AM	***NON-CONTACT DIRECT SELECTIVE LASER TRABECULOPLASTY (DSLT) IN OPEN ANGLE GLAUCOMA. A MULTICENTRE, RANDOMISED, CONTROLLED COMPARATIVE STUDY VERSUS SELECTIVE LASER TRABECULOPLASTY (SLT)***	Presenter: Carlo Traverso Discussant: Christophe Baudouin

11:15 AM – 11:35 AM	***THE UPDATED 2024 PROTOCOL FOR REVIVING IN VIVO-LIKE ERG A- AND B-WAVES IN POSTMORTEM HUMAN ORGAN DONOR EYES***	Presenter: Anne Hanneken Discussant: Julia Haller
11:35 AM – 11:55 AM	***OCT SPLIT-SPECTRUM AMPLITUDE-DECORRELATION OPTORETINOGRAPHY***	Presenter: David Huang Discussant: Timothy Stout
11:55 AM – 12:15 PM	***WHAT'S NEW AT THE NATIONAL EYE INSTITUTE IN 2024?***	Presenter: Michael Chiang

PAPER SESSION III — SATURDAY, MAY 18

10:30 AM – 10:50 AM	***ENHANCED PHENOTYPE IDENTIFICATION OF COMMON OCULAR DISEASES IN REAL-WORLD DATASETS***	Presenter: Joshua Stein Discussant: Louis Pasquale
10:50 AM – 11:10 AM	***THE ROLE OF NUTRITIONAL FACTORS IN TRANSITIONING BETWEEN EARLY, MID AND LATE STAGES OF AGE-RELATED MACULAR DEGENERATION***	Presenter: Johanna Seddon Discussant: Emily Chew
11:10 AM – 11:30 AM	***DIFFERENTIAL ARTERY-VEIN ANALYSIS IMPROVES OCTA PERFORMANCE FOR ARTIFICIAL INTELLIGENCE CLASSIFICATION OF DIABETIC RETINOPATHY***	Presenter: Jennifer Lim Discussant: SriniVas Sadda
11:30 AM – 11:50 AM	***MONTH 60 IMAGING FINDINGS AND RELATIONSHIP TO TREATMENT OUTCOMES FOLLOWING ANTI-VEGF THERAPY FOR MACULAR EDEMA DUE TO CENTRAL OR HEMI RETINAL VEIN OCCLUSION***	Presenter: Michael Ip Discussant: Sophie Bakri
11:50 AM – 12:10 PM	***PROTEIN BIOMARKERS IN THE AQUEOUS HUMOR LIQUID BIOPSY EXHIBIT DIAGNOSTIC POTENTIAL FOR UVEAL MELANOMA***	Presenter: Jesse Berry Discussant: Martine Jager
12:10 PM – 12:30 PM	***THE EFFECT OF MODIFYING AIRE IN MELANOMA IN VITRO***	Presenter: Jose Pulido Discussant: William Mieler

THURSDAY 3:00 PM – 3:20 PM

ARAVIND PSEUDOEXFOLIATION STUDY: 10 YEAR POST-OPERATIVE RESULTS

Alan Robin*, Aravind Haripriya, Madhu Shekar, Chandrasekaran Shivakumar, Rengaraj Venkaatesh, Mohammed Sithiq Uduman, Ravilla D. Ravindran

Purpose: Compare IOL decentration rates 10 years after cataract surgery in those with and without pseudoexfoliation.

Methods: We prospectively randomized eyes with and without pseudo exfoliation (PEX) having visually significant cataracts, to either a one-piece (Alcon SA60AT) or a 3-piece (Alcon MA60AC) IOL with or without a capsular tension ring (CTR). All eyes had no phacodonesis, at least a 4mm pupil, & a minimum of 1500 endothelial cells/mm2. Eyes with cataract alone (CAT) but no other concomitant ocular diseases were randomized to either 1- or 3-piece IOLs but did not receive CTRs. After the first year all eyes received a yearly comprehensive ophthalmic examination. Primary outcome measurements were IOL decentration and capsulotomy rates. Secondary outcome was visual acuity.

Results: At 10 years we had enrolled the following: PEX Group SA60AT + CTR = 236 Eyes, SA60AT no CTR = 233 Eyes, MA60AC + CTR = 232 Eyes, MA60AC no CTR = 229 Eyes, CAT Group SA60AT no CTR = 235 Eyes, MA60AC no CTR = 241 Eyes. At baseline PEX patients were older, had higher IOPs, and denser cataracts. There was no significant difference in decentration rates ($p=.4$) or capsulotomy rates ($p=.98$) between groups. There were no differences between the IOL or CTR groups. By year 8, vision was slightly lower in eyes with PEX. Using a Cox proportional-hazard model, capsular phimosis and a capsulorrhexsis overlapping the IOL were significant risk factors for decentration (both $p<.001$), while a capsulorrhexsis overlapping the IOL was also a significant risk factor for needing a capsulotomy ($p>.001$).

Conclusion: This is the first large scale long-term comparative prospective study using experienced surgeons evaluating both CTRs and IOL types in eyes with PEX. We found no difference between eyes having either 1- or 3-piece IOLs, or CTRs. Avoiding CTRs makes surgery safer and less expense. Careful formation of the capsulorrhexsis avoids decentration and the need for capsulotomy.

Discussant: **Shahzad Mian**

THURSDAY 3:20 PM –3:40 PM

THERAPEUTIC POTENTIAL OF THE NEUROPEPTIDE ALPHA-MELANOCYTE STIMULATING HORMONE (A-MSH) IN FUCHS DYSTROPH

Reza Dana[*♦], Francesca Kahale, Hamid Alemi, Amirreza Naderi, Neha Deshpande, Seokjoo Lee, Thomas Dohlman, Jia Yin, **Ula Jurkunas**

Purpose: To investigate the therapeutic potential of alpha-melanocyte stimulating hormone (α-MSH) in corneal endothelial damage using a validated pre-clinical model of Fuchs endothelial corneal dystrophy (FECD).

Methods: Cultured corneal human endothelial cells (hCEnC-21T) were challenged by H2O2 and treated with α-MSH. Oxidative DNA damage and cell death were assessed using immunofluorescence and flow cytometry. Murine central corneas were exposed to 500 J/cm2 of 365 nm Ultraviolet-A (UV-A) radiation to induce FECD, and then, received α-MSH via intraperitoneal injection either immediately after exposure ('early treatment') or beginning 2 weeks after exposure ('delayed treatment'). Corneal endothelial cells were visualized using in vivo confocal microscopy, and cell density and morphology were analyzed via Konan's CellChekD+ software. Central corneal thickness was measured by anterior segment optical coherence tomography. Statistical analyses between groups were conducted by Two-way ANOVA with Tukey's multiple comparison, with confidence interval set at 95%.

Results: α-MSH significantly reduced DNA double-strand breaks induced by H2O2 in cultured endothelial cells ($p<0.0001$). α-MSH also attenuated endothelial cell apoptosis and necrosis after oxidative challenge. In the Fuchs dystrophy model, early treatment with α-MSH maintained corneal endothelial cell density close to baseline levels throughout follow-up and significantly higher than untreated controls ($p<0.0001$) and prevented the development of the Fuchs phenotype. Delayed α-MSH treatment led to significantly higher retained cell numbers compared to FECD controls ($p<0.05$). At 3 months after UV exposure, both early and delayed treatment with α-MSH suppressed the increase in corneal thickness observed in control untreated animals ($p<0.0001$).

Conclusion: α-MSH demonstrates therapeutic potential in counteracting development of the Fuchs phenotype. Additional work should explore localized delivery to fully evaluate α-MSH as a therapy for maintaining corneal endothelial health and preventing progression of Fuchs dystrophy.

Discussant: **Bennie Jeng**

THURSDAY 3:40 PM – 4:00 PM

DETECTION OF OCULAR SURFACE SQUAMOUS NEOPLASIA USING ARTIFICIAL INTELLIGENCE WITH HIGH-RESOLUTION ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY

Carol Karp*, Jason Greenfield, Rafael Scherer, Diego Alba, Sofia De Arrigunaga, Osmel Alvarez, Sotiria Palioura, Ghada Albayyat, Afshan Nanji, Douglas Da Costa, William Herskowitz, Michael Antonietti

Purpose: To develop a deep learning (DL) model to differentiate ocular surface squamous neoplasia (OSSN) from clinically confounding conditions, such as pterygium and pinguecula, using high resolution anterior segment optical coherence tomography (HR-OCT) images.

Methods: Imaging data was extracted from Optovue HR-OCT (Fremont, CA) and subjects' clinical or biopsy-proven diagnoses. A DL classification model was developed using two methodologies: (1) an autoencoder model was trained with unlabeled data from 105,860 HR-OCT images of 5746 eyes and (2) a Vision Transformer supervised model used labeled data for fine-tuning a binary classifier (OSSN vs. non-OSSN lesions). A sample of 1,466 HR-OCT images from 461 eyes (379 subjects) were classified by expert graders into "OSSN or suspicious for OSSN" and "pterygium or pinguecula". The best performing algorithm was selected. The algorithm's diagnostic performance was then validated in a separate test sample using 566 scans (62 eyes, 48 subjects) with biopsy-proven OSSN. Analysis was conducted at the scan level for the DL model.

Results: The DL model had an accuracy of 90.3% (95%CI:87.5-92.6%), with sensitivity of 86.4% (95%CI: 81.4-90.4%) and specificity of 93.2% (95%CI:89.9-95.7%). The area under the receiver operating characteristic curve (AUC) was 0.945 (95%CI:0.918-0.972) for the DL model. Expert graders had a lower sensitivity (69.8% [95%CI:63.6-75.5]) and a slightly higher specificity 98.5% (95% CI:96.4-99.5%) than the DL model. The deep learning model had overall better performance than the expert graders (AUC=0.688, P<0.001).

Conclusion: A DL model, applied to HR-OCT scans of the anterior segment, demonstrated high accuracy, sensitivity, and specificity in differentiating OSSN from pterygium and pinguecula. Interestingly, the model had comparable, and perhaps even better, diagnostic performance than the expert clinicians in this study and shows promise for enhancing clinical decision-making. Further research is warranted to explore the integration of this AI-driven approach in routine screening and diagnostic protocols for OSSN.

Discussant: **James Chodosh**

THURSDAY 4:00 PM – 4:20 PM

APPLICATION OF A DEEP LEARNING SYSTEM TO DETECT PAPILLEDEMA ON NONMYDRIATIC OCULAR FUNDUS PHOTOGRAPHS IN AN EMERGENCY DEPARTMENT

Valerie Biousse*, Raymond P. Najjar, Zhiqun Tang, Mung Yan Lin, David W. Wright, Matthew T. Keady, **Tien Y. Wong**, Beau B. Bruce, Dan Milea, Nancy J. Newman, BONSAI Study Group

Purpose: The Fundus photography vs. Ophthalmoscopy Trial Outcomes in the Emergency Department (FOTO-ED) studies showed that ED providers poorly recognized funduscopic findings in ED patients. We tested a modified version of the Brain and Optic Nerve Study Artificial Intelligence (BONSAI) deep learning system on nonmydriatic fundus photographs from the FOTO-ED studies to determine if the DLS could have improved the detection of papilledema had it been available to ED providers as a real-time diagnostic aid.

Methods: Retrospective secondary analysis of a cohort of patients included in the FOTO-ED studies. The testing dataset included 1608 photographs obtained in 828 patients from the FOTO-ED studies. Photographs were reclassified according to the optic disc classification system used by the deep learning system ["normal optic discs"; "papilledema"; "other optic disc abnormalities"]. The system's performance was evaluated by calculating the AUC, sensitivity and specificity using a one-vs-rest strategy, with reference to expert neuro-ophthalmologists.

Results: The BONSAI-deep learning system successfully distinguished normal from abnormal optic discs [(AUC 0.92 (95%CI, 0.90-0.93); sensitivity 75.6% (73.7%-77.5%) and specificity 89.6% (86.3%-92.8%)], and papilledema from normal and others [(AUC 0.97 (0.95-0.99); sensitivity 84.0% (75.0%-92.6%) and specificity 98.9% (98.5%-99.4%)]. Six patients with missed papilledema in one eye were correctly identified by the deep learning system as having papilledema in the other eye.

Conclusion: The BONSAI deep learning system was able to reliably identify papilledema and normal optic discs on non-mydriatic photographs obtained in the FOTO-ED studies. Our deep learning system has excellent potential as a diagnostic aid in EDs and non-ophthalmology clinics equipped with nonmydriatic fundus cameras. Ocular GVHD is driven by a systemic T-cell driven process that involves the Meibomian glands leading to a robust form of ocular surface disease that correlates with MGD severity.

Discussant: **James Tsai♦**

THURSDAY 4:20 PM – 4:40 PM

VISUAL OUTCOMES FOLLOWING PLASMA EXCHANGE FOR OPTIC NEURITIS: AN INTERNATIONAL MULTICENTER RETROSPECTIVE ANALYSIS OF 395 OPTIC NEURITIS ATTACKS

John Chen*, Sean Pittock, Elias Sotirchos, **Anthony Arnold**, Laura Bonelli, Heather Moss, Helen Danesh-Meyer, Romain Deschamps, Bertrand Audoin, Romain Marignier

Purpose: To evaluate the effectiveness of plasma exchange (PLEX) for optic neuritis (ON).

Methods: We conducted an international multicenter retrospective study evaluating the outcomes of ON following PLEX. Outcomes were compared to raw data from the Optic Neuritis Treatment Trial (ONTT) using a matched subset.

Results: A total of 395 ON attack treated with PLEX from 317 patients were evaluated. The median age was 37 years (range 9 to 75) and 71% were female. Causes of ON included: multiple sclerosis (108), myelin-oligodendrocyte-glycoprotein-antibody-associated-disease (MOGAD) (92), aquaporin-4-IgG-positive-neuromyelitis-optica-spectrum-disorder (AQP4+NMOSD) (75), seronegative-NMOSD (34), idiopathic (83), and other (3). Median time from onset of vision loss to PLEX was 2.6 weeks (IQR, 1.4-4.0). Median visual acuity (VA) at time of PLEX was count fingers (IQR, 20/200-hand motion) and median final VA was 20/25 (IQR, 20/20-20/60) with no differences among etiologies except MOGAD-ON which had better outcomes. In 81 (20.5%) ON attacks, the final VA was 20/200 or worse. Patients with poor outcomes were older ($p=0.002$), had worse VA at time of PLEX ($p<0.001$), and longer delay to PLEX ($p<0.001$). In comparison with the ONTT subset with severe corticosteroid-unresponsive ON, a final VA of worse than 20/40 occurred in 6/50 (12%) PLEX-treated ON versus 6/18 (33%) from the ONTT treated with intravenous methylprednisolone without PLEX ($p=0.04$).

Conclusion: Most ON attacks improved with PLEX, and outcomes were better than attacks with similar severity in the ONTT. The presence of severe vision loss at nadir, older age, and longer delay to PLEX predicted a worse outcome while MOGAD-ON had a more favorable prognosis.

Discussant: **Nicholas Volpe**

THURSDAY 4:40 PM – 5:00 PM

BLINDNESS FROM THE LHON MTDNA MUTATION 3460A>G STARTS WITH ND1 TRAPPING OF COQ10 AND EXCESSIVE ROS

Alfredo Sadun*, Jack Fuller, Stephen Barnes, Lorenzo Sadun, Pujan Ajmera, Anatassia Alexandrova

Purpose: Leber's Hereditary Optic Neuropathy (LHON) is a maternally inherited mitochondrial genetic disorder that causes bilateral optic neuropathies and severe loss of vision, usually in adult men. Our previous work has demonstrated that this is not so much a bioenergetic problem as it is excessive reactive oxygen species (ROS) production that exceeds a threshold leading to apoptosis of the retinal ganglion cells (RGC). In order to determine the exact origin of these ROS, we used computational chemistry to examine how in 3460A>G the single amino acid mutation affects ND1 of Complex I, the movement of Coenzyme Q 10 (CoQ10) into and out of the channel and the transfer of electrons.

Methods: Molecular Dynamics and Free Energy Perturbation simulations were performed to elucidate the mechanistic impact of the 3460A>G mutation. At different speeds and configurations, positions and movement and free energy of the molecules were calculated and measured. This in silico study required extremely powerful supercomputers.

Results: Firstly, we found that CoQ10 in both the oxidized and reduced states was largely blocked by electrostatic and other forces from entering and exiting its binding pocket. CoQ10 diffuses out of the mutated channel at a rate of about 2×10^{-9} slower than from the WT channel. Secondly, the distance of the CoQ10 headgroup to the terminal Fe/S (N2) was reduced, leading to enhanced quantum electron tunneling (QET).

Conclusion: Thus, the electrons on the CoQ10 headgroup likely traveled backwards, by QET, up the Fe/S chain to exit out of the other end of Complex I, to become ROS. In this human disease, blindness begins with alterations of quantum mechanics.

Discussant: **Steven Feldon**

FRIDAY 10:15 AM – 10:35 AM

SCREENING BY GLAUCOMA POLYGENIC RISK SCORE TO IDENTIFY PRIMARY OPEN-ANGLE GLAUCOMA IN TWO BIOBANKS: AN INTERIM REPORT

Janey Wiggs[*♦], Hetince Zhao, Nazlee Zebardast, Rachel Lee, Kanza Aziz, David Friedman, Thi Ha Vy, Ron Do, Ayellet Segre, **Louis Pasquale**

Purpose: Hundreds of primary-open angle glaucoma (POAG) common genetic variants have been discovered, and while studies suggest the utility of cumulative genetic risk using glaucoma polygenic risk scores (PRS), it is unclear if recalling patients based on PRS aids in POAG diagnosis. Here, we provide an interim report of a study comparing individuals with high PRS to those with low PRS.

Methods: Using UK Biobank data (N=449,186, including 14,171 OAG cases) and Lassosum, we estimated per-allele weighted POAG effects for PRS construction. POAG PRSs were then computed for >54,000 individuals in Mount Sinai BioMe and >45,000 in the Mass General Brigham Biobank. Scores were standard normalized within each genotype-inferred ancestry group. Individuals 35-90 years old in the top and bottom PRS deciles were invited for a comprehensive eye exam. Glaucoma diagnosis relied primarily on structural and functional data. Average mean defect (MD) on Humphrey visual field (VF) tests between top and bottom PRS deciles were compared (t-test). Multivariate logistic regression, adjusted for age, sex, and genetically inferred ancestry, assessed the relationship between PRS and POAG.

Results: POAG was diagnosed in 38/106 (35.9%) of subjects in the top PRS decile and 4/95 (4.2%) in the bottom PRS decile. Among patients with reliable VFs (75%), the average MD in the top vs. bottom PRS deciles were -2.26 ± 3.90 dB vs. -0.89 ± 1.96 dB (p = 0.0072). Overall, the odds ratio (OR) for POAG in the top vs. bottom PRS deciles was 12.7 (95% confidence interval (CI): 4.3 - 37.3).

Conclusion: This cross-sectional study shows that 36% of subjects in the highest decile of genetic risk had evidence of POAG, compared to 4% in the lowest decile. These results suggest that this PRS demonstrates utility in detecting glaucoma. Studies regarding the cross-ancestry utility of the PRS for glaucoma screening are ongoing.

Discussant: Anne Coleman

FRIDAY 10:35 AM – 10:55 AM

PREDICTION OF FUNCTIONAL GLAUCOMA PROGRESSION FROM BASELINE CLINICAL AND STRUCTURAL DATA WITH DEEP LEARNING

Kouros Nouri-Mahdavi*♦, Vahid Mohammadzadeh, Sean Wu, Sajad Besharati, Mahsahd Rafiee, Jane Zou, Yasamin Banaei, Arthur Martinyan, **Joseph Caprioli**, Fabien Scalzo

Purpose: Several pieces of information are available to clinicians for forecasting future course of glaucoma at diagnosis; integration of various data sources for progression prognostic models is an unmet need in glaucoma diagnostics. We designed a deep learning-based prognostic model incorporating baseline clinical and multimodal imaging data for forecasting functional glaucoma progression.

Methods: We included 2,077 eyes (1,176 patients) with ≥5 24-2 visual fields (VF) and ≥3 years of follow-up. VF mean deviation (MD) rates of change were estimated with linear regression. VF progression was defined as a confirmed negative MD slope with $p<0.05$ at final follow-up. A convolutional neural network pre-trained on ImageNet was designed to predict VF progression using baseline clinical/demographic data, disc photographs, and OCT-derived global and sectoral retinal nerve fiber layer and macular measurements. Gender, ethnicity, age, intraocular pressure, central corneal thickness, and VF MD and pattern standard deviation were clinical variables entered into the model. A separate deep-learning model was trained for every combination of the clinical/demographic data and the three imaging modalities.

Results: Average (SD) baseline MD and number of VF exams were –3.6 (5.1) dB and 12.6 (8.5). 637 eyes (31%) deteriorated. The mean (SD) follow-up time for stable and progressing eyes was 7.8 (4.9) and 10.4 (5.0) years. The best-performing model was the one using baseline ODP, and RNFL and macular OCT measurements in addition to clinical and demographic measures (AUC= 0.863; 95% CI: 0.793-0.934; Figure 1) ($p<0.015$ for all comparisons except comparison to the combined ODP and macular OCT). This model achieved the highest accuracy among all the models (0.87; 95% CI: 0.79-0.92) with a sensitivity and specificity of 0.81 and 0.91, respectively.

Conclusion: Our newly designed deep learning model can combine baseline demographic/clinical data with widely available imaging biomarkers and provides clinically relevant information for prediction of glaucoma progression years ahead of time.

Discussant: **Teresa Chen♦**

FRIDAY 10:55 AM – 11:15 AM

NON-CONTACT DIRECT SELECTIVE LASER TRABECULOPLASTY (DSLT) IN OPEN ANGLE GLAUCOMA. A MULTICENTRE, RANDOMISED, CONTROLLED COMPARATIVE STUDY VERSUS SELECTIVE LASER TRABECULOPLASTY (SLT)

Carlo Traverso*, Gus Gazzard, Augusto Azuara Blanco, Nathan Congdon, **Thomas Samuelson**, Michael Belkin

Purpose: Non-adherence to IOP-lowering medications and unavailability of SLT in socioecnomically less privileged settings are substantial obstacles to effective first-line treatment for open-angle glaucoma. This trial, in part supported by an European Commission Horizon 2020 grant (GLAUrious NCT03750201) compared at one year follow-up the clinical efficacy of SLT with DSLT, a novel non-contact delivery system for laser trabeculoplasty.

Methods: For this prospective, randomized, evaluator-masked, controlled study, adult patients with ocular hypertension or POAG were recruited. Only patients with no previous IOP-lowering procedures and untreated/washout IOP 22–35 mmHg were recruited at 13 clinical sites; candidates were randomised 1:1 to receive DSLT or SLT and followed for 12 months.

Results: Of the randomized patients 84 were treated by DSLT and 77 by SLT. Baseline patient and eye characteristics were similar between treatment groups. At 6 months after SLT the mean decrease of unmedicated IOP was 6.16 ± 0.53 mmHg (95% CI -7.21 to -5.11) for the SLT group and 5.46 ± 0.51 mmHg (95% CI -6.48 to -4.45) for the DSLT group, with a mean difference of - 0.70 mmHg (95% CI -2.15 to 0.76; p=0.091). The non-washed out mean reduction of IOP from sceening was -3.28 ± 0.40 mmHg for SLT and -3.20 ±0.38 mmHg for DSLT at 12 months. The mean (±SD) number of IOP-lowering medications used by the SLT group was reduced from 1.22 (0.98) to 0.68 (0.94) compared to 1.19 (1.01) at screening to 0.63 (0.94) at 12 months for the DSLT group. 59.5% of SLT and 61.7% of DSLT subjects were medication-free at 12 months. In either group no safety concerns were identified.

Conclusion: According to our data DSLT was shown to be safe and as effective as SLT on IOP control up to 12 months of follow up. Since laser trabeculoplasty is increasingly offered as first-line IOP-lowering treatment and eligible patients are relentlessly growing in number, DSLT can provide a time-efficient and less costly alternative to SLT in many settings.

Discussant: **Christophe Baudouin**

FRIDAY 11:15 AM – 11:35 AM

THE UPDATED 2024 PROTOCOL FOR REVIVING IN VIVO-LIKE ERG A- AND B-WAVES IN POSTMORTEM HUMAN ORGAN DONOR EYES

Anne Hanneken*, Thomas Neikirk, Lisa Stocks, Satchin Panda, Frans Vinberg

Purpose: We established a method and criteria for the revival of [STARTitalics]in vivo-like[ENDitalics] ERG a- and b-waves in human organ donor retina after circulatory death (Nature 2022). This platform is a paradigm shift for studying human retinal physiology and exploring new approaches for visual rehabilitation. We will share our 2024 protocol for optimizing our surgical recovery and preservation conditions.

Methods: We recovered human eyes from organ donors at the time of circulatory death. Eyes were transported to the laboratory with oxygenated (95% pO2) physiological medium. Retinal punches were taken from the macula and periphery and placed in a customized ex vivo ERG device to measure light-induced electrical responses. To improve viability of the revived eyes, we implemented 16 protocol improvements in three specific areas: a) Improving access to high quality donor eyes, b) Improving the surgical protocol, and c) Optimizing the preservation conditions.

Results: To improve access to high quality organ donor eyes, we built a strong communication network with our organ procurement organization, added a comprehensive preoperative ocular examination, implemented more efficient electrophysiologic testing, rejected whole eyes with preoperative ischemia and expanded our donor pool. To improve viability, we changed the surgical protocol and reduced ischemia times, minimized the delay between circulatory loss and re-oxygenation, coordinated the surgical recovery with the anesthesiologist and the transplant surgeons, and customized our surgical approach in heart and lung transplant cases. To optimize the preservation conditions, we built a prototype for a closed-loop perfusion system, used cool preservation media to lower the metabolism, reduced transportation delays and avoided retinal detachment.

Conclusion: Current 2024 updates involve preoperative assessments, refining surgical techniques, optimizing retinal oxygenation, and extending the lifespan of the revived retina. This platform can be used to explore the transplantation of allogeneic, cone dominant macular grafts into diseased human eyes and other innovative approaches for visual rehabilitation.

Discussant: **Julia Haller**

FRIDAY 11:35 AM – 11:55 AM

OCT SPLIT-SPECTRUM AMPLITUDE-DECORRELATION OPTORETINOGRAPHY

David Huang[*♦], Mark Pennesi, Steven Bailey, Nida Wongchaisuwat, Siyu Chen

Purpose: Split-spectrum amplitude-decorrelation optoretinography (SSADOR) is an efficient algorithm to measure photoreceptor light response using optical coherence tomography (OCT). It boosts the signal-to-noise ratio so that photoreceptor function can be measured without using adaptive optics to resolve single photoreceptors. SSADOR allows rapid surveying of relatively large retinal areas. We investigate if SSADOR can assess cone impairment in degenerative retinal diseases.

Methods: Study participants were prospectively enrolled from the retina clinic at the Casey Eye Institute. SSADOR OCT scans were obtained using a prototype high-speed (250 kHz), ultrahigh resolution (2.4 μm axial resolution) spectral-domain OCT. The scan comprises 5 repeated volumes over a 3x1-mm retinal area acquired over 2.5 seconds. A 0.2-second white stimulus flash is delivered at the beginning of the third volume and is estimated to bleach ~15% of total cone opsins. Three scans are montaged to obtain a 3x3mm optoretinography centered on fixation. The SSADOR algorithm compares pre- and post-flash images of the photoreceptor outer segment to quantify light response.

Results: Six normal subjects, 7 inherited retinal disease (IRD) patients, and 5 non-exudative age-related macular degeneration (AMD) patients were enrolled. In normal subjects, SSADOR signal (mean decorrelation) positively correlated with the flash intensity. IRD and AMD eyes had areas of reduced response in the SSADOR decorrelation map consistent with the clinically observed pathology. In cone dystrophy patients (n = 2), SSADOR detected cone impairment even in areas where mesopic microperimetry showed normal retinal sensitivity. Full-field electroretinogram confirmed reduced cone light responses in these cases.

Conclusion: SSADOR has high sensitivity in detecting functional impairment in macular cone photoreceptors. This novel technology can evaluate larger retinal areas than previous optoretinography methods and may be clinically useful in detecting and monitoring cone dysfunction in degenerative retinal diseases such as AMD and IRD.

Discussant: **Timothy Stout**

SATURDAY 10:30 AM – 10:50 AM

ENHANCED PHENOTYPE IDENTIFICATION OF COMMON OCULAR DISEASES IN REAL-WORLD DATASETS

Joshua Stein*, Hong Su An, Chris Andrews, Suzann Pershing, Tushar Mungle, Amanda Bicket, Julie Rosenthal, Amy Zhang, Wei-Shin Lee, Cassie Ludwing, Bethlehem Mekonnen, Tina Hernandex-Boussard

Purpose: Patients with the ocular diseases of interest in nearly all real-world data research are identified by using ICD billing codes. Yet with sole reliance on billing codes, some patients may get misclassified, possibly affecting study findings. Using machine learning (ML), we developed, trained, and validated a novel approach to identifying patients with common eye diseases by using additional elements in the electronic health record (EHR) beyond billing codes to improve accuracy.

Methods: Using data from 1 site in the SOURCE Ophthalmology Big Data consortium, we trained LASSO regression and other ML models, incorporating variables from structured data fields throughout the EHR to classify patients with glaucoma, macular degeneration (AMD), and diabetic retinopathy (DR). We compared the accuracy, PPV, NPV, AUC, and area under the precision recall curve (AUCPR) of the enhanced phenotype identification (EPI) models to models built using only ICD billing codes. Gold standard assessments for the presence or absence of these conditions were made by ophthalmologists. External validation was done by using data from a 2nd SOURCE site.

Results: Using EHR data from 1800 randomly selected eyes at 1 SOURCE site, we trained EPI and ICD-only models. Our EPI models outperformed models based solely on ICD billing codes for properly identifying patients with glaucoma (AUC 0.97 vs. 0.90), AMD (AUC 0.98 vs 0.95), and DR (AUC 0.997 vs 0.98). The AUPRC was also better for the EPI models compared with those using only the billing codes for glaucoma (0.79 vs 0.32), AMD (0.76 vs. 0.54), and DR (0.96 vs 0.84). In external validation using structured EHR data from a 2nd site, our EPI models worked well for glaucoma (AUC 0.93, AUPRC 0.75), AMD (AUC 0.96, AUPRC 0.68), and DR (AUC 0.98, AUPRC 0.80).

Conclusion: We developed, tested, and externally validated a ML approach that can accurately identify most patients with glaucoma, AMD, and DR, achieving AUCs of ≥ 0.93 for all 3 conditions. For these conditions, our EPI approach outperformed the conventional method involving ICD billing codes alone. The improved performance was most notable in the AUPRC comparisons for glaucoma and AMD. Higher AUPRCs mean the classifier is returning accurate results (high precision) and mostly all positive results (high recall). These models should greatly enhance research involving real-world data to identify patient cohorts with these common eye diseases.

Discussant: **Louis Pasquale**

SATURDAY 10:50 AM – 11:10 AM

THE ROLE OF NUTRITIONAL FACTORS IN TRANSITIONING BETWEEN EARLY, MID AND LATE STAGES OF AGE-RELATED MACULAR DEGENERATION

Johanna Seddon*♦, Dika De, Bernard Rosner

Purpose: Transitions between different stages of age-related macular degeneration (AMD) are not completely captured by traditional survival models with an endpoint of advanced AMD. We explored the transition from early-intermediate AMD to higher severity stages and determined the contributions of nutritional factors to these transitions.

Methods: Eyes with non-advanced AMD were classified as early or intermediate AMD at baseline, using the Age-Related Eye Disease Study severity groups 2 (severity scales 2 – 4) and 3 (scales 5 – 8). Progression was defined as eyes transitioning to higher severity groups including advanced stages, confirmed at 2 consecutive visits over 5 years. Foods and nutrients associated with AMD [leafy green vegetables, fish, lutein/zeaxanthin (LZ), and omega3 fatty acids] were determined by a food frequency questionnaire. Cox proportional hazard models were analyzed accounting for inter-eye correlation, demographics, lifestyle factors, baseline macular status, family history of AMD, caloric intake and a genetic risk score from 12 loci of 9 genes from our latest predictive model (AUC 5 yrs.=0.94).

Results: Among 2697 eyes with early or intermediate AMD, 616 progressed to higher severity groups (22.8%). In the model with food groups, adjusting for other covariates, higher intake of leafy greens was beneficial [hazard ratio (HR)=0.75 for ≥ 2.7 servings/week vs. none, P = 0.02]. Higher fish intake was also protective (HR=0.79 for ≥ two 4-ounce servings/week vs. < 2, P = 0.01). In the multivariate model with nutrient values, LZ intake was protective (HR=0.76 for ≥ 2 mg/day vs. < 2, P = 0.02). Higher intake of omega3 also tended to be protective (HR=0.85 for ≥ 0.7 g/week vs. < 0.7, P = 0.06).

Conclusion: Emphasizing increased weekly consumption of leafy greens, fish and omega3, along with a higher daily intake of LZ during the initial stages of AMD can be beneficial in slowing down the progression of this debilitating disease.

Discussant: **Emily Chew**

SATURDAY 11:10 AM – 11:30 AM

DIFFERENTIAL ARTERY–VEIN ANALYSIS IMPROVES OCTA PERFORMANCE FOR ARTIFICIAL INTELLIGENCE CLASSIFICATION OF DIABETIC RETINOPATHY

Jennifer Lim*, Mansour Abtahi, David Lee, Behrouz Ebrahimi, Albert Dadzie, Mojtaba Rahimi, Yi-Ting Hsieh, Michael Heiferman, Yao Xincheng

Purpose: To investigate the impact of using differential artery-vein (AV) analysis in optical coherence tomography angiography (OCTA) images on the classification performance of diabetic retinopathy (DR) using artificial intelligence (AI).

Methods: We performed a retrospective, cross-sectional study to compare AI DR classification using OCTA quantitative features applied to all vessels versus differentially (arteries and veins) in patients with non-proliferative DR (NPDR) and controls. For differential analysis, an OCTA-AV map was created. Six quantitative features were extracted from the OCTA images: perfusion intensity density (PID), blood vessel density (BVD), vessel area flux (VAF), blood vessel caliber (BVC), blood vessel tortuosity (BVT), and vessel perimeter index (VPI). Using a support vector machine (SVM) classifier, both binary DR and multiclass DR classifications were conducted to evaluate the effect of differential AV analysis on DR classification. In addition, these analyses were performed on the entire OCTA image (one-region) and also regionally (whole, parafoveal and perifoveal regions). The performance of the SVM classifier was assessed using four metrics: sensitivity, specificity, accuracy, and area under the curve (AUC).

Results: 212 OCTA images from patients with NPDR without macular edema (48 No DR; 37 mild/ 39 moderate/ 36 severe NPDR eyes) and controls (52 eyes) underwent image analysis. Differential AV analysis resulted in improved sensitivity of quantitative features ($p<0.005$) and accuracy for DR classification. Differential AV analysis of the entire OCTA image improved mean accuracies from 78.86% to 87.63% overall, and from 79.62% to 85.66% for binary and multiclass classifications, respectively. Differential AV analysis using regional OCTA analysis improved mean accuracies from 84.43% to 93.33% and from 83.40% to 9.25% for binary and multiclass classifications, respectively.

Conclusion: Differential AV analysis in OCTA images significantly improves AI DR classification performance and regional analysis further improves the classification accuracy, compared to whole image analysis.

Discussant: **SriniVas Sadda♦**

SATURDAY 11:30 AM – 11:50 AM

MONTH 60 IMAGING FINDINGS AND RELATIONSHIP TO TREATMENT OUTCOMES FOLLOWING ANTI-VEGF THERAPY FOR MACULAR EDEMA DUE TO CENTRAL OR HEMI RETINAL VEIN OCCLUSION

Michael Ip*♦, **Ingrid Scott**, Paul Van Veldhuisen, Neal Oden, Barbara Blodi

Purpose: To evaluate imaging findings from SCORE2 participants through 60 months to: 1) describe the degree of resolution or progression of these variables; 2) correlate changes in these imaging findings to treatment outcomes such as visual acuity and the number of treatments administered.

Methods: SCORE2 participants were followed for up to 60 months. Visual acuity, injection frequency and imaging tests (CFP, OCT and UWFA) were performed throughout this period.

Results: Less than 6% of eyes had subretinal fluid at month 60. DRIL was the most likely finding to persist, present in 96% of eyes at baseline and unchanged at 95% at month 60. For ultrawide-field fluorescein angiography, at baseline, there was a mean of 5.0% non-perfusion area (95% CI: 3.3% - 6.8%) in the NETWORC grid with little change to month 60. For the ETDRS grid, at baseline, there was a mean of 2.3% non-perfusion area (95% CI: 0.7% - 3.9%) with little change to month 60. There was no correlation between any of the imaging variables at baseline and change in visual acuity to month 60 or in the number of injections following the variable treatment timeframe (month 12 to month 60).

Conclusion: These analyses provide an anatomic explanation for persistent functional deficits many years following initial treatment. Clinical practice patterns should consider evaluation with these imaging tests to help explain persistent functional deficits in many eyes. Additionally, these 8 baseline imaging variables generally should not be relied on to predict visual acuity or intensity of treatment.

Discussant: **Sophie Bakri♦**

SATURDAY 11:50 AM – 12:10 PM

PROTEIN BIOMARKERS IN THE AQUEOUS HUMOR LIQUID BIOPSY EXHIBIT DIAGNOSTIC POTENTIAL FOR UVEAL MELANOMA

Jesse Berry*♦, Atrey Khoche, Chen-Ching Peng, Bejamin XU, Bibiana Reiser, Liya Xu

Purpose: Uveal Melanoma (UM) is a rare, yet dangerous ocular malignancy with high rates of fatal metastasis. Timely identification of the tumor is crucial for effective intervention and management. While most UM tumors can be identified through standard eye examinations or imaging tests, smaller or less- advanced tumors may go unnoticed. Consequently, there is a pressing need for a minimally invasive solution that can reliably diagnose UM. Our objective is to explore whether a distinctive proteomic biomarker signature present in the aqueous humor can address this requirement by accurately distinguishing UM from other non-tumor ocular diseases.

Methods: In this study, we analyzed 49 diagnostic aqueous humor (AH) samples from individuals with UM and 39 samples from those with non-UM conditions including adult glaucoma, congenital retinal disorder, and congenital cataract. Using Olink's proximity extension assay-derived multiplexed platform, we examined 80 microliters of each AH sample. The normalized protein expression levels of 2886 targets were determined for each AH sample. We conducted a comparison between adult glaucoma and adult UM samples to identify differentially expressed proteins (DEPs) specifically in UM. Unpaired T-tests were used to compare the expression levels of each target in UM samples with those from individuals with adult glaucoma. The thresholds applied to determine the DEPs were $p < 0.01$ with a fold change (FC) greater than 2 or less than 0.5 in UM.

Results: After normalizing the data, we identified 421 DEPs, with 48 showing upregulation and 373 showing downregulation in UM. Two upregulated DEPs of interest in the UM cohort were MERTK (FC=2.08, $p<0.0005$) and Retbindin (FC=2.48, $p<4.05e-5$). Downregulated DEPs of interest include RB2 (FC=-0.70, $p<0.0003$), TSPAN1 (FC=-0.58, $p<0.0056$), RET (FC=-0.74, $p<2.96e-6$), and PDCD1L2(FC= -0.41, $p<0.0005$).

Conclusion: Distinctive proteomic signatures in the aqueous humor show noteworthy variations between UM and other ocular diseases. This implies that an aqueous humor protein panel has the potential to function as a diagnostic assay for UM, even in cases where the tumor size is too small for direct sampling or in non-melanoma ocular diseases. Subsequent steps in our research involve conducting a biological pathway analysis to enhance the target list for a focused panel.

Discussant: **Martine Jager**

SATURDAY 12:10 PM – 12:30 PM

THE EFFECT OF MODIFYING AIRE IN MELANOMA IN VITRO

Jose Pulido*, Richard Vile

Purpose: Autoimmune regulator (AIRE) is important in the negative selection of lymphocytes in the thymus by having thymocytes express many separate self-antigens. It had been thought that AIRE expression outside of the thymus was unimportant. Interestingly, it is expressed in cancers including some melanomas as well. The loss of normal AIRE functioning causes autoimmune disease including autoimmune retinopathy. We hypothesized that expression of AIRE in melanomas increase the expression of self-antigens while decreasing AIRE allows for expression of non-self-antigens

Methods: B16, melanoma cells were transfected with either shRNA-AIRE that decreased AIRE levels or CMV-AIRE that increased AIRE levels in the cells. Activated splenocytes from PMEL or OT-1 mice were added to B16ova melanoma. An interferon gamma release assay was performed using splenocytes from PMEL-1 mice as effectors and B16 melanoma or B-16 ova melanoma cells as targets at a 10:1 effector to target ratio.

Results: Compared to untreated B16 cells, those that had shRNA-AIRE had a lighter color phenotype than the control B16 and the CMV-AIRE treated had a darker phenotype. The IFn-γ levels were 190pcg/ml for B16ova cells exposed to PMEL cells, near 0 pg/ml for B16ova-ShRNA AIRE, and 500pg/ml for B16ova-CMV AIRE. Conversely, in B16 melanoma exposed to splenocytes from OT-1 mice that reacted to SINFEEKL antigen, the IFN-γ levels were 550pg/ml for B16, 1300 pg/ml for B16-shRNA A1IRE, and 150pg/ml for B16-CMV AIRE.

Conclusion: The phenotype of melanoma cells is changed by the under or overexpression of AIRE. The expression of AIRE in B melanoma increases the reaction to self-antigens while the under expression decreases the reaction to non-self-antigens. Our study shows that contrary to prior beliefs, the expression of AIRE outside of the thymus materially affects the cells and the immune response to the cells. The regulation of this effect can be exploited to treat cancers.

Discussant: **William Mieler**

AOS 2024

Poster Abstracts

Posters will be displayed on Thursday, May 16 through Saturday, May 18.

Poster authors will be available to discuss their work during guided poster sessions scheduled on Friday, May 17 from 9:15 AM–10:15 AM and on Saturday, May 18 from 9:30 AM–10:30 AM.

PLEASE NOTE THE FOLLOWING PROGRAM KEY:

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

(Posters will indicate relevant financial relationships.)

POSTER SESSION I — FRIDAY, MAY 17

MONITOR 1		
9:15 AM – 9:45 AM	***OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY (OCTA) ANALYSIS OF ISCHEMIC VS NON-ISCHEMIC OPTIC DISC EDEMA***	Anthony Arnold
9:45 AM – 10:15 AM	***BALANCING NEUROPROTECTIVE AND NEUROTOXIC ASTROCYTE REACTIVITY IN OPTIC NEUROPATHIES***	Anna Toth
MONITOR 2		
9:15 AM – 9:45 AM	***CORNEAL SENSITIVITY IS INVERSELY CORRELATED WITH SEVERITY OF DIABETIC RETINOPATHY IN A PREDOMINANTLY UNDERREPRESENTED POPULATION***	Michael Singer
9:45 AM – 10:15 AM	***COMBINED TWO-PIECE MUSHROOM PENETRATING KERATOPLASTY AND "PULL THROUGH" TECHNIQUE: A NOVEL LAMELLAR APPROACH TO FACILITATE SURGERY FOR PETERS ANOMALY IN INFANTS***	Massimo Busin
MONITOR 3		
9:15 AM – 9:45 AM	***FACTORS ASSOCIATED WITH SURGICAL PTOSIS REPAIR AFTER GLAUCOMA AND CATARACT SURGERY IN THE CALIFORNIA MEDICARE POPULATION***	Janet Coleman-Belin
9:45 AM – 10:15 AM	***EVALUATION OF SARCOPENIA IN BLEPHAROPTOSIS USING ORBITAL MAGNETIC RESONANCE IMAGING***	Kendall Hughes
MONITOR 4		
9:15 AM – 9:45 AM	***EXTENDED DEVELOPMENTAL ANGIOGENESIS AFTER ANTI-VEGF TREATMENT IN ROP INDEPENDENT OF REDUCTION OF PLUS DISEASE***	Mary Elizabeth Hartnett
9:45 AM – 10:15 AM	***CAN CHANGES IN MACULAR NEOVASCULARIZATION'S OCTA VASCULAR CHARACTERISTICS PREDICT EXUDATIVE ACTIVITY IN EYES WITH NEOVASCULAR AGE RELATED MACULAR DEGENERATION? THE ACTOR STUDY***	Eric Souied
MONITOR 5		
9:15 AM – 9:45 AM	***HOW CHARLES KELMAN INVENTED PHACOEMULSIFICATION IN THE 1960S: A REAPPRAISAL***	Christopher Leffler
9:45 AM – 10:15 AM	***OUTCOMES OF THE PARS PLANA APPROACH TO POSTERIOR CAPSULOTOMY AND ANTERIOR VITRECTOMY IN PEDIATRIC CATARACT SURGERY WITH IOL PLACEMENT***	M. Edward Wilson

MONITOR 6		
9:15 AM – 9:45 AM	***DEEPER DIVES INTO GLAUCOMA GWAS HITS: WHICH VARIANTS IN EACH LOCUS CONFER RISK AND HOW DO THEY DO IT?***	John Fingert
9:45 AM – 10:15 AM	***GENETICALLY-DETERMINED EYE COLOUR INFLUENCES PROGNOSTIC FACTORS IN UVEAL MELANOMA***	Martine Jager
MONITOR 7		
9:15 AM – 9:45 AM	***INCISIONAL GLAUCOMA SURGERIES PERFORMED AT AMBULATORY SURGICAL CENTERS ARE ASSOCIATED WITH INCREASED RISK OF REOPERATION***	Ken Kitayama
9:45 AM – 10:15 AM	***OPERATIVE FIRE RISK AND SUPPLEMENTAL OXYGEN USE IN OCULOPLASTIC SURGERY***	Mena Kozman

POSTER SESSION II SATURDAY, MAY 18

MONITOR 1		
9:30 AM – 10:00 AM	***OUTCOMES OF A BRIEF PRISM ADAPTATION TEST FOR CHILDREN WITH DISTANCE-NEAR DISPARITY ESOTROPIA UNDERGOING STRABISMUS SURGERY***	Natalie Kerr
10:00 AM – 10:30 AM	***WEARABLE SENSOR TEMPERATURE DATA LOGGER RESPONSE RATES WHEN APPLIED TO SPECTACLES FOR MEASUREMENT OF SPECTACLE WEAR TIME***	Joseph Miller
MONITOR 2		
9:30 AM – 10:00 AM	***VISUAL DEFICITS DUE TO DIABETIC RETINAL DISEASE***	Brian VanderBeek
10:00 AM – 10:30 AM	***LIMITED VITRECTOMY SAFELY CURES VISION DEGRADING MYODESOPSIA FROM VITREOUS FLOATERS***	J. Sebag
MONITOR 3		
9:30 AM – 10:00 AM	***PATHOGENIC MECHANISMS OF IMMUNE CHECKPOINT INHIBITOR (ICI)-ASSOCIATED CHOROIDAL AND RETINAL ADVERSE REACTIONS***	Mark Johnson
10:00 AM – 10:30 AM	***DIGITAL HISTOLOGY OF RETINAL MICROANEURYSMS: CHARACTERISTICS AND CLINICAL RELEVANCE IN DIABETIC RETINOPATHY***	Francesco Bandello
MONITOR 4		
9:30 AM – 10:00 AM	***PREDICTORS OF SURGICAL TREATMENT FOR NEOVASCULAR GLAUCOMA IN THE CALIFORNIA MEDICARE POPULATION***	Victoria Tseng
10:00 AM – 10:30 AM	***DIFFERENCES IN ACCURACY BETWEEN STANDARD AUTOMATED PERIMETRY AND A DIGITAL VISUAL FIELD TEST WHEN CLASSIFYING DISEASE STATE***	Supriyo Sinha

MONITOR 5		
9:30 AM – 10:00 AM	***TOPOGRAPHIC ANALYSIS OF LOCAL OCT BIOMARKERS WHICH PREDICT PROGRESSION TO ATROPHY IN AGE-RELATED MACULAR DEGENERATION***	SriniVas Sadda
10:00 AM – 10:30 AM	***THICK BRIDGING VESSELS SPANNING PERIPHERAL AVASCULAR RETINA IN FAMILIAL EXUDATIVE VITREORETINOPATHY: A NOVEL FLUORESCEIN ANGIOGRAPHY FINDING***	G. Baker Hubbard
MONITOR 6		
9:30 AM – 10:00 AM	***CHARITY CARE IN OPHTHALMOLOGY, 2024***	David Browning
10:00 AM – 10:30 AM	***SUSTAINABILITY IN EYE CARE: FACTORS INFLUENCING SOLID WASTE GENERATION AND OPPORTUNITIES FOR CO-BENEFITS***	Cassandra Thiel
MONITOR 7		
9:15 AM – 9:45 AM	***THE UTILITY OF AN AT-HOME VISION SCREENING KIT IN A PREDOMINANTLY NON-ENGLISH SPEAKING UNDERSERVED POPULATION***	Michael Nguyen
10:00 AM – 10:30 AM	***AHMED GLAUCOMA VALVE IN ANIRIDIA***	Peter Netland

Poster abstracts are listed in alphabetical order by presenting author's last name.

SESSION I · MONITOR 1 · 9:15 AM – 9:45 AM

OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY (OCTA) ANALYSIS OF ISCHEMIC VS NON-ISCHEMIC OPTIC DISC EDEMA

Anthony Arnold*, Giulia Corradetti, Federico Corvi, **Srinivas Sadda**

Purpose: Retinal microaneurysms (MAs) are among the earliest signs of diabetic retinopathy (DR) and can be classified in several subtypes by non-invasive multimodal retinal imaging. Optical coherence tomography (OCT) based dense ART (DART) B-scan angiography is a relatively novel technique providing extremely detailed information on the perfusion characteristics of the retina. The main aim of the present study is to characterize retinal MAs perfusion properties and their blood flow network connectivity by means of quantitative multimodal imaging, also testing the clinical impact of MAs assessment in DR.

Methods: The study design was cross-sectional, observational. Multimodal retinal imaging included confocal multicolor, OCT, OCT angiography (OCTA) and DART OCTA. We classified retinal MAs accordingly with the recently proposed multimodal retinal imaging classification and we tested the role of DART OCTA for detecting retinal MAs blood flow network connectivity. We also tested the relationship with clinical parameters.

Results: The mean superficial VD for the optic nerve in ischemic edema cases was 32.16%, compared to 36.16% in non-ischemic edema cases ($p = 0.002$); for the peripapillary retina, the means were 34.82% compared to 37.34% ($p = 0.002$). The mean deep VD for the optic nerve in ischemic edema cases was 29.98%, compared to 32.85% for non-ischemic cases ($p = 0.04$); for the peripapillary retina, the means were 31.09% compared to 33.38% ($p = 0.05$).

Conclusion: The optic disc and peripapillary VD were statistically significantly decreased in ischemic vs non-ischemic optic disc edema at both SVC and DVC. The differential in vessel densities at superficial levels and in the peripapillary retina raises the question of the role of the central retinal artery-derived circulation in ischemic optic nerve edema.

SESSION II · MONITOR 3 · 10:00 AM – 10:30 AM

DIGITAL HISTOLOGY OF RETINAL MICROANEURYSMS: CHARACTERISTICS AND CLINICAL RELEVANCE IN DIABETIC RETINOPATHY.

Francesco Bandello*, Alessandro Arrigo

Purpose: Retinal microaneurysms (MAs) are among the earliest signs of diabetic retinopathy (DR) and can be classified in several subtypes by non-invasive multimodal retinal imaging. Optical coherence tomography (OCT) based dense ART (DART) B-scan angiography is a relatively novel technique providing extremely detailed information on the perfusion characteristics of the retina. The main aim of the present study is to characterize retinal MAs perfusion properties and their blood flow network connectivity by means of quantitative multimodal imaging, also testing the clinical impact of MAs assessment in DR.

Methods: The study design was cross-sectional, observational. Multimodal retinal imaging included confocal multicolor, OCT, OCT angiography (OCTA) and DART OCTA. We classified retinal MAs accordingly with the recently proposed multimodal retinal imaging classification and we tested the role of DART OCTA for detecting retinal MAs blood flow network connectivity. We also tested the relationship with clinical parameters.

Results: We included 206 retinal MAs of 36 DR eyes. We categorized retinal MAs as red (70; 34%), mixed (106; 51%) and green (30; 15%), corresponding to precise characteristics on structural OCT and both (regular) enface and DART OCTA images. The agreement between enface and DART OCTA techniques for detecting MAs perfusion was very high (overall ICC 0.98; $p<0.01$). However, DART OCTA provided clearer visualization than enface OCTA for detecting the blood flow network connectivity of retinal MAs. We detected 23% of retinal MAs as being invested exclusively by the superficial capillary network, whereas 29% of retinal MAs showed an afferent superficial capillary and an efferent deeper capillary. The remaining 48% of retinal MAs exclusively belonged to deeper capillary networks. Multimodal retinal imaging classification of retinal MAs provided significant correlations with DR duration, DR stage, and macular capillary non-perfusion.

Conclusion: By using a quantitative multimodal imaging classification, retinal MAs still maintain a clinical role in DR.

SESSION II · MONITOR 6 · 9:30 AM – 10:00 AM

CHARITY CARE IN OPHTHALMOLOGY, 2024

David Browning*, Sally Ong, **John Clarkson**, Craig Greven, Harrison Huang

Purpose: To review changes in the provision of charity eye care in the past 50 years with hypothesized resulting effects on surgical training and patient outcomes.

Methods: Case report, personal observations, comparison of experience in community and training program settings, and selected literature review.

Results: The population to which charity care applies has shrunk as broader insurance coverage has been legislated, but in 2023 remains at approximately 7.3% of the United States population. In areas with ophthalmology training programs, house staff supervised by faculty provide most of the charity care. In areas without training programs, a shrinking pool of willing private practitioners provides charity care. Because there is no organized financial support behind provision of charity eye care, non-anecdotal data needed to assess the problem and guide decision-making are lacking.

Conclusion: Charity eye care in ophthalmology in 2024 is a patchwork of transient, local efforts which have a few common themes: absent material basis for sustainability, a narrowing base of support by clinicians, transfer of care to training programs, and financial vetting of applicants for surgery at hospitals by non-clinicians. Unless universal health care legislation passes, which would eliminate the issue, suggestions for improvement include broader voluntary participation by private practice ophthalmologists in charity eye care, allocation of charity care spending by nonprofit hospitals to support this effort, and clinician-determined criteria for provision of charitable surgery supported by involved hospital systems.

SESSION I · MONITOR 2 · 9:45 AM – 10:15 AM

COMBINED TWO-PIECE MUSHROOM PENETRATING KERATOPLASTY AND "PULL THROUGH" TECHNIQUE: A NOVEL LAMELLAR APPROACH TO FACILITATE SURGERY FOR PETERS ANOMALY IN INFANTS

Massimo Busin*, Angeli Christy Yu

Purpose: To describe and report the surgical outcomes of combined two-piece mushroom penetrating keratoplasty (PK) and "pull-through" technique for Peters Anomaly in infants

Methods: Surgery included: Using a 250µm microkeratome head to split the donor cornea into an anterior and a posterior lamella, which were then punched to 8.5mm and 6mm respectively. Following 8.0mm trephination of the host cornea (250µm depth), the host anterior stroma was removed. Partial thickness trephination (6mm in diameter) of the residual bed was completed full-thickness only for 1 clock hour at the 12', 3', 6' and 9' o'clock positions to facilitate subsequent removal of the host residual bed. The donor anterior lamella was fixated with 4 cardinal sutures on top of the host residual bed still in place, thus creating a "semi-closed system" condition. Using corneal scissors, the 6mm unfinished trephination of the residual host cornea was completed under the sutured donor anterior lamella. The posterior lamella was placed endothelium down on the infero-nasal conjunctiva adjacent to the corneal incision. A DSAEK microforceps was inserted infero-temporally under the anterior lamella through the anterior chamber to grasp the donor posterior lamella and deliver it into place, using the pull-through technique. Air was injected into the anterior chamber to tamponade the posterior lamella onto the anterior one. Suturing of the anterior lamella was completed with 12 additional interrupted stitches.

Results: The surgery was performed in 8 eyes of 8 patients with Peters anomaly between 3 months to 2 years of age. All grafts were clear at last follow-up (mean=12 ±3 months). All patients were able to fix and follow.

Conclusion: Fixation of a large anterior lamella over a smaller partially excised host cornea allows selective exchange of the central diseased host cornea under "semi-closed system" conditions, thus overcoming excessive vitreous pressure and minimizing endothelial trauma in the donor tissue.

SESSION I · MONITOR 3 · 9:15 AM – 9:45 AM

FACTORS ASSOCIATED WITH SURGICAL PTOSIS REPAIR AFTER GLAUCOMA AND CATARACT SURGERY IN THE CALIFORNIA MEDICARE POPULATION

Janet Coleman-Belin*, Victoria Tseng, Ken Kitayama, **Anne Coleman**, **Robert Goldberg**

Purpose: Latrogenic ptosis is a known occurrence after intraocular surgery. The purpose of this study was to examine factors associated with surgical ptosis repair after cataract and/or glaucoma surgery in California (CA) Medicare beneficiaries.

Methods: The study population included all CA Medicare beneficiaries with at least one Part-B claim for cataract and/or glaucoma surgery in 2019. Glaucoma surgeries included trabeculectomy,

tube shunt, minimally invasive glaucoma surgery, and cyclophotocoagulation. Covariates that were examined included age, sex, race and ethnicity, Charlson Comorbidity Index (CCI) score, and dual Medicare/Medicaid eligibility. The outcome was surgical ptosis repair. Logistic regression modeling including all covariates was used to examine factors associated with surgical ptosis repair.

Results: There were 99,156 CA Medicare beneficiaries with cataract and/or glaucoma surgery in 2019, of whom 405 (0.4%) had surgical ptosis repair. The largest proportions of the study population were 70 – 74 years old (n=28,471, 28.7%), female (n=58,806, 59.3%), Non-Hispanic White (n=64,253, 64.8%), had a CCI of 1-2 (n=36,098, 36.4%), and were not dual Medicare/Medicaid eligible (n=73,165, 73.8%). In multivariable analyses, age ≥85 versus 65-69 years (odds ratio [OR] = 0.37, 95% confidence interval [CI] = 0.21, 0.65), Black versus Non-Hispanic White race and ethnicity (OR = 0.40, 95% CI = 0.17, 0.98), and receipt of glaucoma versus cataract surgery (OR = 0.41, 95% CI = 0.25, 0.66) were associated with decreased odds of surgical ptosis repair.

Conclusion: California Medicare beneficiaries with cataract and/or glaucoma surgery who were older and of Black race and ethnicity were less likely to have postoperative surgical ptosis repair. These findings may be explained by medical contraindications or social, cultural, and financial barriers to the receipt of surgical ptosis repair.

SESSION I · MONITOR 6 · 9:15 AM – 9:45 AM

DEEPER DIVES INTO GLAUCOMA GWAS HITS: WHICH VARIANTS IN EACH LOCUS CONFER RISK AND HOW DO THEY DO IT?

John Fingert*, Benjamin Roos, Floyd Evans, Todd Scheetz

Purpose: Hundreds of risk loci for glaucoma have been identified by GWAS. However, little data has been gathered about which of hundreds of DNA variants (SNPs) in each locus confer risk for glaucoma. We sought to identify functional SNPs in several glaucoma loci using a massively parallel reporter assay: Bi-allelic Targeted Self-Transcribing Active Regulatory Region sequencing (BiT-STARR-seq).

Methods: Oligos spanning each allele of SNPs associated with glaucoma in a GWAS loci were synthesized, pooled, and cloned into a reporter plasmid, hSTARR-seq_ORI, at a site downstream from the start of transcription site. Consequently, oligos with enhancer activity will stimulate their own transcription. The plasmid library containing these SNPs was first transfected into HEK293T cells in triplicate. DNA and RNA from each replicate of transfected cells was collected, barcoded, pooled and sequenced on an Illumina MiSeq to collect 150 bp paired-end sequences. Sequence reads were normalized for transfection efficiency and sequencing depth, then the transcription was compared between each pair of SNP alleles to identify those that altered transcriptional activity (e.g., enhancing alleles having higher numbers of reads above background).

Results: We analyzed 81 SNPs in the LOXL1 locus, which has been associated with high risk for exfoliation syndrome and glaucoma using BiT-STARR-seq. Each of the 81 pairs of SNP alleles were well represented in our BiT-STARR-seq plasmid libraries and we successfully transfected HEK293T cells with the libraries and obtained high quality DNA and RNA sequences in triplicate experiments. The data from each replicate were highly correlated (r2 = 0.82 – 0.95). Two SNPs,

rs12441130 and rs72745365, have minor alleles that increase self-transcription in the BiT-STARR-seq assay.

Conclusion: Minor alleles of two SNPs, rs12441130 and rs72745365, have enhancer activity in the BiT-STARR-seq assay. These data suggest, rs12441130 and rs72745365, are the functional variants in the LOXL1 locus and contribute risk for exfoliation syndrome. Ongoing work to confirm these findings in an especially relevant cell line, i.e., B3 human lens epithelium cells.

SESSION I · MONITOR 4 · 9:15 AM – 9:45 AM

EXTENDED DEVELOPMENTAL ANGIOGENESIS AFTER ANTI-VEGF TREATMENT IN ROP INDEPENDENT OF REDUCTION OF PLUS DISEASE

Lydia Sauer, Melissa Chandler, **M. Elizabeth Hartnett***

Purpose: Anti-VEGF agents reduce intravitreal angiogenesis in retinopathy of prematurity (ROP). Regulation of VEGF receptor-2 (VEGFR-2) signaling in retinal endothelial cells (RECs) extends peripheral developmental angiogenesis in representative models of ROP. Relaxation of tortuous vessels (plus disease) may give the appearance of extending peripheral developmental angiogenesis. Cinical studies have not measured the effect of anti-VEGF vs. a suitable comparison group on developmental angiogenesis. We tested the hypothesis that inhibition of VEGF promotes developmental angiogenesis independent of reduced plus disease.

Methods: All infants screened for ROP in a single university from January 2019 through December 2022 were retrospectively reviewed. Treated infants received bilateral intravitreal bevacizumab (0.25 mg) and had type 1 ROP, whereas untreated infants (sex-, gestational age-, birthweight- and post-menstrual age-matched) had less severe ROP. All infants had gradable retinal images prior to treatment (baseline) and within 3-6 weeks after treatment (follow-up). Retinal vascular extension was measured from the optic nerve temporally to a marking line at baseline and from the optic nerve to the marking line and to the peripheral vascular extension at follow-up by the same masked analyst. Analyses were with paired and non-paired t-tests.

Results: Of 382 screened infants, 34 developed type 1 ROP; 11 received bilateral intravitreal bevacizumab with adequate images. At baseline, type 1 eyes had less developmental angiogenesis than the comparison group (3667+/-547 vs. 4262+/-937 pixels, p=0.084). There was significantly greater developmental angiogenesis in the treated than untreated eyes from baseline to follow up (872±521px vs. 253±151px, p=0.003), but no difference from optic nerve to the marking lines between baseline and follow-up or between groups.

Conclusion: Our findings support that intravitreal anti-VEGF promoted peripheral developmental angiogenesis to a greater extent than less severe ROP. Our findings do not provide support the hypothesis that anti-VEGF extends vascularization by straightening tortuous vessels in plus disease.

SESSION II · MONITOR 5 · 10:00 AM – 10:30 AM

THICK BRIDGING VESSELS SPANNING PERIPHERAL AVASCULAR RETINA IN FAMILIAL EXUDATIVE VITREORETINOPATHY: A NOVEL FLUORESCEIN ANGIOGRAPHY FINDING

D. Wade Redick, **G. Baker Hubbard***

Purpose: To describe a series of patients with familial exudative vitreoretinopathy (FEVR) who have a novel fluorescein angiography (FA) finding of thick bridging vessels spanning peripheral avascular retina (BVSPAR).

Methods: A retrospective review was conducted of clinical data and FA images of all patients diagnosed with FEVR at the Emory Eye Center and Children's Healthcare of Atlanta from January 2014 to February 2023 who had FA images available for review. Outcome measures were the prevalence of BVSPAR in this cohort, treatments, complications from treatment, and visual acuity (VA) at last examination.

Results: A total of 64 children (128 eyes) with the diagnosis of FEVR had FA images available for review. Of these, 9 (14%) patients (10 eyes, 7.8%) exhibited the FA finding of BVSPAR. Tractional retinal detachment (TRD) at presentation was noted in 4 eyes (40%). Nine eyes underwent treatment (8 had laser, 2 had anti-VEGF injections, and 4 underwent combined pars plana vitrectomy and scleral buckling procedures). With median follow-up of 6.2 years (range 284 days – 11.2 years), VA ranged from 20/30 to NLP. Five out of 8 eyes with this FA findings had VA at last examination of CF or worse. Presence of RD at last examination was noted in 3 eyes. Four eyes developed complications after treatment. Worsening of pre-existing RD or development of new RD after treatment was noted in 4 eyes out of 9 eyes that underwent treatment (44%). 3 eyes developed cataract after treatment, 2 eyes had worsening macular exudation, and 1 eye developed a retinal tear after treatment.

Conclusion: BVSPAR was noted in 14% of pediatric patients undergoing FA for FEVR. This finding was often associated with a severe phenotype of FEVR and, after treatment, worsening of traction was encountered in a large proportion (44%). Knowledge of this FA pattern may assist in counselling families regarding prognosis with treatment.

SESSION II · MONITOR 1 · 9:30 AM – 10:00 AM

OUTCOMES OF A BRIEF PRISM ADAPTATION TEST FOR CHILDREN WITH DISTANCE-NEAR DISPARITY ESOTROPIA UNDERGOING STRABISMUS SURGERY

Marium Hashemi, Shruthi Velrajan, Lauren Ditta, **Natalie Kerr***

Purpose: Determining the target angle to use for a child with distance-near disparity (DND) esotropia undergoing surgery is problematic, as under-corrections of the near angle or overcorrections of the distance angle occur. We utilized a brief in-office prism adaptation test (PAT) for the near angle in a series of children to determine the target angle.

Methods: All children undergoing surgery for PAET by two strabismus surgeons were reviewed. Twenty-five children with DND underwent brief preoperative PAT tests. Preoperative and postoperative data was collected. Successful surgical outcome was defined as a significant reduction in DND. Student's t test was utilized to determine statistical significance.

Results: After PAT, 6 children showed no increase in ET with PAT (24%) while 19 (76%) had an increase in ET. Sixteen children received surgery for their prism adapted angle. Results are presented in the form of the average with range: distance ET 25 PD (10-38); near ET 41 PD (20-60); DND 16 PD (10-30); increase in ET with PAT 15.4 PD (range = 4-30). Two month postoperative outcomes were: distance ET 4 PD (-15 – 30); near ET 13 PD (0-40). The change in DND after surgery to 9.3 PD (range = 6-24) was statistically significant (p=0.0111). No child required reoperation for exotropia. Nine children (56%) had an improved fusion response and 8 (50%) demonstrated improved stereopsis.

Conclusion: The brief in-office PAT for the near angle of ET in DND ET identified a large percent of children who tolerated an augmented amount of surgery to an angle (closer to) their near deviation, resulting in a statistically significant reduction in DND and improvement in both sensory and motor outcomes. A brief in-office PAT for the near angle may be a valuable tool for improving surgical outcomes for children with DND and PAET.

SESSION I · MONITOR 3 · 9:45 AM – 10:15 AM

EVALUATION OF SARCOPENIA IN BLEPHAROPTOSIS USING ORBITAL MAGNETIC RESONANCE IMAGING

Kendall Hughes*, Jonathan Nguyen, Andres Rodriguez, Kamand Khalaj, Alice Chuang, Roy Riascos-Castaneda, Ying Chen, **Timothy McCulley**

Purpose: This study investigates the hypothesis that involutional blepharoptosis (ptosis) may be due to underlying levator palpebrae superioris (LPS) sarcopenia. We assess sarcopenia using the change in signal intensity of the extraocular muscles, indicative of sarcopenia-related fat infiltration, with age on magnetic resonance imaging (MRI).

Methods: Charts of adult patients, without orbital pathology with T1 coronal, non-fat saturated orbital MRIs between 11/2014 – 11/2023 were reviewed. If both eyes of a patient were eligible, one eye was randomly chosen for analysis. The average intensity was obtained for medial (MR), lateral (LR), superior (SR) and inferior (IR) rectus muscles and the intraconal orbital fat. The ratio of muscle to fat intensity were calculated to account for differences in MRI protocols. A regression analysis was performed between the intensity of each muscle and age, as well as the ratio of muscle to fat intensity and age.

Results: 30 eyes were included. The intensity of each muscle individually and the average of all four muscles significantly increased with age (10.33±3.09, P=0.002; 11.94±3.79, P=0.004; 10.51±3.10, P=0.002; 10.30±3.08, P=0.002, and 10.77±3.12, P=0.002 per year for MR, LR, SR, IR, and average of all muscles, respectively). The ratios of LR and IR muscle to fat intensity also statistically significantly increased with age (LR/Fat: 0.0025±0.0009, P= 0.008, IR/Fat: 0.0021±0.0009, P = 0.025). Additionally, the ratio of average of all muscles to fat intensity exhibited a significant increase with age (0.0020±0.0006, P=0.003).

Conclusion: There is a positive association between age and signal intensity of extraocular muscles on MRI, indicative of sarcopenia. MRI may be useful to assess for sarcopenia and is consistent with the hypothesis that blepharoptosis is at least in part due to sarcopenia.

SESSION I · MONITOR 6 · 9:45 AM – 10:15 AM

GENETICALLY DETERMINED EYE COLOUR INFLUENCES PROGNOSTIC FACTORS IN UVEAL MELANOMA

Maria Chiara Gelmi, Laurien Houtzagers, Annemijn Wierenga, Rick de Leeuw, Peter de Knijff, **Martine Jager***

Purpose: Uveal melanoma (UM) has its highest incidence in people with light (blue/green) eyes. We previously observed that UM in clinically reported dark eyes are more frequently pigmented and that patients with dark eyes are less susceptible to the prognostic impact of chromosome aberrations in the UM. We analysed whether the use of DNA-determined eye colours confirmed these findings.

Methods: Using DNA from peripheral leukocytes, sequencing using the HIrisPlex-S assay was performed. Predictions of eye colour genotypes were determined through the Hirisplex webtool (https://hirisplex.erasmusmc.nl/). Light eye colour was assigned with probability values ≥ 0.70, brown eye colour with probability values ≥ 0.50. Associations were calculated with Pearson's chi-square test, log rank test or Kaplan-Meier curves where appropriate.

Results: Of the 146 cases, 121 were predicted to have light eyes (83%), 20 brown (14%) and 5 could not be assigned (3%). The genetically determined eye colour showed a good correlation with reported eye colour ($p < 0.001$) and was not associated with UM-related survival ($p = 0.67$). Monosomy 3 and gain of 8q were present in similar proportions in light and brown eyes; cases with brown eyes had a higher frequency of dark tumours than light eyes ($p < 0.001$). Chromosome 3 loss was a prognostic factor in genetically light eyes and brown eyes, while gain of 8q was not in brown eyes, similar to prior findings in clinically blue/green eyes, where neither 8q or PRAME were prognostic factors.

Conclusion: In the Netherlands, we saw a very high frequency of light eye genes (83%) among UM patients, compared to 68% in the general Dutch population. Eye color influenced tumor pigmentation, while eye color genes influenced which genetic tumor characteristics played a role in prognosis. As populations differ greatly in the percentage of people with light or dark eyes, one should determine genetic prognostic factors for each population separately.

SESSION II · MONITOR 3 · 9:30 AM – 10:00 AM

PATHOGENIC MECHANISMS OF IMMUNE CHECKPOINT INHIBITOR (ICI)-ASSOCIATED CHOROIDAL AND RETINAL ADVERSE REACTIONS

Rachana Haliyur, **Susan Elner**, Therese Sassalos, Shilpa Kodati, **Mark Johnson***

Purpose: Although immune checkpoint inhibitors (ICIs) have revolutionized cancer therapy, their use is limited by non-specific inflammatory events that occur distant from the neoplastic site. To

better understand the adverse reactions of these agents involving the ocular posterior segment, we sought to summarize and categorize postulated mechanisms of ICI-mediated retinal and choroidal inflammation.

Methods: We reviewed selected literature describing immune-mediated retinal and choroidal adverse reactions associated with systemic ICI therapy. By drawing parallels with ICI-associated findings in other organ systems, we synthesized and categorized the likely pathogenic mechanisms underlying the various chorioretinal adverse immune reactions.

Results: ICI-induced posterior segment adverse reactions can be categorized into three major mechanisms of unintended, targeted inflammation. In Type 1 reactions, T cell activation by ICIs can result in cross-reactivity of anti-tumor T cells with ocular tissues (Type 1a) or expansion of eye-specific T cells in predisposed individuals (Type 1b), leading to ocular inflammation that mimics known uveitic conditions. In Type 2 reactions, non-specific ocular or systemic inflammation exacerbated by ICI use can cause retinal vasculitis through a "bytander" mechanism, potentially resulting in vision-threatening vascular occlusions. In Type 3 reactions, ICI use can prompt autoantibody-antibody mediated inflammation and/or exacerbation of paraneoplastic processes likely related to T cell driven expansion of B cell populations.

Conclusion: Although relatively uncommon, posterior segment inflammatory disorders associated with ICI therapy may be vision-threatening if not identified and treated appropriately. We propose that the pathogenic mechanisms underlying these chorioretinopathies fall into three major categories involving inadvertent T cell mediated inflammation. Visual prognosis with appropriate treatment is generally favorable, but some reactions, such as longstanding exudative retinal detachment and ICI-induced occlusive retinal vasculitis, can result in permanent visual defects.

SESSION I · MONITOR 7 · 9:15 AM – 9:45 AM

INCISIONAL GLAUCOMA SURGERIES PERFORMED AT AMBULATORY SURGICAL CENTERS ARE ASSOCIATED WITH INCREASED RISK OF REOPERATION

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

Purpose: There has been a surge in the use of Ambulatory Surgical Centers (ASCs) for eye surgeries in the United States, notably for savings in healthcare costs. However, surgical outcomes at ASCs have not been examined. The goal of this study was to examine the time to glaucoma reoperation for patients who received incisional glaucoma surgery at ASCs versus outpatient hospitals (OHs).

Methods: A retrospective cohort was constructed using the entire population of 2016- 2018 California (CA) Medicare beneficiaries who received incisional glaucoma surgery (trabeculectomy, tube shunt, or EX-PRESS® shunt). We excluded beneficiaries with non-CA residence, age <65 years, or missing eye laterality code. The primary exposure was place of service for professional claim: ASC or OH. The primary outcome was the time to reoperation with a new glaucoma surgical procedure or revision of index surgery. Follow-up time extended through 2019. Time-to-event was modeled using Kaplan-Meier curves and Cox proportional hazards regression. The final model adjusted for age, sex, race and ethnicity, dual-Medicaid and Part D low-income subsidies, systemic disease burden, glaucoma severity, and cohort year.

Results: A total of 6,457 beneficiaries met inclusion criteria. Of these, 61.4% (n=3,967) had their glaucoma surgery performed at an ASC. The Kaplan-Meier curve demonstrates increased time to glaucoma reoperation for ASC patients (p<.0001). In the unadjusted model, beneficiaries who underwent surgery at an ASC had 31% increased risk of re-operation (hazard ratio [HR]: 1.31, 95% confidence interval [CI]: 1.18-1.45, p<.0001). In the fully adjusted model, beneficiaries who received surgery at an ASC had 31% increased risk of re-operation (HR: 1.31, 95% CI: 1.18-1.46, p<.0001).

Conclusion: This is the first study to demonstrate increased reoperation risk in patients who receive glaucoma surgery at ASCs versus OHs. Additional studies are necessary to investigate whether these observations represent differences in case complexity, quality of care, or availability of surgical scheduling and operating room resources.

SESSION I · MONITOR 7 · 9:45 AM – 10:15 AM

OPERATIVE FIRE RISK AND SUPPLEMENTAL OXYGEN USE IN OCULOPLASTIC SURGERY

Mena Kozman*, Dean McCulley, Amelia McCulley, Dylan McCulley, Martha Meyers, **Timothy McCulley**, Ying Chen

Purpose: Over 650 surgical fires occur annually in the United States. Open-system delivery (OSD) of supplemental oxygen (O2) poses ophthalmological surgery particularly at risk. Due to the increased fire risk, standard guidelines recommend O2 supplementation of 30% or less during OSD. However, little is known regarding the true periocular O2 concentrations during OSD. We created a model to replicate OSD of O2 and concurrently measured O2 levels in the periocular region to assess the fire risk in ophthalmology procedures.

Methods: This is an experimental study. A nasal cannula connected to an O2 tank is placed in the "nostrils" of an adult-size mannequin head (MH). An O2 sensor was secured in the periocular area to record O2 levels. The highest levels were recorded upon initiating O2. After discontinuing the O2 supply, levels were recorded every 5 seconds. Oxygen delivery was varied by adjusting the flow rate at 1 liter (L), 2L, 3L, 4L, and 6L. The effect of surgical draping was evaluated by repeating the experiment on the MH with surgical towels.

Results: Without draping, 100% O2 supplemented at 1, 2, 3, 4, and 6 L per minute reached 38.2%, 42.8%, 44.6%, 46.5%, and 48.7% O2 concentration, respectively. Higher initial O2 levels were seen with surgical drapes at 59.8%, 65.7%, 66.5%, 66.9%, and 71.4%, respectively. All initial O2 level measures were above the safety threshold of 30%. All flow rates in both draping techniques reached an O2 level of 25% or lower after 20 seconds.

Conclusion: Our study revealed that in an OSD, periocular O2 levels reached higher than the recommended safety concentration at all tested flow rates regardless of draping. In both settings, the time for O2 levels to drop to 25% was 20 seconds, suggesting that timely intraoperative cessation of O2 delivery is crucial in preventing surgical fires.

SESSION I · MONITOR 5 · 9:15 AM – 9:45 AM

HOW CHARLES KELMAN INVENTED PHACOEMULSIFICATION IN THE 1960S: A REAPPRAISAL

Christopher Leffler*, Stephen Schwartz

Purpose: To better understand the timing and specifics regarding the development of phacoemulsification in the 1960s. Charles Kelman developed phacoemulsification by modifying an ultrasonic dental tool (Cavitron, NY) to emulsify cataracts so that they could be removed through small incisions. Kelman wrote that he first learned of the dental tool just as his research grant was about to run out.

Methods: We reviewed the John A. Hartford Foundation files related to Kelman, and interviewed his first wife, two people who worked in his lab (a dentist and an assistant), and family of his dentist (Larry Kuhn) and of the engineer (Anton Banko) who built the device.

Results: By January 1962, Kelman learned of the Cavitron instrument from his then-fiancée, who worked in Larry Kuhn's dental office. Kelman initially pursued other ideas for cataract surgery, including cryoextraction in 1962. His first grant, which covered small-incision cataract surgery, became active in Jan. 1964. Kelman and Kuhn were together when the idea for using the Cavitron device for cataract surgery was formulated. Kelman and Kuhn tested the Cavitron device on a previously-extracted cataract without obvious efficacy at Kuhn's office. In February 1965, when Kelman's grant had 2 years remaining, he began devoting resources to studying the Cavitron instrument. The first time the Cavitron instrument was able to remove a cataract in any species in a manner deemed a success was in a cat's eye on March 23, 1966. The first two phacoemulsifications in human patients took place between April and June of 1967.

Conclusion: By all accounts, Kelman and Kuhn collaborated in at least several important steps in early phacoemulsification development. Kelman probably became aware of the Cavitron ultrasonic instrument earlier than is generally recognized, but multiple modifications of this device were required to permit its use for cataract surgery.

SESSION II · MONITOR 1 · 10:00 AM – 10:30 AM

WEARABLE SENSOR TEMPERATURE DATA LOGGER RESPONSE RATES WHEN APPLIED TO SPECTACLES FOR MEASUREMENT OF SPECTACLE WEAR TIME

Joseph Miller*, Erin Harvey, Jenifer Martin

Purpose: To determine the time response Tau of a temperature datalogger (TheraMon) attached to spectacle (Dilli Dalli, Clearvision, Hauppauge, NY) headstrap and used to determine periods of spectacle wear. When not worn, the sensor records room temperature (RT) (~23 deg C) and when worn, head temperature (HT) (~33 deg C). Above threshold (TT) (~28 deg C), wear is assumed. We heated and cooled sensors by convection (heat transfer through the air) and conduction (heat transfer by direct contact) to determine Tau, then estimated the shortest period of detectable spectacle wear.

Methods: Three sensors were affixed to spectacle headbands with heat shrink tubing (HS-914, Insultab, Woburn, MA). Sampling rate was q5 seconds. Convective Heating (CVH) (refrigerator to RT, or RT to heating pad), Convective Cooling (CVC) (from RT to a refrigerator, or from the heating pad to RT) and Conductive Cooling (CNC) (RT to ice water) step changes in temperature were induced. Tau (mean, sd, N, 95%CI) was time (sec) to 63.2% of final temperature, which was then used calculated time to TT.

Results CNC Tau equaled 33.3s, sd=2.9s, N=3, 95%CI (27.5-39.1s). CVH Tau equaled 508.3s, sd=36.4s, N=6, 95%CI (435.5-581.1s). CVC Tau equaled 298.3s, sd=24.2s, N=6, 95%CI (249.9-346.7s).

Conclusion: Human sensor wear Tau is expected to range from direct skin contact (tight fitting band, approaching conductive transfer), to a sensor resting atop various amounts of hair and air (approaching convective transfer). For our range of Tau (33s to 580), a sensor taken from RT to HT would take between 28s and 403s to reach TT (28 deg C), and represents the shortest period of spectacle wear that might be recorded. Wearing the spectacles for a period of 3 time constants (between 2 and 20 minutes) would result in the sensor becoming equilibrated (within 95%) to near body temperature.

SESSION II · MONITOR 7 · 10:00 AM – 10:30 AM

AHMED GLAUCOMA VALVE IN ANIRIDIA

Ahmed Abdou, **Peter Netland***

Purpose: To evaluate clinical outcomes after Ahmed Glaucoma Valve implantation in glaucoma associated with aniridia.

Methods: This was a retrospective, noncomparative, consecutive, interventional case series of 20 eyes in 15 patients with aniridic glaucoma treated with the Ahmed Glaucoma Valve (Model FP7, New World Medical, Rancho Cucamonga, CA). Patient records were reviewed for intraocular pressure (IOP), number of glaucoma medications, surgical success (5 mmHg< IOP< 21 mmHg and >20% from baseline, no additional glaucoma surgery, no NLP vision), and complications. The study was approved by the Institutional IRB.

Results: The IOP and number of glaucoma medications were significantly reduced at all time points after surgery. The cumulative probability of success was 95% at 5 years after surgery. Transient postoperative complications included shallow AC (5%) and choroidal effusion in (10%). Complications in the late postoperative period included tube repositioning (20%) and patch graft for tube exposure (15%).

Conclusion: Ahmed Glaucoma Valve implantation is effective for controlling IOP in patients with aniridic glaucoma.

SESSION II · MONITOR 7 · 9:30 AM – 10:00 AM

THE UTILITY OF AN AT-HOME VISION SCREENING KIT IN A PREDOMINANTLY NON-ENGLISH SPEAKING UNDERSERVED POPULATION

Michael Nguyen*, Timothy Do, Kara Her, Bryan Kuo, Kevin Chau, Madeleine Lu, **Michele Lim**

Purpose: This study aimed to create a user-friendly vision screening kit for a predominantly non-English speaking, underserved patient population, addressing disparities in vision care access.

Methods: This is a single-site prospective cross-sectional study at an urban free clinic. Adult patients provided informed consent, and demographic information was collected. In-person visits included visual acuity (VA) and Amsler grid testing, while remote self-test kit results were obtained by phone. Area Deprivation Index (ADI) scores were derived from the 2021 Neighborhood Atlas.

Results: 101/141 (71.6%) patients completed the study. The mean age was 59.69 ± 14 years, and 60.4% were female. The majority (95%) were born outside the United States, and 81.2% did not speak English as their primary language. The uninsured rate was 47.5%, with 41.6% undocumented patients, 67.3% faced difficulty accessing eye care due to lack of insurance, financial and language obstacles. The mean annual household income was $8,091 ± $13,407, and the mean Area Deprivation Index (ADI) decile was 9.5 (worse deprivation). For the right eye, the mean in-person VA LogMAR score was 0.303 ± 0.268, and the mean at-home VA LogMAR score was 0.297 ± 0.274 (p=0.68). For the left eye, the mean in-person VA LogMAR score was 0.274 ± 0.253, and the mean at-home VA LogMAR score was 0.270 ± 0.248 (p=0.794). High correlation coefficients were observed for both eyes (r=0.880 and r=0.877, respectively; p<0.0001), indicating a robust correlation between in-person and at-home measurements. Amsler grid screening demonstrated an overall reproducibility rate of 97.7% for each eye.

Conclusion: This study demonstrates good reproducibility of visual acuity and Amsler grid measurements of a simple at-home vision screening kit in a vulnerable population. The kit may serve as a tool for triaging patients to increase access to eye care services for those who need it most.

SESSION II · MONITOR 5 · 9:30 AM – 10:00 AM

TOPOGRAPHIC ANALYSIS OF LOCAL OCT BIOMARKERS WHICH PREDICT PROGRESSION TO ATROPHY IN AGE-RELATED MACULAR DEGENERATION

Srinivas Sadda*♦

Purpose: To define optical coherence tomography (OCT) biomarkers that topographically precede the development of complete retinal pigment epithelium and outer retinal atrophy (cRORA) in eyes with age-related macular degeneration (AMD).

Methods: Patients with dry AMD and cRORA were included in this retrospective case-control study. The visit four years (48 ± 4 months) prior to the development of cRORA was defined as

the baseline, and the region on the OCT B-scans of future cRORA development was termed the case region. A region in the same eye equidistant to the foveal center as the case region that did not progress to cRORA was selected as the control region. OCT B-scans at baseline through both case and control regions were evaluated for the presence of soft and cuticular drusen, drusen with hyporeflective cores (hcD), drusenoid pigment epithelial detachments (PED), subretinal drusenoid deposits (SDD), thick and thin double-layer signs (DLS), intraretinal hyperreflective foci (IHRF), and acquired vitelliform lesions (AVL). Frequency of OCT biomarkers were compared between case and control regions.

Results: A total of 57 eyes of 41 patients with dry AMD and evidence of cRORA were included. Mean time from the baseline to the first visit with cRORA was 44.69 ± 6.56 months. The presence of soft drusen, drusenoid PED, AVL, thin DLS, and IHRF at the baseline visit were all associated with a significantly increased risk of cRORA at that location. Multivariable logistic regression revealed that IHRF (OR, 8.559; p<0.001), drusenoid PED (OR, 7.148; p=0.001), and a thin DLS (OR, 3.483; p=0.021) were independent predictors of development of cRORA at that location.

Conclusion: The presence of IHRF, drusenoid PED, and thin DLS are all local risk factors for the development of cRORA at that same location. These findings would support the inclusion of these features within a more granular staging system defining specific steps in the progression from early AMD to atrophy.

SESSION II · MONITOR 2 · 10:00 AM – 10:30 AM

LIMITED VITRECTOMY SAFELY CURES VISION DEGRADING MYODESOPSIA FROM VITREOUS FLOATERS

J. Sebag*♦

Purpose: Vitreous floaters can impact vision and disturb patients greatly, especially when there is degradation of contrast sensitivity (CS), a condition called Vision Degrading Myodesopsia (VDM). Limited vitrectomy (LPPV) was developed to clear vitreous without inducing surgical PVD and restore normal CS. This study determined the safety and efficacy of LPPV for VDM in a large case series with long follow-up.

Methods: Retrospective analysis of 326 operated eyes vs. 402 observation controls, followed for 23.1 ± 28.5 months (range = 3-152) with visual quality-of-life (VQOL) questionnaires, quantitative ultrasonography (QUS) of vitreous density, and measuring CS.

Results: In cases that underwent LPPV, there was 60% greater vitreous echodensity ($p < 0.001$) & 44.4% more degradation in CS ($p < 0.001$) compared to the observation controls. Post-op, QUS decreased by 53% ($p < 0.001$) & CS improved 55% ($p < 0.001$). There was no endophthalmitis, and vitreous hemorrhage occurred in only 2/326 (0.6%). Retinal tears developed in 3/326 (1%) & retinal detachment in 5/326 (1.5%). Cataract surgery was needed in 14% of phakic eyes, on average 13 months after vitrectomy. There were no cases of macular edema or glaucoma. VQOL indices improved by 50% ($p < 0.01$). Patients with multi-focal IOLs and those who failed previous YAG laser had similar findings.

Conclusion: Limited vitrectomy is safe and effective in curing VDM, even in patients with multi-focal IOLs and those who failed previous YAG laser.

SESSION I · MONITOR 2 · 9:15 AM – 9:45 AM

CORNEAL SENSITIVITY IS INVERSELY CORRELATED WITH SEVERITY OF DIABETIC RETINOPATHY IN A PREDOMINANTLY UNDERREPRESENTED POPULATION

Michael Singer[*♦], Preston O'Brien, Luke Mein, Andrea Olivera

Purpose: To assess the relationship between diabetic retinopathy (DR) and corneal sensitivity in an under-represented patient population.

Methods: In this prospective study, 100 eyes of 50 patients from primarily underrepresented racial and ethnic backgrounds with DR underwent assessment of corneal sensitivity using a Cochet-Bonnet esthesiometer. Severity of DR was graded by a masked reading center. Corneal sensitivity was compared in eyes with current or regressed proliferative DR (PDR) (n=35) and eyes with nonproliferative DR (NPDR) with no history of PDR (n=65). Corneal sensitivity in eyes that regressed from PDR to NPDR with anti-vascular endothelial growth factor (anti-VEGF) therapy (n=7) was compared to treatment-naïve eyes with no current or prior PDR (n=55) and to eyes with newly diagnosed, treatment-naïve PDR (n=12).

Results: Subjects had a mean age of 57.9 years (SD, 12.7), most (76%) were Black or Hispanic, and half (50%) were male. In eyes with current or prior PDR, the median corneal sensitivity (average of 4 quadrants) was 0.5 cm (interquartile range [IQR] 0-3.375), whereas in eyes with no current or prior PDR, the median corneal sensitivity was 4.75 cm (IQR 2.0-6.0, $P < .0001$). The median corneal sensitivity in eyes with regressed PDR was 0 cm (IQR 0-0.875), significantly lower than eyes with no current or prior PDR (4.5 cm, IQR 4.0, $P = .0076$) and no different than eyes with untreated PDR (0 cm, IQR 1.25). The odds of eyes with DR severity scale score ≥60 having complete corneal sensitivity loss was 3.6 times that of eyes with NPDR.

Conclusion: Corneal sensitivity is impaired in eyes with PDR compared to NPDR and is not rescued by anti-VEGF therapy in an under-represented patient population. Assessment of corneal sensitivity in eyes with DR may identify patients at risk for additional complications, including neurotrophic keratopathy.

SESSION II · MONITOR 4 · 10:00 AM – 10:30 AM

DIFFERENCES IN ACCURACY BETWEEN STANDARD AUTOMATED PERIMETRY AND A DIGITAL VISUAL FIELD TEST WHEN CLASSIFYING DISEASE STATE

Allister McGuire, Luis de Sisternes, Diksha Goyal, **Dimitri Azar**, Supriyo Sinha[*♦]

Purpose: We compared the performance of an entirely gaze-based digital system against standard automated perimetry in subjects with normal and abnormal visual fields. We analyzed the performance of each system in classifying disease state.

Methods: We performed a prospective, multicenter study involving 8 normal visual field subjects and 33 abnormal visual field subjects. Prior to testing, the subjects were categorized as normal, (mild, moderate, and severe) glaucoma, and neuro-ophthalmic, based on medical history and

prior visual field test results. One eye per subject was randomly enrolled. Each subject underwent testing using an experimental 24-2 pattern visual field software as a medical device (referred to here as "TTVF"), which runs on a head-mounted display, followed by a Humphrey Field Analyzer (HFA) using the SITA Standard algorithm in a 24-2 pattern. After a 10-minute break, each subject used the two devices in reverse order. Mean deviation, analyzed with confusion matrices across disease stages, and mean sensitivity were acquired.

Results: HFA did not significantly outperform TTVF in distinguishing any visual field category (normal, mild, moderate, severe glaucoma, and neuro-ophthalmic) from another. In generally identifying abnormal visual fields, TTVF yielded 0.98 sensitivity and 1.0 specificity while HFA yielded lower sensitivity and specificity (0.82 and 0.79, respectively). In distinguishing mild glaucoma from normal subjects, TTVF (area under receiver-operating curve, AUC, ≈1.0) outperformed HFA (AUC = 0.77) significantly ($p \leq 0.05$). Decreased sensitivity in the periphery of mild glaucoma subjects and/or increased perception of visual stimuli in normal subjects using TTVF may explain this observation.

Conclusion: Standard automated HFA perimetry did not outperform the gaze based TTVF digital system. TTVF showed enhanced performance in distinguishing mild glaucoma and normal subjects.

SESSION I · MONITOR 4 · 9:45 AM – 10:15 AM

CAN CHANGES IN MACULAR NEOVASCULARIZATION'S OCTA VASCULAR CHARACTERISTICS PREDICT EXUDATIVE ACTIVITY IN EYES WITH NEOVASCULAR AGE RELATED MACULAR DEGENERATION? THE ACTOR STUDY

Eric Souied*♦, Rocio Blanco Garavito, Donato Colantuano, Alexandra Miere

Purpose: To explore the predictability of changes in optical coherence tomography angiography (OCTA) neovascularization morphology in relation to exudative activity in eyes with neovascular age-related macular degeneration (nAMD) treated with ranibizumab 0.5 mg.

Methods: Eighty-five eyes of 85 patients with nAMD, diagnosed less than 1 year prior to study entry and treated with ranibizumab 0.5 mg, were included in this longitudinal, prospective study. Included eyes had no exudative activity at study inclusion and were treated with ranibizumab 0.5 mg in a PRN regimen for the following 9 months. At each study visit, multimodal imaging, including structural OCT (Spectralis, Heidelberg Engineering, Heidelberg, Germany) and OCTA (AngioVue, Optovue, Freemont, California, US) were performed. Different vascular characteristics of macular neovascularization (MNV), both qualitative and quantitative, were extracted at each visit and correlated with the presence of exudative activity on OCT by 2 independent, masked readers.

Results: No significant correlation was found between OCTA neovascular characteristics in the absence of exudation with the presence of exudative activity on structural OCT the following month. OCTA's positive predictive value (PPV) for the overall population was 38.87% (confidence interval [33.8% ; 44.2%]). In eyes with baseline visual acuity of < 55 letters, OCTA PPV was 48.15% (confidence interval [35.3% ; 61.3%]). The negative predictive value (NPV) of OCTA on the overall population was 60.92%. Inter-observer reproducibility of OCTA assessments Cohen's kappa=0.82.

Reproducibility between readers of SD-OCT assessments was 0.85. Furthermore, no correlation was observed between SD-OCT features and OCTA characteristics at the same visit.

Conclusion: OCTA MNV quantitative and qualitative vascular parameters and their changes are not correlated with the presence of exudative activity on structural OCT the following month. Nevertheless, OCTA provides additional vascular remodeling information to OCT, whose clinical significance remains to be determined.

SESSION II · MONITOR 6 · 10:00 AM – 10:30 AM

SUSTAINABILITY IN EYE CARE: FACTORS INFLUENCING SOLID WASTE GENERATION AND OPPORTUNITIES FOR CO-BENEFITS

Brooke Sherry, Shaina Shiwdin, Cassandra Thiel*, Yash Patil, Gerardo Elgeuzabal, Emma Pak, **Joel Schuman**, Christina Prescott

Purpose: The growing concern over climate change has become a prominent topic in healthcare, particularly within eye care. It has been leading to shifts in weather changes causing an increased prevalence of ocular traumas, eye pathologies, and various diseases due to increased exposures to heat, UV radiation, and pollutants. Given the healthcare industry's contribution of 8.5% of the US's Greenhouse Gases (GHGs) every year, our focus is on the evaluation of the sustainability of cataract surgeries, the most common eye surgery in the world.

Methods: In this study, our team obtained a comprehensive set of data spanning numerous years of cataract surgeries across 2,095 patients. This data set encompassed details on costs of individual items, patient billings, surgeons, dates, times, and surgical venues. Data pertaining to concurrent procedures alongside cataract surgeries have been excluded from our analysis. Furthermore, our team manually collected data on the waste produced over 59 cataract surgeries performed by different surgeons over a 2-month period.

Results: Our findings unveiled significant disparities in waste production between different surgeons and surgical locations. These findings also highlighted statistically significant observations that indicate a correlation between extended operating room time and increased waste production ($p=0.00155$). Similarly, reduced expenditure on supplies is associated with a heightened waste generation. We also determined that the facility's mean expenditure per patient was $34,790.05, with a median and mode of $33,798.55 and $33,544.37, respectively.

Conclusion: These results indicate multiple factors correlating to variations in waste production underscoring the potential for a multitude of sustainability measures that we can implement into cataract surgeries. These measures could include the reuse of supplies, modifying the packaging of certain materials and educating providers and administrators. These initiatives have the potential to be advantageous for the future of our environment, improve patient outcomes, and financially benefit hospitals.

SESSION I · MONITOR 1 · 9:45 AM – 10:15 AM

BALANCING NEUROPROTECTIVE AND NEUROTOXIC ASTROCYTE REACTIVITY IN OPTIC NEUROPATHIES

Anna Toth*, Evan Cameron, Michael Nahmou, **Jeffrey Goldberg**

Purpose: In response to injury or disease, astrocytes undergo a remodeling process known as "reactive gliosis," involving changes in morphology, gene expression, and function. These changes have the potential for both toxic and protective effects, but the intrinsic mechanisms that regulate neurotoxic versus neuroprotective astrocyte phenotypes and their effects on central nervous system degeneration and repair remain poorly understood. Here, we identify soluble adenylyl cyclase (sAC) in reactive astrocytes as critical for neuroprotective astrocyte proliferation and retinal ganglion cell (RGC) survival after optic nerve injury.

Methods: Optic nerve crush (ONC) injury was used to induce severe RGC axonal damage in mice with conditional sAC deletion in astrocytes (sACfl/fl/GFAP-Cre) and controls. Single-cell RNA-sequencing was performed on uninjured versus crushed optic nerves 3 days after injury to assess astrocyte heterogeneity. Astrocyte proliferation was assessed by quantifying EdU incorporation in optic nerve sections, and RGC survival and microglial/macrophage response were assessed by RBPMS and Iba1 immunolabeling, respectively, in retinal whole mounts. A novel AAV5.gfaABC(1)D viral vector was used to express nuclear- and cytoplasmic-targeted cAMP sponges and a nuclear-targeted sAC construct specifically in optic nerve head (ONH) astrocytes.

Results: We show that injured optic nerve astrocytes differentiate into two distinct neurotoxic and neuroprotective reactive populations defined by proliferation. We find that sAC is required for neuroprotective astrocyte proliferation after optic nerve injury in vivo and that loss of sAC exacerbates RGC death after injury ($P<0.01$). Using a novel viral vector that targets ONH astrocytes, we show that elevating nuclear or depleting cytoplasmic cAMP in reactive astrocytes inhibits deleterious microglial/macrophage cell activation ($P<0.01$) and promotes RGC survival after optic nerve injury ($P<0.0001$).

Conclusion: These data expand upon and define new reactive astrocyte subtypes and represent a novel step toward the development of candidate gliotherapeutics with translational potential for the treatment of glaucoma and other optic neuropathies.

SESSION II · MONITOR 4 · 9:30 AM – 10:00 AM

PREDICTORS OF SURGICAL TREATMENT FOR NEOVASCULAR GLAUCOMA IN THE CALIFORNIA MEDICARE POPULATION

Victoria Tseng*♦, Ken Kitayama, Fei Yu, **Anne Coleman**

Purpose: To examine predictors of receiving surgery for intraocular pressure reduction in California (CA) Medicare beneficiaries with neovascular glaucoma (NVG).

Methods: The study population included all 2019 CA Medicare beneficiaries with NVG. Covariates

included age, sex, race and ethnicity, Centers for Disease Control and Prevention Social Vulnerability Index (SVI), and Charlson Comorbidity Index (CCI). Glaucoma surgeries included trabeculectomy, tube shunt, minimally invasive glaucoma surgery, and cyclophotocoagulation (CPC). Logistic regression models including all covariates were used to examine factors associated with receiving each type of glaucoma surgery.

Results: The study population included 1,843 beneficiaries with NVG, of whom 264 (14.3%) had glaucoma surgery. The largest proportion of beneficiaries with NVG were 70-74 years old (425/1,853; 23.1%), male (990/1,853; 53.7%), Non-Hispanic White (733/1,853; 39.8%), and with CCI score ≥5 (693/1,853; 37.6%). Mean SVI score was 0.63±0.27 (scale 0-1). In multivariable analyses, CCI ≥5 versus 0 was associated with lower odds of any glaucoma surgery and of each type of surgery except CPC (odds ratio [OR]=0.47, 95% confidence interval [CI]=0.29, 0.74 for any surgery). Compared to Non-Hispanic White beneficiaries, racially and ethnically minoritized beneficiaries had increased odds of trabeculectomy (OR=3.77, 95% CI=1.05, 13.57 for Black; OR=2.69, 95% CI=1.04, 6.92 for Hispanic) and tube shunt (OR=2.62, 95% CI=1.27, 5.41 for Other race and ethnicity). Beneficiaries 75-79 versus 65-69 years old had decreased odds of trabeculectomy (OR=0.21, 95% CI=0.05, 0.98).

Conclusion: In 2019 CA Medicare beneficiaries with NVG, higher systemic disease burden and older age were associated with decreased likelihood of glaucoma surgery, while racially and ethnically minoritized beneficiaries had increased likelihood of surgery. These differences may be explained by a combination of surgical risk stratification and disparities in NVG treatment patterns due to cultural and socioeconomic barriers, which merit further investigation.

SESSION II · MONITOR 2 · 9:30 AM – 10:00 AM

VISUAL DEFICITS DUE TO DIABETIC RETINAL DISEASE

Brian VanderBeek*, Yinxi Yu, **Joshua Stein**

Purpose: Diabetic retinal disease (DRD) is the leading cause of blindness in working-age adults. Despite advances in treatment, many patients still lose their eyesight to the disease. The purpose of this study is to demonstrate the current level of visual loss due to DRD.

Methods: The Sight Outcomes Research Collaborative (SOURCE) was used to identify all patients with DRD, diabetic macular edema (DME), and proliferative diabetic retinopathy (PDR). Cohorts for each of the three diseases were created using ICD10 codes to identify patients based on the first date of diagnosis within the database. Patients in each cohort had their vision assessed at the index date, then, when available, again at years 1,2,3, and 5 after inclusion in the cohort. The primary outcome of the study was the percentage of eyes with vision deficits to the level of 20/70 and 20/200 or worse.

Methods: The Sight Outcomes Research Collaborative (SOURCE) was used to identify all patients with DRD, diabetic macular edema (DME), and proliferative diabetic retinopathy (PDR). Cohorts for each of the three diseases were created using ICD10 codes to identify patients based on the first date of diagnosis within the database. Patients in each cohort had their vision assessed at the index date, then, when available, again at years 1,2,3, and 5 after inclusion in the cohort. The primary outcome of the study was the percentage of eyes with vision deficits to the level of 20/70 and 20/200 or worse.

Results: 33,888, 7609, and 11923 eyes were included for analysis in the DRD (18426 patients), DME (4345), and PDR (6507) cohorts, respectively. At first presentation, 16.7% and 8.3% of DRD eyes had vision ≤20/70 and ≤20/200 respectively. These percentages decreased over the next 5 years (5-year ≤20/70 VA=9.8%, 5-year ≤20/200 VA=3.8%). The percent of eyes with DME and ≤20/70 vision decreased from 16.2% to 11.5% at 1 year but increased to 12.9% at year 2 before ending at 12.1% in year 5. DME eyes with ≤20/200 vision also decreased from 4.8% to 3.6%, before increasing again through year 5 (5.0%). PDR eyes with ≤20/70 vision started at 34.5% but decreased each observation to a low of 18.4% at year 5. Similar improvement was seen in PDR with ≤20/200 or vision starting at 19.7% and decreased at each observation until year 5(8.0%).

Conclusion: Visual deficits due to DRD remain a significant concern despite advances in therapies for DRD.

SESSION I · MONITOR 5 · 9:45 AM – 10:15 AM

OUTCOMES OF THE PARS PLANA APPROACH TO POSTERIOR CAPSULOTOMY AND ANTERIOR VITRECTOMY IN PEDIATRIC CATARACT SURGERY WITH IOL PLACEMENT

M. Edward Wilson*, Rupal Trivedi

Purpose: To report on the outcomes and safety of pars plana posterior capsulotomy in pediatric cataract surgery with long follow-up

Methods: The charts of patients eighteen years of age and younger undergoing cataract extraction with a posterior capsulectomy and anterior vitrectomy using a pars plana approach from Jan 1995 through June 2023 at a single academic center were reviewed. Eyes with traumatic cataract and preoperative retinal detachment were excluded. All significant intraoperative and postoperative complications were recorded for analysis. Only new diagnoses and subsequent surgical interventions for indications not present at the time of initial cataract extraction were included as complications in the statistical analysis. Analyses were conducted using SPSS software (IBM, Armonk, NY).

Results: Five-hundred and fifty-two eyes met inclusion criteria. The median age at surgery was 2.97 years, with a range of 11 days to 17.82 years. Ninety-one eyes (16.5%) were less than 7 months of age at surgery. All eyes received primary IOL implantation. Median follow-up was 5.1 years (range 0-25.12 years). Visual axis opacification requiring additional intervention occurred in 11.8% (65 eyes) of cases (31/91 eyes, 34.1% <7mo old; 34/461, 7.4% eyes 7 months or older). The intervention occurred a median of 7.3 months following initial surgery (5.8 months <7mo old, 13.3 months 7 months or older). None of the child above age 9 years at cataract surgery required intervention to remove VAO. Eleven (2%) eyes required surgery for glaucoma at a median of 4.25 years after cataract surgery. Glaucoma surgery was more frequent in the younger age group, 6/91 (6.6%) eyes <7 months and 5/461 (1.1%) 7 months or greater in age at surgery. Retinal detachment occurred in 1 eye (0.18%) after postoperative trauma. Of eyes with measurable acuities (434 eyes, 78.6%), the median best corrected visual acuity (BCVA) was 20/40

Conclusion: In conclusion, this cohort demonstrates the use of pars plana posterior capsulectomy and anterior vitrectomy at the time of IOL implantation in children is clinically predictable and of low risk.

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