OPHTHALMOLOGY & VISUAL SCIENCES

2026 RD Research Day

36TH ANNUAL

RESEARCH DAY

May 11, 2026

OPHTHALMOLOGY & VISUAL SCIENCES

DALHOUSIE UNIVERSITY

Table of Contents

Schedule

Time	Presenter	Presentation Title
8:00am	Opening Remarks and Housekeeping [Room C3]	
8:15-9:00am Ophthalmology Keynote	Dr. Nazlee Zebardast [Room C3] Harvard University	Precision medicine in glaucoma care
9:00-9:15am	Aliénor Jamet	Neuroprotection of RGCs in experimental glaucoma using a novel AAV2 hSYN1-TrkB-2A-mBDNF gene therapy in adult and old mice
9:15-9:30am	Neetin Prabhu	Factors influencing the survival of full-thickness skin grafts in the periocular region: A systematic review
9:30-9:45am	Korolos Sawires	Comparative outcomes of aflibercept biosimilars and reference aflibercept in nAMD: a systematic review and meta-analysis
9:45-10:00am	Kana Tokumo	Evaluation of the impact of OCT and visual field findings on glaucoma likelihood
10:00-10:20am	Break [Room C3]	
10:20-10:35am	Robyn McGowan	Pikachurin axonal trafficking and complex formation
10:35-10:50am	Emma-Lee Rhyno	Rural residence and risk of retinal detachment in Atlantic Canada
10:50-11:05am	Jeffrey Locke	Multimodal signal-domain analysis of evoked and resting-state electroretinograms in normal, inner retinal, and dystrophic phenotypes across mouse models and human clinical cohorts
11:05-11:45am	Research Day Blitz A [Room C3]	
11:05–11:10am	Grace Jung	Characterization of GCaMP6s labelling in retinal ganglion cell subtypes
11:10–11:15am	Sorayya Seddigh	From scalpel to syringe: Intralesional interleukin-2-based therapy is effective for locally advanced periocular cutaneous squamous cell carcinoma
11:15-11:20am	Abdelrahman Abu Osba	Quality of glaucoma referrals by optometrists and ophthalmologists
11:20-11:25am	Syed Ahmad	Association of repeated intravitreal faricimab and ranibizumab injections with intraocular pressure elevations
11:25–11:45am	Research Blitz Panel Q&A	
11:45–1:00pm	Lunch [Room C5]	
12:15–12:45pm Collaborative Keynote	Drs. Rishi Gupta, Nazlee Zebardast, Brian Nosek and Jessica Spence [Room C4]	Research Live! with Rishi Gupta Trainee & Early Career Researcher Focused but all welcome. Pick up lunch in room C5 and bring to session in room C4.
1:00–1:45pm Collaborative Keynote	Dr Brian Nosek [Room C2] University of Virginia	Shifting incentives from getting it published to getting it right
1:45-2:15pm	Interdisciplinary Trainee Speaker Series (ITSS) [Room C2]	
1:45–1:55pm	ITSS Surgery: Regan Duffy	Pediatric FFP-free cardiopulmonary bypass prime solution QI initiative
1:55–2:05pm	ITSS Ophthalmology: Brianna Samson	Quantifying the compressive mechanical properties of retinal tissue using spherical indentation
2:05-2:15pm	ITSS Anesthesia: Emma Nielsen	Experiences and correlates of adverse and traumatic events in pediatric perioperative providers

Time	Presenter	Presentation Title
2:15–2:30pm	Break [Room C3]	
2:30–3:00pm	Research Day Blitz B [Room C3]	
2:30–2:35pm	Kevin Hodgson	Optic disc hemorrhage case series
2:35–2:40pm	Faiyaz Ali Khan Abid	CASK is presynaptic in rod photoreceptors
2:40-2:45pm	Korolos Sawires	Missed opportunities of ophthalmology education in preclerkship case-based learning curriculum
2:45-2:50pm	Reann Post	Virtual reality perimetry is associated with overestimation of threshold sensitivities and underestimation of visual field defects
2:50-3:00pm	Research Blitz Panel Q&A	
3:00–3:15pm	Arjav Gupta	A systematic review of acquired cutaneous orbital fistulae
3:15pm-3:30pm	Michael Miller	Investigating the role of glycosylation in loss of function in mGluR6 mutations
3:30-3:45pm	Colyn Munn	An AI model for generating a non-invasive fluorescein angiography
3:45-4:00pm	Mohammad Abdullah	Long term follow-up of patients with Trabeculectomy and Mitomycin C
4:00-4:15pm	Ahmed Abdelaal	Incidence and progression of glaucoma following Boston type 1 keratoprosthesis: A systematic review and meta-analysis
4:15-4:30pm	Lucas Antonio de Almeida Torres	Amniotic membrane could improve success rates of preserflo implant?
4:30-4:35pm	Ophthalmology Research Day Wrap-Up and Evaluation Completion [Room C3]	
4:35-5:15pm	Wine and Cheese Reception [Room C5]	
5:00pm	Closing Remarks and Awards Ceremony [Room C5]	

Q & A sessions are included as described below:

- Collaborative RD Keynote address (30 minutes to present, 15 minutes for Q&A)
- Ophthalmology Keynote address (35 minutes to present, 10 minutes for Q&A)
- Ophthalmology Trainee presentations (10 minutes to present, 5 minutes for Q&A)
- Interdisciplinary Trainee Speaker Series (ITSS) presentations (6 minutes to present, 4 minutes Q&A)

Keynote Speakers

Dr. Nazlee Zebardast

Nazlee Zebardast MD MPH MSc is the Director of Glaucoma Imaging and Associate Professor of Ophthalmology at Massachusetts Eye and Ear and Harvard Medical School. Dr Zebardast completed her medical degree at Yale School of Medicine, followed by Ophthalmology residency training and glaucoma fellowship at Wilmer Eye Institute of Johns Hopkins Hospital in 2018.

Dr. Zebardast is a clinician scientist and specializes in the treatment of adult glaucoma and combined glaucoma and cataracts. She was selected for the NIH/NEI-funded K12 Harvard-Vision Clinical Scientist Training Program as well as the Gliklich Innovation Scholarship program in 2019. She has been continuously funded by the NIH through a K23 career development award, an R21 award, and an R01 research grant. She has additionally received the Research to Prevent Blindness Career development award and the American Glaucoma Society Clinician Scientist Award.

Dr. Zebardast has received numerous awards and honors for her academic and research accomplishments and has published in many top ophthalmology journals. She has made significant contributions to global epidemiologic research having helped established the Indian Family Angle Closure Evaluation with colleagues at Aravind Eye Institute in Southern India. Her work has shed light on sociodemographic disparities in care of glaucoma patients. Her research on comparative effectiveness and outcomes in glaucoma surgery had helped delineate which patients may benefit most from these procedures.

Dr. Zebardast's current research focuses on developing precision medicine-based tools for disease detection, aiding clinicians in assessing disease progression and eventually optimizing patient-related outcomes. She is currently working to define image-based and longitudinal endophenotypes for glaucoma using machine learning methods and to understand the genetic underpinning of vision loss in this blinding disease. This work aims to combine clinical phenotypes and genetic background to improve assessment of disease risk for any individual.

Dr Zebardast served on the American Academy of Ophthalmology Task Force of Enhancing Workforce Diversity, is a member of the American Glaucoma Society Research committee, serves on the glaucoma workgroup of the Collaborative Community on Ophthalmic Imaging (CCOI), sits on the Associate Advisory Board for the World Glaucoma Association and currently serves as an editor for *Ophthalmology* and *Ophthalmology Glaucoma*, preeminent journals in her field.

Dr. Brian Nosek

Brian Nosek co-developed the Implicit Association Test, a method that advanced research and public interest in implicit bias. Nosek co-founded three non-profit organizations: Project Implicit to advance research and education about implicit bias (http://projectimplicit.net/), the Society for the Improvement of Psychological Science to improve the research culture in his home discipline (http://improvingpsych.org/), and the Center for Open Science (COS; http://cos.io/) to improve rigor, transparency, integrity, and reproducibility across research disciplines. Nosek is Executive Director of COS and a professor at the University of Virginia. Nosek's research and applied interests are to understand why people and systems produce behaviors that are contrary to intentions and values; to develop, implement, and evaluate solutions to align practices with values; and, to improve research credibility and cultures to accelerate progress.

Acknowledgements

The Department of Ophthalmology and Visual Sciences would like to thank the following individuals for serving as judges for the 36th Annual Research Day:

Dr. Nazlee Zebardast
Department of Ophthalmology
Harvard Medical School
Boston, MA

Dr. Melina Agosto
Department of Ophthalmology
and Visual Sciences
Dalhousie University
Halifax, NS

Dr. Erdit Celo
Department of Ophthalmology
and Visual Sciences
Dalhousie University
Halifax, NS

We would also like to thank **Dr. Brennan Eadie**, Department of Ophthalmology and Visual Sciences, Dalhousie University, for moderating Research Day and **Dr. Rishi Gupta** for hosting the Research Live! segment of our program.

Finally, we acknowledge the dedication and efforts of the **Scientific Planning Committee**, whose time, expertise, and commitment were essential to the successful planning and execution of this event.

- **Dr. Balwantray Chauhan, co-Chair**
- **Leah Wood, co-Chair**
- **Robyn Sharpe**
- **Dr. Paul Rafuse**

A special thank you to **Laurie Ketch** for editing this program document and **Chris Phillips** for his support and guidance with the audio-visual aspects of today's event.

Research Day would not have been possible without the hard work and collaboration of the **DOVS Research Committee** and many other individuals in our Department.

Thank you.

Continuing Professional Development and Medical Education

Research Day is educationally approved by Dalhousie University Continuing Professional Development and Medical Education.

DALHOUSIE UNIVERSITY | CONTINUING PROFESSIONAL DEVELOPMENT & MEDICAL EDUCATION

This activity is an Accredited Group Learning Activity (Section 1) as defined by the Maintenance of Certification Program of the Royal College of Physicians and Surgeons of Canada, and approved by Dalhousie University Continuing Professional Development and Medical Education. You may claim a maximum of **7 hours** (credits are automatically calculated).

Through an agreement between the Royal College of Physicians and Surgeons of Canada and the American Medical Association, physicians may convert Royal College MOC credits to AMA PRA Category 1 Credits™. Information on the process to convert Royal College MOC credit to AMA credit can be found at: edhub.ama-assn.org/pages/applications.

Learning Objectives

At the end of the **2026 Research Day**, participants will be able to:

1. Examine and evaluate the current basic science and clinical research in vision sciences that is being carried out in the Department of Ophthalmology and Visual Sciences and beyond. *(CanMEDS roles: Scholar, Collaborator)*
2. Demonstrate oral presentation skills needed to effectively present scientific research data. *(CanMEDS roles: Scholar, Communicator)*
3. Demonstrate skills related to defending their research results (through Q&A format). *(CanMEDS roles: Medical Expert, Scholar, Communicator)*

At the end of **Dr. Nazlee Zebardast's keynote** address entitled:
"Precision medicine in glaucoma care", participants will be able to:

1. Differentiate personalized care and precision medicine *(CanMEDS roles: Medical Expert, Scholar)*
2. Develop understanding of genetic and polygenic risk scores *(CanMEDS roles: Medical Expert, Scholar)*
3. Identify ways in which advances in machine learning and genomics can lead to precision-based care *(CanMEDS roles: Medical Expert, Scholar)*

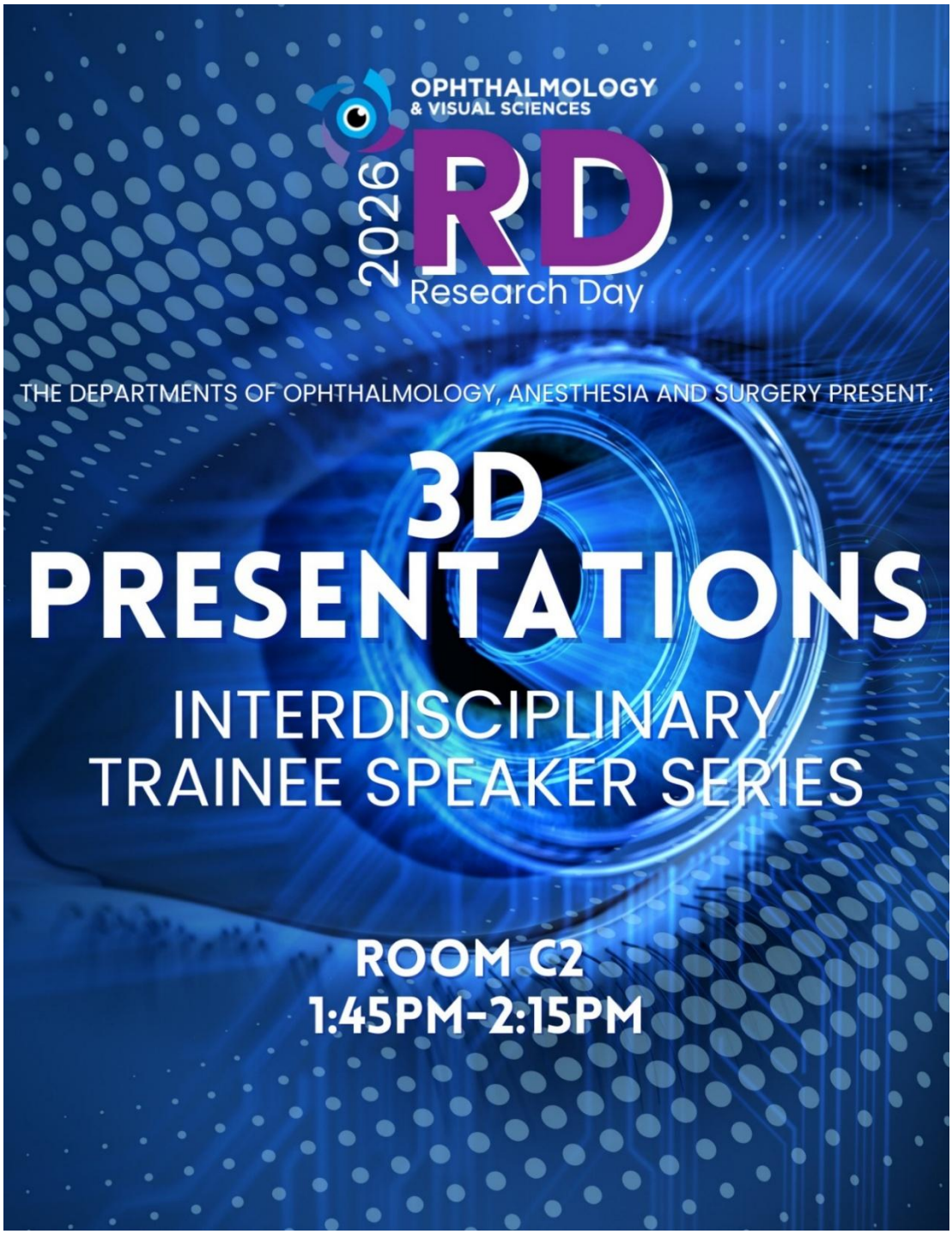
At the end of **Dr. Brian Nosek's keynote** address entitled: "Shifting incentives from getting it published to getting it right", participants will be able to:

1. Summarize the scholarly norms and values of research. *(CanMEDS roles: Medical Expert, Scholar)*
2. Assess the gap between those values and the culture and reward system for researchers. *(CanMEDS roles: Medical Expert, Scholar)*
3. Describe strategies that are changing the norms, incentives, and policies for researchers and consider their applicability for one's own research area. *(CanMEDS roles: Scholar, Communicator, Collaborator)*

Research Live! With Rishi Gupta

Research Live! With Rishi Gupta brings the energy of a late-night talk show to the world of academic medicine offering a candid look at the *lives behind the research*. Through a lively, unscripted conversation, the Research Day keynote speakers will share candid reflections on their career journeys, mentorship, setbacks, and what keeps them motivated in research. Designed for trainees and early-career researchers, but open to all, this session offers practical insights, honest advice, and a behind-the-scenes look at life in academia.

Interdisciplinary Trainee Speaker Series



Title: *Pediatric FFP-free cardiopulmonary bypass prime solution QI initiative*

Authors: Duffy, R., Bierer, J., Deshaies, C., Kiberd, M., Moulton, D., Conrad, D., & Horne, D.

Abstract

Objectives: Fresh frozen plasma (FFP), commonly used in pediatric cardiopulmonary bypass (CPB) prime, contains high complement concentrations that may contribute to complement activation and systemic inflammatory response syndrome (SIRS). We describe the IWK "FFP-free CPB-prime" quality improvement initiative to minimize complement driven SIRS.

Methods: Quarterly multidisciplinary meetings involving cardiac surgery, anesthesia, perfusion, hematopathology, peri-operative nurses and blood bank began in June 2025. After expert input, group discussion reached consensus on initiative. Meeting 1 (M1) identified risks associated with removing FFP and discussed replacement fluids, monitoring requirements, and mitigation strategies. Meeting 2 (M2; September 2025) finalized replacement fluid, drafted version 1 mitigation protocol for weight-based phased roll-out. Meeting 3 (M3; January 2026) reviewed phase 1 systemwide protocol compliance, blood product derivate dosing and activated phase 2. Osmolarity is checked on all FFP-free prime patients.

Results: Risks identified in M1: 1) difficulty achieving goal anti-coagulation (AT III present in FFP), 2) osmolarity/oncotic prime solution differences, 3) post-operative bleeding (factor dilutional coagulopathy). M2 identified 5% Human serum Albumin (HSA) replacement for FFP (normal oncotic pressure). Quarterly Phased roll out stages agreed upon: 1) immediate for patients 6-8kg ("safe group" system logistics & mitigation protocol), 2) 4-6kg (intermediate risk), 3) <4kg (high risk). M3 confirmed system readiness, activated phase 2, and added dosing for blood derivatives (version 2). Osmolality is normal in FFP-free prime (mean 289 mOsm/kg [285–293]). One of six patients had post-operative bleeding. Protocol version3 increased blood derivative doses.

Conclusion: Early phase implementation supports FFP-free CPB prime feasibility, but ongoing safety monitoring continues with phased rollout.

3D Disciplines: Divisions of pediatric cardiac surgery, pediatric anesthesiology, pediatric hematopathology, perfusion, peri-operative nursing & blood bank staff.

3D Findings: Our recent findings support removing FFP from cardiopulmonary bypass prime to mitigate FFP-complement transfer to patients. No protocols exist in literature to perform this safely. In June 2025, an IWK cardiac surgery quality Improvement team (cardiac surgery, perfusion, anesthesiology, hematopathology, blood bank, peri-operative nurses) was established and meets quarterly. The "IWK Cardiac Surgery FFP-free transition protocol" was developed, distributed to stakeholders and subsequent in-person sessions confirmed practice changes throughout the peri-operative environment. It outlines: 1) a phased safety rollout by decreasing weight cohorts, 2) adjustments including pre-operative testing (lab, nurses and surgeons), prime modifications (bloodbank & perfusion), anti-coagulation monitoring/dosing and recombinant blood product management (hematopathology & anesthesiology). Phase two is underway, with six patients safely transitioned to FFP-free prime. Meetings continue for safety review and

progression to next phases. Anti-coagulation and bleeding outcomes will be investigated using propensity matched cohort comparisons, followed by future RCT to investigate inflammatory benefits.

Quantifying The Compressive Mechanical Properties Of Retinal Tissue Using Spherical Indentation

Presenting Author: Brianna Samson

Presenter's Affiliations: Department of Biomedical Engineering, Dalhousie University

Other authors and affiliations: Smith, C. (1,2) (1) Department of Ophthalmology and Visual Sciences, Dalhousie University; (2) Department of Biomedical Engineering, Dalhousie University

Abstract

Background: Quantifying the compressive mechanical behaviour of retinal tissue is essential for understanding the role of mechanical forces in healthy tissue and during disease progression. Existing approaches focus on nanoscale surface mechanics and do not capture depth-dependent or region specific mechanical behaviour, resulting in limited data at the tissue scale. The aim of this study is to develop a methodology for quantifying the apparent compressive modulus of retinal tissue using spherical indentation.

Methods: Rabbit retinal tissue samples were subjected to indentation testing using the Biomomentum Mach-1 system, equipped with a 0.5mm spherical indenter at a velocity of 0.07 mm/s. Samples were mounted photoreceptor-side down onto a polydimethylsiloxane substrate to ensure stability. Using force-displacement data, the apparent compressive modulus was calculated using the Hayes model, incorporating thickness measurements from optical coherence tomography.

Results: Indentation mapping was performed over 15-25 locations per retina, in central and peripheral regions. Testing was conducted in PBS at two time points, <6 hours or 24-hours post-dissection. The methodology enabled separation of tissue and substrate response and supports analysis of regional and time-dependent variations in apparent compressive modulus.

Conclusions: This framework enables tissue-scale characterization of retinal mechanics and may inform biomechanical modelling and calibration of robotic and microsurgical systems that require precise force control.

Title: *Experiences and Correlates of Adverse and Traumatic Events in Pediatric Perioperative Providers*

Presenting Author: Emma Nielsen BSc, MSc, MD (She/Her)

Presenter's Affiliations: Anesthesia Resident

Supervisor: Dr. Sally Bird

Other authors and affiliations:

Nielsen, E. (1), Gowie, J. (2), Blackman, S. (1), Kiberd, M. (1) & Bird, S. (1)
(1) Department of Anesthesia, Dalhousie University, Halifax
(2) Faculty of Medicine, Dalhousie University, Halifax.

Abstract

Background: There is growing evidence of the prevalence of secondary traumatic stress (STS) and its negative impacts on healthcare workers (HCWs). Physicians can also be affected by adverse, or unintended, events (AEs), referred to as second victims of medical error. This interdisciplinary study evaluates the experiences and correlates of AEs and STS across pediatric perioperative personnel and identifies support preferences.

Methods: A cross-sectional survey was administered to pediatric perioperative HCWs. STS was quantified using the Professional Quality of Life measure. The Second Victim Experience Support Tool - Revised identified dimensions of impact following AEs and preferences for support.

Results: The 74 respondents represented anesthesia, surgery, and nursing disciplines (n=21,17,36) with a mean (SD) age and years of experiences of 43 (±11) and 18.6 (±11). 75% identified as female. Of participants, 97.3% reported experiencing at least one AE and 91.9% had experienced one traumatic event. STS over the past month was characterized as low by 52.6% and moderate by the remaining 48.4%. Women had a higher likelihood of experiencing moderate STS, ($\chi^2(1) = 7.21$, p=0.007) with no differences between disciplines. The probability of experiencing moderate STS decreased with age (OR=0.92, p=0.07) and years of experience (OR=0.94, p=0.027). The most strongly desired support was respected peer-based discussions, 4.52 (±0.65).

Conclusions: Experiences of adverse and traumatic events were common. As nearly half of HCWs reported moderate STS, regardless of position, interdisciplinary discourse and action is recommended. This study reinforces the importance of peer-based discussion for support and the protective nature of prior clinical experience.

Abstracts


OPHTHALMOLOGY
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RD
Research Day
ABSTRACTS

Presentation 1

Neuroprotection of Retinal Ganglion Cells in Experimental Glaucoma using a Novel Gene Therapy Construct AAV2-SYN1-TrkB-2A-mBDNF in Adult and Old Mice

Presenting Author: Aliénor Jamet

Presenter's Affiliations: Department of Medical Neuroscience, Dalhousie University

Other authors and affiliations: Jamet, J. Aliénor (1,2); Hooper, L. Michele (1,3,4); Agosto, A. Melina (1,3); Chauhan, C. Balwantray (1,2,3,4) (1) Retina and Optic Nerve Research Laboratory, Dalhousie University, Halifax, Canada. Departments of (2) Medical Neuroscience, (3) Physiology and Biophysics, and (4) Ophthalmology and Visual Sciences, Dalhousie University, Halifax, Canada.

Abstract

Background:

As an adjunct to lowering intraocular pressure (IOP), gene therapy with recombinant adeno-associated viral (AAV) vectors may enhance retinal ganglion cell (RGC) survival in glaucoma. The efficacy of boosting brain derived neurotrophic factor (BDNF) expression, an agent essential for the survival of RGCs that is blocked during glaucoma, is limited by downregulation of its receptor, TrkB. We investigated whether mature BDNF (mBDNF) and TrkB expression will generate a sustained neuroprotective benefit for RGCs in experimental glaucoma (EG) in both adult and old mice injected pre-, concomitantly with, and post-EG induction.

Methods:

Thy1-YFP-H and C57BL/6 adult (3-months-old) and old (18-24-months-old) mice received either an intravitreal injection of AAV2 hSYN1-TrkB-2A-mBDNF (treated) or hSYN1-mCherry (sham-treated). There were 3 groups based on treatment administration time: (i) 3 weeks before EG induction (pre), (ii) concomitantly with EG induction (con), and (iii) 3 weeks after EG induction (post), using the hydrogel model. IOP was monitored weekly for 8 weeks, and RGC density, estimated with RBPMS immunohistochemistry (IHC), was compared to contralateral control eyes (Co).

Results:

In the pre, con and post adult and old mice, RGC densities were higher in treated compared to sham-treated eyes relative to untreated Co eyes, following an average doubling of IOP. In adult mice, the sham-treated eyes lost 27% (pre), 26% (con), and 31% (post) of RGCs, whereas in the AAV treated eyes RGC loss was significantly less at 8%, 9%, and 15%, respectively. In old mice, the sham-treated eyes lost 34% (pre), 30% (con), and 35% (post) of RGCs, whereas in AAV treated eyes RGC loss was significantly less at 16%, 18%, and 25%, respectively.

Conclusions:

This novel construct carrying both mBDNF and TrkB, enhanced RGC survival in treated eyes compared to sham-treated eyes across all cohorts (pre, con, post) and age groups. Treatment timing influenced outcomes, with pre-treated eyes exhibiting higher RGC survival than con and post-treated eyes, with post-treated eyes having the lowest RGC survival. Age also affected outcomes, with reduced survival observed in old mice relative to adult mice.

Presentation 2

Factors Influencing Graft Survival in Full-Thickness Skin Grafts of the Periocular Region: A Systematic Review

Presenting Author: Neetin Prabhu

Presenter's Affiliations: Department of Ophthalmology and Visual Sciences, Dalhousie University

Other authors and affiliations: Gupta, A (1,2); Hodgson, K (1); Oyesode, O (1); Long, C (1); Gostimir, M (3); Hussain, A (1) 1. Department of Ophthalmology and Visual Sciences, Dalhousie University, 2035-2 West Victoria Building, 1276 South Park St, Halifax, Nova Scotia, Canada, B3H 2Y9 2. Northern Ontario School of Medicine, 935 Ramsey Lake Rd, Sudbury, Ontario, Canada, P3E 2C6 3. Wills Eye Hospital, 840 Walnut Street, Philadelphia, Pennsylvania, USA, 19107

Abstract

Background:

Full thickness skin grafts (FTSG) are a commonly utilized tool in facial reconstruction. The success of a skin graft is paramount to the structural integrity of a defect repair. We sought to systematically review existing evidence for factors influencing the success of full-thickness skin grafts in the periocular region.

Methods:

A systematic review of published literature from 1965 to December 1, 2025 was conducted following PRISMA guidelines. Publication descriptors, methodological details, and overall results were extracted. Articles were assessed for methodological quality using the MINORS, Cochrane ROB 2 or AMSTAR 2 instruments depending on study type.

Results:

Twenty-six studies were included. Most were retrospective and 73.1 percent were from the 3rd level of evidence. Non-comparative non-randomized studies were generally rated as higher quality, with the remainder being low to moderate. Nine studies reported graft failure, with an incidence below 10% in nearly all studies. The only comparative study that found a statistically significant decrease in graft survivability was the infiltration of lidocaine with epinephrine into the graft donor site compared to without epinephrine ($p = 0.05$).

Conclusions:

Overall, studies investigating factors influencing FTSG were of low to moderate quality. Success of FTSG in the periocular region was high regardless of additional interventions. Local anesthetic use with epinephrine was however associated with worse outcomes. Our review identified a need for additional high-quality evidence which can be used to indicate whether the donor site affects success for this intervention, as well as additional randomized controlled trials for higher quality of literature.

Presentation 3

Comparative Outcomes of Aflibercept Biosimilars and Reference Aflibercept in Neovascular AMD: A Systematic Review and Meta-analysis

Presenting Author: Korolos Sawires

Presenter's Affiliations: Faculty of Medicine, Dalhousie University, Halifax, Nova Scotia, Canada

Other authors and affiliations: Nithianandan, H. (2,3); Somani, S. (2,3,4), 2 U Vision Group, Brampton, Ontario, Canada 3 William Osler Health Systems, Brampton, Ontario, Canada 4 Department of Ophthalmology & Vision Sciences, University of Toronto, Toronto, Ontario, Canada

Abstract

Background:

Anti-vascular endothelial growth factor (anti-VEGF) therapy remains the cornerstone of treatment for nAMD, with aflibercept widely used due to its efficacy and durability. As aflibercept biosimilars become increasingly available worldwide, retina specialists face uncertainty regarding their real-world equivalence to the reference product, particularly with respect to visual outcomes, retinal anatomy, and safety. Although individual phase 3 trials have demonstrated non-inferiority of specific biosimilars, a consolidated synthesis across multiple biosimilar agents is warranted. A pooled evaluation is needed to support evidence-based treatment decisions, inform formulary and policy considerations, and clarify the potential role of biosimilars in improving affordability and access to anti-VEGF therapy without compromising patient outcomes.

Methods:

A systematic review and meta-analysis (PROSPERO: CRD420251048633) was conducted using MEDLINE, Embase, and CENTRAL from inception to June 2025. Phase 3 randomized controlled trials comparing aflibercept biosimilars to reference aflibercept in patients with nAMD were included. Primary outcomes were mean change in best-corrected visual acuity (BCVA), mean change in retinal thickness, proportion of eyes gaining ≥ 15 ETDRS letters, and adverse events. Risk of bias was assessed with the Cochrane RoB 2 tool, and certainty of evidence was graded using GRADE. Meta-regression examined outcomes across follow-up.

Results:

Six phase 3 randomized controlled trials comprising 2,044 participants (1,026 treated with aflibercept biosimilars and 1,018 with reference aflibercept) were included, representing five distinct aflibercept biosimilars. Pooled analysis revealed no significant difference in BCVA change over time between biosimilars and reference (slope: 0.03 letters/week; p = 0.10). An early anatomic advantage for reference aflibercept was not sustained on longitudinal analysis of retinal thickness (slope: -0.17 µm/week; p = 0.23). The pooled risk ratio for gaining ≥15 ETDRS letters was 1.19 (95% CI: 0.98-1.45; p = 0.08). Across 15 reported safety endpoints, including ocular and systemic adverse events, no significant differences were observed. Risk of bias was assessed as low in half of the included trials, with the remainder demonstrating some concerns but no high-risk domains. Certainty of evidence was rated as moderate to high across key functional, anatomical, and safety outcomes.

Conclusions:

This meta-analysis, based on moderate to high certainty evidence, demonstrates no clinically meaningful differences in functional, anatomical, or safety outcomes between aflibercept biosimilars and reference aflibercept for the treatment of nAMD. These findings support the clinical equivalence of aflibercept biosimilars and provide evidence to inform treatment selection, formulary decisions, and broader adoption in retina practice, while highlighting the need for continued long-term pharmacovigilance.

Presentation 4

Influence of Individual and Combined OCT and Visual Field Findings on Glaucoma Likelihood

Presenting Author: Kana Tokumo

Presenter's Affiliations: Department of Ophthalmology and Visual Sciences, Dalhousie University

Other authors and affiliations: Lucas Torres(1), Glen Sharpe(1), Jayme Vianna(1), Balwantray Chauhan(1)

(1) Department of Ophthalmology and Visual Sciences, Dalhousie University

Abstract

Background:

Optical coherence tomography (OCT) and standard automated perimetry are routinely used together in the assessment of glaucoma. However, how individual tests influence diagnostic likelihood and how their combinations contribute to clinical decision-making remain unclear. This study aimed to evaluate the impact of individual tests and their combinations on glaucoma likelihood.

Methods:

Using data from the Crowd Sourced Glaucoma Study, where 531 glaucoma specialists in 74 countries evaluated 1,234 cases and provided a glaucoma likelihood (from 0-100), 876 cases with complete OCT parameters and Glaucoma Hemifield Test (GHT) results were included in the analysis. These likelihood estimates were based on OCT parameters, including retinal nerve fiber layer (RNFL) thickness, rim width, and ganglion cell-inner plexiform layer (GCIPL) thickness and the GHT. The outputs of all these tests are categorized as within normal limits (WNL), borderline (BL), or outside normal limits (ONL) based on the normative values in the device software. We evaluated the impact of individual tests and combinations on glaucoma likelihood.

Results:

For single tests, GHT classified some cases as ONL even at low glaucoma likelihood scores (0-20), whereas OCT parameters classified some cases as WNL even at high likelihood scores (80-100), particularly GCIPL. For pairwise combinations, among OCT parameters, the influence differed. The largest changes in likelihood were observed when RNFL findings were added to GCIPL, whereas smaller changes were seen when rim or GCIPL findings were added to RNFL. In discordant cases (one test normal and the other abnormal), OCT-OCT combinations showed context dependence. Adding an abnormal result to a normal finding produced larger increases in likelihood, whereas adding an abnormal result to an already abnormal finding produced smaller changes. In contrast, OCT-GHT combinations showed less context dependence, with similar changes in likelihood regardless of whether the baseline result was WNL or ONL.

Conclusions:

The influence of diagnostic tests on glaucoma likelihood differed by test type and combination. Among OCT parameters, RNFL may have a relatively stronger influence. Combined effects of paired tests also differed by modality, with OCT-OCT combinations showing greater context dependence than OCT-GHT combinations. These findings suggest that the effects of individual test findings are not simply additive.

Presentation 5

Pikachurin Axonal Trafficking and Complex Formation

Presenting Author: Robyn V. McGowan

Presenter's Affiliations: (1) Retina and Optic Nerve Laboratory, (2) Department of Physiology and Biophysics, (3) Department of Ophthalmology and Visual Sciences, Dalhousie University

Other authors and affiliations: McGowan, R. V. (1,2), Abid, F. A. K. (1,2), Agosto, M. A.(1, 2, 3) (1) Retina and Optic Nerve Laboratory, (2) Department of Physiology and Biophysics, (3) Department of Ophthalmology and Visual Sciences, Dalhousie University, Halifax, Nova Scotia.

Abstract

Background:

Rod and cone photoreceptors are specialized neurons that detect light, then transmit information to bipolar cells at synapses in the outer plexiform layer of the retina. Pikachurin (PIKA) is a multi-domain heparan sulfate (HS) proteoglycan expressed in PRs. It is secreted into the synaptic cleft, where it binds to presynaptic dystroglycan, postsynaptic orphan receptor GPR179, and postsynaptic adhesion molecule LRRTM4. Knockout of PIKA results in ultrastructural and functional defects at rod synapses. However, the role of HS in PIKA function at synapses is unknown.

Methods:

In vitro binding experiments were performed with PIKA deletion mutants using a co-immunoprecipitation assay. Synaptic localization was tested by subretinal injection and electroporation of plasmids expressing tagged wild-type or mutant PIKA under control of an opsin promoter for specific expression in PRs.

Results:

Using a panel of deletion and truncation mutants expressed in heterologous cells, we determined that a.a. 240-342, a region of unknown function between the last fibronectin III domain and the first EGF-like domain, is necessary and sufficient for PIKA HS modification. Site-directed mutagenesis of S244, identified as a likely candidate based on neighboring sequences, completely abolished HS modification, indicating that this residue is the sole HS attachment site. The a.a. 240-342 region was also necessary for co-immunoprecipitation of LRRTM4, consistent with the previously reported HS-dependent binding. To assess requirements for synaptic localization, PIKA mutants were expressed in mouse rods. Deletion of the HS-containing region or the fibronectin III domains did not prevent localization at rod presynapses. In contrast, deletion of the first EGF-like and laminin G domains severely impaired localization, suggesting an important role for these domains in mediating trafficking or synaptic enrichment.

Conclusions:

We show that mutation of PIKA Ser244 (S244A) abolishes HS modification, indicating that this is the sole HS attachment site. PIKA mutants with amino acids 240-342 deleted were still able to correctly localize at OPL synapses, suggesting that HS modifications are dispensable for synaptic localization.

Presentation 6

Evaluating Socioeconomic and Geographic Variation in Retinal Detachment Incidence in Nova Scotia

Presenting Author: Emma-Lee Rhyno

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Abstract

Background:

Rhegmatogenous retinal detachment (RRD) is an ophthalmic emergency associated with significant risk of permanent vision loss without timely surgical intervention. While prior work has demonstrated increasing incidence rates of RRD across the Maritimes, less is known about how socioeconomic status and geographic residence influence disease burden. Understanding these patterns is important for identifying inequities in risk and access to care. This study evaluated the association between income, rurality, and RRD incidence in Nova Scotia using 2024 population-based data derived from the Postal Code Conversion File Plus (PCCF+).

Methods:

A retrospective cohort study was conducted including all patients in Nova Scotia diagnosed with RRD (ICD-10 code H33.0) Presenting to the QEII Eye Care Center from January 1 to December 31, 2024. Cases were identified through the Canadian Institute for Health Information Discharge Abstract Database and National Ambulatory Care Reporting System. Patient postal codes were linked to Statistics Canada PCCF+ to assign household income quintiles and classify geographic residence as Census Metropolitan Areas (CMA; Halifax), Census Agglomerations (CA; Kentville/Truro/New Glasgow/Cape Breton) or rural areas (all other communities within NS). Population denominators were derived from PCCF+-linked census data. Incidence rates per 100,000 population were calculated, and Poisson regression was used to estimate incidence rate ratios (IRRs), using urban CMA residence as the reference category.

Results:

A total of 314 cases of RRD were identified in Nova Scotia in 2024. Of these, 148 (47.1%) occurred among residents of Halifax, Nova Scotia's only CMA, 65 (20.7%) in CAs, and 101 (32.2%) among individuals residing in rural regions. After accounting for population size, incidence rates were 27.6 (95% CI, 23.3-32.5) per 100,000 in CMAs, 28.4 (95% CI, 22.0-36.4) in CAs, and 31.8 (95% CI, 25.9-38.6) in rural regions. Compared with CMA regions, the incidence rate ratio (IRR) was 1.03 (95% CI, 0.77-1.38) for CA regions and 1.15 (95% CI, 0.90-1.47) for rural regions. Although incidence appeared higher in rural populations, these differences were not statistically significant. RRD cases were relatively evenly distributed across household income quintiles from 57 (18.2%) in the lowest Q1, 68 (21.7%) in Q2, 53 (16.9%) in Q3, 67 (21.3%) in Q4, and 69 (22.0%) in the highest Q5. Assuming equal population distribution across income quintiles, incidence ranged from 24.5 to 31.9 per 100,000, with no consistent socioeconomic gradient observed.

Conclusions:

This preliminary population-based analysis demonstrates that RRD incidence in Nova Scotia was similar across both geographic and socioeconomic strata. These findings may suggest that RRD occurrence may be more strongly influenced by clinical risk factors than rurality and socioeconomic status within the province. Further work will be aimed at highlighting trends in health disparities regarding travel burden to help inform the equitable delivery and distribution of subspecialty ophthalmology care going forward.

Presentation 7

Seeing More in the Electroretinogram: Integrating Time, Frequency, and Resting-State Analyses Across Mouse Models and Human Retinal Disease

Presenting Author: Jeffrey Locke

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Abstract

Background:

Clinical and experimental interpretation of the electroretinogram (ERG) has traditionally emphasized time-domain waveform features such as a- and b-wave amplitudes and timing. While robust and clinically interpretable, this approach compresses complex retinal signaling into a limited set of parameters and may overlook physiologically meaningful high-frequency and temporally distributed activity arising from inner retinal circuits. Frequency- and time-frequency-domain analyses offer complementary perspectives but remain inconsistently applied in ERG research due to methodological heterogeneity and uncertainty around parameter selection and interpretation. In parallel, resting-state ERG has emerged as a means of probing intrinsic retinal activity, though its relationship to stimulus-evoked responses remains unclear. This study applies a consistent, cross-domain analytical approach to examine how different signal representations capture retinal dysfunction across experimental models and clinical disease.

Methods:

Full-field ERGs were recorded across evoked and resting-state conditions in three mouse phenotypes: normal-retina, inner-retinal dysfunction, and global-retinal degeneration. Signals were analyzed using time-domain metrics, power spectral density analysis, and time-frequency transforms. Time-frequency analysis employed Morlet wavelets parameterized using full-width-at-half-maximum(FWHM) approach to explicitly control temporal-spectral trade-offs. Multiple time-frequency representations were compared to contextualize their strengths. The same analytical pipeline was applied to human clinical ERG and resting-state recordings acquired under ISCEV standards.

Results:

Across stimulus conditions, increasing retinal dysfunction produced graded reductions in ERG amplitude, spectral power, and time-frequency energy, with global-retinal degeneration showing the largest deficits and inner-retinal dysfunction intermediate effects. In mice, time-domain measures demonstrated large between-group effects (i.e. rod-isolated b-wave and oscillatory potential measures, Kruskal-Wallis $H \approx 30$-$40, p < 10^{-7}$). Frequency-domain analysis revealed broad, statistically significant spectral clusters spanning low- and high-frequency bands, with family-wise error-corrected cluster p values typically <0.01. Time-frequency analysis further localized these deficits in both time and frequency, identifying extended post-stimulus clusters of reduced broadband power in pathology groups (permutation-correct $p \leq 0.001$). Resting-state ERG revealed systematic alterations in intrinsic retinal activity, including flattening of the aperiodic (1/f-like) spectral slope and reduced high-frequency periodic structure. These resting-state

signatures persisted even when stimulus-evoked ERGs approached the noise floor. Importantly, analogous spectral and resting-state patterns were observed in human retinal disease cohorts, demonstrating cross-species consistency.

Conclusions:

Integrating time-domain, frequency-domain, time-frequency, and resting-state analyses provides a richer and more sensitive view of retinal function than any signal method alone. Time-frequency and resting-state ERG reveal complementary information about retinal circuit integrity and remain informative even in advanced disease. This unified framework has potential to enhance both experimental studies and clinical assessment of retinal disorders.

Presentation 8

Characterization of GCaMP6s Labeling in Retinal Ganglion Cell Subtypes

Presenting Author: Grace Jung

Presenter's Affiliations: Retina and Optic Nerve Research Laboratory; Department of Medical Neuroscience, Dalhousie University, Halifax

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Abstract

Background:

Retinal ganglion cell (RGC) subtypes with distinct visual functions show varying levels of susceptibility to glaucoma, highlighting the need for tools that assess all subtypes equally to better understand the disease. GCaMP6s is a calcium indicator that fluoresces when neurons are activated, enabling real-time monitoring of cell function. However, the selectivity of GCaMP6s virus-based labeling across RGC subsets remains unexplored. We aim to determine whether GCaMP6s is a reliable indicator for all ON, OFF, and ON-OFF functional classes by integrating anatomical, molecular, and transcriptomic approaches.

Methods:

An adeno-associated viral (AAV) vector construct, AAV2-CAG-GCaMP6s, will be intravitreally injected into wild-type mice to drive GCaMP6s expression in RGCs. After 4 weeks, we will dissect retinas and intracellularly fill individual GCaMP6s-labeled RGCs with Neurobiotin. Dendritic arbours of the Neurobiotin-filled cells will be reconstructed to define morphological groups. To classify the GCaMP6s+ population into ON, OFF, or ON-OFF subtypes, we will visualize the laminar position of dendrites within the inner plexiform layer (IPL). Additionally, RGCs will be immunolabeled with cocaine- and amphetamine-regulated transcript (CART), a specific marker expressed in ON-OFF direction-selective RGCs. Single-cell RNA sequencing (scRNA-seq) will be used for cell clustering and mapping sequenced data to pre-established transcriptomes.

Results:

We will determine the degree of GCaMP6s labeling bias by comparing the distribution of morphological clusters in GCaMP6s+ RGCs to Fluorogold (a pan-RGC retrograde tracer)+ cell clusters. RGCs will be classified based on dendritic stratification in the inner IPL (ON), outer IPL (OFF), and both (ON-OFF); we expect the proportions of ON, OFF, and ON-OFF RGCs in GCaMP6s-expressing populations to align with Fluorogold-labeled populations. The colocalization of CART and GCaMP6s signals will provide molecular validation of GCaMP6s expression in ON-OFF RGCs. Additionally, the percentage of CART+ cells within GCaMP6s+ cells will be compared to those within the RNA Binding Protein for Multiple Splicing (RBPMS; a pan-RGC marker)+ population. Significant overlap in scRNA-seq cluster identities between AAV2-CAG-GCaMP6s-transduced and control retinas will demonstrate subtype-independent GCaMP6s delivery at a genetic level. We further seek to reveal known transcriptomic signatures of functional classes in GCaMP6s-expressing cells.

Conclusions:

This multidimensional approach will allow us to characterize GCaMP6s labeling in the three functional RGC classes, enabling a comprehensive assessment of AAV2-CAG-GCaMP6s transduction selectivity. The proposed research will therefore establish the validity of GCaMP6s use for tracking early cellular changes and single-cell-level disease progression, advancing our understanding of glaucoma or related conditions.

Presentation 9

From Scalpel to Syringe: Intralesional IL2-based therapy is effective for locally advanced periocular cutaneous squamous cell carcinoma

Presenting Author: Sorayya Seddigh

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Abstract

Background:

Cutaneous squamous cell carcinoma (cSCC) is a common eyelid malignancy that is typically treated by surgical excision. Locally invasive periocular cSCC may not be amenable to surgery in cases where extensive resection would result in structural or functional compromise.

Methods:

We report the first series of biopsy-confirmed periocular cutaneous squamous cell carcinoma (cSCC) cases treated with intralesional interleukin-2 (IL-2).

Results:

Treatment courses for six patients are summarized, with one representative case detailed here. A 75-year-old male presented with a large, painful, centrally pedunculated mass on the left upper eyelid, measuring 5.5cm by 2.5cm. Mass excisional biopsy and reconstruction revealed moderately differentiated invasive SCC involving deep and peripheral margins. Given the risks associated with further resection, the patient opted to pursue local immunotherapy. He received five doses of intralesional IL2 every two weeks. The lesion was completely clinically cleared at six weeks, and there was no recurrence noted at 15-month follow-up.

Conclusions:

Local intralesional IL2 therapy can be an effective treatment option for locally invasive periocular cSCC in cases that may result in significant functional or aesthetic compromise.

Presentation 10

Assessing Referral Quality in Glaucoma Care: A Retrospective Analysis of Clinical Data in Optometrist and Ophthalmologist Referrals

Presenting Author: Abdelrahman Abu Osba

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Abstract

Background:

To assess the completeness of glaucoma referral documentation and identify omitted clinical information in referrals to glaucoma specialists.

Methods:

Referrals submitted by optometrists and ophthalmologists were retrospectively reviewed and evaluated for documentation completeness. The total completeness score and proportion of missing elements were compared between referral sources. Multivariable analyses were performed to assess the association between referral completeness and intervention at first visit, as well as wait time.

Results:

A total of 522 referrals were analyzed, including 336 from optometrists and 186 from ophthalmologists. Optometry referrals were more complete than ophthalmology referrals (median 9 [IQR 7-10] vs 5 [IQR 4-6], $p < 0.001$). Visual field testing and optical coherence tomography were among the most frequently omitted elements in both groups. Ophthalmology referrals more often lacked systemic history and systemic medication documentation, whereas optometry referrals more often omitted ocular history and ocular medications. Intervention at first visit occurred more frequently in ophthalmology referrals than optometry referrals (59.7% vs 33.9%, $p < 0.001$), corresponding to 1.68 referrals required to result in one intervention compared to 2.95 in optometry.

Conclusions:

Glaucoma referral completeness differs significantly by referral source. Optometry referrals were more complete than ophthalmology referrals, however, both groups demonstrated gaps that may impact clinical assessment. These findings support the need for standardized guidelines to improve referral quality and optimize patient care.

Presentation 11

Association of Repeated Intravitreal Faricimab and Ranibizumab Injections with Intraocular Pressure Elevations

Presenting Author: Syed Ahmad

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Abstract

Background:

Neovascular diseases of the retina such as age-related macular degeneration (AMD) are leading causes of vision impairment worldwide. The current standard of care is intravitreal injection of anti-vascular endothelial growth factor (anti-VEGF). Previous studies have linked repeated anti-VEGF intravitreal injections to intraocular pressure elevations. Faricimab is an anti-VEGF agent with a unique mechanism of action recently approved to treat neovascular retinal diseases. This study investigated the association between intraocular pressure elevations and repeated intravitreal injections of faricimab and ranibizumab.

Methods:

A retrospective chart review of patients receiving intravitreal injections of faricimab and ranibizumab was conducted. Eyes with retinal vein occlusion, baseline ocular hypertension, or baseline elevated IOP, defined as >21 mmHg prior to the first injection, were excluded. Visual acuity, retinal images via optical coherence tomography, refractive error, and IOP were assessed prior to each injection. IOP elevation was defined as an IOP >21 mmHg with a ≥20% increase from baseline, or a ≥50% increase in IOP from baseline. The primary outcome was the odds of IOP elevation following repeated intravitreal faricimab or ranibizumab injections. The secondary outcome assessed whether faricimab was associated with greater odds of IOP elevation than ranibizumab.

Results:

We identified 47 patients (64 eyes) and 42 patients (61 eyes) who had received repeated intravitreal faricimab and ranibizumab injections, respectively. The mean age of all participants was 76.1 ± 9.8 years. The mean follow-up duration for the faricimab cohort was 1.2 ± 0.5 years, whereas the mean follow-up duration for the ranibizumab cohort was 5.8 ± 3.6 years. The most common indications for anti-VEGF therapy were AMD (72.0%) and diabetic macular edema (24.7%). Generalized estimating equations (GEE) analysis did not reveal statistically significant odds of IOP elevation related to either repeated faricimab or ranibizumab injections, which was consistent with subsequent sensitivity and post-hoc analyses. GEE analysis did not reveal a statistically significant difference in the comparative odds of IOP elevations between faricimab and ranibizumab.

Conclusions:

To our knowledge, this is among the first real-world studies to examine the association between repeated intravitreal faricimab injections and the odds of IOP elevation. Our results did not indicate that repeated intravitreal faricimab and ranibizumab injections are significantly associated with increased odds of IOP elevation. These findings extend the existing evidence from Phase III trials and real-world data, supporting the IOP safety profile of both agents, though the substantial difference in follow-up duration and injection count between cohorts limits direct comparative conclusions.

Presentation 12

Structural, Functional and Perfusion Changes Following Optic Disc Hemorrhages in Patients with Glaucoma

Presenting Author: Kevin Hodgson

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Abstract

Background:

Optic disc haemorrhages (ODH) are commonly seen in patients with open angle glaucoma (OAG) and are associated with overall progression of the disease. The sequence of events following an ODH, leading to progression of structural and/or functional markers, is poorly understood.

Methods:

Prospective case series of patients with OAG presenting with an ODH in an area of the disc with minimal or no damage observed on OCT and corresponding to a normal area of the visual field at baseline.

Results:

OCT and microperimetry progression occurred in 4 and 3 out of 5 patients following ODH, observed after 1 year of follow-up, whereas only 1 patient progressed on OCT-angiography.

Conclusions:

ODHs may identify optic disc regions at risk for future progression. In our study, OCT and microperimetry detected progression in all but one and two patients respectively, and in all cases progression occurred typically after 1 year from the detection of the ODH, confirming previous studies. Our findings support close monitoring of patients with ODHs with structural and functional tests.

Presentation 13

CASK is Presynaptic in Rod Photoreceptors

Presenting Author: Faiyaz Ali Khan Abid

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Abstract

Background:

In the retinal outer plexiform layer (OPL), rod photoreceptors (PRs) form tripartite synapses with bipolar and horizontal cells. The mechanisms responsible for organizing rod presynaptic proteins specifically at sites apposed to BC dendrites are poorly understood. Previous immunostaining results in mouse retina revealed CASK (calcium/calmodulin-dependent serine protein kinase), a MAGUK family scaffolding protein, colocalized with BC synapses in the OPL. However, CASK is expressed ubiquitously, and it was unknown whether the OPL protein is presynaptic or postsynaptic.

Methods:

To determine whether CASK at OPL synapses is pre- or post-synaptic, we performed cell-type specific somatic CRISPR knockout in PRs and ON-type BCs, using electroporated small guide RNAs (sgRNAs) and Cas9 driven by cell-type specific promoters. For expression in rod PRs, we used a minimal murine opsin (MOPS) promoter, and for expression in ON-BCs, we made use of the Grm6 200 bp promoter sequence. The CRISPR plasmid and a plasmid coding for enhanced green fluorescent protein (EGFP), a transfection marker, is introduced into the retinal cells via subretinal injection and electroporation. Four weeks post-electroporation, knockdown of CASK was tested by IF using a CASK antibody, and co-staining with a synapse marker. Defects in synaptic morphology was tested for using antibodies against other proteins of interest.

Results:

We observed that in rod PRs positive for transfection marker EGFP, CASK immunostaining at synaptic puncta was absent, while EGFP negative spherules in the same fields had robust CASK signal. Additionally, a small but significant decrease in enrichment of the postsynaptic transduction channel TRPM1 was also observed in the CASK knockout rods. In retinas electroporated with a control construct expressing Cas9 but no sgRNA, there was no difference between EGFP positive and negative cells in both CASK and TRPM1 expression.

Conclusions:

These results demonstrate that OPL CASK is expressed only in the presynaptic rod terminals and also serve as validation for the specificity of CASK antibody labeling in the OPL. The small but significant decrease in enrichment of the postsynaptic transduction channel TRPM1 observed in the CASK knockout rods may suggest a role for the scaffolding protein in organizing other synaptic proteins. Future studies will focus on identifying CASK interaction partners and functional roles at rod pre-synapses.

Presentation 14

Missed Opportunities in Ophthalmology Education in Pre-Clerkship Case-Based Learning Cases

Presenting Author: Korolos Sawires

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Abstract

Background:

Formal ophthalmology education is increasingly reduced across Canadian medical schools. With the recent removal of core ophthalmology clerkships at many institutions, indirect exposures, such as through case-based learning (CBL), become vital for introducing medical students to eye health. The purpose of this study is to identify gaps and missed opportunities for ophthalmology teaching in the pre-clerkship CBL curriculum at Dalhousie University.

Methods:

Two independent reviewers analyzed all 70 pre-clerkship CBL cases. Each was coded for ophthalmology-related content, including ocular history and symptoms, physical exam findings, ophthalmic medications, surgical history, and systemic conditions with ocular manifestations. Thematic areas such as anatomy, cranial nerves, disability/accessibility, and age-related conditions were also assessed.

Results:

Only 16% of cases included any eye-related history, and 21% mentioned eye exams. Just 1% referenced visual disabilities, ocular medications, or surgical history. "Cranial nerves" was coded 84 times and "anatomy and histology" 82 times across all cases, but other codes were infrequently noted. Several cases involving elderly patients omitted mention of cataracts or macular degeneration. Cases with long-standing diabetes often failed to address diabetic retinopathy or the need for screening.

Conclusions:

This review reveals a significant deficiency in ophthalmology content within the CBL curriculum, despite many clinical scenarios offering opportunities for integration. The findings highlight the need to embed ophthalmology teaching more deliberately, even in non-ophthalmology-focused sessions. This is the first study to comprehensively evaluate ophthalmology content in a pre-clerkship CBL curriculum. Future studies should expand this analysis to other Canadian institutions to assess national trends and inform curriculum reform.

Presentation 15

Virtual Reality Perimetry is Associated with Overestimation of Threshold Sensitivities and Underestimation of Visual Field Defects

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Abstract

Background:

Visual field testing is central to the diagnosis and monitoring of glaucoma and values produced by the current standard desktop automated bowl perimeter (Humphrey Field Analyzer; HFA) have been used for decades to classify disease stage and progression. There has been recent interest in visual field testing using virtual reality (VR) headsets; however, concerns remain regarding the accuracy of the data produced. This study compared pointwise and generalized threshold sensitivities measured using a VR device versus the HFA in eyes at various stages of glaucoma severity.

Methods:

Participants with established glaucomatous optic neuropathy and consistent visual field defects completed five visual field testing sessions using a 24-2 program on both the HFA and VR device.

Results:

Fifty-one participants were grouped as early (>/=-6dB; n=20), moderate (< -6dB to < /=-12dB; n=14), or advanced (< -12dB; n=17). The VR device overestimated threshold sensitivities at nasal and peripheral loci for all stages of glaucoma. Additionally, localized scotomas demonstrated significantly higher median threshold sensitivities using the VR device for early (VR=25, IQR=22,28; HFA=22, IQR=16,25; $p<0.01$), moderate (VR=22, IQR=16,26; HFA=13, IQR=3,20; $p<0.01$), and advanced glaucoma (VR=15, IQR=5,20; HFA=9, IQR=-1,10; $p<0.01$). Differences in generalized analyses were also apparent for both mean sensitivity and mean deviation with Bland-Altman Analyses revealing overall biases of +1.65 and +1.36, respectively.

Conclusions:

This study found that the VR device significantly overestimated threshold sensitivity compared to the standard HFA across all stages of glaucoma, particularly in nasal, peripheral, and localized scotoma regions. These data indicate that VR devices produce overestimations of the raw data used in visual field analyses which could lead to under diagnosis of glaucoma, misclassification of disease severity, and/or underestimation of the impact of glaucoma on a patient's quality of life.

Presentation 16

A Systematic Review of Acquired Cutaneous Fistulae of the Orbit

Presenting Author: Arjav Gupta

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Abstract

Background:

Cutaneous fistulae of the orbit are abnormal connections between periorbital skin and adjacent epithelium-lined structures. They are heterogenous in their origins, anatomical involvement, and management strategies. We sought to evaluate the origins and management strategies of acquired cutaneous orbital fistulae (ACOF) based on an updated literature review.

Methods:

Systematic Review

Results:

A systematic review of Medline, Embase, Web of Science, and Cochrane from inception to April 2024 yielded 102 relevant papers. Fistula cases were broadly categorized by origin as iatrogenic (traumatic repair, retained implants, lateral canthoplasty, orbital exenteration, non-exenteration oncological surgery, other surgical procedures), inflammatory and infectious (dacryocystitis and lacrimal sac abscess, Pott's Puffy Tumour, other infections and inflammatory conditions), and trauma-related (direct trauma, substance use). CT and MRI were the primary imaging methods, though their role varied by etiology as well. Conservative approaches including antibiotics were often unsuccessful in fistula management. Surgical interventions varied by etiology, including the use of flaps, grafts, fistulectomy, and dacryocystorhinostomy (DCR).

Conclusions:

The most reported acquired fistulae were due to dacryocystitis, and most were amenable to DCR surgical intervention. Thorough history and physical examination are essential in approaching orbital-cutaneous fistulae, as management strategies may vary greatly and impact success rate.

Presentation 17

Investigating N-Glycan Structure in WT and Congenital Stationary Night Blindness mGluR6 Mutants

Presenting Author: Michael Miller

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Other authors and affiliations: Agosto, M (1) Department of Physiology and Biophysics, and (2) Department of Ophthalmology and Visual Sciences, Dalhousie University

Abstract

Background:

In scotopic conditions, light is detected by rod photoreceptors, which relay information to ON-bipolar cells via the metabotropic glutamate receptor 6 (mGluR6). We previously reported that N-glycosylation of mGluR6 is important for synaptic localization and binding with trans-synaptic partner ELFN1. We additionally identified congenital stationary night blindness (CSNB) mGluR6 mutants that have aberrant glycosylation and ELFN1 binding defects, linking glycosylation status to disease pathophysiology. The structure of these glycans and specific carbohydrate components required for function remain unknown.

Methods:

To characterize the glycans in WT and CSNB mutant mGluR6, we used lectins that bind to specific carbohydrates: AAL to detect fucose, SNA to detect sialic acid, and ConA to detect mannose. For investigation of glycan maturation, HEK cells were treated with mannosidase inhibitors. Treatment with the glycosidase enzyme EndoH was used to differentiate immature core and mature complex glycosylated forms of mGluR6. Receptor function was tested using a Ca2+ mobilization assay.

Results:

Lectin blotting of WT mGluR6 with AAL and ConA revealed that the complex glycosylated form contains fucose, and the core glycosylated form is high in mannose, as expected. Pulldowns of mGluR6 with SNA demonstrated the presence of sialic acid. CSNB mutants had significant reductions in binding to AAL and SNA, consistent with lack of complex glycan maturation. In control conditions, only complex glycosylated forms of mGluR6 bound to ELFN1. Inhibition of mannosidases generated a new form of WT mGluR6 that retained the ability to bind ELFN1 despite EndoH sensitivity. Treatment with mannosidase inhibitors had no impact on glutamate-induced receptor activation, while all but one of the tested CSNB mutants had no detectable activity.

Conclusions:

Our results demonstrate that WT mGluR6 has a glycan structure containing complex modifications, while the CSNB mutants resemble immature glycans, consistent with their susceptibility to EndoH and inability to bind ELFN1. However, blocking glycan maturation on WT mGluR6 with mannosidase inhibitors did not prevent ELFN1 binding, suggesting an alternative glycan structure. Furthermore, this form of mGluR6 mediated normal functional responses, in contrast to the lack of activity of CSNB mutants, suggesting glycosylation defects alone may not explain their loss of function.

Presentation 18

An AI Model for Generating Maps of Retinovascular Leakage from Non-Invasive Fundus Images

Presenting Author: Colyn Munn

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Abstract

Background:

Ultra-widefield fluorescein angiography (UWF-FA) allows for the visualization of peripheral retinovascular leakage not captured by standard-field FA imaging or optical coherence tomography. Despite UWF-FA's advantages, it requires an intravenous dye injection and emergency readiness in case of an anaphylactic reaction. Our research aims to develop an alternative method for generating UWF maps of vascular leakage, allowing for a non-invasive evaluation of peripheral leakage and eliminating the subjectivity associated with UWF-FA interpretation.

Methods:

A conditional generative model was developed to generate UWF maps of leakage from a single UWF color fundus photo. This was achieved using: (1) an autoencoder model trained on a dataset of 652,397 standard-field color fundus images; (2) a custom training approach that includes transfer learning of the autoencoder to a dataset of 2,011 UWF color fundus and UWF leakage maps.

Results:

Our results show that the trained autoencoder is capable of encoding and decoding color fundus photos with a median structural similarity (SSIM) score of 0.79 on our test dataset (IQR: 0.74-0.87; ntest = 65,240). Evaluation on a test set revealed that the generator detected significantly more vascular leakage in eyes with diabetic retinopathy than those with no disease (2.9% vs 0.0%; $p<0.001$).

Conclusions:

By leveraging UWF color fundus photography and generative AI techniques, we have demonstrated the feasibility of synthesizing UWF leakage maps without the need for dye-injection. This approach highlights the potential to obtain angiographic insights where UWF-FA imaging is unavailable or infeasible.

Presentation 19

Long-term outcomes of trabeculectomy with mitomycin-c (MMC): A retrospective study

Presenting Author: Mohammad Abdullah

Presenter's Affiliations: Department of Ophthalmology and Visual Sciences, Dalhousie University

Other authors and affiliations: Lucas Torres1, Marcelo Nicolela1, Paul Rafuse1 (1) Department of Ophthalmology and Visual Sciences, Dalhousie University

Abstract

Background:

Glaucoma is a progressive optic neuropathy with a characteristic optic nerve head appearance and visual field defects. This was correlated anatomically with the progressive loss of the retinal ganglion cell layer (RGC). Intraocular pressure (IOP) is the only modifiable risk factor and can be reduced by a variety of medical and surgical treatments. Among the surgical treatments, trabeculectomy (TRAB) has long been regarded as an effective surgical procedure to lower IOP, especially in advanced cases, and remains the gold standard nowadays. In this study, we examine the long-term outcomes of TRAB with Mitomycin-C (MMC) in Atlantic Canada

Methods:

This is a retrospective review and partial analysis of patients who underwent primary Trabeculectomy and mitomycin-C (MMC) with or without phacoemulsification. The surgeries were performed by two glaucoma specialists in Halifax (P.R and M.N) between 2000 and 2015. To be included in this study, patients had to have at least 10 years of follow-up information. Data collection included demographics, type of surgery (TRAB or combined with phacoemulsification - TP), type of glaucoma, ocular surgeries (including laser procedures), bleb needling, TRAB revision, glaucoma medications, and visual field Mean Deviation (MD). The primary outcome of this study was to correlate the long-term rates of VF progression with IOP levels in eyes submitted to trabeculectomy and followed for more than 10 years. The secondary outcomes included failure rates, secondary procedures, and the rate of revisions/needling. A failed case was defined as any case that required another surgical intervention in the operating room (excluding needling or Internal revision) or loss of the light perception status.

Results:

In this abstract we present the partial results of one surgeon (P.R). To date, 90 patients with prior TRAB with MMC met our inclusion criteria. About 39.6% were males and 59.3% were females. Trabeculectomy combined with phacoemulsification (TP) accounted for 61.5%, while TRAB-MMC alone accounted for 37.4%. The most common diagnosis was Primary Open Angle Glaucoma (POAG), accounting for 85.7%. More than half of the patients (53.8%) had no prior SLT or LPI. In addition, 35.6% of our patients did not require any IOP-lowering drops more than 10 years after their Trabeculectomy. The rate of revisions (External and Internal) accounted for 12.2%, with no patients requiring needling. The failure rate was 26.67% (24 eyes), all of which required Shunt procedures of Baerveldt or Ahmed valve insertion.

Conclusions:

Our partial results showed a relatively low failure rate of 26.6%, more than 10 years after Trabeculectomy with MMC. In addition, about half of the included patients required 1 IOP-lowering agent or none at the last follow-up. This study is in progress and will be followed by more analyses and data collection.

Presentation 20

Incidence and Progression of Glaucoma Following Boston Type 1 Keratoprosthesis: A Systematic Review and Meta-Analysis

Presenting Author: Ahmed Abdelaal

Presenter's Affiliations: Department of Ophthalmology and Visual Sciences, Dalhousie University

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Abstract

Background:

Boston Type 1 Keratoprosthesis (KPro) implantation is an established treatment for severe corneal blindness when traditional keratoplasty is not feasible. This systematic review and meta-analysis aimed to quantify the incidence and progression of postoperative glaucoma following Boston Type 1 KPro implantation. Despite advances in device design and postoperative management, glaucoma remains a common and sight-threatening complication. Accurate estimates of glaucoma incidence and progression are essential to guide treatment and enhance long-term visual outcomes in this high-risk population.

Methods:

MEDLINE, Embase, and CENTRAL were systematically searched from inception to June 2025. Two independent reviewers performed title/abstract screening, full-text screening, data extraction, and risk-of-bias assessment in parallel, with disagreements resolved through discussion with a third reviewer. Studies reporting glaucoma-related outcomes following KPro implantation were included. Random-effects meta-analyses were performed to estimate pooled incidences of postoperative glaucoma. Risk of bias was assessed using Joanna Briggs Institute tools, and certainty of evidence was evaluated using GRADE. This review was prospectively registered on PROSPERO (ID: CRD420251036643).

Results:

Forty-five studies met inclusion criteria, encompassing 2,357 eyes with a mean follow-up of 34.9 months. The mean age of reported patients was 51.6 years, and 45.4% of eyes had pre-existing glaucoma. Overall, the pooled incidence of any form of postoperative glaucoma was 25.9% (95% CI 20.6-32.3%, I^2 = 85.1%) and an incidence rate of 0.10 events per eye-year (95% CI 0.07-0.13; I^2 = 89.3%). Among studies reporting de novo glaucoma, the pooled incidence was 37.0% (95% CI 25.7-49.9%, I^2 = 80.2%), while progression of pre-existing glaucoma occurred in 38.2% of eyes (95% CI 26.3-51.6%, I^2 = 76.6%). Ocular hypertension without diagnostic confirmation of glaucoma was observed in 30.4% of eyes (95% CI 21.2-41.5%, I^2 = 83.4%). Significant heterogeneity persisted across analyses, largely attributable to variability in outcome definitions, indication for KPro, and reporting practices.

Conclusions:

Glaucoma represents a frequent and clinically important complication following Boston Type 1 KPro implantation, affecting approximately one-quarter to one-third of eyes postoperatively. Both de novo

glaucoma and progression of pre-existing disease are common, underscoring the need for vigilant perioperative monitoring and standardized diagnostic approaches.

Presentation 21

Comparison of the Safety and Efficacy of PreserFlo MicroShunt Alone Versus with Amniotic Membrane in Glaucoma Surgery

Presenting Author: Lucas Torres

Presenter's Affiliations: Department of Ophthalmology and Visual Sciences, Dalhousie University

Other authors and affiliations: Authors: Lucas Torres(1); Lesya Shuba(1) (1) Department of Ophthalmology and Visual Sciences, Dalhousie University

Abstract

Background:

The PreserFlo MicroShunt with mitomycin C is a safe and effective bleb-forming procedure for glaucoma. However, failure rates may reach 20%, often requiring needling or surgical revision. Histopathology shows fibrosis with enlarged fibroblasts, similar to failed trabeculectomy, without immune or foreign-body reactions. Amniotic membrane (AM) has anti-inflammatory and anti-scarring properties. In trabeculectomy, AM use has reduced encapsulated blebs by over 80% at one year and improved intraocular pressure (IOP) outcomes. We hypothesize that AM use with the PreserFlo MicroShunt will improve success rates and reduce postoperative interventions.

Methods:

This randomized prospective study compares PreserFlo MicroShunt with mitomycin C (0.4 mg/mL) with and without AM (LabAmnio dehydrated double layer). Standard surgical technique will be used. In the AM group, the stent will be covered with a LabAmnio double-layer patch. Patients will be followed for one year (day 1; weeks 1 and 2; months 1, 3, and 6; and 12 months). Outcomes include IOP, inflammation, glaucoma medications, interventions, and adverse events. The primary outcome is mean IOP at 3, 6, and 12 months. Secondary outcomes include number of interventions, IOP reduction from baseline, medication use, and adverse events.

Results:

Recruitment is ongoing. Eight patients have been enrolled in the AM group. Results will be presented at Research Day.

Conclusions:

AM use in PreserFlo MicroShunt surgery may be safe, improve outcomes, and reduce the need for additional interventions and medications.

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