form & function in ocular disease

OCTOBER 28 - 29, 2022
HALIFAX, NOVA SCOTIA, CANADA

A multi-disciplinary clinical and basic science symposium

GUEST FACULTY

Christine Curcio, University of Alabama at Birmingham
Why AMD affects the macula: Visual neuroscience meets drusen biology

Reza Dana, Harvard Medical School
New ways of doing old things: Corneal immune modulation and pro-regenerative treatments

Ross Ethier, Georgia Institute of Technology & Emory University School of Medicine
Under stress: The role of mechanics in ocular disease

Andrzej Grzybowski, University of Warmia and Mazury & Institute for Research in Ophthalmology
Promises and hazards of AI in ophthalmology

Jonathan Horton, Beckman Vision Centre, University of California San Francisco
Ambulatory monitoring with wearable eye trackers in exotropia

Christina Schwarz, University of Tübingen
2P or not 2P? - Two-photon ophthalmoscopy and its potential for clinical application

Val Sheffield, University of Iowa
Treatments for inherited blindness

Richard Spaide, Vitreous Retina Macula Consultants of New York
Choroidal venous overload

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2. Approved CE Credits

Educationally Approved by Dalhousie University Continuing Professional Development and Medical Education

As an accredited provider, Dalhousie University Continuing Professional Development and Medical Education, designates this continuing professional development activity for 7.25 credit hours as an accredited group learning Section 1 activity as defined by the Maintenance of Certification Program of the Royal College of Physicians and Surgeons of Canada.

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 www.amaassn.org/go/internationalcme.

In keeping with CMA Guidelines, program content and selection of speakers are the responsibility of the planning committee. Support is directed toward the costs of the course and not to individual speakers.

Canadian Orthoptic Council (COC)

This program has been granted the following COC CE credits: 1.5 Core, 5.8 Non-Core.
3. Welcoming Remarks

Dear Colleagues:

It gives me great pleasure to welcome you to the 9th Form and Function in Ocular Disease meeting at Dalhousie University.

The Research Committee has put together an excellent program with world-renowned experts in exceptionally diverse areas spanning the visual neurosciences and the eye in health and disease.

We are grateful to our sponsors, Novartis, Heidelberg Engineering, CenterVue SpA and Bausch + Lomb for providing generous unrestricted support for the meeting.

We are excited by the program and hope you find this meeting to be a memorable one.

Regards,

Balwantray C. Chauhan, PhD
Mathers Professor and Research Director
## 4. Schedule

**Friday, October 28, 2022**

Moderators: Dr. Marcelo Nicolela and Dr. William Baldridge

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<thead>
<tr>
<th>Time</th>
<th>Presenter</th>
<th>Presentation Title</th>
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<tbody>
<tr>
<td>1:30 pm</td>
<td>Registration</td>
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<tr>
<td>2:00 pm</td>
<td>Welcoming Remarks and Housekeeping</td>
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<tr>
<td>2:05-2:50 pm</td>
<td>Christina Schwarz, PhD</td>
<td>2P or not 2P? – Two-photon ophthalmoscopy and its potential for clinical application</td>
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<tr>
<td>2:50–3:35 pm</td>
<td>Jonathan Horton, MD, PhD</td>
<td>Ambulatory monitoring with wearable eye trackers in exotropia</td>
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<tr>
<td>3:35–4:00 pm</td>
<td>Break</td>
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<tr>
<td>4:00pm–4:20 pm</td>
<td>Trainee Award: Bonnie He, MD</td>
<td>Risk of angle closure glaucoma with bisphosphonate use in osteoporosis</td>
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<tr>
<td>4:20pm–5:05 pm</td>
<td>Andrzej Grzybowski, MD, PhD, MBA, MAE</td>
<td>Promises and hazards of AI in ophthalmology</td>
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<td>5:05 pm</td>
<td>Adjourn</td>
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**Saturday, October 29, 2022**

Moderators: Dr. Balwantray Chauhan and Dr. Chris Seamone

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<thead>
<tr>
<th>Time</th>
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<tr>
<td>9:00 am</td>
<td>Welcome and Housekeeping</td>
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<tr>
<td>9:05–9:25 am</td>
<td>Trainee Award: Delaney Henderson, MSc</td>
<td>Longitudinal characterization of retinal ganglion cell function in models of optic nerve damage using viral delivery</td>
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<tr>
<td>9:25-10:10 am</td>
<td>Richard Spaide, MD</td>
<td>Choroidal venous overload</td>
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<td>10:10–10:35 am</td>
<td>Break</td>
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<tr>
<td>10:35–11:20 am</td>
<td>Reza Dana, MD, MPH, MSc, FARVO</td>
<td>New ways of doing old things: Corneal immune modulation and pro-regenerative treatments</td>
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<tr>
<td>11:20–12:05 pm</td>
<td>Christine Curcio, PhD, FARVO</td>
<td>Why AMD affects the macula: Visual neuroscience meets drusen biology</td>
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<td>12:05–1:05 pm</td>
<td>Lunch</td>
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<td>1:05–1:50 pm</td>
<td>Val Sheffield, MD, PhD</td>
<td>Treatments for inherited blindness</td>
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<tr>
<td>1:50–2:35 pm</td>
<td>Ross Ethier, PhD</td>
<td>Under stress: The role of mechanics in ocular disease</td>
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<tr>
<td>2:35 pm</td>
<td>Closing and Adjourn</td>
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5. Speaker Biographies

Christine Curcio, PhD, FARVO

White-McKee Endowed Professor of Ophthalmology
Department of Ophthalmology and Visual Science
University of Alabama at Birmingham School of Medicine

EyeSight Foundation of Alabama
Vision Research Laboratories

Dr. Curcio investigates human retinal neuroscience, aging, and age-related macular degeneration (AMD) using laboratory and clinical approaches. She has focused on anatomic and molecular pathobiology especially drusen and other characteristic extracellular deposits of AMD, outer retinal degeneration and gliosis, transdifferentiation of retinal pigment epithelium, and microarchitecture of end-stage neovascularization and atrophy. Her superb microscopy studies provided a cellular and subcellular basis of clinical retinal imaging technology (optical coherence tomography, fundus autofluorescence, adaptive optics-assisted scanning laser ophthalmoscopy, angiography), building toward a fully-visualizable progression sequence of disease. Her maps of the human photoreceptor layer showing rod loss in aging and AMD stimulated development of delayed rod-mediated dark adaptation as a functional indicator for AMD onset. Since 1984, research resulting in 230 peer review articles and >300 invited presentations has been funded by the National Institutes of Health, foundations, and industry. She serves on editorial boards of *Investigative Ophthalmology & Visual Science* and *Retina*. She was awarded the 2002 (inaugural) Roger H. Johnson Prize for Macular Degeneration research, the 2014 Ludwig von Sallmann Prize, the 2020 Research to Prevent Blindness – David F. Weeks Award for excellence in AMD research, and the 2022 Lawrence A. Yannuzzi Lectureship from the International Retinal Imaging Society. Dr. Curcio provides histology to the Classification of Atrophy Meeting (CAM), a clinical international consensus group defining OCT-based imaging endpoints for AMD clinical trials.
Dr. Dana’s research focuses on the molecular and cellular regulation of corneal and ocular surface immunity in transplantation, autoimmunity, wound healing, and regenerative medicine approaches to corneal diseases. His research has led to over 500 publications (including >480 peer-reviewed articles), which to date have been cited >38,000 times with an h-index of 98. Dr. Dana's translational research has been facilitated by 15 successful Investigational New Drug (IND) applications to the FDA. Dr. Dana has trained 140 research postdoctoral and graduate students from 36 countries to date in his laboratory, in addition to over 90 clinical fellows. His trainees include numerous department/division chairs and a medical school dean. His research is supported by 10 US federal grants.
Professor Ethier is a Georgia Research Alliance Eminent Scholar at Georgia Institute of Technology & Emory University School of Medicine. Prior to joining Georgia Tech, he was Head of the Department of Bioengineering at Imperial College, London for 5 years, and Director of the Institute of Biomaterials and Biomedical Engineering at University of Toronto for 2 years before that. He received his Ph.D. from MIT in 1986, his S.M. from MIT in 1983, his M. Math. from Waterloo in 1982 and his B.Sc. from Queen’s in 1980.

His research is in the biomechanics of cells and whole organs, with specific emphasis on ocular biomechanics. He works on developing treatments for glaucoma, the second most common cause of blindness, and for SANS, a syndrome affecting astronauts which is a major NASA human health concern. He has published approximately 200 refereed journal articles and two books, has received both Steacie and Humboldt Fellowships, and the Lissner medal. His work has attracted more than 15,500 citations and has an h-index of 73 (Google Scholar, June 2022).

He sits on the editorial boards of four journals, and is a member of the BrightFocus Foundation’s Glaucoma Research Scientific Review Committee, the ASME Engineering Sciences Segment council, and the ARVO Glaucoma section Annual Meeting Program Committee. He currently chairs the external Advisory Boards for the Departments of Bioengineering at Imperial College London and University of British Columbia. He is the founding chair of the Bioengineering Society (UK), and has served on the following bodies: World Council of Biomechanics, US National Committee on Biomechanics (executive member), the Beckman-Argyros Award in Vision Research (Executive Committee), Bioengineering Division of the American Society of Mechanical Engineers (Chair), External Advisory Board of the Department of Biomedical Engineering at U Alabama Birmingham, NSERC Banting Fellowship Selection Committee (Chair), and the SB3C Foundation (Chair). He has received the title of Fellow from the following organizations: American Society of Mechanical Engineers; American Institute for Medical and Biological Engineering; International Academy for Medical and Biological Engineering; Association for Research in Vision and Ophthalmology; The City and Guilds Institute; and the Biomedical Engineering Society. He has acted for the Governments of Israel and Singapore, chairing external reviewer committees evaluating Biomedical Engineering programs.
Andrzej Grzybowski, MD, PhD, MBA, MAE

Professor of Ophthalmology
Chair of Ophthalmology, University of Warmia and Mazury, Olsztyn, Poland
Head of the Institute for Research in Ophthalmology, Poznan, Poland

Andrzej Grzybowski is a Professor of Ophthalmology and Chair of the Department of Ophthalmology, University of Warmia and Mazury, Olsztyn, Poland; Head of Institute for Research in Ophthalmology, Foundation for Ophthalmology Development, Poznan, Poland.

He is a member of Euretina, the Retina Society, American Academy of Ophthalmology, European Association for Vision and Eye Research, European Society of Cataract and Refractive Surgeons and Cogan Society. He became a lifelong member of the European Academy of Ophthalmology. He has received numerous awards from these societies.

Professor Grzybowski has authored over 500 peer-reviewed publications, and over 50 book chapters. He is an editorial board member of numerous journals including the American Journal of Ophthalmology, Acta Ophthalmologica, PLOS One, Graefe’s Archive for Clinical and Experimental Ophthalmology and Translational Vision Science & Technology.

He is the only Polish ophthalmologist included in the top 2% ranking of the world-best scientists prepared by Stanford University for 2019 and 2020. In 2021, he received the International Society for Refractive Surgery Founders’ Award and published a book *Artificial Intelligence in Ophthalmology*. In 2022 he was awarded Officers’ Cross of The Order of Polonia Restituta for outstanding achievements in research and teaching, and support for international scientific cooperation by the President of Poland.
Jonathan Horton, MD, PhD

Beckman Vision Centre, University of California San Francisco

Jonathan C. Horton MD PhD specializes in neuro-ophthalmology, pediatric ophthalmology, strabismus, and the treatment of double vision. He earned his medical degree from Harvard Medical School, where he also received a PhD in neurobiology in the laboratory of David Hubel and Torsten Wiesel. He did a medical internship and a year of neurology residency at the Massachusetts General Hospital, followed by ophthalmology residency at Georgetown University. Dr. Horton completed fellowships in neuro-ophthalmology and pediatric ophthalmology at the University of California, San Francisco. He is now professor of ophthalmology, neurology and physiology, and member of the Program in Neuroscience. His National Institutes of Health-supported laboratory is focused on the neural basis of visual perception, amblyopia, strabismus, eye movements, and disorders of binocular vision.
Christina Schwarz is a Research Group Leader at the Institute for Ophthalmic Research at the University of Tübingen, Germany. She earned MSc degrees in Physics and Biomedical Optics from Heidelberg University, Germany and a PhD in Vision Science from the University of Murcia, Spain. Her research is currently supported by an ERC Starting Grant. She serves as Topical Editor for Optics Letters in the content area of Vision & Adaptive Optics and as Chair of Optica’s Technical Group Vision.
Val Sheffield, MD, PhD

Professor of Pediatrics, Division of Medical Genetics, University of Iowa
Professor of Ophthalmology and Visual Sciences, University of Iowa
Investigator, University of Iowa Institute for Vision Research
Roy J. Carver Chair in Molecular Genetics

Dr. Sheffield received his Ph.D. degree in Developmental Biology and his M.D. degree with honors from the University of Chicago. He received Pediatric residency training and Medical Genetics fellowship training at the University of California, San Francisco (UCSF). Upon completion of training at UCSF, Dr. Sheffield came to the University of Iowa, where he has spent his entire career. His laboratory played an active role in the human genome project helping to complete the first major goal of the human genome project. The focus of Dr. Sheffield’s research has been the study of human hereditary diseases. His laboratory has identified genes involved in numerous different disorders including hereditary blindness, deafness, diabetes, and hypertension. Besides identifying genes and mutations that cause human diseases, his laboratory has studied disease mechanisms. His laboratory is currently exploring novel treatments for human diseases including blindness and diabetes.

Included among Dr. Sheffield’s list of honors are the E. Mead-Johnson Award for Pediatric Research from the Society for Pediatric Research and the Lewis Rudin Glaucoma Prize from the New York Academy of Medicine. Dr. Sheffield was a Howard Hughes Medical Institute (HHMI) investigator for 18 years. He was elected to the National Academy of Medicine (USA) in 2005 and to the American Academy of Arts and Sciences in 2020. He has authored or co-authored more than 350 peer-reviewed scientific publications.

Besides running his research laboratory, Dr. Sheffield cares for patients with genetic disorders. He also has mentored numerous graduate students and post-doctoral fellows.
Richard F. Spaide, MD is a specialist in retinal diseases and has published more than 350 articles in peer-reviewed journals, more than 50 book chapters, and edited several books. He is a graduate of Muhlenberg College and Jefferson Medical College in Philadelphia. He completed his Ophthalmology Residency at St. Vincent’s Hospital and Medical Center in New York and his Retina Fellowship at the Manhattan Eye, Ear, and Throat Hospital.

His major research interests include macular diseases, retinal surgery, and ocular imaging. Past highlights in his published papers include indocyanine angiography, fundus autofluorescence, characterization of central serous chorioretinopathy, application of mechanical engineering principles to macular hole formation, development of concepts concerning oxidative damage and characterization of lipid peroxides in Bruch’s membrane, the combination of photodynamic therapy and intravitreal triamcinolone for age-related macular degeneration, and development of new methodologies to image the retina and choroid. His current research interests include multimodal imaging, optical coherence tomography angiography, and new computer-based rendering techniques to visualize retinal anatomy.

Dr. Spaide has been cited in multiple Who's Who and Best Doctors lists and has received many awards including the Richard and Linda Rosenthal Foundation Award in the Visual Sciences, Prix Soubrane de la Recherche en Ophtalmologie, Award of Merit from the Retina Society, Henkind Award, Coscas Award, Nataraja Pillai Award from the Vitreoretinal Society of India, W. Richard Green MD Award, George Theodossiads Award from the Greek Retinal Society, Founders Award from the American Society of Retinal Surgeons, Life Achievement Honor Award from the American Academy of Ophthalmology, the Simon Gratz Award from Thomas Jefferson University, Roger Johnson Memorial Award for Macular Degeneration Research, J. Donald Gass Award, and the Doyne Medal. He is a Fellow of the Association for Research and Vision in Ophthalmology. He is on the Editorial Board of several journals, an Associate Editor of the journal Retina.
6. Learning Objectives

Christine Curcio, PhD, FARVO

*Why AMD affects the macula: Visual neuroscience meets drusen biology*

**Objectives**

1. Understand deposit-driven AMD pathophysiology – 2 layers of extracellular deposits, mapping onto the topography of cones (drusen) and rods (subretinal drusenoid deposits).
2. Explore why visual dysfunction in a macular disease starts with rods, close to the fovea.
3. Explore how high-risk drusen form secondarily to xanthophyll carotenoid delivery and why that presents an opportunity for AMD prevention.

**Notes:**

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Reza Dana, MD, MPH, MSc, FARVO

*New ways of doing old things: Corneal immune modulation and pro-regenerative treatments*

**Objectives:**


**Notes:**

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Ross Ethier, PhD

*Under stress: The role of mechanics in ocular disease*

**Objectives:**

1. To introduce attendees to basic concepts of biomechanics (stress, strain, deformation) and the role that tissue microstructure plays in relating stress and strain.
2. To describe the biomechanical and mechanobiological environments of the optic nerve head and trabecular meshwork and their relevance in glaucoma.
3. To briefly review mechanobiological effects in other ocular conditions, e.g. myopia, secondary cataract.

**Notes:**

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Andrzej Grzybowski, MD, PhD, MBA, MAE

Promises and hazards of AI in ophthalmology

Objectives:

1. To present some major historical background in development of AI with some relations to Ophthalmology
2. To present recent developments of AI in medicine
3. To present recent developments of AI in Ophthalmology
4. To present the concept of deep vs superficial medicine
5. To present major hazards and limitations of AI in medicine and ophthalmology

Notes:
Ambulatory monitoring with wearable eye trackers in exotropia

Objectives:

1. To understand the two sensory states experienced by patients with intermittent exotropia: fused, binocular versus deviated, suppressed.
2. To understand the uncertainty regarding optimal clinical management of intermittent exotropia.
3. To learn how ambulatory eye tracking glasses can be used to monitor ocular alignment over the course of a day while patients engage in regular activities, allowing one to quantify the prevalence of their intermittent exotropia.
4. To appreciate how information about the prevalence of exotropia may guide clinical management and be useful for assessing the response to various treatments.

Notes:
Objectives

1. To present proof-of-concept studies of two-photon imaging to track the visual cycle in the living nonhuman primate eye.
2. To discuss safety aspects, and highlight future potentials for high-resolution imaging of the human retina in health and disease.
Objectives

1. Understand the extensive genetic heterogeneity of inherited retinopathies including syndromic retinopathies (such as Bardet-Biedl syndrome).
2. Understand that retinopathies can be caused by mutant multimeric protein complexes.
3. Understand the role of primary cilia in retinopathies.
4. Learn about potential treatment strategies for retinopathies including gene therapy, cell therapy, and genome editing.
5. Learn about a potential novel therapy for retinopathies, which came about by studying the diabetic phenotype in mouse models of Bardet-Biedl syndrome.

Notes:
Richard Spaide, MD

*Choroidal venous overload*

**Objectives**

1. To learn about venous overload and its intrinsic and extrinsic causes.

**Notes:**

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7. Presentation Evaluation Forms

Christine Curcio, PhD, FARVO

*Why AMD affects the macula: Visual neuroscience meets drusen biology*

Please rate the following aspects of this presentation from 1 to 5, where 1 is strongly disagree and 5 is strongly agree.

<table>
<thead>
<tr>
<th>The presenter:</th>
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<td>Demonstrated thorough knowledge of their topic</td>
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What was your overall evaluation of this presenter?  

| 1 | 2 | 3 | 4 | 5 |

Comments?


Reza Dana, MD, MPH, MSc, FARVO

*New ways of doing old things: Corneal immune modulation and pro-regenerative treatments*

Please rate the following aspects of this presentation from 1 to 5, where 1 is strongly disagree and 5 is strongly agree.

**The presenter:**

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**Comments?**
Ross Ethier, PhD

*Under stress: The role of mechanics in ocular disease*

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**The presenter:**

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**Comments?**
Andrzej Grzybowski, MD. PhD, MBA, MAE

Promises and hazards of AI in ophthalmology

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What was your overall evaluation of this presenter?

| 1 | 2 | 3 | 4 | 5 |

**Comments?**
Ambulatory monitoring with wearable eye trackers in exotropia

Please rate the following aspects of this presentation from 1 to 5, where 1 is strongly disagree and 5 is strongly agree.

The presenter:

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What was your overall evaluation of this presenter?

| 1 | 2 | 3 | 4 | 5 |

Comments?
Christina Schwarz, PhD

2P or not 2P? – Two-photon ophthalmoscopy and its potential for clinical application

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What was your overall evaluation of this presenter?

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**Comments?**
Val Sheffield, MD, PhD

*Treatments for inherited blindness*

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**What was your overall evaluation of this presenter?**

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**Comments?**
Richard Spaide, MD

*Choroidal venous overload*

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**Comments?**
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