Department of Ophthalmology and Visual Sciences

ANNUAL REPORT

2019–2020
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Dear colleagues and friends of the Department of Ophthalmology & Vision Sciences,

It gives me great pleasure to invite you to read the 2019-20 Annual Report of the Department of Ophthalmology & Visual Sciences (DOVS).

The year 2020, which according to the WHO Vision 2020 – The Right to Sight Project launched in 1999, was supposed to be the year when the main causes of all preventable and treatable blindness would be eliminated as a public health issue, has turned out to be an unprecedented year for all of us, particularly affecting those linked with Health Care.

While we are still in the middle of a global pandemic, dealing with the uncertainties related to COVID-19, I am proud to say that our Department, working in collaboration with our partners in Government, Nova Scotia Health Authority, IWK and Dalhousie University, has responded and adapted quickly to the new realities facing those delivering health care. I would like to thank all of our clinical, research and education staff, who raised to the task of finding new, innovative and safe methods to get the job done, while maintaining the highest possible standards under the circumstances.

While you read this report, I want to highlight the fact that the impact of the COVID-19 pandemic on our clinical and academic deliverables won’t be fully seen in this report, as we are reporting data from the fiscal year 2019-2020 (until March 31st, 2020), just a few weeks into the Province shut down because of the pandemic.

We, however, remain optimistic with all that we accomplished since our last report, and all that has been done since the pandemic started. The DOVS has flourished in many areas, as you will see in this current report.
MISSION

The Department of Ophthalmology & Visual Sciences provides high quality ophthalmological care for the population of Nova Scotia and Atlantic Canada, delivers excellent medical education programs and conducts internationally recognized research in a collaborative and innovative environment.

VISION

To lead Canadian ophthalmology in patient care, education and research.

VALUES

- Commitment to excellence
- Transparency, accountability, fiscal and social responsibility
- Innovation and a spirit of inquiry
- Professionalism and inclusivity
- Collaboration and community engagement
Who We Are & What We Do

Where We Deliver Care

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Eye Care Centre Visits</td>
<td>51,065</td>
</tr>
<tr>
<td>Cobequid Clinic</td>
<td>1,994</td>
</tr>
<tr>
<td>IWK Ophthalmology</td>
<td>7,484</td>
</tr>
<tr>
<td>Total Adult Surgeries</td>
<td>7,588</td>
</tr>
<tr>
<td>Total IWK Surgeries</td>
<td>312</td>
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Who Delivers Care

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<table>
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<tbody>
<tr>
<td>Ophthalmologists</td>
<td>28</td>
</tr>
<tr>
<td>Nursing &amp; Technical Staff</td>
<td>42</td>
</tr>
<tr>
<td>Administrative Staff</td>
<td>30</td>
</tr>
<tr>
<td>Research Coordinators</td>
<td>9.5</td>
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Surgical Cases by Subspecialty

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<tr>
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<tbody>
<tr>
<td>Cataracts</td>
<td>4,565</td>
</tr>
<tr>
<td>Cornea</td>
<td>271</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>603</td>
</tr>
<tr>
<td>Orbit/Plastics</td>
<td>173</td>
</tr>
<tr>
<td>Other</td>
<td>79</td>
</tr>
<tr>
<td>Paediatrics</td>
<td>312</td>
</tr>
<tr>
<td>Retinal Surgery</td>
<td>1,775</td>
</tr>
<tr>
<td>Adult Strabismus</td>
<td>122</td>
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Research

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<tr>
<td>60 Invited Presentations</td>
<td></td>
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<tr>
<td>35 Peer Reviewed Manuscripts</td>
<td></td>
</tr>
<tr>
<td>$2.27M Continuing Research Grants &amp; Contracts</td>
<td></td>
</tr>
<tr>
<td>$0.68M New Research Grants &amp; Contracts</td>
<td></td>
</tr>
<tr>
<td>$2.95M Total Research Funding</td>
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Who We Are & What We Do

Education

### Postgraduate Education

<table>
<thead>
<tr>
<th>Position</th>
<th>Number</th>
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<tbody>
<tr>
<td>Residents PGY2-5</td>
<td>11</td>
</tr>
<tr>
<td>Resident PGY1</td>
<td>3</td>
</tr>
<tr>
<td>Fellow - Clinical Glaucoma</td>
<td>1</td>
</tr>
<tr>
<td>Fellow - Paediatrics</td>
<td>1</td>
</tr>
<tr>
<td>Postdoctoral Fellows</td>
<td>2</td>
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<tr>
<td>Clinical Vision Sciences</td>
<td>7</td>
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### Undergraduate Education

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>MED 4 Elective students</td>
<td>33</td>
</tr>
<tr>
<td>Dalhousie Medical 1 &amp; 2 student electives</td>
<td>14</td>
</tr>
<tr>
<td>Emergency Medicine Resident electives</td>
<td>6</td>
</tr>
<tr>
<td>Total Undergraduate Tutor Hours</td>
<td>56</td>
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### Professional Development

<table>
<thead>
<tr>
<th>Event</th>
<th>Number</th>
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<tbody>
<tr>
<td>Grand Rounds</td>
<td>29</td>
</tr>
<tr>
<td>Conferences</td>
<td>2</td>
</tr>
<tr>
<td>Journal Clubs</td>
<td>3</td>
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Our Faculty

Dr. Curtis Archibald, Assistant Professor  
Dr. Dan Belliveau, Assistant Professor  
Dr. Balwantray Chauhan, Professor  
Dr. Alex de Saint Sardos, Assistant Professor  
Dr. Alan Cruess, Professor  
Dr. Mishari Dahrab, Assistant Professor  
Dr. John Dickinson, Associate Professor  
Dr. Brennan Eadie, Assistant Professor  
Dr. Carolina Francisconi, Assistant Professor  
Dr. Paul Freund, Assistant Professor  
Dr. Stan George, Associate Professor  
Dr. Rishi Gupta, Assistant Professor  
Mr. Erik Hahn, Lecturer  
Dr. Ahsen Hussain, Assistant Professor  
Dr. Hesham Lakosha, Assistant Professor  
Dr. G. Robert La Roche, Professor  
Dr. Darrell Lewis, Assistant Professor  
Dr. Charles Maxner, Professor  
Dr. Anu Mishra, Assistant Professor  
Dr. Jeremy Murphy, Assistant Professor  
Dr. Marcelo Nicolela, Professor & Head  
Dr. Daniel O'Brien, Associate Professor  
Dr. Andrew Orr, Associate Professor  
Dr. Paul Rafuse, Associate Professor  
Dr. Johane Robitaille, Professor  
Dr. Arif Samad, Associate Professor  
Dr. Christopher Seamone, Associate Professor  
Dr. Lesya Shuba, Associate Professor  
Dr. John Taiani, Assistant Professor  
Dr. Alex Tan, Assistant Professor  
Dr. Francois Tremblay, Professor  
Dr. Jayme Vianna, Assistant Professor

Cross Appointments
Dr. David Clarke (Surgery)  
Dr. Patrice Cote (Biology)  
Dr. Melanie Kelly (Pharmacology)  
Dr. Emad Massoud (Surgery)  
Dr. Paul Neumann (Anatomy & Neurobiology)  
Dr. Sylvia Pasternak (Pathology)  
Dr. David Persaud (Health Services Administration)  
Dr. David Westwood (Health & Human Performance)

Distributed Learning Faculty
Dr. William Best, Assistant Professor  
Dr. Paul Cheevers, Assistant Professor  
Dr. David Comstock, Assistant Professor  
Dr. Erin Demmings, Assistant Professor  
Dr. Edward Doherty, Assistant Professor  
Dr. Donald Farrell, Assistant Professor  
Dr. Jennifer Gao, Assistant Professor  
Dr. Abbas Haider, Assistant Professor  
Dr. Kenneth Hammel, Lecturer  
Dr. Mohammed Kapasi, Assistant Professor  
Dr. Colin Mann, Assistant Professor  
Dr. Kristine Mayer, Assistant Professor  
Dr. Rajender Mohandas, Assistant Professor  
Dr. Kenneth Roberts, Assistant Professor  
Dr. Robert Scott, Assistant Professor  
Dr. Banakesa Shetty, Assistant Professor  
Dr. Saraswati Sivakumar, Assistant Professor  
Dr. Iva Smrz, Assistant Professor  
Dr. Jeff Steeves, Assistant Professor  
Dr. Christopher Symonds, Assistant Professor  
Dr. Vicki Taylor, Assistant Professor  
Dr. Hilda Zommer-Sykes, Assistant Professor

Joint Appointments
Dr. William Baldridge (Anatomy & Neurobiology)

Emeritus Appointments
Dr. Raymond LeBlanc, Professor Emeritus  
Dr. Michael Ramsey, Professor Emeritus

Adjunct Appointments
Dr. Dao-Yi Yu, Adjunct Professor  
Dr. Sharon Bentley, Assistant Adjunct Professor
Dr. Freund completed his medical education at Schulich School of Medicine at The University of Western Ontario in 2012. He then went on to complete his Master of Science/Medical Sciences - Ophthalmology at the University of Alberta in 2014. Dr. Freund completed his Ophthalmology Residency at the Eye Institute of Alberta, Royal Alexandra Hospital in 2018, and then completed a Fellowship in Neuro-Ophthalmology at the University of Toronto, in June of 2019.

Dr. Freund will be working in our Neuro-Ophthalmology service and in comprehensive ophthalmology at the Eye Care Centre–VG Hospital starting September 16, 2019.

Dr. Rishi Gupta Congratulations to Dr. Rishi Gupta on his promotion to Associate Professor. The promotion will be effective July 1, 2020. The Promotions Committee was impressed with the caliber of the application, teaching dossier and documentation and it was a pleasure to support the application and forward it on for review and support at both the faculty level and provost.
Dr. Gerhard Zinser Postdoctoral Fellowship in Ophthalmology

Congratulations to Dr. Corey Smith who was awarded the Dr. Gerhard Zinser Postdoctoral Fellowship in Ophthalmology for 2019/2020. This prestigious award was established in memory of the late Dr. Gerhard Zinser, the co-founder and Managing Director of Heidelberg Engineering, who was instrumental in advancing imaging technology. Beyond fostering the growth of existing research, support from Heidelberg Engineering has also expanded research capacity by providing funding for new trainees. Dr. Corey Smith, a former PhD trainee in Dr. Balwantray Chauhan’s lab, will build on his impressive PhD work involving new techniques to image the eye, while bringing a unique perspective to vision and eye research through a multidisciplinary background in biophysics, engineering and physiology. Dr. Smith’s current research involves developing novel non-invasive imaging techniques to monitor the health of cells that die as a result of diseases such as glaucoma.

The NSHA Long Service Award ceremony took place on Wednesday, November 20th, 2019. Dr. O’Brien received an award for 30 years of service.

Dr. Michael Wall, University of Iowa, delivered the Dr. Aditya Mishra Lecture in Neuro-Ophthalmology during the 2019 Atlantic Eye Symposium. Dr. Charles Maxner chaired the session. This annual lecture is supported through the generous contributions to the Dr. Aditya Mishra Endowment at the QEII Health Sciences Centre Foundation.
DMRF New Faculty Grant Award

We are pleased to announce that Dr. Brennan Eadie and Dr. Jayme Vianna are the inaugural recipients of the DMRF Covert Department of Ophthalmology and Visual Sciences New Faculty Research Grant and DMRF-Department of Ophthalmology and Visual Sciences New Faculty Research Grant respectively. These funds were made possible through the Dalhousie Medical Research Foundation and the applications were reviewed independently by the Faculty of Medicine Research Advisory Committee of Dalhousie University.

Dr. Eadie is leading a project entitled “Evaluation of a custom head-mounted visual field testing device for glaucoma.” He is working to develop and test a new Virtual Reality-like, head-mounted visual field-testing device that performs as well, or better, than the current standard of care visual field devices. The main goal of this research is to show that the diagnosis and monitoring of glaucoma can be improved by wider availability of visual field testing, which in turn will have an impact on reducing the burden of visual disability in glaucoma.

Dr. Vianna is leading a project is entitled “Glaucoma impairment on saccades performed during eye movement perimetry.” This study aims to understand the relationship between glaucoma and slow eye movements by testing the speed of eye movements in regions of the visual field of glaucoma patients. Dr. Vianna will examine whether differences in eye movement are related to the level of visual damage. The goal of this research is to understand how to effectively analyze eye movements in patients with various stages of glaucoma and use this information to devise strategies for disease detection.
Established in 2014, the Mathers Scholarships permit the Department to support students at the Undergraduate, Masters, PhD and Fellowship levels and are building our capacity year over year.

The Dr. R. Evatt and Rita Mathers Trainee Scholarships in Ophthalmology & Visual Sciences are enabled by a visionary endowment from the estate of the late Peggy St. George to honour her step parents pictured above.

2019 Winners

Dr. Johnny Di Pierdomenico is the recipient of the Research Fellowship in Ophthalmology and Visual Sciences. Under the direction of Dr. Balwantray Chauhan, Dr. Di Pierdomnico will induce experimental glaucoma in a special strain of mice in which the retinal ganglion cell (RGC) are fluorescently labelled allowing for in vivo imaging. In parallel, he will conduct functional testing using electrophysiology and measure how visual function is impacted by RGC loss during the evolution of glaucoma in these animal models. Deepening our understanding on how functional tests are impacted by true RGC loss will drive future development of diagnostic functional tests tailored to different stages of glaucoma disease severity.

The PhD in Vision Science scholarship is awarded to Tareq Yousef, who under the supervision of Dr. William Baldridge, is continuing to investigate whether a light-sensitive protein, melanopsin, contributes to the process of retinal neuron light-adaptation in a fish retina model. He will investigate the possible novel connections that melanopsin make within the retina itself, and what changes they impose on retinal signaling mediated by the important chemical messenger, dopamine. Melanopsin’s contribution to light-adaptation may prove imperative for the development of visual prostheses and reversing visual-impairment in the future.

The recipient Master of Vision Science scholarship is Delaney Henderson. Delaney is supervised by Drs. Balwantray Chauhan and Corey Smith and will continue to investigate how a gene delivery technique may be used to deliver fluorescent molecules that allow visualization of cells in the retina. This potential diagnostic tool may allow clinicians to monitor retinal ganglion cell death caused by glaucoma and increase our understanding of the properties of cellular loss of function.
The Master of Clinical Vision Science scholarship is awarded to Nadia Dicostanzo, who under the direction of Dr. Kevin Duffy, is studying the effect of tetrodotoxin (TTX) on the optic nerve when used as a treatment of amblyopia in mature cat models. Recovery from amblyopia has recently been shown in visually mature cats with the use of small amounts of intraocular TTX. Considering the exciting therapeutic potential of TTX as a treatment for amblyopia in older animals, her study aims to assess the safety of TTX injections as they relate to optic nerve pathology. Sections of optic nerve from both treated and non-treated eyes will be examined histologically to assess for signs of optic nerve degeneration and abnormality.

Dr. Danielle Cadieux is the recipient of the Concurrent Masters and Ophthalmology Residency scholarship. She continues to carry out her research under the direction of Drs. Mark Goldszmidt and Anuradha Mishra. Dr. Cadieux will study how surgical residents take initiative to independently identify learning needs, implement learning strategies, and evaluate learning outcomes in the context of the operating room to achieve the required competencies throughout their residency programs. Understanding these practices will benefit postgraduate students and educators by providing a framework to assess current practice, provide feedback, and address future needs.

The Undergraduate scholarship is awarded to Brooklyn Rawlyk, who under the direction of Dr. Balwantray Chauhan, is studying the relationship between intraocular pressure (IOP) and retinal ganglion cell (RGC) loss in glaucoma. She will track elevated IOP levels in mouse models and process the retinas for immunohistochemistry to quantify RGC loss. From this research, she hopes to gain a better understanding of the functional changes within the retina that can lead to earlier disease intervention.
The clinical services delivered by the Department occur at the Eye Care Centre (QEII Health Sciences Centre - VG site – Nova Scotia Health Authority) for adult ophthalmology, at the paediatric ophthalmology Clinic located at the IWK Health Centre, at the ophthalmology clinic located at the Cobequid Community Centre (both adult and paediatric services) and in all private offices in town, where community based faculty members provide most of their ambulatory clinical care.
The drop in volumes over 2015-16 and 2016-17 occurred when one of the paediatric ophthalmologists was ill and then relocated. A new member was recruited in the autumn of 2017.

During 2015-16, increased volumes at Cobequid occurred when we relocated a large number of clinics to that center during the flooding at the VG-Eye Care Centre.

OCT Image: Courtesy of Dr. A. Cruess
The Department has been taking steps to address the wait time for elective surgery, particularly cataract surgery. In 2016, we increased the daily surgical output for cataract surgery from 14 cases per operating room to 16 cases by reducing turnaround time through increased efficiencies in the OR. The increased output is having a positive impact on wait time for elective cases. The number of patients receiving cataract surgery within the National benchmark of 16 weeks climbed to 73% (2018/19) but dropped to 57% (2019/20). Although the causes for this apparent increase in wait time are not clear, it appears to have been affected by changes in practice in some offices regarding proper entering of backdated data in Novari, which might have caused a momentary over estimation of wait times. Additionally, there was a corresponding increase in median days waiting for surgery (Figure 6). Wait times for other elective surgeries performed at DOVS is under control for glaucoma, and paediatric ophthalmology, however elective retina surgery wait times are longer than desired. We also reduced the wait time for orbital/oculoplastic procedures through the addition of a second surgeon to the service. Long wait times for cornea transplants continues to be an issue due to the lack of donor tissue. We recruited another cornea surgeon in 2019, and Dr. Darrell Lewis has taken over directorship of the Eye Bank program.

Median days waiting for all completed cases

Percentage of completed cataract cases within the national benchmark of 16 weeks
Message from the Postgraduate Medical Education Director

Mishari Dharab, MD, PhD, FRCSC
Director, Postgraduate Medical Education

The Dalhousie University postgraduate ophthalmology medical education program had many calls for celebrations over the last year. Our program was one of the first to receive Full accreditation by the Royal College based on the new accreditation standards. We also started to see our shift towards competency-based medical education with a gradual introductions of its key components.

Our two graduating residents were successful on their Royal College examinations in June 2019. We had the joy of watching them mature academically and clinically into fine ophthalmologists. Dr. William Best is now practicing comprehensive ophthalmology in Prince Edward Island. Dr. Aaron Winter headed south to complete a Neuro-ophthalmology fellowship at Massachusetts Eye & Ear Infirmary, Boston. Our two clinical fellows also graduated in June 2019. Dr. Jennifer Gao, Clinical Glaucoma Fellow, is now practicing in Antigonish, Nova Scotia and Dr. Mauricio Aldrete, Pediatric Fellow, is now practicing in Dieppe, New Brunswick.

The Annual CaRMS selection process continues to bear fruit. We had a successful matching for 2019 for all our three positions in the first iteration. On July of 2019, we welcomed the following residents and fellows to our program:

Dr. Rami Darwich, McGill University  
Dr. Douglas Iaboni, Dalhousie University  
Dr. Syed Mohammad, University of Ottawa  
Dr. Maytham Alali, Paediatrics Fellow  
Dr. Gabriela Campos-Baniak, Glaucoma Fellow

Dr. Lesya Shuba said farewell to the postgraduate medical education director role after years of dedication and excellence. We are in debt to her and all of our colleagues for their untiring efforts in making our program an envy to all across Canada. We will continue to move forward together and elevate even further.

2019 Graduates: Drs. William Best and Aaron Winter  
2019 Fellowship Graduates: Drs. Mauricio Aldrete and Jennifer Gao
Our undergraduate ophthalmology curriculum continues to develop and grow. We have a very active and successful visiting elective program for Med 4 students across the country. Our residents participated in the annual med school career evening in October 2019. This is a great opportunity for us to meet interested medical students and is always a fun night. We had an enjoyable evening of learning and some friendly competition on Feb 13, 2019 for our annual Med 2 ophthalmology night. As part of an update to this curriculum, Drs. Rishi Gupta and Brennan Eadie facilitated an engaging “Ophthalmology Jeopardy” for the medical students which was very well received.

In June 2019, the Department participated in the second iteration of the Pre-Clerkship Residency Exploration Program (PREP). The highlight of the ophthalmology component was a half day, interprofessional, interactive workshop for forty med 2 students. They had a number of unique experiences including reviewing the anatomy of their eyes through B scan ultrasound, having the opportunity to inject an IOL into a model eye and also to explore some low vision technology from the CNIB.

The residents have also been doing an excellent job working closely with the medical school ophthalmology interest group and created a number of unique educational experiences for them. Thank you to all the faculty, residents and staff who help support our undergraduate teaching curriculum.
Pre-clerkship Residency Exploration Program 1 (PREP)

Med 2 Night—Ophthalmology Jeopardy
Award Winning Educators

The Clinical Teaching Award is an annual award that recognizes one staff physician’s outstanding contributions to the clinical education of ophthalmology residents. This honour is decided upon by the ophthalmology resident group, which nominates and then chooses the recipient each year.

The residents felt that Dr. Gupta’s dedication and contribution to their clinical teaching goes above and beyond the call of duty. Dr. Gupta’s teaching is comprehensive and thoughtful, with his feedback leaving us wanting to do better.
The Surgical Teaching Award is an annual award that recognizes one staff physician's outstanding contributions to the surgical education of ophthalmology residents. This honour is decided upon by the ophthalmology resident group, which nominates and then chooses the recipient each year.

Residents feel that few surgeons match Dr. Tan’s dedication and ability to provide access to surgical cases. Dr. Tan’s encouragement during difficult cases and ability to handle complications with comfort makes performing surgery under his direction challenging and fun at the same time. His positive feedback is very encouraging for the progression of the resident and their surgical skills. Because of Dr. Tan’s surgical expertise, patience, and willingness to educate, residents at all levels of training find his surgical instructions irreplaceable.
Grand Rounds

Apr 3/19  Dr. Alan Cruess  A peculiar foveomacular vitelliform dystrophy
Apr 24/19 Dr. David Jordan*  The severely damaged eye: Is SO truly a risk
May 9/19  Dr. Jeremy Sivak*  Elephant in the eye: practical challenges for intraocular drug development, and a potential solution
May 15/19 Dr. James Brandt*  The CCT story: what the cornea tells us about glaucoma
May 22/19 Dr. George Talany  Health literacy in ophthalmology
May 29/19 Dr. Mauricio Aldrete  Tilting at windmills
Sept 11/19 Dr. Mishari Dahrab  The bite without the bark: when face meets rebar
Sept 18/19 Dr. Harald Gjerde  Ca$hing in on concussions with vision therapy
Sept 25/19 Dr. Charles Eberhart*  Pathological and molecular advances in retinoblastoma
Oct 2/19  Dr. Brennan Eadie  Minimally invasive glaucoma surgery (MIGS): an update on the approaches and evidence
Oct 9/19  Dr. Amit Mishra  Intracocular lymphoma
Oct 16/19 Dr. Mark Greiner*  Diabetes and the cornea (yes it happens there too)
Oct 23/19 Dr. Wesley Chan  Global ophthalmology: current status and how to get involved
Oct 30/19 Dr. Fiona Rowe*  Stroke-related visual impairment in clinical practice
Nov 6/19  Dr. Dani Cadieux  Self-inflicted ocular injury
Nov 13/19 CNIB – Vision Loss Rehab  Life changing technology for people with sight loss
Nov 20/19 Dr. Trudy Taylor  Update on Spondyloarthritis diagnosis and management
Nov 27/19 Dr. Flavio Rezende*  Pushing the limits in vitreo-retinal surgery
Dec 4/19  Dr. David Clarke  Surgical treatment of epilepsy: cutting for the fits
Jan 15/20 Dr. Aish Sundaram  What would Sherlock say? The case of anti-VEGF and glaucoma
Jan 22/20 Dr. Tom Zhao  The eye of the storm: an update on low pressure systems
Jan 29/20 Dr. Maythem Alali  The hidden eye
Feb 5/20  Dr. Devin Betsch  Beauty is in the eye of the beholder: adverse ocular outcomes of cosmetic products and procedures
Feb 12/20 Dr. Alexander Tan  The environmental impact of cataract surgery
Feb 19/20 Dr. Carolina Francisco*con  The dark side of the light
Feb 26/20 Dr. Eri Celo  Ocular neuropathic pain
Mar 4/20  Dr. Jeffrey Liebmann*  The central ten degrees
Mar 11/20 Dr. Harry Dang  3D printing in ophthalmology: current challenges and potential applications
Mar 25/20 Dr. Gabriela Baniak  Complementary and alternative medicine in glaucoma

*Visiting Professor Program
Dr. Mark Grenier  
Subspecialty: Cornea  
Department of Ophthalmology and Visual Sciences  
University of Iowa  
Diabetes and the cornea (yes it happens here too)  
October 16, 2019

Dr. Fiona Rowe  
Subspecialty: Orthoptics  
Clinical Vision Science  
University of Liverpool  
Stroke – related visual impairment in clinical practice  
October 30, 2019

Dr. Flavio Rezende  
Subspecialty: Retina  
Département d’Ophthalmologie  
Université de Montréal  
Pushing the limits in vitreo-retinal surgery  
November 27, 2019

Dr. Jeffrey Liebmann  
Subspecialty: Glaucoma  
Department of Ophthalmology  
Columbia University  
The central ten degrees  
March 4, 2020

Dr. David Jordan  
Subspecialty: Oculoplastics  
University of Ottawa Eye Institute  
The severely damaged eye: is SO truly a risk  
April 24, 2019

Dr. Jeremy Sivak  
Subspecialty: Basic Science  
Krembil Research Institute: University Health Network  
Elephant in the eye: practical challenges for intraocular drug development and a potential solution  
May 8, 2019

Dr. James Brandt  
Subspecialty: Pediatrics/Glaucoma  
UC Davis Eye Center  
The CCT story – what the cornea tells us about glaucoma  
May 15, 2019

Dr. Charles Ebehart  
Subspecialty: Pathology  
Johns Hopkins University School of Medicine  
Pathological and molecular advances in retinoblastoma  
September 25, 2019
The Department of Ophthalmology and Visual Sciences continues to thrive in its research activities and profiles. In spite of the many challenges that 2020 continues to bring us, our research faculty, trainees and staff have shown tremendous resilience and willingness to adapt to ensure our output is minimally affected.

We continue to attract the best research trainees, much aided by our excellent endowments. Specifically, the Mathers Endowment supports our trainee programs in the clinical and basic sciences at all levels.

A new funding initiative, the Dalhousie Medical Research Foundation (DMRF) Ophthalmology New Faculty Research Grant competition, provides young faculty members will ensure that they are poised to apply for research funding at the national level. I would like to congratulate Drs. Brennan Eadie and Jayme Vianna as the inaugural recipients of this award.

Our residents are to be congratulated for their superb research projects. I am especially pleased to see early engagement of even our first year residents in research projects, which is in no small part due to the efforts of our Resident Research Directors, Drs. Johanne Robitaille and Jayme Vianna.

Finally, I want to thank Ms. Leah Wood, our Research Administrator, for being the backbone of our research enterprise. Leah should be credited for so many positive initiatives she has taken on since her arrival a few years ago. I want to acknowledge Dr. Andrea Titterness who filled in for Leah during maternity leave.

I invite you to explore our achievements in the various research areas in this Annual Report. Please do not hesitate to contact me with any questions, queries or comments. Our objective, as always, is to strive for better.
Dr. William Baldridge is the D.G.J. Campbell Professor & Head of the Department of Medical Neuroscience and Professor in Ophthalmology & Visual Sciences at Dalhousie University. He first became interested in vision science and retinal circuitry when he worked as an undergraduate research summer student in Dr. Bill Stell’s Laboratory at the University of Calgary. His interest grew as he pursued graduate studies that focused on the structure and function of horizontal cells under the supervision Dr. Alexander Ball at McMaster University. This work also led to collaborations with Reto Weiler (University of Oldenburg, Germany) and John Dowling (Harvard University). Dr. Baldridge expanded his research expertise in retinal ganglion cell calcium dynamics during his postdoctoral studies with Dr. David Vaney at the University of Queensland, Australia and Dr. Steve Barnes at the University of Calgary.

Dr. Baldridge landed his first faculty position at the School of Optometry at the University of Waterloo. He thoroughly enjoyed teaching vision and retinal physiology in Waterloo; however, he was unable to resist the opportunity to become a founding member of the Dalhousie University Retina and Optic Nerve Research Laboratory.

During his career at Dalhousie University, Dr. Baldridge has developed a world-renowned research program that focuses on understanding the structure and function of the vertebrate retina and he developed a model of horizontal function that continues to hold true today. He continues this work trying to understand the molecular mechanism(s) that modulate changes in horizontal cell function during different levels of ambient illumination.

Dr. Baldridge’s lab has also developed a variety of methods to load retinal cells with calcium-indicator dyes which are now used in other laboratories worldwide. He and his team develop and use calcium-imaging techniques to study calcium levels found retinal neurons in hopes that it will contribute to the understanding of the role that calcium plays in retinal diseases such as glaucoma and diabetic retinopathy. Increased calcium levels could contribute to cell death which in turn would lead to vision loss. Finding a way to regulate the calcium could potentially preserve vision. Most recently, he and his students have studied the calcium dynamics of retinal ganglion cells in the rd1 mouse retina, a model of retinal degeneration.

In addition to his research, Dr. Baldridge is an award-winning educator who is most proud of his students and research trainees who have gone on to have successful careers in their chosen professions.
The 30th Annual Research Day took place on Wednesday, April 10, 2019 at the Halifax Convention Centre. The keynote speaker was Dr. David Hunter, Pediatric Ophthalmologist-in-Chief and the Richard M. Robb Chair of Ophthalmology at Boston Children’s Hospital. Dr. Hunter conducted a full day of teaching on April 9 and served as a judge during Research Day.

This year, the Department of Ophthalmology & Visual Sciences partnered with the Departments of Surgery and Anesthesia to host concurrent Research Days in the same venue. Additionally, the program for all departments was available on mobile app that was accessible to all attendees. The Department of Surgery and the QEII Foundation hosted a noon time lecture, open to all attendees, presented by Dr. Leonard D’Avolio from Harvard. Dr. D’Avolio described his novel working of using health data to promote more efficient health management, patient care, and outcomes.

Thank you, Drs. David Hunter, Darrell Lewis, and Brennan Eadie, for participating as judges. Congratulations to the following Research Day Awardees:

**Resident Category**

1st Prize: Dr. Aishwarya Sundaram “An Eye on the Air: Settle Plate Testing to Measure Air Quality in a Tertiary Care Ophthalmology Department during Fast Track Vs. Regular Cataract Procedures”

2nd Prize: Dr. Harald Gjerde “The Utility of a fzd4-/- Zebrafish Model in the Screening of Novel Treatments for Familial Exudative Vitreoretinopathy (FEVR)”

**Junior Trainee Category**

1st Prize: Douglas Iaboni “Morphological Multivariate Cluster Analysis of Murine Retinal Ganglion Cells Selectively Expressing Yellow Fluorescent Protein”

**Senior Trainee Category**

1st Prize: Dr. Jennifer Gao “Diagnostic sensitivity of macular ganglion cell layer thickness, peripapillary retinal nerve fibre layer thickness, and minimum rim width in detecting glaucoma in a large clinical
The 11th Annual Atlantic Eye Symposium was held on September 27 & 28, 2019, at the Halifax Convention Centre. The 5th Annual Ophthalmic Allied Health Personnel Education Day was held in conjunction with the Atlantic Eye Symposium. We had another outstanding Symposium, highlighted by an impressive list of guest speakers:

**Dr. Mashad Darvish**, McGill University, Jewish General Hospital, Cornea

**Dr. Bobby Korn**, UC San Diego Shiley Eye Institute, San Diego Veteran Hospital, Oculoplastics

**Dr. Netan Choudhry**, University of Toronto, Cleveland Clinic, Retina

**Dr. John Kitchens**, Retina Associates of Kentucky, Retina

**Dr. John Bierly**, South East Eye Specialists, Cataract

**Dr. Michael Wall**, University of Iowa, Neuro-Ophthalmology

**Dr. Kuldev Singh**, Stanford University, Standord Byers Eye Institute, Glaucoma

**Dr. Steven Gedde**, Bascom Palmer Eye Institute, Glaucoma

**Dr. Carolina Francisconi**, Dalhousie University, Nova Scotia Health Authority, Retina

**Dr. Rishi Gupta**, Dalhousie University, Nova Scotia Health Authority, Retina

**Dr. Paul Rafuse**, Dalhousie University, Nova Scotia Health Authority, Glaucoma

**Dr. Devesh Varma**, University of Toronto, Cataract

**Dr. Alan Cruess**, Dalhousie University, Nova Scotia Health Authority, Retina

Many people contributed to the success of the Symposium, and we thank the organizing Committee for its efforts to ensure another excellent educational event. Organizing Committee Members include: Drs. Arif Samad, Marcelo Nicolela, Chris Seamone, Curtis Archibald, Dan Belliveau and Ms. Laura Irons.

**Dr. Michael Wall**, University of Iowa, delivered the Dr. Aditya Mishra Lecture in Neuro-Ophthalmology during the recent Atlantic Eye Symposium. Dr. Charles Maxner chaired the session.
# Resident Research

<table>
<thead>
<tr>
<th>NAME</th>
<th>YEAR</th>
<th>SUPERVISOR</th>
<th>PROJECT TITLE</th>
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<tbody>
<tr>
<td>Dr. Wesley Chan</td>
<td>PGY 5</td>
<td>Dr. Jai Shankar</td>
<td>Transverse venous sinusus stenosis on magnetic resonance imaging in patients with idiopathic intracranial hypertension – A pilot study</td>
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<td>Dr. Harald Gjerde</td>
<td>PGY 5</td>
<td>Drs. Johane Robitaille, Jason Berman, Chris McMaster</td>
<td>The utility of a FZD4 knockdown zebrafish model in the screening of novel treatments for familial exudative vitreoretinopathy (FEVR)</td>
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<td>Dr. Tom Zhao</td>
<td>PGY 5</td>
<td>Dr. Paul Rafuse</td>
<td>Hypotonous keratopathy phenomenon</td>
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<tr>
<td>Dr. Tom Zhao</td>
<td>PGY5</td>
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<td>BENAQ photoswitch as a chemical visual prosthesis in a model of acquired retinal degeneration</td>
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<td>Dr. Danielle Cadieux</td>
<td>PGY 4</td>
<td>Dr. Anuradha Mishra &amp; Mark Goldszmidt</td>
<td>Be Prepared: An exploration of how surgical residents approach preoperative preparation</td>
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<td>Dr. Amit Mishra</td>
<td>PGY 4</td>
<td>Dr. William Baldridge</td>
<td>Effects of cannabinoids on retinal ganglion cell signaling in the mouse model</td>
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<td>Dr. Amit Mishra</td>
<td>PGY4</td>
<td>Dr. Brennan Eadie</td>
<td>Evaluation of neural and vascular structural degeneration of the retina and optic nerve head following retro-geniculate ischemic stroke using optical coherence tomography. A cross sectional study</td>
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<tr>
<td>Dr. Aishwarya Sundaram</td>
<td>PGY 4</td>
<td>Drs. Jayme Vianna and Marcelo Nicolela</td>
<td>Facilitating the transition to collaborative glaucoma care: A needs assessment for designing a continuing medical education module</td>
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<td>Dr. Erdit Celo</td>
<td>PGY3</td>
<td>Dr. Melanie Kelly</td>
<td>Effects of cannabinoid receptor agonists on ocular inflammation in an endotoxin-induced uveitis model</td>
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<td>Dr. Erdit Celo</td>
<td>PGY3</td>
<td>Dr. Jayme Vianna</td>
<td>Appraising the quality of meta-analysis in the glaucoma literature</td>
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<td>Dr. George Talany</td>
<td>PGY3</td>
<td>Drs. Rishi Gupta, Anuradha Mishra, Christine Chambers</td>
<td>The effect of preoperative animated videos on patients undergoing cataract surgery—Anxiety, satisfaction, comprehension</td>
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<td>Dr. Devin Betsch</td>
<td>PGY2</td>
<td>Drs Rishi Gupta, Andrew Orr</td>
<td>A family affair: two cases of familial optic disc pits</td>
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<tr>
<td>Dr. Devin Betsch</td>
<td>PGY2</td>
<td>Dr. Ahsen Hussain</td>
<td>Botulinum Toxin A to improve brow lift outcomes</td>
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<tr>
<td>Dr. André Pollmann</td>
<td>PGY2</td>
<td>Drs. Darrell Lewis, Rishi Gupta</td>
<td>Structural integrity of hydrophobic acrylic intraocular lens with eyelets (enVistaTM) in an experimental model of transscleral fixation</td>
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<td>Dr. Rami Darwich</td>
<td>PGY1</td>
<td>Dr. Carolina Francisconi</td>
<td>Retinal outcome of follow naïve-treatment eyes in patients receiving unilateral intravitreal anti-VEGF injections (Bevacizumab, Ranibizumab, and Aflibercept)</td>
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<td>Dr. Douglas Iaboni</td>
<td>PGY1</td>
<td>Drs. Jayme Vianna and Marcelo Nicolela</td>
<td>Educational interventions for Nova Scotian ophthalmists in recent expansions on scope of practice</td>
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<tr>
<td>Dr. Syed Mohammad</td>
<td>PGY1</td>
<td>Dr. Carolina Francisconi</td>
<td>Enface findings and contrast sensitivity changes in patients following retinal detachment</td>
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## Trainee Research

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<th>Program</th>
<th>Supervisor(s)</th>
<th>Project Title</th>
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<tbody>
<tr>
<td>Hanouf alKharashi</td>
<td>MSc (CVS)</td>
<td>Robert LaRoche</td>
<td>The role of stereopsis in microsurgical performance on the EYESi ophthalmic simulator</td>
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<tr>
<td>Maren Brodovsky</td>
<td>MSc (Medical Sciences)</td>
<td>JM Robitaille/C McMaster</td>
<td>Mapping FEVR gene mutations and analysis of SNP load effect on disease severity</td>
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<tr>
<td>Gabriela Campos-Baniak</td>
<td>Glaucoma Fellow</td>
<td>Lesya Shuba</td>
<td>Diurnal intraocular pressured fluctuation</td>
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<tr>
<td>Gabriela Campos-Baniak</td>
<td>Glaucoma Fellow</td>
<td>Jayme Vianna</td>
<td>Crowd-sourced glaucoma Study</td>
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<tr>
<td>Jessica Carr</td>
<td>MSc (CVS)</td>
<td>William Baldridge</td>
<td>Calcium dynamics of ganglion cell layer neurons in rd1 mice</td>
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<tr>
<td>Emma Courtney</td>
<td>Undergraduate Honours Student</td>
<td>Melanie Kelly</td>
<td>The role of the endocannabinoid system in transmission of pain in corneal sensory pathways</td>
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<td>Michael Craig</td>
<td>MSc (CVS)</td>
<td>Francois Tremblay/Time Bardouille</td>
<td>Using MEG and EEG to measure binocular integration in the occipital cortex</td>
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<tr>
<td>Adam Deveau</td>
<td>Medical Student</td>
<td>Ahsen Hussain</td>
<td>Periocular invasive melanoma manifestation in a patient using bimatoprost: case report and literature review</td>
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<td>Nadia Dicostanzo</td>
<td>MSc (CVS)</td>
<td>Kevin Duffy</td>
<td>Optic nerve integrity following retinal inactivation for the treatment of post-critical period amblyopia</td>
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<tr>
<td>Johnny Di Pierdomenico</td>
<td>Postdoctoral Fellow</td>
<td>Balwantray Chauhan</td>
<td>A new gel based method of experimental glaucoma</td>
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<tr>
<td>Elyse Duggan</td>
<td>Medical Science Student</td>
<td>Corey Smith/Balwantray Chauhan</td>
<td>Correspondence of optical coherence tomography to histology</td>
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<td>Ben DuPlessis</td>
<td>Medical Student</td>
<td>Lesya Shuba</td>
<td>Museum of historical ophthalmic tools and instruments</td>
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<tr>
<td>Rebecca Fells</td>
<td>MSc (CVS)</td>
<td>Robert LaRoche</td>
<td>A novel use of optical coherence tomography for assessment of ocular torsion</td>
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<td>Hirad Feridooni</td>
<td>Postdoctoral Fellow (Pharmacology)</td>
<td>JM Robitaille/C McMaster</td>
<td>Development of novel therapeutics for the treatment of rare ocular developmental vascular disorders</td>
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<tr>
<td>Jennifer Gao</td>
<td>Glaucoma Fellow</td>
<td>Jayme Vianna</td>
<td>Diagnostic sensitivity of macular ganglion cell layer thickness, peripapillary retinal nerve fibre layer thickness, and minimum rim width in detecting glaucoma in a large clinical population</td>
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<tr>
<td>Miso Gostimir</td>
<td>Elective resident from Western</td>
<td>Ahsen Hussain</td>
<td>A systematic review and meta-analysis of methods for reducing local anesthetic injection pain among patients undergoing periorcular surgery</td>
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<td>Miso Gostimir</td>
<td>Elective resident from Western</td>
<td>Ahsen Hussain</td>
<td>Reply RE: A systematic review and meta-analysis of methods for reducing local anesthetic injection pain among patients undergoing periorcular surgery</td>
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<td>Verina Hanna</td>
<td>Medical Student</td>
<td>Brennan Eadie</td>
<td>Real world experience with preservative-free latanoprost drops for glaucoma</td>
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<td>Verina Hanna</td>
<td>Medical Student</td>
<td>Corey Smith/Balwantray Chauhan</td>
<td>Segmentation accuracy in optical coherence tomography angiography</td>
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<td>Delaney Henderson</td>
<td>MSc (Medical Neuroscience)</td>
<td>Balwantray Chauhan</td>
<td>Viral vector labelling of retinal ganglion cells</td>
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<td>Kazunori Hirasawa</td>
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<td>Balwantray Chauhan</td>
<td>Optical coherence tomography angiography</td>
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<td>Faisal Jarrar</td>
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<td>Jayme Vianna</td>
<td>Comparison of OCT and disc photos to detect glaucoma progression</td>
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<tr>
<td>Name</td>
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<td>Faris Kapra</td>
<td>Medical Science Student</td>
<td>Balwantray Chauhan</td>
<td>Comparison of macular visual field testing with the Humphrey and Octopus perimeters</td>
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<td>Kateryna Krazter</td>
<td>MSc (Pathology)</td>
<td>G Dellaire, JM Robitaille, D Gaston</td>
<td>CRISPR safe-harbor sites</td>
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<td>Margaret Luke</td>
<td>Postdoctoral Fellow</td>
<td>Melanie Kelly</td>
<td>Role of serine hydrolases in retina</td>
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<td>Chad McLeod</td>
<td>Medical Student</td>
<td>Francois Tremblay</td>
<td>Optimization of SWVEP procedures for VA estimation</td>
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<td>Michel Nader</td>
<td>Medical Student (RIM program)</td>
<td>JM Robitaille/C McMaster</td>
<td>Characterizing retinal vascular development using FEVR mouse models</td>
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<td>Mike Ngo</td>
<td>Postdoctoral Fellow (Pharmacology)</td>
<td>JM Robitaille/C McMaster</td>
<td>Identifying genes for familial exudative vitreinopathy and development of novel therapeutics for the treatment of rare ocular developmental vascular disorders</td>
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<td>Eric Poon</td>
<td>Medical Student (RIM program)</td>
<td>Marcelo Nicolela</td>
<td>Long term progression and rate of visual disability in glaucoma</td>
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<td>Lindsey Puddicombe</td>
<td>BSc (Psych &amp; Neuro)</td>
<td>William Baldrige</td>
<td>Intrinsisc light sensitivity of melanopsin neurons in zebrafish retina</td>
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<td>Brooklyn Rawlyk</td>
<td>Medical Science Student</td>
<td>Balwantray Chauhan</td>
<td>Quantification of retinal ganglion cells in postmortem tissue of patients with Alzheimer's Disease and Glaucoma, and healthy subjects</td>
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<td>Sunil Ruparelia</td>
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<td>Brennan Eadie</td>
<td>Anti-VEGF and rates of glaucoma across Canada</td>
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<td>Danyal Saëed</td>
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<td>Ribociclib-associated vortex keratopathy</td>
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<td>Dominic Salhl</td>
<td>MSc (CVS)</td>
<td>Robert LaRoche/ Leah Walsh/ Erik Hahn</td>
<td>Predictors of recurrence after the surgical correction of exotropia</td>
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<td>Joseph Saunders</td>
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<td>C. Maxner, P. Freund &amp; A. Orr</td>
<td>Genome-wide association study in idiopathic intracranial hypertension</td>
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<td>Herman Stubeda</td>
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<td>Comparison of 5 visual field criteria for detecting glaucomatous damage</td>
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<td>Justine Sy</td>
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<td>Functional retinal ganglion cells activity following light-induced retinal damage in mice</td>
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<td>Perrine Tami</td>
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<td>Brennan Eadie/ Jayme Vianna</td>
<td>Modeling factors influencing lack of capacity for patient follow-up in glaucoma clinical practices</td>
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<td>Sarah Vander Ende</td>
<td>MSc, PhD (Biochemistry &amp; Molecular Biology)</td>
<td>JM Robitaille/C McMaster</td>
<td>Discovering genes for familial exudative vitreoretinopathy</td>
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<td>Ashley Whelan</td>
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<td>Ahsen Hussain</td>
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<td>Takeshi Yabana</td>
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<td>Balwantray Chauhan</td>
<td>Specificity of the calcium indicator GCaMP3 to retinal ganglion cells</td>
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<td>Tareq Yousef</td>
<td>PhD (Med Neurosci)</td>
<td>William Baldridge</td>
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Number of Books, Scientific Abstracts, and Peer-reviewed Articles by Department Members in 2019

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Number of National and International Presentations by Department Members in 2019

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20. Francisconi C, Ribeiro RVP, Wagner M, Freitas A. Effects of axial length on retinal nerve fiber layer and macular ganglion cell-inner plexiform layer measured by spectral-domain OCT. Arquivos Brasileiros de Oftalmologia. [Accepted].


Books and Chapters


Other Publications

Research Funding Facts & Figures

Number of Continuing and New Grants and Contracts for 2019

Value of Research Funding for Grants and Contracts in 2019
New Research Grants and Contracts


Continuing Research Grants and Contracts


Donors

The academic and clinical missions of the Department of Ophthalmology & Visual Sciences are enabled by generous supporters and partnerships with a number of Foundations and private groups. The Department continues to thrive thanks to the visionary forethought of several philanthropic donors who created endowments that enable our research and education mandates through studentships, scientist support and opportunities to optimize our existing budgets. We are grateful to all our supporters.

### Endowments

- Christie Family
- Hayman Family
- MacKeen Family
- Dr. R. Evatt and Rita Mathers Research Fund
- Dr. R. Evatt and Rita Mathers Scholarship Fund
- Dr. R. Evatt and Rita Mathers Chair in Ophthalmology & Visual Sciences
- Dr. Aditya Mishra Endowment
- Dr. Francis C and Emily Yoh Tan Ophthalmology Resident Award
- QEII Foundation Scholar in Glaucoma Research
- QEII Foundation Scholar in Retina Research
- QEII Foundation Eye Care Centre Endowment
- Royal Arch Masons Glaucoma Fund

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Should you wish to make a donation to support the Department of Ophthalmology & Visual Sciences, you may do so through any of our Foundation partners below.
Department of Ophthalmology & Visual Sciences

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