



Department of Ophthalmology and Visual Sciences

ANNUAL REPORT 2019–2020



OPHTHALMOLOGY
& VISUAL SCIENCES



DALHOUSIE
UNIVERSITY

Table of Contents

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02	T ã•ã } ÊKãã } ÊKã^ ^•
03	Y @ Á ^ ÁE^ÁBÁ @æÁ ^Ö[ÁÁ
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Marcelo Nicolela, MD, FRCSC

*Head and Chief
Department of Ophthalmology & Visual Sciences
Dalhousie University & Nova Scotia Health Authority*

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

Eye Care Centre Visits	51,065
Cobequid Clinic	1,994
IWK Ophthalmology	7,484
Total Adult Surgeries	7,588
Total IWK Surgeries	312

Who Delivers Care

Ophthalmologists	28
Nursing & Technical Staff	42
Administrative Staff	30
Research Coordinators	9.5

Surgical Cases by Subspecialty

Cataracts	4,565
Cornea	271
Glaucoma	603
Orbit/Plastics	173
Other	79
Paediatrics	312
Retinal Surgery	1,775
Adult Strabismus	122

Research

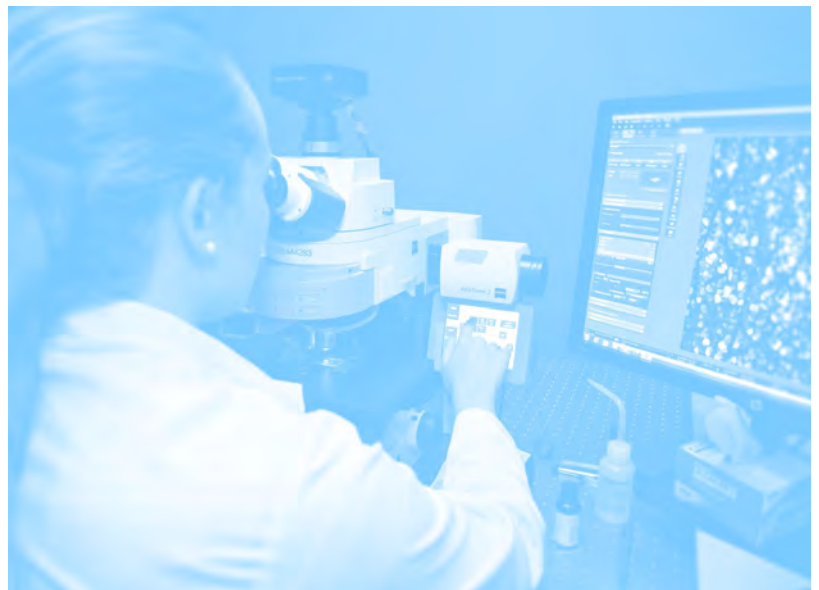
60 Invited Presentations

35 Peer Reviewed Manuscripts

\$2.27M Continuing Research Grants & Contracts

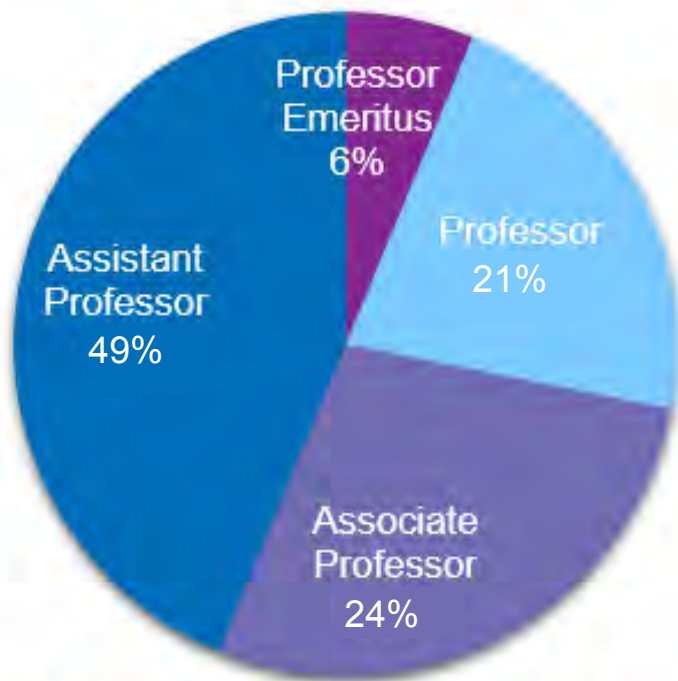
\$0.68M New Research Grants & Contracts

\$2.95M Total Research Funding



Who We Are & What We Do

Education



Postgraduate Education

Residents PGY2-5	11
Resident PGY1	3
Fellow - Clinical Glaucoma	1
Fellow - Paediatrics	1
Postdoctoral Fellows	2
Clinical Vision Sciences	7

Undergraduate Education

MED 4 Elective students	33
Dalhousie Medical 1 & 2 student electives	14
Emergency Medicine Resident electives	6
Total Undergraduate Tutor Hours	56

Professional Development

Grand Rounds	29
Conferences	2
Journal Clubs	3

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

Joint Appointments

Dr. William Baldrige (Anatomy & Neurobiology)

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

Emeritus Appointments

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

Ajunct Appointments

Dr. Dao-Yi Yu, Adjunct Professor
 Dr. Sharon Bentley, Assistant Adjunct Professor



Dr. Paul Freund

Assistant Professor
Neuro-Ophthalmology

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. Rishi Gupta

Associate Professor
Retina



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.



Mathers Awards

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 Pierdomenico 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 Baldrige, 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.



Pictured (L-R : Delaney Henderson | Tareq Yousef | Brooklyn Rawlyk | Nadia Dicostanzo (not pictured) | Johnny Di Pierdomenco (not pictured) | Danielle Cadieux (not pictured)

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

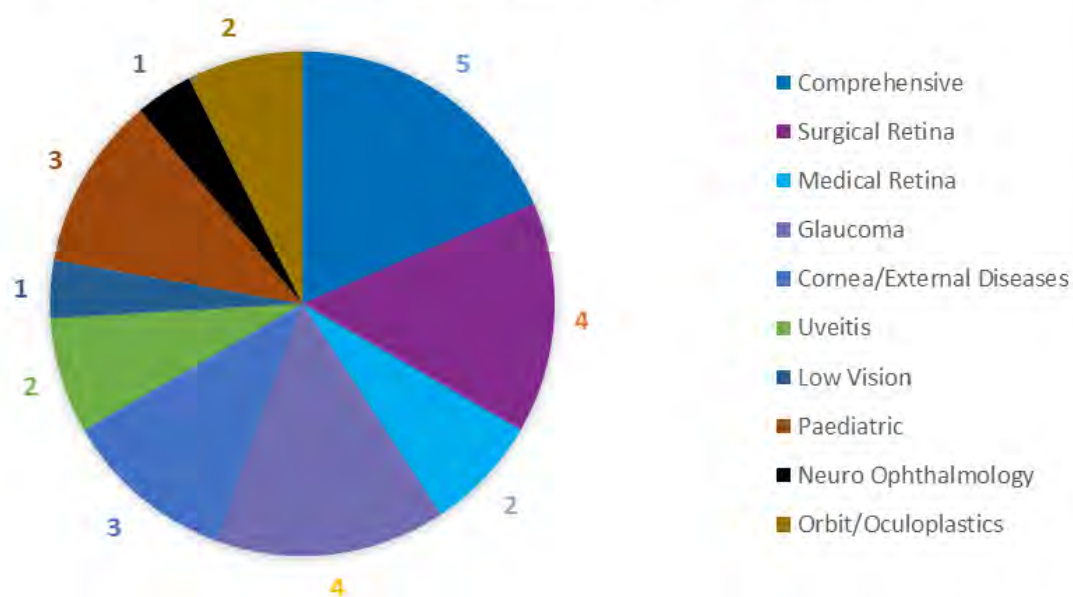
initiative to independently identify learning needs, implement learning strategies, and evaluate learning outcomes in the context of the operating room to achieve the required competencies throughout their residency programs. Understanding these practices will benefit postgraduate students and educators by providing a framework to assess current practice, provide feedback, and address future needs.

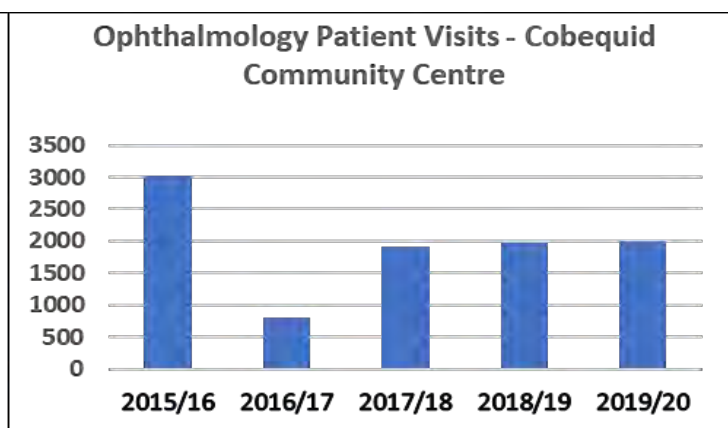
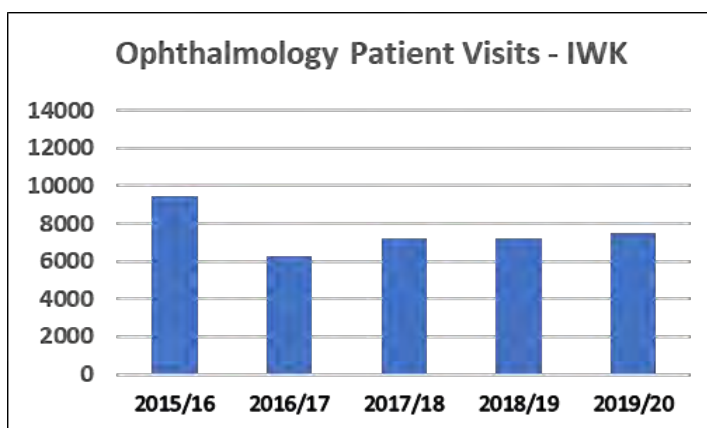
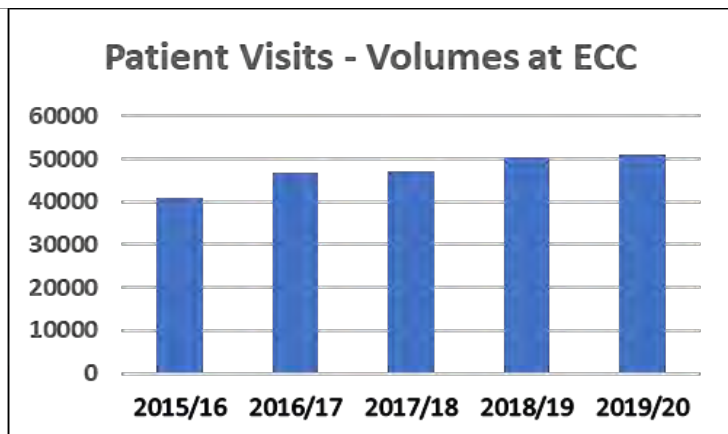
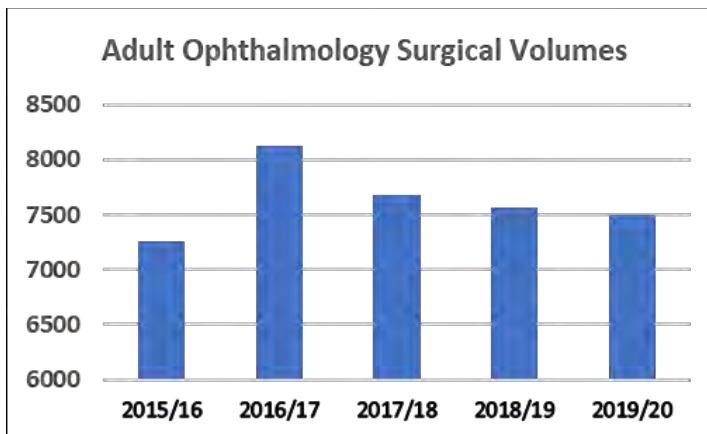
The **Undergraduate** scholarship is awarded to **Brooklyn Rawlyk**, who under the direction of Dr. Balwantray Chauhan, is studying the relationship between intraocular pressure (IOP) and retinal ganglion cell (RGC) loss in glaucoma. She will track elevated IOP levels in mouse models and process the 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.

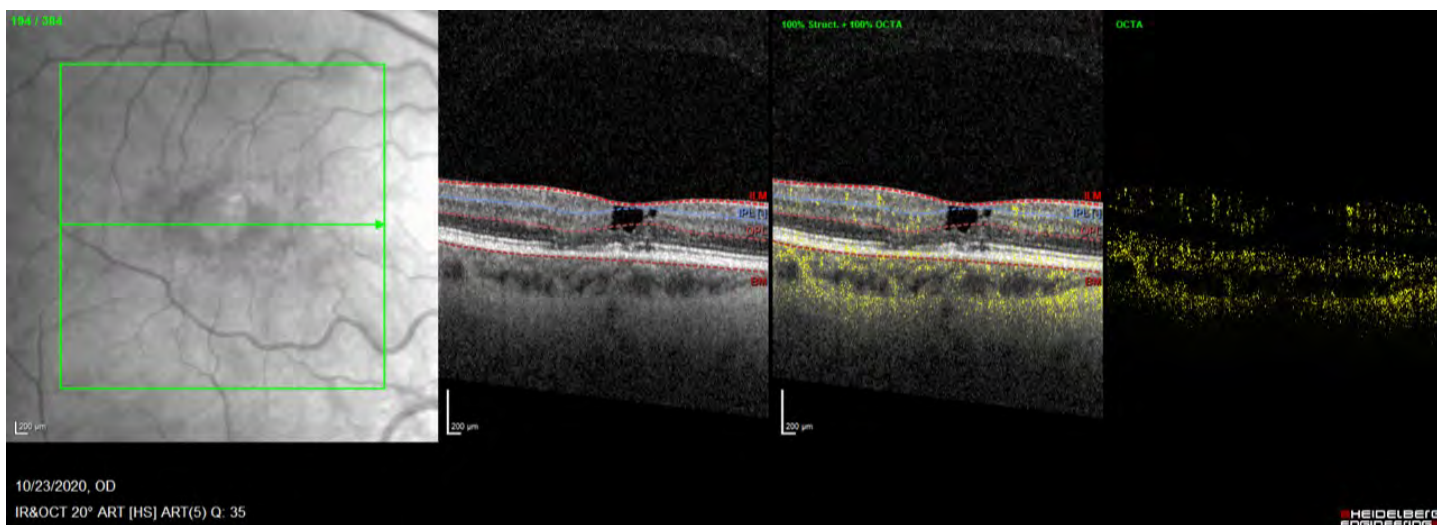
FACULTY SUBSPECIALTY PROFILE (NUMBERS)





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.

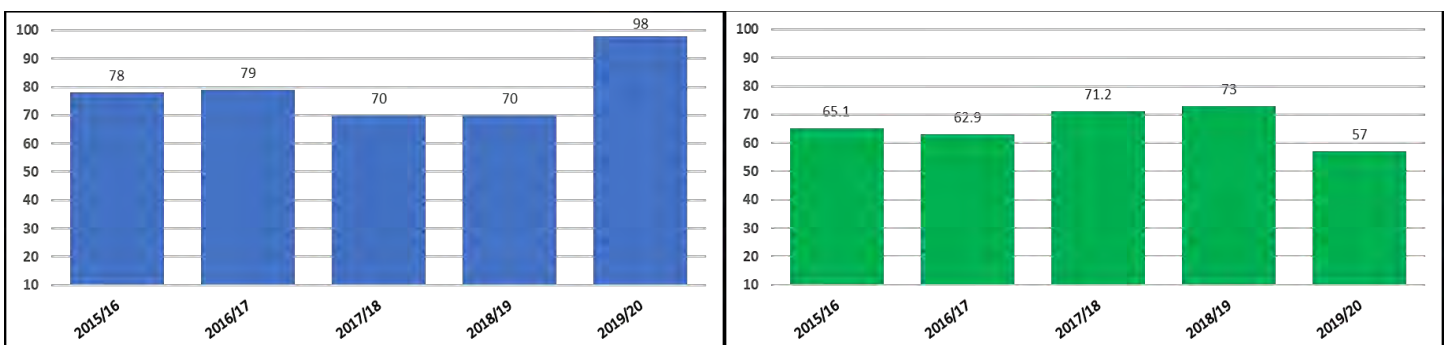
During 2015-16, increased volumes at Cobequid occurred when we relocated a large number of clinics to that center during the flooding at the VG-Eye Care Centre



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





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

Message from the Postgraduate Medical Education Director

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



Anuradha Mishra, MD, MEd, FRCSC
Director, Undergraduate Medical Education

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.



Med 2 Night—Ophthalmology Jeopardy



Pre-clerkship Residency Exploration Program 1 (PREP)



Award Winning Educators



Clinical Teaching Award – 2019
recipient Dr. Rishi Gupta

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.



Surgical Teaching Award – 2019
recipient Dr. Alex Tan

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	Intraocular 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 Francisconi	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

Visiting Professor Program

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

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

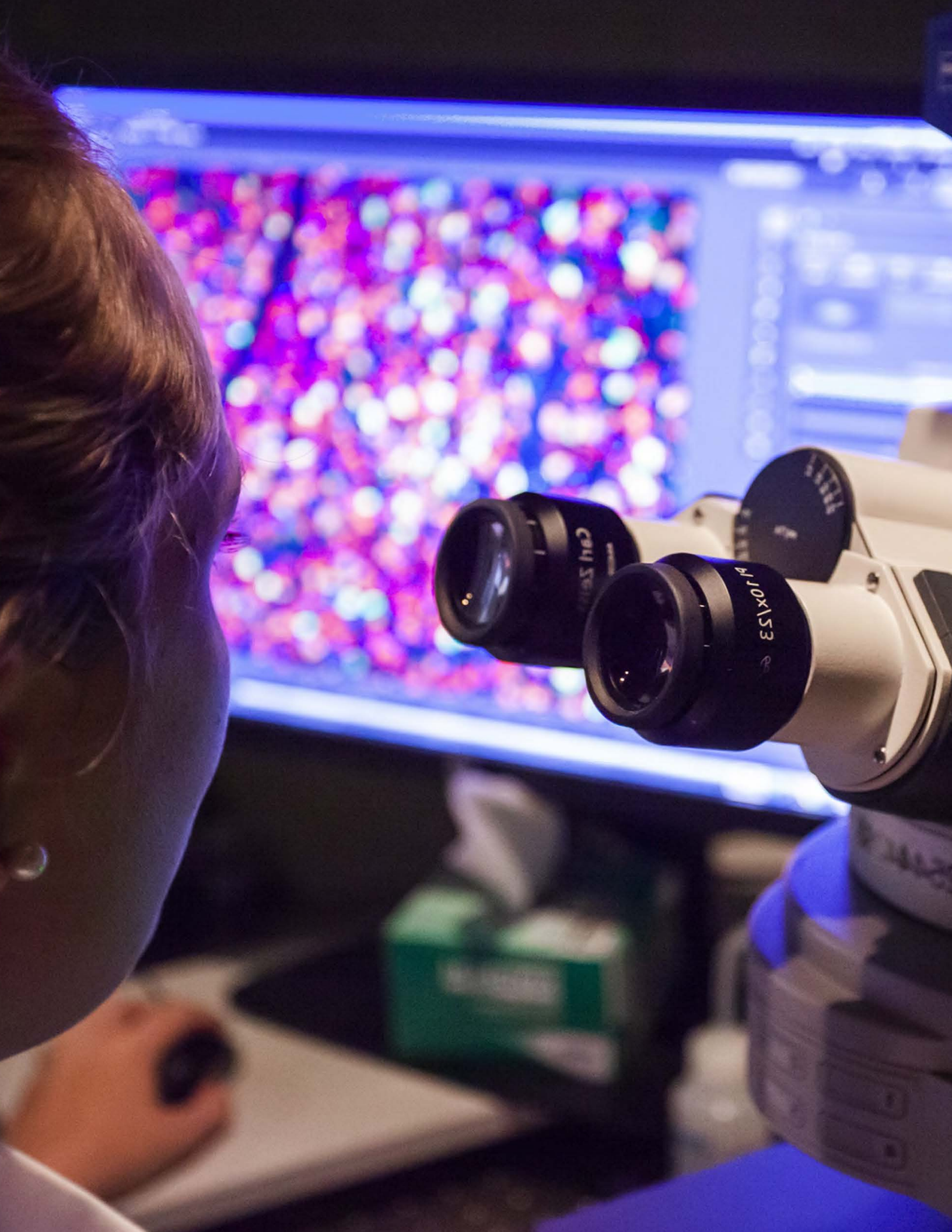
Subspecialty: Retina

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





Balwantray Chauhan, PhD
Research Director

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.

Research Profile - William Baldrige



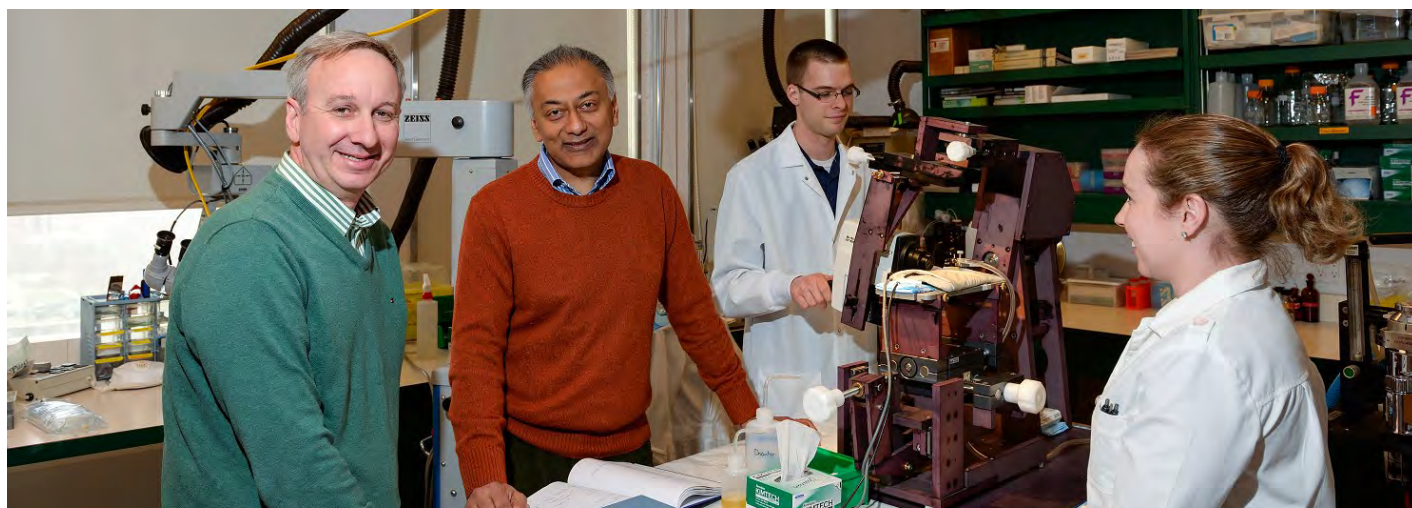
Dr. William Baldrige is the D.G.J. Campbell Professor & Head of the Department of Medical Neuroscience and Professor in Ophthalmology & Visual Sciences at Dalhousie University. He first became interested in vision science and retinal circuitry when he worked as an undergraduate research summer student 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. Baldrige 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. Baldrige 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. Baldrige 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. Baldrige'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. Baldrige 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.



30th Annual Research Day



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

11th Annual Atlantic Eye Symposium

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.

**11th Annual
Atlantic Eye Symposium**

September 27 & 28, 2019

**The NEW Halifax Convention Centre
Halifax, Nova Scotia**

Department of Ophthalmology & Visual Sciences, Dalhousie University

Resident Research

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

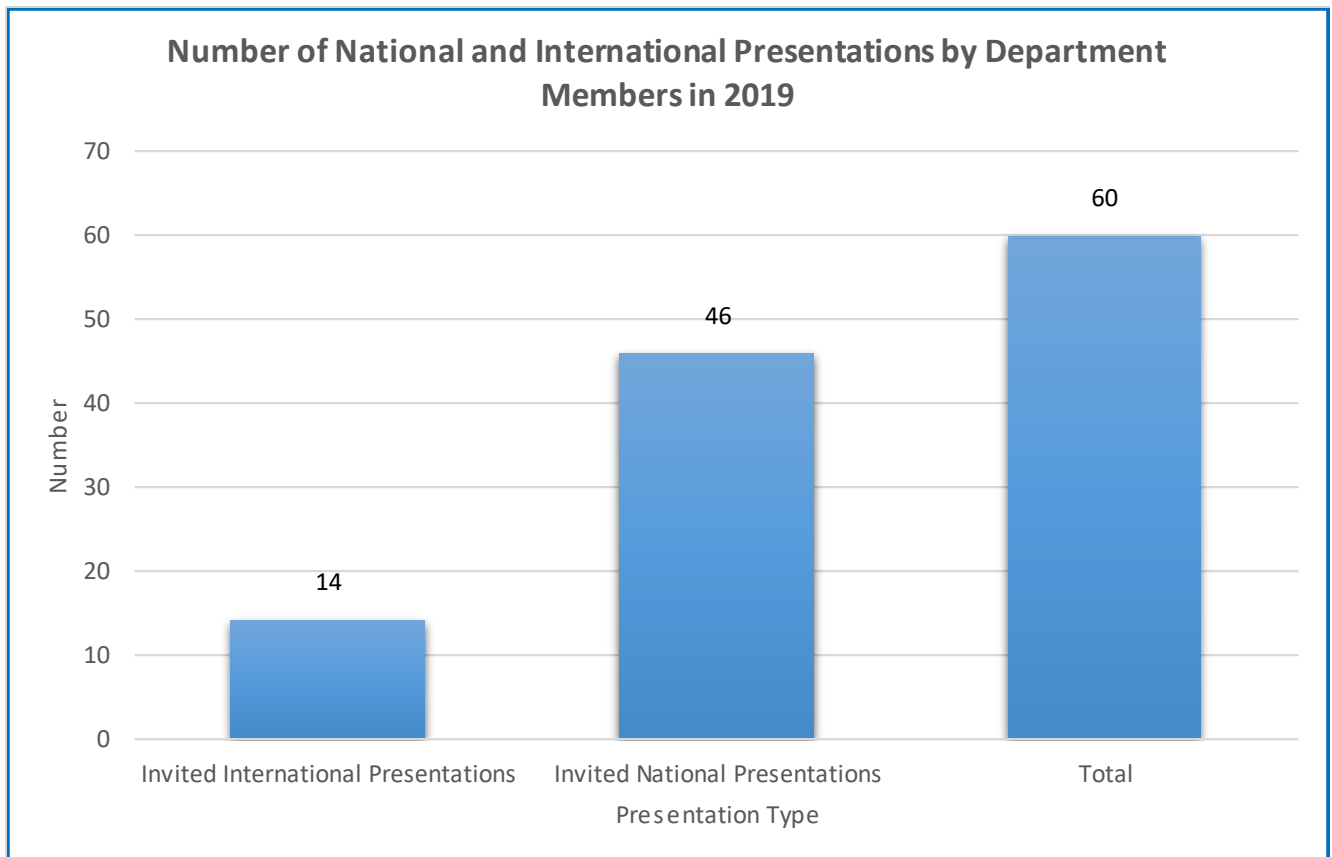
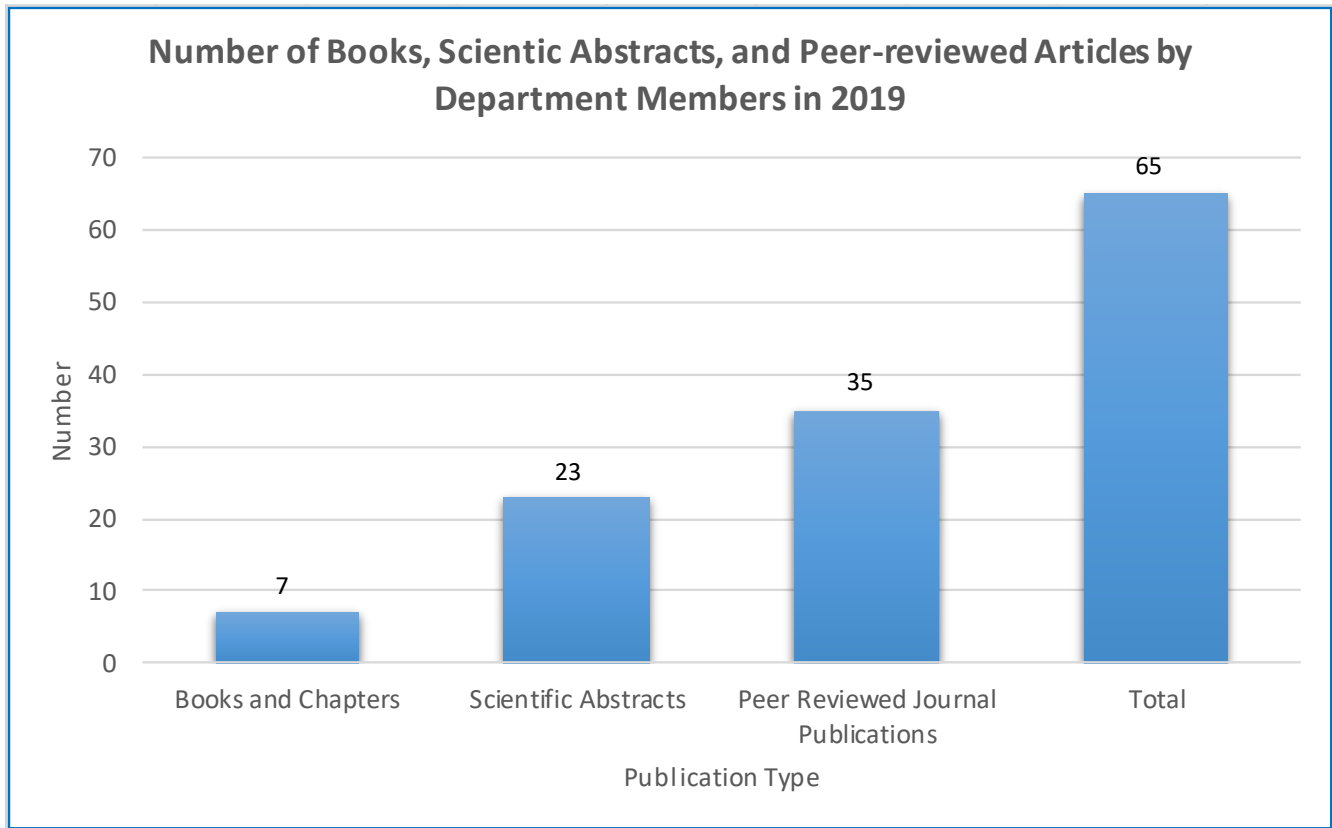
Trainee Research

Name	Program	Supervisor(s)	Project Title
Hanouf alKharashi	MSc (CVS)	Robert LaRoche	The role of stereopsis in microsurgical performance on the EYESi ophthalmic simulator
Maren Brodovsky	MSc (Medical Sciences)	JM Robitaille/C McMaster	Mapping FEVR gene mutations and analysis of SNP load effect on disease severity
Gabriela Campos-Baniak	Glaucoma Fellow	Lesya Shuba	Diurnal intraocular pressured fluctuation
Gabriela Campos-Baniak	Glaucoma Fellow	Jayne Vianna	Crowd-sourced glaucoma Study
Jessica Carr	MSc (CVS)	William Baldrige	Calcium dynamics of ganglion cell layer neurons in rd1 mice
Emma Courtney	Undergraduate Honours Student	Melanie Kelly	The role of the endocannabinoid system in transmission of pain in corneal sensory pathways
Michael Craig	MSc (CVS)	Francois Tremblay/Time Bardouille	Using MEG and EEG to measure binocular integration in the occipital cortex
Adam Deveau	Medical Student	Ahsen Hussain	Periocular invasive melanoma manifestation in a patient using bimatoprost: case report and literature review
Nadia Dicostanzo	MSc (CVS)	Kevin Duffy	Optic nerve integrity following retinal inactivation for the treatment of post-critical period amblyopia
Johnny Di Pierdomenico	Postdoctoral Fellow	Balwantray Chauhan	A new gel based method of experimental glaucoma
Elyse Duggan	Medical Science Student	Corey Smith/Balwantray Chauhan	Correspondence of optical coherence tomography to histology
Ben DuPlessis	Medical Student	Lesya Shuba	Museum of historical ophthalmic tools and instruments
Rebecca Fells	MSc (CVS)	Robert LaRoche	A novel use of optical coherence tomography for assessment of ocular torsion
Hirad Feridooni	Postdoctoral Fellow (Pharmacology)	JM Robitaille/C McMaster	Development of novel therapeutics for the treatment of rare ocular developmental vascular disorders
Jennifer Gao	Glaucoma Fellow	Jayne Vianna	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
Miso Gostimir	Elective resident from Western	Ahsen Hussain	A systematic review and meta-analysis of methods for reducing local anesthetic injection pain among patients undergoing periocular surgery
Miso Gostimir	Elective resident from Western	Ahsen Hussain	Reply RE: A systematic review and meta-analysis of methods for reducing local anesthetic injection pain among patients undergoing periocular surgery
Verina Hanna	Medical Student	Brennan Eadie	Real world experience with preservative-free latanoprost drops for glaucoma
Verina Hanna	Medical Student	Corey Smith/Balwantray Chauhan	Segmentation accuracy in optical coherence tomography angiography
Delaney Henderson	MSc (Medical Neuroscience)	Balwantray Chauhan	Viral vector labelling of retinal ganglion cells
Kazunori Hirasawa	Postdoctoral Fellow	Balwantray Chauhan	Optical coherence tomography angiography
Faisal Jarrar	Medical Student	Jayne Vianna	Comparison of OCT and disc photos to detect glaucoma progression

Trainee Research

Name	Program	Supervisor(s)	Project Title
Faris Kapra	Medical Science Student	Balwantray Chauhan	Comparison of macular visual field testing with the Humphrey and Octopus perimeters
Kateryna Krazter	MSc (Pathology)	G Dellaire, JM Robitaille, D Gaston	CRISPR safe-harbor sites
Margaret Luke	Postdoctoral Fellow	Melanie Kelly	Role of serine hydrolases in retina
Chad McLeod	Medical Student	Francois Tremblay	Optimization of SWVEP procedures for VA estimation
Michel Nader	Medical Student (RIM program)	JM Robitaille/C McMaster	Characterizing retinal vascular development using FEVR mouse models
Mike Ngo	Postdoctoral Fellow (Pharmacology)	JM Robitaille/C McMaster	Identifying genes for familial exudative vitreoretinopathy and development of novel therapeutics for the treatment of rare ocular developmental vascular disorders
Eric Poon	Medical Student (RIM program)	Marcelo Nicolela	Long term progression and rate of visual disability in glaucoma
Lindsey Puddicombe	BSc (Psych & Neuro)	William Baldrige	Intrinsic light sensitivity of melanopsin neurons in zebrafish retina
Brooklyn Rawlyk	Medical Science Student	Balwantray Chauhan	Quantification of retinal ganglion cells in postmortem tissue of patients with Alzheimer's Disease and Glaucoma, and healthy subjects
Sunil Ruparelia	Medical Student	Brennan Eadie	Anti-VEGF and rates of glaucoma across Canada
Danyal Saeed	Medical Student	Ahsen Hussain	Ribociclib-associated vortex keratopathy
Dominic Salhl	MSc (CVS)	Robert LaRoche/ Leah Walsh/ Erik Hahn	Predictors of recurrence after the surgical correction of exotropia
Joseph Saunders	Medical Student	C. Maxner, P. Freund & A. Orr	Genome-wide association study in idiopathic intracranial hypertension
Corey Smith	Postdoctoral Fellow	Balwantray Chauhan	Clinical and basic science applications of optical coherence tomography angiography
Herman Stubeda	Medical Student	Jayne Vianna	Comparison of 5 visual field criteria for detecting glaucomatous damage
Justine Sy	MSc (CVS)	Balwantray Chauhan	Functional retinal ganglion cells activity following light-induced retinal damage in mice
Perrine Tami	Medical Student	Brennan Eadie / Jayne Vianna	Modeling factors influencing lack of capacity for patient follow-up in glaucoma clinical practices
Sarah Vander Ende	MSc, PhD (Biochemistry & Molecular Biology)	JM Robitaille/C McMaster	Discovering genes for familial exudative vitreoretinopathy
Ashley Whelan	Medical Student	Ahsen Hussain	Dr. Charles Miller Fisher: important contributions to ophthalmology
Takeshi Yabana	Postdoctoral Fellow	Balwantray Chauhan	Specificity of the calcium indicator GCaMP3 to retinal ganglion cells
Tareq Yousef	PhD (Med Neurosci)	William Baldrige	Modulation of horizontal cell gap junctions in the teleost retina

Publication Facts and Figures



Peer Reviewed Journal Publications

1. **Freund PFR**, Alshafai L, Margolin EA (2019). Multifocal stroke from ozone gas emboli. *Journal of Neuro-Ophthalmology: The Official Journal of the North American Neuro-Ophthalmology Society*, 39(4), 518-519. [Published] PubMed ID: [30741783](#).
2. **Freund PFR**, Wright T, Margolin EA (2019). Toxic optic neuropathy from quinine overdose. *Journal of Neuro-Ophthalmology: The Official Journal of the North American Neuro-Ophthalmology Society*. [Published] PubMed ID: [31842144](#).
3. Chaudhary V, Qian J, Boucher MC, Brent M, Wong D, Sheidow T, Duval R, Kherani A, Dookeran R, Maberley D, **Samad A**. Evidence-based Canadian guidelines for telemedicine screening for diabetic retinopathy: recommendations from the Canadian Retina Research Network (CR2N) Tele-Ophthalmology Steering Committee. *Canadian Journal of Ophthalmology*. [Case Series - Submitted].
4. **Torres LA, Sharpe GP, Hutchison DM, Zangalli CS, Burk RO, Reis ASC, Costa VP, Nicolela MT, Chauhan BC, Vianna JR** (2019). Influence of Bruch's membrane opening area in diagnosing glaucoma with neuroretinal parameters from optical coherence tomography. *American Journal of Ophthalmology*, 208, 94-102. [Published] PubMed ID: [31351051](#).
5. **Vianna JR, Butty Z, Torres LA, Sharpe GP, Hutchison DM, Shuba LM, Nicolela MT, Chauhan BC** (2019). Outer retinal layer thickness in patients with glaucoma with horizontal hemifield visual field defects. *The British Journal of Ophthalmology*, 103(9), 1217-1222. [Published] PubMed ID: [30385436](#).
6. **Hussain A**, Tucker N, DeAngelis DD, Yin VT, Ing E, Arthurs B, Gill HS, Hardy I, Hurwitz J, Kratky V, Maleki B, Nijhawan N, Oestreicher J, Zafar A (2019). Guidelines for vismodegib in the management of periocular basal cell carcinoma. *Canadian Journal of Ophthalmology. Journal Canadien d'ophtalmologie*. [Published] PubMed ID: [31901307](#).
7. **Chan W, Freund PFR, Gjerde H, Lewis DR, Russell L, Samad A, Greve M, Rafuse P** (2019). Complications of ocular tattooing: a Canadian case series. *Canadian Journal of Ophthalmology. Journal Canadien d'Ophtalmologie*, 54(6), e273-e277. [Published] PubMed ID: [31836111](#).
8. Aboobakar IF, Wang J, **Chauhan BC**, Boland MV, Friedman DS, Ramulu PY and Yohannan J (2019). Factors predicting a greater likelihood of poor visual field reliability in glaucoma patients and suspects. *Trans Vis Sci Technol*. [Published].
9. Yang H, Luo H, Gardiner SK, Hardin C, Sharpe GP, Caprioli J, Demirel S, Girkin CA, Liebmann JM, Mardin CY, Quigley HA, Scheuerle AF, Fortune B, **Chauhan BC**, Burgoyne CF (2019). Factors Influencing Optical Coherence Tomography Peripapillary Choroidal Thickness: A Multicenter Study. *Investigative ophthalmology & visual science*, 60(2), 795-806. [Published] PubMed ID: [30811523](#).
10. Hong S, Yang H, Gardiner SK, Luo H, Hardin C, Sharpe GP, Caprioli J, Demirel S, Girkin CA, Liebmann JM, Mardin CY, Quigley HA, Scheuerle AF, Fortune B, **Chauhan BC**, Burgoyne CF (2019). OCT-Detected Optic Nerve Head Neural Canal Direction, Obliqueness, and Minimum Cross-Sectional Area in Healthy Eyes. *American journal of ophthalmology*, 208, 185-205. [Published] PubMed ID: [31095953](#).
11. **Chauhan BC, Vianna JR, Sharpe GP**, Demirel S, Girkin CA, Mardin CY, Scheurle AF and Burgoyne CF (2019). Differential effects of aging in the macular retinal layers, neuroretinal rim and peripapillary retinal nerve fiber layer. *Ophthalmology*. [Published] PubMed ID: [31668716](#).
12. **Torres LA, Jarrar F, Sharpe GP, Hutchison DM, Ferracioli-Oda E, Hatanaka M, Nicolela MT, Vianna JR, Chauhan BC** (2019). Clinical relevance of protruded retinal layers in minimum rim width measurement of the optic nerve head. *The British Journal of Ophthalmology*, 103(10), 1401-1405. [Published] PubMed ID: [30472658](#).

13. Topouzis F, Goldberg I, Bell K, Tatham AJ, Ridolfi A, Hubatsch D, **Nicolela M**, Denis P, Lerner SF (2019). Brinzolamide/brimonidine fixed-dose combination bid as an adjunct to a prostaglandin analog for open-angle glaucoma/ocular hypertension. *European Journal of Ophthalmology*, 1120672119878044. [Epub] PubMed ID: [31595773](#).
14. Wu Z, **Vianna JR**, Reis ASC, Zemborain ZZ, Lee SH, Thenappan A, Weng DSD, Tsamis E, Joiner DB, Ritch R, De Moraes CGV, Hood DC (2019). Qualitative evaluation of neuroretinal rim and retinal nerve fibre layer on optical coherence tomography to detect glaucomatous damage. *The British Journal of Ophthalmology*. [Published] PubMed ID: [31662310](#).
15. Feng M, **Lewis DR**, Monsef B, Price F (2019). Re: Campbell et al. Evolution in the risk of cataract surgical complications among patients exposed to tamsulosin: a population-based study. *Ophthalmology*, 126(9), e69-e70. [Letter to the Editor - Epub] PubMed ID: [31443796](#).
16. Gary A, McKay BR, **Francisconi CLM**, Muni RH. Toxoplasmosis chorioretinitis mimicking cytomegalovirus retinitis in an immunocompromised pediatric patient following bone marrow transplantation. *Jama Ophthalmology*. [Case Report - Submitted].
17. **Cadieux DC**, **Gupta RR** (2019). Sarcoidosis presenting with intermediate uveitis and subcutaneous nodules. *CMAJ*, 191(36). [Case Report - Epub] PubMed ID: [31501183](#).
18. **Gupta RR**, **Seamone ME**, **Pollmann AS**, **O'Brien DM**, **Lewis DR** (2019). Dislocation of a scleral-fixated, hydrophobic, single-piece acrylic intraocular lens secondary to eyelet fracture from Gore-Tex suture. *Journal of VitreoRetinal Diseases*, 2(5), 276–281. [Case Report - Published].
19. **Francisconi CLM**, Kim DT, Juncal V, Qian J, Brosh K, Wong DT, Giavedoni L, Berger A, Altomare F, Muni RH (2019). Foveal avascular zone area analysis using OCT angiography after pneumatic retinopexy for macula-off rhegmatogenous retinal detachment repair. *Journal of VitreoRetinal Diseases*. [Published] DOI: [10.1177/2474126419856461](#).
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].
21. Wu Z, Crabb DP, **Chauhan BC**, Crowston JG and Medeiros FA (2019). Improving the feasibility of glaucoma clinical trials using trend-based visual field progression end points. *Ophthalmology Glaucoma*, 2:72-77. [Published].
22. Barnes CS, Schuchard RA, Birch DG, Dagnelie G, **Wood L**, Koenekoop RK, Bittner AK (2019). Reliability of semiautomated kinetic perimetry (SKP) and goldmann kinetic perimetry in children and adults with retinal dystrophies. *Translational Vision Science & Technology*, 8(3), 36. [Published] PubMed ID: [31211001](#).
23. **Gupta RR**, **Iaboni DSM**, **Seamone ME**, Archambault C, Lederer DE (2019). Acute annular outer retinopathy: literature review and a report of two cases. *Journal of VitreoRetinal Diseases*, 3(3), 172-182. [Review - Published] DOI: [10.1177/2474126419838436](#).
24. **Eadie BD**, **Heathcote JG**, **Gupta RR** (2019). Acute Phacolytic Glaucoma and morgagnian cataract. *JAMA Ophthalmology*, 137(4), e184495. [Case Report - Published] PubMed ID: [30973585](#).
25. Deveau AP, **Seamone ME**, **Lewis DR**, **Gupta RR** (2019). How to knot bury and not break the suture: The 3-1-bury-1 knot. *Canadian Journal of Ophthalmology*. [Published] DOI: [10.1016/j.cjco.2019.02.014](#).
26. **Smith CA**, **Hooper ML** and **Chauhan BC** (2019). Optical coherence tomography angiography in mice. Quantitative analysis after experimental models of retinal damage. *Invest. Ophthalmol. Vis. Sci.*, 60:1556-1565. [Published].

27. **Chan W, Neufeld A, Maxner C**, Shankar J (2019). Irreversibility of transverse venous sinus stenosis and optic nerve edema post-lumbar puncture in idiopathic intracranial hypertension. *Canadian Journal of Ophthalmology*, 54(2), e57-e59. [Case Report - Epub] Available [here](#).
28. **Mishra AV, Seamone ME, Zaki A, Lewis DR, Nicolela M, Gupta RR** (2019). Rhodotorula endophthalmitis associated with Baerveldt shunt implantation. *Canadian Journal of Ophthalmology. Journal Canadien d'Ophthalmologie*, 54(2), e90-e92. [Case Report - Published] PubMed ID: [30975373](#).
29. Jiang S, Baig K, Kalevar A, Choudhry N, **Gupta RR** (2019). Novel approach to scleral fixation of a Reper intraocular lens and artificial iris complex following pars plana lensectomy and vitrectomy for ectopia lentis and cataract in a patient with aniridia and nystagmus. *Retinal Cases & Brief Reports*. [Published].
30. **Betsch D, Demmings E, Gupta RR** (2019). Pigmentary changes in the retina in a patient with McArdle's disease. *Ophthalmology Retina*. [Case Report - Published].
31. Hutnik C, Crichton A, Ford B, **Nicolela M, Shuba L**, Birt C, Sogbesan E, Damji KF, Dorey M, Saheb H, Klar N, Guo H, Hodge W (2019). Selective laser trabeculoplasty versus argon laser trabeculoplasty in glaucoma patients treated previously with 360° selective laser trabeculoplasty: a randomized, single-blind, equivalence clinical trial. *Ophthalmology*, 126(2), 223-232. [Published] PubMed ID: [30278197](#).
32. Blandford SN, **Hooper ML**, Yabana T, **Chauhan BC, Baldrige WH, Farrell SRM** (2019). Retinal characterization of the Thy1-GCaMP3 transgenic mouse line after optic nerve transection. *Investigative Ophthalmology & Visual Science*, 60(1), 183-191. [Published] PubMed ID: [30640971](#).
33. Tooley AA, Alnemi S, **Hussain A**, Bradley EA (2019). Dry eye symptoms following blepharoptosis surgery in elderly (≥80 years old) vs non-elderly patients. *Expert Review of Ophthalmology*. [Published] DOI: [10.1080/17469899.2018.1555033](#).
34. **Hussain A** (2019). Considerations for ophthalmic complications. *JAMA Facial Plastic Surgery*. [Letter to the Editor - Published] PubMed ID: [30676612](#).
35. Gostimir M, **Hussain A** (2019). A systematic review and meta-analysis of methods for reducing local anesthetic injection pain among patients undergoing periocular surgery. *Ophthalmic Plastic and Reconstructive Surgery*. [Review - Published] PubMed ID: [30664129](#).

Books and Chapters

1. Kamali T, **Farrell SRM, Baldrige WH**, Fischer J and **Chauhan BC** (2019). Two-photon Scanning Laser Ophthalmoscope [Book Chapter]. In: Bille JF (Ed), *High Resolution Imaging in Microscopy and Ophthalmology. New Frontiers in Biomedical Optics* (pp. 195-211). Springer: Cham, Switzerland.
2. **Eadie BD**, Kwon YH, **Shuba LM** [Accepted] Glaucoma Visual Function Assessment [Book Chapter]. In: Yang Sun (Ed), *Albert and Jakobiec's Principles and Practice of Ophthalmology* (pp. Chapter 196). Springer: Baltimore, Maryland.
3. **Gupta RR, Lewis DR** [Accepted] Iridodialysis Repair [Book Chapter]. In: Rosenberg ED, Nattis AS, Nattis RJ (Eds), *Operative Dictations in Ophthalmology*. Springer: International.
4. **Gupta RR, Lewis DR** [Accepted] Iris Cerclage for Traumatic Mydriasis [Book Chapter]. In: Rosenberg ED, Nattis AS, Nattis RJ (Eds), *Operative Dictations in Ophthalmology*. Springer: International.
5. **Gupta RR, Lewis DR** [Accepted] Pars Plana Vitrectomy for Infectious Endophthalmitis [Book Chapter]. In: Rosenberg ED, Nattis AS, Nattis RJ (Eds), *Operative Dictations in Ophthalmology*. Springer: International.
6. **Gupta RR, Lewis DR** [Accepted] Drainage of Suprachoroidal Hemorrhage [Book Chapter]. In: Rosenberg ED, Nattis AS, Nattis RJ (Eds), *Operative Dictations in Ophthalmology*. Springer: International.
7. **Gupta RR, Lewis DR** [Accepted] IOL exchange with Gore-Tex Scleral Fixation of an Akreos Adapt AO [Book Chapter]. In: Rosenberg ED, Nattis AS, Nattis RJ (Eds), *Operative Dictations in Ophthalmology*. Springer: International.

Scientific Abstracts

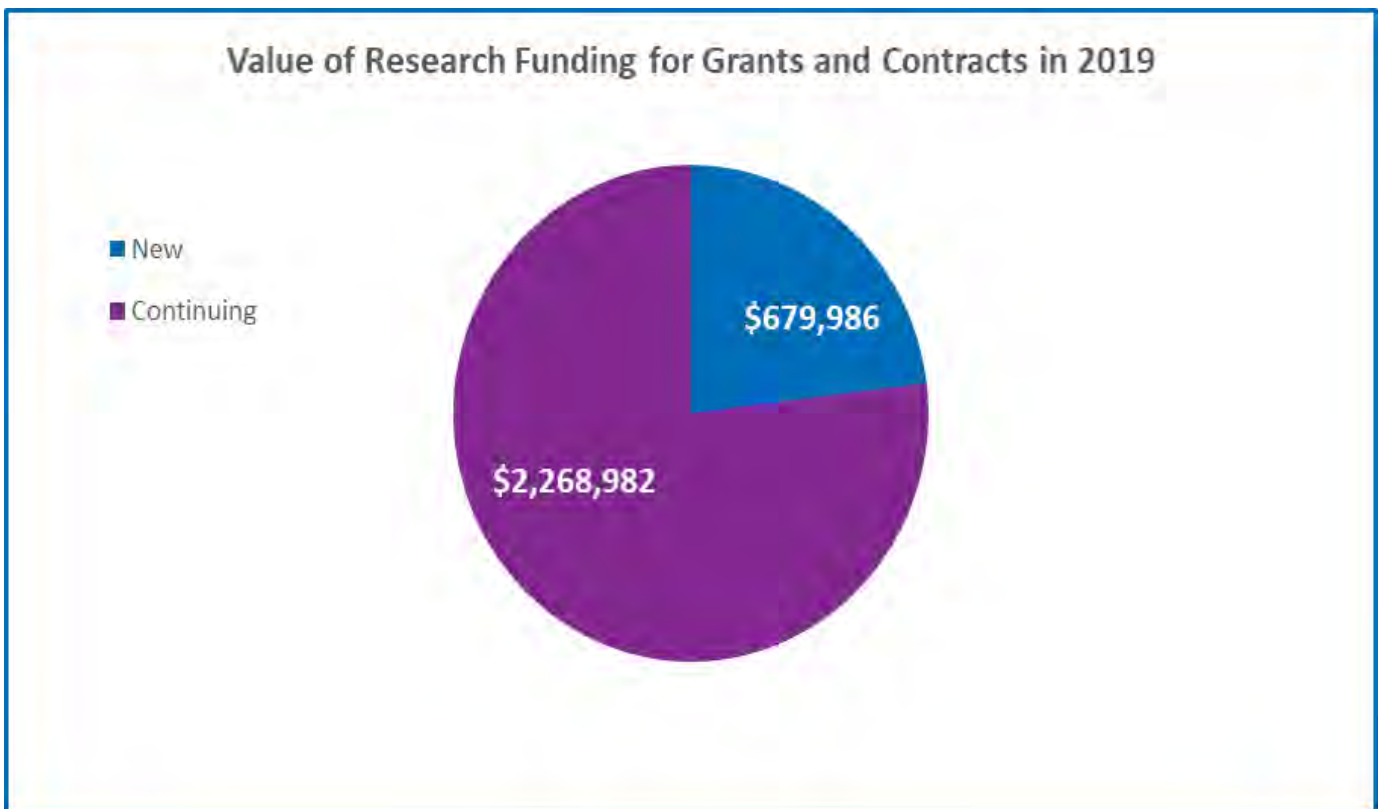
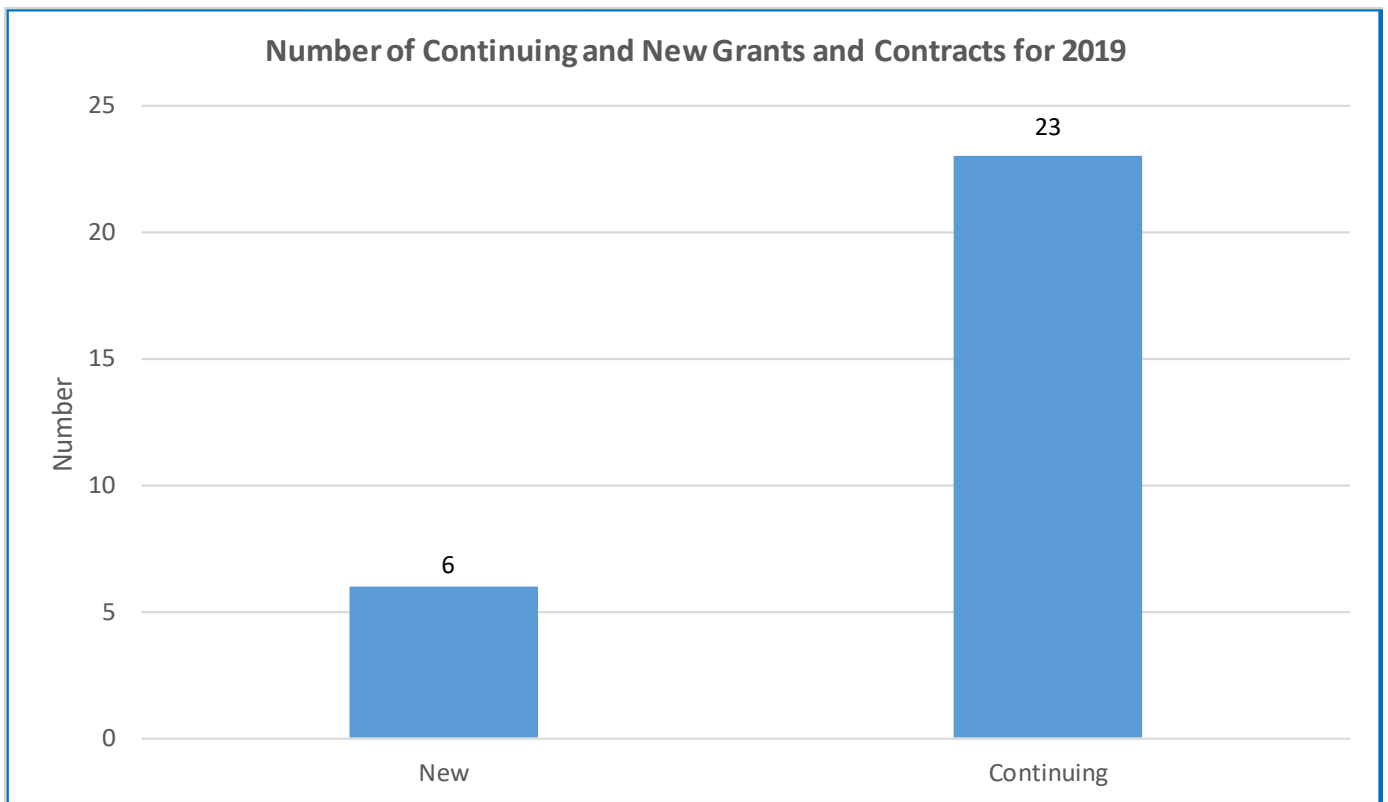
1. Juncal VR, Paracha Q, Bamakrid M, **Francisconi CLM**, Farah J, Kherani A, Muni RH. Ranibizumab and aflibercept levels and their impact on vascular endothelial growth factor in human breast milk following intravitreal injection. [Podium] Retina Society Meeting 2019 (London, UK), September 2019.
2. **Francisconi CLM**, Ta Kim D (presenter), Juncal V, Qian J, Brosh K, Wong DT, Giavedoni LR, Berger AR, Altomare F, Muni RH. Foveal avascular zone area analysis using OCT angiography after pneumatic retinopexy for macula-off rhegmatogenous retinal detachment repair. [Podium] 19th EURETINA Congress (Paris, France), September 2019.
3. **Francisconi CLM**, Ta Kim D, Juncal V, Qian J, Brosh K, Wong DT, Giavedoni LR, Berger AR, Altomare F, Muni RH. Foveal avascular zone area analysis using OCT angiography after pneumatic retinopexy for macula-off rhegmatogenous retinal detachment repair. [Poster On Demand] American Society of Retinal Specialists Annual Meeting (Chicago, IL, USA), July 2019.
4. Juncal VR, Ta Kim DT, Marafon SB, Jin TS, Bamakrid M, Paracha Q, **Francisconi CLM**, Muni RH. Real-world evidence of pneumatic retinopexy in patients with primary rhegmatogenous retinal detachment meeting PIVOT criteria. [Podium] American Society of Retina Specialists Annual Meeting (Chicago, IL, USA), July 2019.
5. Heshin KYB, **Francisconi CLM**, Juncal V, Berger A, Giavedoni L, Wong D, Altomare, F, Hillier RJ, Sabatino F, Kadhim M, Newsom R, Chaudhary V, Qian J, Muni R. Retinal displacement after retinal detachment repair – Retrospective study. [Podium] Canadian Ophthalmological Society Annual Meeting (Quebec City, QC, Canada), June 2019.
6. **Francisconi CLM**, Juncal V, Hillier RJ, Felfeli T, Giavedoni LR, Wong DT, Berger AR, Altomare F, Kertes PJ, Kohly RP, Muni RH. Association of baseline OCT features with visual outcomes following retinal detachment repair: Post-hoc analysis of the PIVOT trial. [Podium] Canadian Ophthalmological Society Annual Meeting (Quebec City, QC, Canada), June 2019.
7. Bamakrid M, Paracha Q, Jin S, **Francisconi CLM**, Juncal V, Muni R. Retrospective review of outcomes following pneumatic retinopexy in patients with primary rhegmatogenous retinal detachment. [Poster] Canadian Ophthalmological Society Annual Meeting (Quebec City, QC, Canada), June 2019.
8. Juncal VR, Paracha Q, Bamakrid M, **Francisconi CLM**, Farah J, Kherani A, Muni RH. Ranibizumab and aflibercept levels and their impact on vascular endothelial growth factor in human breast milk following intravitreal injection. [Podium] Canadian Ophthalmological Society Annual Meeting (Quebec City, QC, Canada), June 2019.
9. **Francisconi C**, Brosh K, Juncal V, Berger AR, Altomare F, Chow DR, Wong DT, Giavedoni LR, Muni RH. Prospective analysis of retinal vessel printing on fundus autofluorescence following pneumatic retinopexy. [Podium] Canadian Ophthalmological Society Annual Meeting (Quebec City, QC, Canada), June 2019.
10. **Gao J, Quach J, Nicolela M, Shuba L, Chauhan B, Vianna J**. Diagnostic sensitivity of macula ganglion cell layer thickness, peripapillary retinal nerve fiber thickness, and minimum rim width in detecting glaucoma in a large clinical population. [Podium] 2019 Canadian Ophthalmological Society Annual Meeting (Quebec, QC), June 2019.
11. **West M, Sharpe G, Hutchison D, Shuba L, Rafuse, P, Nicolela M, Vianna J, Chauhan B**. Value of central 10-2 perimetry in patients with existing 24-2 visual field defects. [Poster] 2019 ARVO Annual Meeting (Vancouver, BC), May 2019.
12. **Vianna JR, Chauhan BC**. Pilot analysis of the web-application and inter-evaluator variability for the crowd-sourced glaucoma study. [Poster] 2019 ARVO Annual Meeting (Vancouver, BC), May 2019.

13. **Torres L, Lanoe V, Quach J, Sharpe G, Hutchison D, Shuba L, Nicoleta M, Chauhan B, Vianna J.** Longitudinal changes in choroidal thickness and neuroretinal parameters in glaucoma. [Poster] ARVO (Vancouver, BC), May 2019.
14. **Gao J, Quach J, Nicoleta M, Shuba L, Chauhan B, Vianna J.** Diagnostic sensitivity of macula ganglion cell layer thickness, peripapillary retinal nerve fiber thickness, and minimum rim width in detecting glaucoma in a large clinical population. [Poster] ARVO (Vancouver, BC), May 2019.
15. Jeoung JW, Yang H, Gardiner SK, Wang Y, Hong SW, Girard MJA, Hardin CA, Wei P, **Vianna J, Chauhan BC,** Burgoyne CF. Optical coherence tomography (OCT) optic nerve head (ONH) neural canal direction, obliqueness and minimum cross-sectional area in highly myopic versus age-matched healthy eyes. [Poster] 2019 ARVO Annual Meeting (Vancouver, BC), May 2019.
16. Reis ASC, Jammal AA, Zangall C, Ferreira BG, **Vianna JR, Artes PH,** Costa VP. Repeatability of macular and optic nerve head OCT parameters in advanced glaucoma. [Poster] 2019 ARVO Annual Meeting (Vancouver, BC), May 2019.
17. **Henderson D, Vianna JR, Hooper M, Farrell S, Chauhan BC.** Characterizing morphological changes of RGCs with longitudinal in vivo imaging in a model of experimental glaucoma. [Poster] 2019 ARVO Annual Meeting (Vancouver, BC), May 2019.
18. Yang H, Luo H, Hardin CA, Albert C, **Vianna JR, Sharpe G,** Reynaud J, Demirel S, Mansberger SL, Fortune B, Gardiner SK, **Chauhan BC,** Burgoyne CF. Improved detection of optical coherence tomography (OCT) structural abnormality in glaucoma (GL) with combined sectoral rim and retinal nerve fiber layer (RNFL) criteria. [Poster] 2019 ARVO Annual Meeting (Vancouver, BC, Canada), May 2019.
19. **Sharpe G, Hutchison D, Rafuse PE, Nicoleta MT, Vianna JR, Chauhan BC.** Orientation of glaucomatous nasal step visual field defects measured with a high-density stimulus pattern with microperimetry. [Poster] 2019 ARVO Annual Meeting (Vancouver, BC, Canada), May 2019.
20. Juncal VR, Paracha Q, Bamakrid M, **Francisconi CLM,** Farah J, Kherani A, Muni RH. Ranibizumab and aflibercept levels and their impact on vascular endothelial growth factor in human breast milk following intravitreal injection. [Podium] ARVO 2019 (Vancouver, BC, Canada), April 2019. Published: July 2019, *Investigative Ophthalmology & Visual Science*, 60(9) 6390.
21. Juncal VR, Paracha Q, Bamakrid M, **Francisconi CLM,** Farah J, Kherani A, Muni RH. Ranibizumab levels and its impact on vascular endothelial growth factor in human breast milk following intravitreal injection. [Podium] Brazilian Retina Society Meeting (Fortaleza, Brazil), April 2019.
22. Juncal VR, Brosh K, **Francisconi C,** Qian J, Sabatini F, Hillier R, Chauhary V, Wong DT, Muni RH. A multi-center study using fundus autofluorescence imaging to compare quality of retinal reattachment in pneumatic retinopexy vs. pars plana vitrectomy. [Podium] Brazilian Retina Society Meeting (Fortaleza, Brazil), April 2019.
23. **Chan W, Mishra A,** Shankar J, Green L, **Maxner C.** Transverse venous sinus stenosis in idiopathic intracranial hypertension-A prospective pilot study. [Podium] 30th Annual Department of Ophthalmology and Visual Sciences Research Day (Halifax, NS), April 2019.

Other Publications

1. **Gupta RR, Deveau A, Mishra AV, Lewis DR** (2019) *Scleral fixation of a Reper artificial iris-IOL complex* - American Academy of Ophthalmology [Video] [View here](#)

Research Funding Facts & Figures



New Research Grants and Contracts

1. **Nicolela MT, Shuba LM, Eadie BD** (2019 - 2022). An extension trial to evaluate the long-term safety and efficacy of Bimatoprost SR in patients with open-angle glaucoma or ocular hypertension [Industry Contract] - Allergan Inc. - \$100,000 (USD).
2. **Nicolela MT** (2019 - 2020). A comparison of Imatoprost SR to selective laser trabeculoplasty in patients with open-angle glaucoma or ocular hypertension [Industry Contract] - Allergan Inc. - \$350,000 (USD).
3. **Tremblay F, Chauhan, BC** (2019 - 2020). Dendritic retraction and associated physiological responses in retinal ganglion cells in experimental glaucoma Y3 [Grant] - Glaucoma Research Society of Canada - \$18,887.
4. **Nicolela MT, Shuba LM, Eadie BD** (2019 - 2020). Patient reported outcomes for XEN gel stent versus trabeculectomy for the treatment of glaucoma [Industry Contract] - Allergan Inc. - \$30,000.
5. **Pollmann AS, Lewis DR, Seamone SE, Gupta RR** (2019 - 2021). Structural integrity of hydrophobic acrylic intraocular lens with eyelets (enVista) in an experimental model of transscleral fixation [Grant] - Dalhousie - \$2,489.
6. **Dickinson J, Cruess A, Gupta RR** (2019 - 2023). A phase III, multicenter, randomized, double-masked, active comparator-controlled study to evaluate the efficacy and safety of Faricimab in patients with diabetic macular edema (RHINE) [Industry Contract] - F. Hoffman-La Roche - \$480,083.

Continuing Research Grants and Contracts

1. **Oystreck D, Cameron, R, van Iderstine S, Tremblay F, LaRoche GR** (2018 - 2019). Development, enhancement and gamification of vision tests in virtual reality [Grant] - Innovacorp's Early Stage Commercialization Fund - \$50,000.
2. **Chauhan BC** (2018 - 2023). Novel imaging targets for detecting early progression of glaucoma [Grant] - CIHR - \$730,576.
3. **Tremblay F, Chauhan, BC** (2018 - 2019). Dendritic retraction and associated physiological responses in retinal ganglion cells in experimental glaucoma [Grant] - Glaucoma Research Society of Canada - \$19,372.
4. **Chauhan BC** (2018 - 2023). Optic nerve changes in glaucoma (unrestricted funding) [Grant] - Heidelberg Engineering - \$650,000.
5. **Eadie BD, Nicolela MT** (2018 - 2019). Evaluation of the ability of optic coherence tomography to distinguish glaucomatous from ischemic optic neuropathy [Grant] - Glaucoma Research Society of Canada - \$10,000.
6. **Torres LA, Chauhan BC, Vianna JR** (2018 - 2019). Influence of Bruch's membrane opening area on the diagnostic performance of optical coherence tomography [Grant] - Glaucoma Research Society of Canada - \$18,741.
7. **Chauhan BC** (2017 - 2019). Modelling the deep optic nerve head of patients with glaucoma [Grant] - NSHRF - \$24,927.
8. **Dickinson J, Cruess A, Gupta RR** (2017 - 2019). An open-label, randomized, active-controlled, parallel-group, phase-3b study of the efficacy, safety, and tolerability of three different treatment regimens of 2 mg Aflibercept administered by intravitreal injections to subjects with diabetic macular edema (DME) [Industry Contract] - Bayer - \$87,435.
9. **Baldrige WH** (2017 - 2022). Modulation of horizontal cells in the vertebrate retina [Grant] - NSERC - \$130,000.
10. **Chauhan BC** (2017 - 2022). Calcium dynamics in retinal ganglion cells [Grant] - National Science and Engineering Council - \$140,000.

11. **Chauhan BC** (2017 - 2020). Detecting the earliest progression of glaucoma with optical coherence tomography angiography [Grant] - Alcon Research Institute - \$230,000.
12. **Cruess A, Dickinson J, Gupta RR** (2016 - 2021). Peripheral diabetic retinopathy (DR) lesions on ultrawide-field fundus images and risk of DR worsening over time [Industry Contract] - Jaeb Center for Health - \$124,700.
13. McMaster C, **Robitaille JM** (2016 - 2021). A treatment for the inherited childhood blinding disorder familial exudative vitreoretinopathy [Grant] - CIHR - \$750,000.
14. **Chauhan BC** (PI), **Tremblay F** (Coll) (2016 - 2021). Structural and functional changes in the retina and optic nerve in experimental glaucoma [Grant] - CIHR - \$672,760.
15. McMaster C, **Robitaille JM**, Berman J, Hoffman E, Kanneboyina Nagaraju (AGADA Biosciences Inc), Dalhousie University Industry Liaison and Innovation, the Centre for Drug Research and Development and AGADA Biosciences Inc (2016 - 2021). A scientific and clinical hub for orphan drug development [Grant] - Atlantic Innovation Fund - \$4,505,000.
16. **Cruess A, Gupta RR** (2016 - 2020). Safety and efficacy of Abicipar Pegol (AGN-150998) in patients with neovascular age-related macular degeneration. (SEQUOIA) [Industry Contract] - Allergan - \$506,315.
17. **Nicolela MT** (2015 - 2020). The efficacy and safety of Bimatoprost SR in Patients with open-angle glaucoma or ocular hypertension [Industry Contract] - Allergan Inc. - \$404,862 (USD).
18. **Chauhan BC** (2015 - 2020). Alcon Research Institute Award and Matching Funds from QEII Foundation [Grant] - Alcon Research Institute - \$225,800.
19. **Cruess A, Gupta RR** (2015 - 2020). Peripheral diabetic retinopathy (DR) lesions on ultrawide-field fundus images and risk of DR worsening over time. (Protocol AA) [Grant] - National Eye Institute/ National Institutes of Health (NEI/NIH) - \$124,700.
20. **Tremblay F** (2015 - 2020). Determinants of signal characteristics in a retinal network: contribution of local field potentials and spike trains [Grant] - NSERC - \$120,000.
21. **Dickinson J, Cruess A, Gupta RR** (2015 - 2020). A multicenter, prospective epidemiologic study of the progression of geographic atrophy secondary to age-related macular degeneration (PROXIMA B) [Industry Contract] - F. Hoffmann-La Roche Ltd. - \$169,812.
22. **Cruess A, Gupta RR** (2015 - 2019). A two-year, randomized, double masked, multicenter, three-arm study comparing the efficacy and safety of RTH258 versus Aflibercept (Eylea®) in subjects with neovascular age-related macular degeneration (HAWK) [Industry Contract] - Alcon Research Inc. - \$488,774.
23. **Nicolela MT** (2012 - 2019). A randomized clinical trial of selective laser trabeculoplasty (SLT) in open-angle glaucoma who have been previously treated with complete SLT [Grant] - CIHR - \$90,200.

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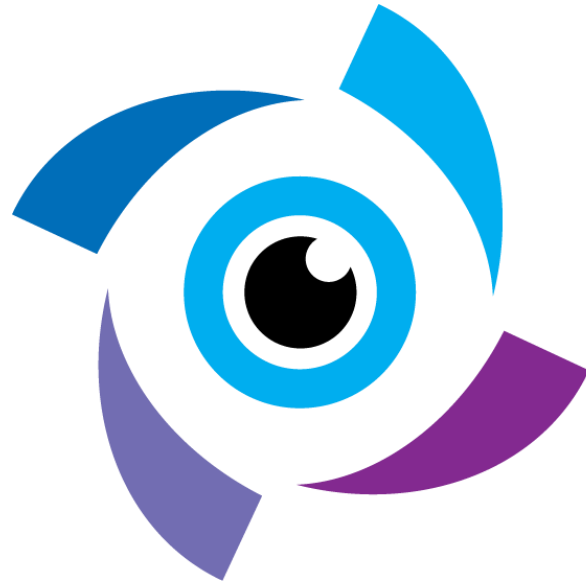
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Department of Ophthalmology & Visual Sciences

Dalhousie University/Nova Scotia Health Authority
1276 South Park Street, Room 2035
2 West Victoria Building, Halifax, NS B3H 2Y9
Office: 902-473-7155 Fax: 902-473-2839
Email: ophthalmology.research@dal.ca
ophthalmology.medicine.dal.ca

