The Glaucoma Research Society of Canada Awarded $256,419 in Grants in 2021 for These 13 Research Projects

Creating a Virtual Reality App for Patient Education, Treatment, Adherence & Quality of Life

Deteriorating vision can have a negative effect on the Quality of Life (QoL) of many glaucoma patients making it imperative for them to adhere to their prescribed treatment.

Patients, their families, and even their health-care providers find it difficult to understand verbal descriptions of vision loss without the use of visual aids, potentially leaving the glaucoma patient feeling misunderstood and isolated.

Computer simulations and virtual reality (VR) are interactive tools widely used in medicine for educational and surgical training. Patient education, especially in ophthalmology, is one area of potential VR application that is relatively unexplored when examining compliance to treatments.

To better understand the vision loss experienced by many glaucoma patients, our study will design and develop a VR simulation of visual loss using patient ophthalmic visual field images. Researchers will then assess the impact through QoL questionnaires.

We expect this study will enhance treatment compliance while improving empathy and understanding among family members and caregivers. The VR app can also be used to educate ophthalmologists, optometrists, medical trainees, social workers, and nurses to better understand glaucoma patients' needs.

Dr. Enitan Sogbesan, McMaster University, Hamilton, ON

Dr. Sogbesan will be the guest speaker at GRSC's 2021 Annual Supporters' Meeting. Please see GRSC's website for details on how to register for the Oct. 6th online event.

Delivering Online Meditation to Patients with Glaucoma

Art of Meditation (AoM) uses a specific sound (a mantra) to focus attention inwards, allowing the meditator to experience a restful but alert state of consciousness. In 2017, our 24-week pilot study, funded by the Glaucoma Research Society of Canada, found that AoM improved health-related quality of life (QoL) and reduced anxiety in people with glaucoma.

This follow-up study will assess the feasibility of delivering an online AoM to cope with stress and enhance the QoL of people with glaucoma. We expect participants in the AoM will experience enhanced QoL, reduced depression and anxiety, and improved sleep quality.

Dr. Monali Malvankar & Dr. Cindy Hutnik, Lawson Health Research Institute, London, ON

Determining Optimal Laser Positioning to Improve Outflow of Fluid in the Eye

Our research will compare two standard positions of laser treatment for patients with primary angle closure suspect characteristics (PACS) in both eyes. We will try to determine the optimal laser position to both reduce pain and produce the best results for the patient.

The study will follow 172 patients throughout their treatment, charting their pain level and visual disturbances during the procedure itself. We will also track and chart the subsequent effects the treatment has on their condition.

Dr. Catherine Birt & Dr. Natalie Brossard, Sunnybrook Health Sciences Centre, University of Toronto, Toronto, ON

Testing Perceptual Grouping during Binocular Rivalry

The 2020 Glaucoma Research Society of Canada grant helped us launch this study and collect an important amount of data, despite the restrictions caused by the pandemic.

For our renewal project, we will continue to test grouping during binocular rivalry in patients with mild glaucoma and in age-matched controls to probe the strength of neural connectivity of the visual cortex involved in early visual processing.

We have improved this study since its initial funding to include more complex visual stimuli. We hypothesize that: the inter-hemispheric transfer of visual information is affected in mild glaucoma; the strength of lateral connectivity in the visual cortex is weaker in mild glaucoma; and these impairments will affect the visual processing of complex stimuli.

This research will provide valuable insights into the strength of neural connectivity and into the visual processing of complex stimuli in patients with mild glaucoma who show no visual deficits on standard tests.

Dr. Luminita Tarita-Nistor & Dr. Yvonne M Buys, Krembil Research Institute, University Health Network, Toronto, ON

Developing an Aspirin-Loaded Injection for Post-Surgery Healing

Glaucoma filtration surgery (GFS) lowers intraocular pressure (IOP). Our study will evaluate the safety and efficacy of an Aspirin -loaded injection compared to the application of mitomycin C (MMC) at prolonging the effect of GFS.

This represents a novel indication for Aspirin which is quite different from its original use. For this research, we will use a rat model of induced ocular hypertension (OHT) and experimental GFS. We expect the injection will prolong the post-operative IOP-lowering effects. Findings from this study will determine if we pursue Health Canada approval for clinical testing in humans.

Because of the significantly lower toxicity profile of Aspirin relative to MMC, this type of injection and delivery system represents a promising new strategy to improve surgical success rates for patients with glaucoma.

Dr. Cindy Hutnik, Dr. Patti Kiser, Dr. Cady Zeman-Pocrnich, Dr. James Armstrong, Anastasiya Vinokurtseva & Richard Zhang, Lawson Health Research Institute, Ivey Eye Institute, London, ON

Determining the Risk of Glaucoma in Patients Undergoing Sleep Studies

Sleep apnea occurs when breathing is repeatedly interrupted during sleep. Some studies suggest that sleep apnea may be a risk factor for glaucoma, however this theory has been difficult to test because of costs and logistics.

Our research project will follow patients already being treated at sleep study clinics to determine if a correlation exists between the severity of sleep apnea and glaucoma risk.

We expect to find a correlation and this study could result in automatic referrals of sleep apnea patients to eye care professionals for glaucoma screening. Findings could also lead to further research to better understand how the treatment of sleep apnea affects the progression of glaucoma.

Dr. Cindy Hutnik, Dr. William Reisman, Richard Zhang & Steven Villani, Lawson Health Research Institute, Ivey Eye Institute, London, ON

Measuring Quality of Life through Phone Surveys

Our project will study the practicality of administering two quality of life (QoL) phone questionnaires to patients with mild-moderate glaucoma over a 12-month period.

The study will evaluate patients' enrollment rate, response rate, call burden, satisfaction with care, value of information, and call frequency preference. We will also study both questionnaires for their effectiveness in detecting changes to visual field testing and health-related quality of life over time.

We expect that the questionnaire with more questions will be better able to detect changes, although with an increased call burden for patients.

Dr. Keean Nanji, Dr. Enitan Sogbesan, Dr. Kevin Kennedy, Dr. Brian Chan & Dr. Feng Xie, McMaster University, Hamilton, ON

Optimal Testing Parameters for Detecting Glaucoma Progression

Monitoring the progression of glaucoma is critical but also difficult for doctors. This is due to a lack of understanding of which testing parameter is more useful in assessing glaucoma progression.

Our research project will investigate the progression rates of different parameters of the optical coherence tomography (OCT) test and how glaucoma severity impacts them.

We surmise that the usefulness of different OCT parameters varies depending on the stage of the disease. Our findings will help guide doctors on optimal testing parameters for detecting glaucoma progression and may help cut costs of redundant testing.

Dr. Yong Woo Kim, Dr. Balwantray Chauhan & Glen Sharpe, Dalhousie University, Nova Scotia Health Authority, Halifax, NS

Improving Eye Movement Visual Field Tests

Visual field tests (perimetry) are the leading method used to detect and monitor glaucoma. For the standard automated perimetry (SAP) the patient looks at a central point and reacts to light stimuli in their peripheral field of vision using a hand-held clicker.

One of the biggest drawbacks of this test is maintaining focus on the central point while responding to the light stimuli, since the eye's natural response is to look at the stimulus. To address this issue, eye movement perimetry (EMP) relies on patient eye movements, rather than a clicker, to respond to stimuli.

Early studies indicate that EMP may be as reliable as SAP, while being more comfortable and preferred by patients. EMP can also measure multiple parameters of patients' eye movements that SAP cannot.

Our research project aims to refine EMP testing and address reliability concerns to improve the quality of this critically important test.

Dr. Brennan Eadie & Dr. Jayme Vianna, Dalhousie University, Nova Scotia Health Authority, Halifax, NS

Mapping Optic Nerve Head Tissue Strain in Glaucoma

In 2020, we received a research grant for this project from the Glaucoma Research Society of Canada. Our findings showed a significant correlation between intraocular pressure (IOP) and pulsatile optic nerve head (ONH) deformation. Because of the pandemic, we studied a smaller group of glaucoma patients than originally intended.

For this renewal project, we will improve all steps and increase sample size to provide a better idea of the maximum deformation occurring in glaucoma patients. We will look for ways to determine if OHN strain correlates better than IOP with the degree of damage.

This appears to be the first time that deformation maps have been derived from optical coherence tomography data. Strain imaging could allow for more precise diagnosis and treatments for each eye.

Dr. Mark Lesk, Dr. Santiago Costantino & Dr. Marisse Massis-Solano, Maisonneuve Rosemont Hospital, University of Montreal, Montreal, QC

Does Glaucoma Have a Rhythm of Its Own?

Intraocular pressure (IOP) is a major risk factor for glaucoma. One's circadian rhythm (sleep-wake cycle) may play a role in its function through melatonin produced naturally during the cycle.

Cell culture and animal studies suggest that melatonin pathways in the eye may also be involved in the process, but it is unknown whether a melatonin pathway exists within humans and if so, whether it is altered in human glaucoma.

Our research project will investigate normal and glaucoma human eyes to look for the elements of a melatonin-based eye clock. We will use eyes donated to research - 22 eyes with open-angle glaucoma and 22 non-glaucoma eyes.

We expect to find a local eye-clock with a melatonin pathway that affects IOP and glaucoma, and that functions in addition to a central body clock.

We hope our findings will lead to new treatment approaches for glaucoma.

Dr. Neeru Gupta & Dr. Yeni Yucel, St. Michael's Hospital, University of Toronto, Toronto, ON

Did Delisting Eye Exams Result in Inefficient Use of Medical Resources?

In 2004, the Ontario Government stopped paying optometrists and physicians for routine eye exams for people aged 20-64, affecting about eight million Ontarians each year.

In 2017, the Glaucoma Research Society of Canada funded a study showing that 17% of glaucoma patients aged 25-64 do not have insurance coverage for their drops. This highlighted cost as a barrier for working age Ontarians with diagnosed glaucoma.

We surmised that delisting eye exams may result in inefficient use of family doctors and ophthalmologists for glaucoma diagnosis and increase government costs. This is because needed information for glaucoma diagnosis by ophthalmologists is often missed in the referrals by family doctors, and the accuracy of glaucoma diagnosis made by family doctors is suboptimal.

Our study will use physician billing data to compare the annual rate of visits to family doctors, ophthalmologists, and optometrists for glaucoma diagnosis from 2000-2014. We expect that evidence will point to an overall increase in system costs due to inefficient use of family doctors and ophthalmologists for glaucoma diagnosis.

Dr. Yaping Jin & Dr. Yvonne Buys, Dept of Ophthalmology & Vision Sciences, University of Toronto, Toronto, ON

Studying Glaucoma Medication Adherence & Persistence Rates

Using data collected in Ontario, our study will chart: glaucoma medication adherence and persistence rates overall; the rates of glaucoma therapy disruption in hospitalized patients; and the potential risk factors for this disruption.

We surmise that the disruption in patients' glaucoma therapy during hospitalization will depend on several factors: the degree of other medical conditions; the degree of glaucoma; the number and type of medication being used; the nature including length of the hospital stay; and the region or type of hospital.

Having a better understanding of patients who are at high risk of discontinuing glaucoma medication may improve both adherence and persistence of glaucoma therapy during hospitalization.

Dr. Matt Schlenker, The Institute for Better Health, Trillium Health Partner, Toronto, ON