



THE GLAUCOMA RESEARCH SOCIETY OF CANADA AWARDED \$315,040 IN GRANTS IN 2022 FOR THESE 16 RESEARCH PROJECTS

Studying the Benefits of Breathing Exercises & Meditation on Patients with Glaucoma

Dr. Malvankar and her team received two GRSC research grants in 2022. One, a renewal of a project funded in 2021, continues studying the benefits of Art of Meditation (AoM) for glaucoma patients. The new project will study breathing exercises.

AoM uses a specific sound or mantra to focus attention inwards, allowing the meditator to experience a restful but alert state of consciousness. Previous studies funded by the GRSC found that AoM improved health-related quality of life (QoL) and reduced anxiety in people with glaucoma.

These follow-up studies will assess the benefits of delivering AoM and breathing exercises to cope with stress and enhance the QoL of people with glaucoma. We expect participants in the AoM and breathing exercises will experience enhanced QoL, reduced depression and anxiety, and improved sleep quality.

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

Dr. Malvaknar will be the guest speaker at GRSC's 2022 Annual Supporters' Meeting. Please see the attached flyer and GRSC's website for details on how to register for the Oct. 12th online event.

Inhibiting SKI-1 to Promote Optic Nerve Regeneration

The eye transmits visual information to the brain via the optic nerve. In glaucoma, the optic nerve undergoes progressive degeneration leading to impaired vision. Our group seeks to develop therapies promoting optic nerve regeneration by blocking inhibitors of regeneration.

Previous work funded by GRSC demonstrated improved optic nerve regeneration after neutralizing inhibitors with large protein fragments. To further improve inhibitor neutralization, we have developed new, smaller compounds permitting more efficient inhibitor targeting. Our research will test the effect of these compounds on optic nerve regeneration and vision in an animal model of glaucoma.

*Dr. Philippe Monnier, Dr. Chloe Soutar, &
Dr. Valerie Wallace, Krembil Research Institute /
Donald K. Johnson Institute, Toronto, ON*

Adapting Accessible Virtual Reality Technologies for Surgical Training in Glaucoma

Surgical conferences and other educational events are necessary to keep up with the latest techniques. However, many ophthalmologists and trainees may not be able to attend in person.

Virtual reality (VR) is a growing technology that has been adapted for use across nearly every medical discipline and surgical education has been at the forefront of VR development for many specialties including neurosurgery, orthopedics and plastic surgery. Glaucoma education is particularly responsive to the VR platform. But the technology is still in its development stage, meaning practitioners must continually learn new techniques and skills which can be difficult.

This research aims to develop a multifaceted, accessible, and affordable means to provide remote surgical education in ophthalmology by using readily available VR devices with an initial focus on Micro-Invasive Glaucoma Surgery (MIGS).

*Dr. Patrick Gooi, Dr. Derek Waldner &
Dr. Abdullah Sarhan, University of Calgary, AB*

Comparing the Effectiveness of Different Laser Diode Techniques

Vision loss in glaucoma patients most often stems from high intraocular pressure (IOP). Transscleral cyclophotocoagulation (TSCPC) is effective in reducing IOP but its use is limited by concern over complications from thermal damage and inflammation.

This research project aims to compare two different treatment approaches of laser diode for elevated IOP not controlled with medical therapy. Researchers will evaluate the effectiveness and need for re-treatment of these techniques, along with the frequency and seriousness of complications over the two-year study period. This clinical trial will enable physicians to improve treatment in patients requiring TSCPC.

Dr. Andrew Toren, Dr. Béatrice Des Marchais, Dr. Catherine Baril, Dr. Caroline Lajoie, Dr. Annie Goyette, Université Laval, Quebec City, QC

EYE-PAC Intervention Program to Improve Treatment Regimes of Glaucoma Patients

Visual field loss caused by glaucoma negatively affects the quality of life, work productivity, and everyday activities of patients. To prevent loss of vision, glaucoma patients need to keep up with prescribed treatment routines. However, many patients report barriers preventing them from sticking to their prescribed regime.

The Eye Patient Adherence and Compliance (EYE-PAC) Intervention Program will provide home care services to assist patients with these barriers. Services will include patient education, assistance with eye drops, and mobile eye examinations.

Researchers will follow up with participants after six months and one year to record their progress and success of the intervention.

Dr. Enitan Sogbesan, McMaster University, Hamilton, ON

Pro-Inflammatory Molecule Profiles in Different Stages Of POAG

Glaucoma is the leading cause of blindness in the world. Elevated intraocular pressure (IOP) in glaucoma patients contributes to a gradual loss of retinal ganglion cells. Primary open-angle glaucoma (POAG) is the most common type of glaucoma in developed countries. Often, POAG can be moderated by controlling IOP. However, some patients' POAG continues to worsen even with low IOP.

This study will analyze the make-up of pro-inflammatory molecules in patients with POAG, and compare it to the severity of their glaucoma. By deciphering the molecular signature associated with POAG progression, researchers hope to identify the patients at risk of progression and better understand POAG.

Dr. Ellen Zhou, Dr. Jeremy Sivak, Dr. Irfan Kherani, Dr. David Mathew & Dr. Matthew Schlenker, University of Toronto, Toronto, ON

Angle Closure Glaucoma Risk with Bisphosphonates in Osteoporosis Patients

Bisphosphonates are a widely prescribed class of medications used for the prevention of osteoporosis in both men and women. They have been prevalent in North America since the 1990s. Two published case reports suggest a possible link between bisphosphonates and glaucoma.

This study aims to calculate the potential harmful risk of bisphosphonates on the chronic and acute types of angle closure glaucoma (ACG) by using previously collected data from the US. Researchers hypothesize that bisphosphonates increase the risk of ACG in osteoporosis patients and that results of this study will have important public health implications given the popularity of these drugs.

Dr. Mahyar Etminan, Dr. Bonnie He, Dr. Rami Darwich, Dr. Brennan Eadie, University of British Columbia, Vancouver, BC

Using Corneal Biomechanics to Predict Success of Glaucoma Surgery

The wound healing that occurs after certain glaucoma surgeries is a major factor in patient outcomes. This study will look at the association between corneal stiffness and the success rate of subconjunctival glaucoma filtration surgery by collecting patients' test measurements with respect to healing.

We hypothesize that patients with stiffer corneas will have a significantly shorter, event-free healing time compared with patients with less stiff corneas.

Results could lead to a better understanding of baseline risks and predictive factors associated with the surgery and have the potential to dramatically improve surgical outcomes through improved understanding of the healing process.

Dr. Ike Ahmed, Dr. Matt B. Schlenker, Dr. Irfan Kherani, Dr. James J. Armstrong, University of Toronto, Toronto, ON

Assessing the Role of Routine Eye Exams in Glaucoma Detection

Routine eye exams can facilitate early glaucoma diagnosis and improve outcomes, yet about half of people with glaucoma in Canada do not know they have it. In 2004, the Ontario government stopped coverage of routine exams for individuals aged 20-64.

Using data from Ontario, researchers will determine the number of patients who received a glaucoma diagnosis from a routine eye exam by optometrists from 1998-2019 along with those with a missed diagnosis.

This study will be the first to assess the role of routine exams by optometrists in glaucoma detection and evaluate the impact of public-funded routine exams on glaucoma detection.

Dr. Yaping Jin, Dr. Yvonne Buys, University of Toronto, Toronto, ON

Studying Cardiac Hormones for Potential Glaucoma Treatment

To reduce the progression of vision loss, glaucoma treatments aim to lower intraocular pressure (IOP). However, intolerance, allergy, or inadequate pressure lowering are common in patients necessitating research into new glaucoma treatments.

Certain cardiac hormones are fundamental to water and electrolyte balance, and play a strong role in the diagnosis, prognosis, and treatment of cardiovascular disease including high blood pressure and heart failure. It is believed that they may also play a role in IOP regulation.

This study aims to better understand these hormones and their impact to explore if they should be investigated as a potential glaucoma treatment.

Dr. Neeru Gupta, Dr. Yeni Yöcel, Unity Health, University of Toronto, Toronto, ON

Improving Visual Perception with Audiovisual Stimulation

Some glaucoma patients have trouble exploring their environment and doing complex visual tasks like identifying potential hazards. Auditory processing is also often affected, which exacerbates challenges in daily life.

Our pilot study will assess the feasibility and potential effectiveness of a six-week home-based audiovisual (AV) stimulation procedure using immersive virtual reality (IVR) to improve visual perception and quality of life in glaucoma patients.

We will perform the AV stimulation protocol in IVR from participants' homes with real-time data recording and remote control of the head-mounted display from our lab.

Dr. Michael Reber, Dr. Monica Daibert-Nido, Krembil Research Institute/Donald K. Johnson Institute, Toronto, ON

Comparing IOP Measurements Using Icare HOME versus iCare IC200

For patients with glaucoma, lowering intraocular pressure (IOP) is still currently the only modifiable risk factor to reduce the progression of vision loss associated with the disease. IOP is measured during visits to a practitioner's office. However, these occasional snapshots may fail to capture routine variations in a patient's IOP caused by factors such as the time of day.

The Icare HOME uses the same mechanism used in office visits. This project will compare IOP measurements of glaucoma patients obtained with the Icare HOME versus the iCare IC200 to determine if a greater number of IOP measurements taken throughout the day will provide more datapoints to improve glaucoma management for individual patients.

Dr. Jenn Qian, Dr. Matt Schlenker, Dr. Irfan Kherani, University of Toronto, Toronto, ON

Using OCT & Histology to Assess Photoreceptor Loss in POAG

Our research will determine whether the outer layers of the retina are involved in primary open-angle glaucoma (POAG) by studying two things:

- 1) the use of optical coherence tomography (OCT) imaging to measure the thickness of outer retinal layers in patients diagnosed with POAG in comparison to age-matched non-glaucoma patients, and
- 2) a comparison of a thorough histopathological and OCT assessment of the outer retinal layers in post-mortem donor eyes of patients with POAG to age-matched donor eyes.

Researchers hope to gain a better understanding of POAG from this study.

Dr. Miguel N Burnier Jr, Dr. Nabil Saheb, McGill University Health Centre Research Institute, Montreal, QC

Studying the Risk of Glaucoma with Use of ADHD Stimulant Medication

Methylphenidate hydrochloride (MPH) is a stimulant drug that is currently used as the first line of treatment for attention deficit hyperactivity disorder (ADHD) for both children and adults. Some preliminary studies have uncovered a potential link between the use of MPH and the development of angle closure glaucoma (ACG) and posterior subcapsular cataract (PSC).

Researchers hypothesize that MPH increases the risk of ACG and PSC in ADHD patients compared to non-users of ADHD pharmacological therapy or users of non-stimulant forms of ADHD medication.

Dr. Brennan Eadie, Dr. Mahyar Etminan, Dr. Bonnie He, Dr. Rami Darwich, Dalhousie University, Halifax, NS

Using Lithium for Cell Survival in Mice Models of Glaucoma

Intraocular pressure (IOP) and age are risk factors for glaucoma in which there is loss of retinal ganglion cells (RGC). Despite treatment to reduce IOP, a proportion of patients continue to lose vision, indicating that factors other than IOP are responsible for RGC loss in glaucoma.

Studies show that pathways associated with RGC loss in glaucoma share many similarities with some neurodegenerative diseases successfully treated with lithium (Li). This study aims to investigate the impact of Li treatment on RGC survival. Researchers hypothesize that mice pre-treated with Li will have greater RGC survival compared to those receiving a placebo.

Dr. Balwantray Chauhan, Dr. Tomas Hajek, Dalhousie University, Halifax, NS

GRSC will open its online research portal for 2023 research project grant applications in mid to late October. For details, check our website: www.glaucomaresearch.ca or email: info@glaucomaresearch.ca