



Finding new methods for detecting glaucoma

Patients like Stelth Ng know first-hand the impact of this rapidly growing disease

Renee Sylvestre-Williams

Eyes might be the windows to the soul, but they don't like to give up their own secrets, especially with diseases such as glaucoma. Musician and filmmaker Stelth Ng should know; he's spent a decade in and out of the hospital because of his eyes. Stelth, 26, has had more than 16 surgeries in both eyes as a result of various conditions, including cataracts, dislocation of his intraocular lenses, multiple retinal detachments, corneal edema and glaucoma. As a result, he is completely blind in his right eye and uses his left eye to see.

"When people talk about glaucoma, they're usually talking about primary open-angle glaucoma," says Dr. Graham Trope, senior scientist at the Krembil Research Institute and co-director of Glaucoma Service at the Donald K. Johnson Eye Institute. He is also Stelth's ophthalmologist and has been treating him for the past six years. "[Primary

open-angle glaucoma is] the most common form of glaucoma in North America. It affects about 65 million people in the world. That's projected to increase to about 76 million or so in 2020. With the aging boomers, glaucoma is becoming more and more common."

Glaucoma results in a buildup of pressure in the eye, which can lead to irreversible vision loss. That does happen, but when you speak with research scientist Dr. Jeremy Sivak, a scientist at the Krembil Research Institute and the Chair in Glaucoma Research at the Donald K. Johnson Eye Institute, you discover that it's more than just a pressure disease – and it can have many causes, as in Stelth's case.

"Glaucoma," he says, "is a chronic degeneration of the optic nerve and the cells that make up the optic nerve, which are called retinal ganglion cells. But they're a particular type of nerve cell in the retina,

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– Musician Stelth Ng

which is the light-receptive tissue at the back of your eye, like the film in a camera, if you will." All of our visual input, he says, goes through this one thread of the optic nerve that comes out the back of the eyeball. In glaucoma, that thread is damaged, and messages can't reach the brain.

So, glaucoma is actually a neurodegenerative disease. While treatment has focused on lowering eye pressure, research is looking at what causes the nerve damage. There is no definite answer, but there are a lot of options, including looking at the role of glial cells, which are support cells in the central nervous system, or as Dr. Sivak describes them, the pit crew for the specialized nerve cells.

When these specialized cells suffer damage, this can trigger a switch in how the glial support cells work, according to Dr. Sivak. The glial cells go to deal with the injury and don't do their regular work. "The dysfunction of those glial cells is linked as one of the earliest pathological signs that happens in a glaucoma eye. The broad hypothesis underlying this aspect of the lab is, if we can selectively target the right enzymes or the right proteins in those glial cells, then we could encourage them to do their job better again."

Dr. Trope is also working on new methods for detecting glaucoma. His current work with engineer Dr. Moshe Eizenman at the University of Toronto (who is also an affiliate scientist at the

Krembil Research Institute) explores the possibility of completing a visual field test on a cellphone. "Patients who may have glaucoma have to do a vision test called a visual field test. This is a very complicated test and expensive," he says. "Patients have to come to the hospital and sit in the machine for 10 or 15 minutes. We check their peripheral vision. It's expensive and hard work, and it requires a skilled technician to run the test."

Stelth says that while his medical odyssey was at times stressful, he was inspired by Dr. Trope and other members of the Glaucoma Service at Toronto Western Hospital.

"I have always felt sincere concern for the well-being of my eyes and vision. My experiences with the doctors here have led me to feel that my vision is a priority, and that I'm not just another name that goes in and out of the hospital. I really owe all of them so much for my ability to still see today."

And Stelth, who approached music with great intensity because he feared he might go blind, has used that inspiration from these very experiences to influence his current career path. This past March, he organized and initiated a music concert and lecture demonstration series for the visually impaired.

"There were many young children there who were completely blind – some of them had cancer from the age of two that robbed them of their vision. Playing piano, violin and ballet music to them

during the concert showed me how much of a difference music can make in their lives. Their enthusiasm alone was touching."

Stelth says he hopes to continue his work with visually impaired children.

Outside of his busy teaching and ballet accompaniment schedule, Stelth works with cinematographers, dancers and musicians in Toronto and New York City to create choreographed short films that combine the two art forms.

"When I was 18, subsequent surgeries on my eyes resulted in total blindness for three months. During those months, I turned to the violin and piano whenever I lost faith and became depressed. Not being able to see sheet music actually gave me the chance to envision visual images in my head while I practised. Several years later, when I regained my vision and saw Charlotte Ballet Dancers perform in Chautauqua, [N.Y.], the connection with visualizing music came full circle back to me."

Meanwhile, until a cure is found, Dr. Trope says the best treatment for glaucoma is early detection.

He compares it to hypertension, where there are no symptoms, and people aren't aware they have it. People, especially those under age 65, don't get their eyes checked because they have to pay out of pocket. Once there is a glaucoma diagnosis, treatment is free, but unless people get their eyes checked, there's no means for early detection. ■



Because of vision loss, Stelth Ng, opposite page, has had more than 16 surgeries in both eyes. Dr. Jeremy Sivak, above left, and Dr. Graham Trope, above right, are searching for answers.