Bascom Palmer Researcher Receives Grant to Improve Estimates of Glaucoma Progression

In the next few decades, more than six million patients in the U.S. will be diagnosed with glaucoma, double the number from 2010. A sizable percentage of these patients will progress at such a rapid rate that they are at high risk to go blind or develop visual disability in their lifetimes. For this group, accurate assessments and early identification is critical to maintaining vision.

With a five-year, $1 million K23 grant from the National Institutes of Health (NIH), Swarup Swaminathan, M.D., assistant professor of clinical ophthalmology at the University of Miami Miller School of Medicine, is working on techniques to identify these fast progressors sooner.

According to Swarup Swaminathan, M.D., population-level data can help guide estimates of rates of change in patients.

“With currently available software, it can take five or more glaucoma tests to identify whether a patient’s glaucoma is progressing at a moderate or rapid rate, which translates to about five or six years depending on the frequency of testing,” says Dr. Swaminathan. “More sophisticated models
could help ophthalmologists identify these patients earlier with fewer tests.”

Dr. Swaminathan and his research team are creating the Bascom Palmer Glaucoma Repository, a database with the clinical and imaging data of more than 70,000 glaucoma patients seen at the Bascom Palmer Eye Institute. Population-level data from this database will aid in improving the predictions of rates of disease progression.

“As a premier academic ophthalmic center, Bascom Palmer has one of the largest electronic health record databases in the country,” Dr. Swaminathan said. “A major concern with data sets that are used for ‘big data’ research is a lack of patient diversity, but we are fortunate to have large African American, Afro-Caribbean, and Latin American communities in South Florida. It’s one of our greatest strengths.”

**Improving Accuracy of Rates of Prediction**

Applying statistical techniques such as linear mixed modeling can help improve the accuracy of rates of prediction while also identifying patients who have rapidly advancing disease, Dr. Swaminathan said. “If I’m meeting a patient for the first time who has had three prior tests, population-level data can help guide my estimate of the rate of change for this patient,” he said. For patients who are fast progressors, quicker identification translates to closer surveillance and more aggressive management.

Through the Miami Clinical and Translational Science Institute (CTSI), Dr. Swaminathan met a mentor and collaborator in J. Sunil Rao, Ph.D., a biostatistician and co-director of the CTSI’s Biostatistics, Epidemiology and Research Design
Program.

“As ophthalmologists, we can live in our silo sometimes, and I like the fact that this project spans different groups within our academic community at UM,” says Dr. Swaminathan.

“The K23 grant and our expanding collaborations using rich data sources provide a truly unique opportunity to bring our two disciplines much closer together,” said Dr. Rao, who is also a professor and director of the Division of Biostatistics at the Miller School of Medicine. “Dr. Swaminathan is immersing himself in statistical methods and coding, and I am doing the same with the clinical translational of our findings. I hope this kind of collaboration proves to be a model that will be replicated in the future across the medical enterprise.”

Further Research

The repository that Dr. Swaminathan is using for his NIH K23 grant holds countless additional possibilities for further research. “Large data sets are going to become increasingly important for us in all walks of life, but especially in healthcare and medicine. This work is the tip of the iceberg; it really could serve as the beginning of several potential projects that can substantially push the field of ophthalmology forward,” he said.

Another area of research that Dr. Swaminathan has been exploring is a non-invasive technique for imaging the distal outflow system of the eye. With the support of a CTSI Pilot Award, he and his team engineered the required equipment that will allow them to visualize the tracer dye in the eye. Developing an accurate image of the eye’s outflow system could
help physicians optimize treatment options for glaucoma patients, he says. Collaborators at the Ophthalmic Biophysics Center include Jean-Marie Parel, Ph.D. and Marco Ruggeri, Ph.D.

Dr. Swaminathan’s promising work to advance glaucoma research at Bascom Palmer continues to gain recognition. Most recently, he was named the Mary Lee and Richard E. Bastin Chair in Ophthalmology, the first endowed chair at Bascom Palmer to support a junior faculty member.

“I am extremely humbled and grateful for this recognition. This support will help us get our feet off the ground in assembling a robust research program with high potential for future impact,” he said.