

Haiyan Gong, MD, PhD

Dr. Gong discusses aqueous outflow and her culinary style.



How did you become interested in glaucoma?

After several years as a practicing ophthalmologist in Beijing, China, I came to the United States for a 1-year research fellowship at West Virginia University. I really enjoyed doing

research and decided to pursue a doctoral degree in an eye-related research laboratory. I was fortunate to find Thomas Freddo, OD, PhD, at Boston University School of Medicine, who was willing to accept me as his PhD student. At the time, he was collaborating with Roger Kamm, PhD, a professor at Massachusetts Institute of Technology on a research project funded by the National Institutes of Health/National Eye Institute, "The Outflow Characteristics of Aqueous Humor." My role was to conduct morphological studies proposed by this grant. When I completed my doctoral thesis, *Age-Related Changes in Extracellular Matrix Components of Human Aqueous Outflow Pathway*, I felt that I still needed to develop my understanding of this field. The cause of glaucoma at the cellular and tissue level remains unknown, and elucidating this pathogenesis is an objective that constantly motivates me.

FAST FACTS

- Associate professor of ophthalmology, anatomy, and neurobiology at Boston University School of Medicine, 2008 to present
- Adjunct associate professor, guest lecturer (2007-present), Bioscience Department, and adjunct associate professor (2005-present), OD/MA program, The New England College of Optometry, Boston
- Visiting scientist, Center for Biomedical Engineering, Massachusetts Institute of Technology, Cambridge, 1999 to present
- Guest professor (2012-present) at Affiliated Eye Hospital, Nanchang University, Nanchang, China, and guest professor (2005-present) at Huashan Hospital, Fudan University, Shanghai, China
- Principal investigator, Cellular Physiology of the Aqueous Outflow Pathway (National Eye Institute R01EY022634), 2012 to 2017

What is the major question you hope to answer about aqueous outflow in glaucomatous eyes?

A long-standing goal of mine is to determine the precise location responsible for the increased aqueous outflow resistance observed in glaucomatous eyes. This information would facilitate the search for ways to reverse the change. It would also offer new targets for pharmacological treatment. My current research projects aim to identify structural changes in the aqueous outflow pathway that account for the significant reduction in the active outflow area and aqueous outflow facility in ocular hypertensive animal models and human glaucomatous eyes.

What are some differences that have been found in the cells of eyes with versus without glaucoma?

In healthy eyes, trabecular cells are lost with advancing age.^{1,2} Cellular loss in glaucomatous eyes exceeds that of normal aging.³ My colleagues and I are currently analyzing the cellular changes in the trabecular meshwork of glaucomatous eyes at different stages of the disease. So far, our data suggest that trabecular meshwork cells become activated by unknown factors to produce abnormal amounts of extracellular matrix proteins before undergoing apoptosis. Understanding what these factors are will help us better understand the pathogenesis of the disease and develop new targets for treatment of the disease. It will also provide insight into why some new drugs may not work for advanced glaucoma due to the severe loss of trabecular meshwork cells.

How do you approach training/mentoring?

Through my experiences training students of various backgrounds, I have realized that each individual brings a unique skill set and requires different responsibilities from me as a mentor. When I interview a student, I make sure that our personalities are compatible and that we both understand what we hope to gain from the relationship; a mentor-mentee affiliation cannot be successful unless both parties understand the expectations and goals. Certain students are not realistic about how much they want to accomplish in a limited time frame, and it is my responsibility to help them set achievable goals.

In general, after we have established basic guidelines for a certain project, I give my students a lot of independence. They decide their own hours and make their own

(Continued on page 57)

(Continued from page 58)

schedules, as long as they keep to the deadlines we have established. Students who are less driven and less motivated receive additional gentle guidance, but I still grant them as much freedom as allows them to accomplish their tasks.

I feel a great sense of joy and accomplishment when my students establish their goals. I have served as the primary thesis advisor for seven master's students and currently serve as primary thesis advisor for two PhD students. I have mentored nine medical students in basic scientific research, and I have helped them to further their career ambitions in research and in ophthalmology by giving them opportunities to present their findings at annual meetings of the Association for Research in Vision and Ophthalmology and to gain research awards. Two medical students are currently residents in ophthalmology. I have trained nine postdoctoral research fellows, seven of whom currently hold academic appointments at the rank of assistant, associate, or full professor. One of them is a professor and chairman in the Department of Ophthalmology at one of the top universities in Shanghai, China, and another is a vice chairman at the same university. I have found that, when I want the best for my students, they work even harder, almost like children who do not want to disappoint a parent.

What has surprised me is that the success of a student has less to do with his or her level of education and more to do with his or her personal ambition and perseverance. A postdoctoral research fellow is not guaranteed to be more successful than a medical student.

What do you miss the most about China?

I miss my relatives and friends the most. I return to China every couple of years to give seminars at various universities. I spend most of my downtime visiting relatives and friends. I also miss my hometown's authentic Chinese cuisine. I like to eat at small, family-owned restaurants that are only frequented by locals. These trips are very special for me because of the memories they bring back from my childhood.

Although I miss traditional Chinese food, I often do not have the time necessary to prepare extravagant dishes. As a result, I have developed my own style of cooking. My goal in the kitchen is to prepare meals that are simple, time efficient, and delicious. My dinner guests are often surprised to hear that I prepared their tasty dishes in less than 30 minutes! ■

1. Alvarado J, Murphy C, Polansky J, Juster R. Age-related changes in trabecular meshwork cellularity. *Invest Ophthalmol Vis Sci*. 1981;21(5):714-727.

2. Grierson I, Howes RC. Age-related depletion of the cell population in the human trabecular meshwork. *Eye (Lond)*. 1987;1(pt 2):204-210.

3. Alvarado J, Murphy C, Juster R. Trabecular meshwork cellularity in primary open-angle glaucoma and nonglaucomatous normals. *Ophthalmology*. 1984;91(6):564-579.