Arthur J. Sit, SM, MD

What does it mean to be a clinician-scientist, and how does someone choose this career? We all have unique career paths, although mine was perhaps more circuitous than most. While a mechanical engineering student at the University of Toronto, I had to choose between two summer internships: working on robots for nuclear reactors or helping to model fluid flow in a bovine eye perfusion system. I chose the latter, because I was fascinated that the anterior segment of the eye is a complex microfluidic system that generates and regulates IOP. I had no notion of attending medical school at that time, however, and it took 5 years for me to return to biomedical engineering research as a graduate student at the Massachusetts Institute of Technology. Many clinician-scientists begin with clinical training. I started from the research side, where I recognized that I wanted to be involved in all stages of medical science, from identifying the gaps in knowledge and formulating the critical questions to developing answers to these questions to implementing new ideas and technology into clinical practice. This broad role is unique to clinician-scientists, who occupy the interface between clinical medicine and medical science.

Role models and mentors are critical to becoming a successful clinician-scientist. I am fortunate to have had many, but it was during my fellowship with Robert Weinreb, MD, at the University of California, San Diego, that I witnessed how a well-organized, efficient, and productive research and clinical enterprise can advance medical science.

Since I joined the faculty at Mayo Clinic, my research has combined my background in engineering with my clinical practice. IOP is fundamental to understanding and treating glaucoma, and understanding IOP requires the measurement of aqueous humor dynamics in humans. Following in the footsteps of Richard Brubaker, MD, I have concentrated on developing better tools with which to understand aqueous humor dynamics. The first device was a digital Schiotz tonometer for more objective measurements of outflow facility compared with strip chart-based electronic Schiotz tonometers. More recently, I have focused on developing an objective technique for the noninvasive measurement of episcleral venous pressure.[1] A key determinant of IOP, episcleral venous pressure is critical to determining another aqueous humor dynamics parameter, uveoscleral outflow. Combined with fluorophotometry to measure the rate of aqueous humor flow, my long-term goal is to understand the fluid dynamics changes in normal IOP variations, abnormalities that occur in disease, and the mechanisms of action of novel therapies.

Using the aforementioned devices, my colleagues and I recently elucidated the changes in aqueous humor dynamics that may explain the characteristic 24-hour IOP pattern. During sleep, aqueous humor production drops by about half, but a marked decrease in uveoscleral flow appears to compensate, producing a typical rise in IOP when measured in the physiologic positions.[2] We have also begun to determine the changes that occur with physiologic variations of IOP and in glaucoma.

Being a clinician-scientist is what allows me to combine professional interests. "Do what you love" is a cliché but true. I would add that we should do what we are good at and build on our strengths. As a clinician-scientist, this is the path to greatest achievement and fulfillment. ■

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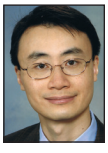

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