SECTION EDITOR: TONY REALINI, MD, MPH

Claude Burgoyne, MD

I am a glaucoma clinician and surgeon as well as the director of the Optic Nerve Head (ONH) Research Laboratory at the Devers Eye Institute in Portland, Oregon. I am fortunate to have found a subject to be passionate about and to have received the support of mentors, collaborators, and funding agencies necessary to pursue a body of science that I think is important.

MY BEGINNINGS

My interest in the ONH began at the end of my residency when I walked into a lecture by Harry Quigley, MD, at the Armed Forces Institute of Pathology in the summer of 1990. During my 2 subsequent years of fellowship training with him and his colleagues on the Glaucoma Service at the Wilmer Eye Institute in Baltimore, I became skilled with the monkey model of experimental glaucoma. The experience also gave me a conceptual framework for bringing engineering to the study of the lamina cribrosa and sclera in glaucoma, which had not been done at that point.

In 1993, I took my first job as director of glaucoma services at the LSU Eye Center in New Orleans, where Herbert Kaufman, MD, gave me a 3-year start-up package that included 2 days of protected research time per week. I did not know that I would find Richard Hart, PhD, the chair of biomechanical engineering at Tulane University and an expert on finite element modeling of "laminar" bone. Rich and I, along with Francis Suh, PhD (a soft-tissue biomechanics expert), wrote grant applications to the American Health Assistance Foundation and the Whitaker Foundation to model the lamina cribrosa. These funds paid for Anthony Bellezza and Crawford Downs to complete their doctorates in my laboratory. Together, the five of us laid the foundation for a National Institutes of Health (NIH) R01 award that enabled each of us to commit a portion of our professional lives to this body of work. With this NIH R01, we developed the initial tools for the three-dimensional (3-D) reconstruction (on my side) and finite element modeling (on the engineers' side) that eventually attracted new graduate students and postdoctoral fellows.

CURRENT RESEARCH

My laboratory continues to study the effects of aging and experimental glaucoma on the load-bearing connective tissues of the monkey ONH within high-resolution, 3-D histomorphometric reconstructions of perfusion-fixed postmortem tissues. In April 2005, I made the decision to move my collaborative group to the Devers Eye Institute so as to join the glaucoma research group that Jack Cioffi, MD, and Mike Van Buskirk, MD, had built. The relocation was complicated by Hurricane Katrina. Since our arrival at Devers, however, as coprincipal investigator of two NIH R01 grants with Christopher Girkin, MD, of the University of Alabama Birmingham, Dr. Downs has extended our monkey work to human cadaveric eyes. He is also the principal investigator of an effort to implement telemetric IOP measurement in our monkey experimental glaucoma model.

In collaboration with Shaban Demirel, BScOptom, PhD, and Hongli Yang, PhD, my laboratory has a second NIH RO1 award to translate all of our 3-D histomorphometric techniques to in vivo spectral domain optical coherence tomography imaging of the monkey and human ONH. We are also collaborating with Brad Fortune, OD, PhD, who is funded by an NIH R01 to build new strategies for the in vivo assessment of the axonal physiology of retinal ganglion cells. In addition, we are working with Lin Wang, MD, PhD, who is funded by an NIH R01 award to study changes in ONH autoregulation in models of aging and monkey experimental glaucoma. I recently received a Mid-career Achievement Award from the American Glaucoma Society that supports a new research program to study the cellular mechanisms that underlie early changes to the ONH in experimental glaucoma.

CONCLUSION

The goal of our work is to build a clinical science with which to predict eye-specific susceptibility to glaucomatous ONH damage at all levels of IOP and to develop IOP-stabilizing and non-IOP-related interventions based on this science. I believe these are attainable goals, and I am deeply committed to their achievement. ❑

Section Editor Tony Realini, MD, MPH, is an associate professor of ophthalmology at West Virginia University Eye Institute in Morgantown. Dr. Realini may be reached at (304) 598-6884; realinia@wvuh.com.

Claude Burgoyne, MD, may be reached at cfburgoyne@deverseye.org.