Douglas H. Johnson, MD (1951-2007)

Douglas H. Johnson, MD, physician and scientist, died July 26, 2007, following a short battle with liver cancer. He was 56 years old. Dr Johnson was a professor in the Department of Ophthalmology at the Mayo Clinic in Rochester, Minnesota. In 2005, he was awarded the William and Betty MacMillan Professorship in Ophthalmology at the Mayo Clinic in recognition of his many scientific and teaching contributions. He served on the editorial boards for the Archives (1994-2005) and Experimental Eye Research (2004-2006). Since 1998, he served as the chair of the Scientific Advisory Committee for the American Health Assistance Foundation glaucoma section. Recently, the American Health Assistance Foundation established the Dr Douglas H. Johnson Award for Glaucoma Research. At the time of his death, he was also a member of the National Advisory Eye Council.

Dr Johnson was born April 17, 1951. He received his bachelor of arts degree in biology from St Olaf College, Northfield, Minnesota, in 1973 and his doctor of medicine degree from Mayo Medical School, Rochester, in 1977. He completed his medical internship and residency in ophthalmology at the Mayo Clinic before heading to Cambridge, Massachusetts, where he did his glaucoma fellowship at Harvard University. In 1983, Dr Johnson returned to the Mayo Clinic as a consultant in the Department of Ophthalmology, where he became full professor in 1998.

Dr Johnson fulfilled numerous challenging roles during his life: surgeon, scientist, teacher, and father. He was fascinated by the complex biology behind ocular physiology, focusing his scientific career on understanding the anatomical and biochemical factors that control aqueous humor drainage through the trabecular meshwork in the normal eye and the pathophysiologic changes within the trabecular meshwork in the glaucomatous eye. Dr Johnson realized early on that to study aqueous humor flow through the trabecular meshwork, an appropriate model was necessary. In 1987, he published his pioneering work on the ex vivo human trabecular meshwork organ culture model, a model that would enable the study of the trabecular meshwork under constant flow or constant pressure. Twenty years later, this model serves as the only human model to study cellular and molecular changes in the trabecular meshwork that follow infusion of compounds such as pressure-lowering glaucoma medications or growth factors. It has been adopted by 14 laboratories worldwide.

Dr Johnson’s passion was to understand the morphological architecture of the eye, particularly the trabecular meshwork. Whether a light micrograph or a transmission or scanning electron micrograph, he believed that the images taught us something about the function of the trabecular meshwork. Throughout his career he described similarities and differences between normal trabecular meshworks and meshworks found in primary open-angle glaucoma, pseudoexfoliation glaucoma, and pigmentary and steroid-induced glaucoma. He, along with Elke Lutjen-Drecoll, MD, of Germany, showed that the thickened tenons and sheaths within the trabecular meshwork that are hallmark ultrastructural changes in glaucoma do not cause the elevation of intraocular pressure but represent a marker of an underlying pathological process. His most recent pursuit was to describe the ultrastructural changes that follow nonpenetrating laser trabeculectomy, where regions between laser scars appear “foamy or expanded.” It was Dr Johnson’s belief that these expanded regions were areas of extracellular remodeling that helped improve fluid flow through the trabecular meshwork. He recently found similar regions located under collector channels in normal eyes, suggesting to him that the expanded juxtacanalicular regions may be the main trabecular meshwork flow areas. At the time of his death, he was characterizing these expanded juxtacanalicular regions in glaucomatous eyes, where he believed he would find pathophysiologic differences between normal and glaucomatous trabecular meshworks.

His scientific approaches drew on his deep expertise as a leading glaucoma surgeon. He was curious and wanted to know the answers to questions that mystified him in his clinical practice. He spearheaded population-based studies that addressed questions ranging from the incidence of glaucoma, the probability of blindness from open-angle glaucoma, and the probability of conversion from pigment dispersion syndrome to pigmentary glaucoma. He wanted the knowledge to best inform and treat his patients. He looked to improve his surgical skills and often tried new technologies, such as trabecular stents, to see what impact they had on fluid flow as well as the histological appearance of the trabecular meshwork.

It seemed to those who worked with him that Dr Johnson understood what is most important about doing scientific research. He understood that to be successful one must keep an open mind, ask hypothesis-driven questions, and explain the results in clear, concise language that does not exaggerate the significance of the result. To enforce this, he built a research program that used a multidisciplinary approach to study glaucoma. He innovatively used a range of skills from molecular biology, biochemistry, cell biology, gene transfer, and the clinic to investigate this important disease. He was rewarded for his efforts by having continuous funding from the National Eye Institute for 20 years.

Dr Johnson was an innovator, teacher, mentor, and friend. He was a man of great integrity and insightfulness and an inspiration to all of those he taught and with whom he collaborated. The field of ophthalmology has lost an outstanding physician and scientist, but more importantly, the world has lost a great person. He will be missed.

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