

Sharon Freedman, MD

Dr. Freedman describes the challenges of treating children with glaucoma and of balancing professional and personal responsibilities.



What is your longest time between completing a research project and publishing it?

I did a project while a glaucoma research fellow with M. Bruce Shields, MD, at Duke in 1991. I investigated the differences in the healing properties of fibroblast cells

in the eyes of children versus the elderly. The findings were very interesting, but somehow, I never finished writing up the manuscript for publication. I found the original data and presented them at Bruce's retirement scientific meeting at Yale Medical Center in the summer of 2011. I had to re-create the figures, because I could not even download the originals from the floppy disk drives on which they had been stored for 20 years. I still hope to publish the research, since I hate to shirk any responsibility, even one from the distant past.

What are the greatest challenges you encounter in treating children with glaucoma?

With the exception of those that are due to developmental or genetic problems (eg, aniridia, Axenfeld-Rieger syndrome, Sturge-Weber syndrome, or glaucoma after the removal of an infantile cataract), pediatric glaucomas mirror the types seen in adults. In addition to damage to the optic nerve, however, glaucoma in very young children can cause massive stretching of the eye itself. The cornea enlarges and develops Haab striae, which cloud, scar, and sometimes permanently distort the cornea. The eye can also elongate, causing high myopia. Ophthalmologists are in a race against time to control the IOP before some of the secondary effects of its elevation become visually significant. Moreover, if a child has asymmetrical or unilateral glaucoma, visual loss may occur not only from damage to the cornea or optic nerve but also because of amblyopia.

Many therapies that are effective in adults are less so in children. Drugs may work for one type of pediatric glaucoma but not another. In addition, side effects from topical medications are a major problem, because the drops go into the nasolacrimal system, are absorbed by the nasal mucosa, and enter the bloodstream. For example, β -blockers can affect the circulatory and respiratory

systems of a child much more seriously than in an adult. This class of medication can cause a flare in asthma symptoms, slow the heart rate, and cause exercise intolerance in children. Because their blood-brain barrier is not as well developed as adults', infants may suffer life-threatening systemic side effects after a single drop of brimonidine.

Most of the surgical options for glaucoma treatment in adults are applicable in children. Because of their different wound-healing response and the continuing growth of their eyes, however, children will often require more than one surgical intervention. Five or 10 years' survival of a glaucoma procedure sounds terrific for an 85-year-old but not a 5-year-old. Ophthalmologists who treat pediatric glaucoma must always think three steps ahead; they must preserve vision without burning bridges for interventions that they have a hunch will be needed down the line.

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FAST FACTS

- Professor of ophthalmology and professor of pediatrics and chief of the Division of Pediatric Ophthalmology and Strabismus, Duke Eye Center, Durham, North Carolina, 2007 to present
- Heed Foundation fellow and Hornaday fellow, both 1991 to 1992
- Recipient of an Honor Award from the American Association of Pediatric Ophthalmology and Strabismus, 2001
- Recipient of the AAO's Senior Honor Award, 2009
- Recipient of the Leonard B. Tow Humanism in Medicine Award, 2010
- Principal investigator for the multicenter trial of Early Treatment for Retinopathy of Prematurity (ETROP)
- Former secretary for program and current vice president-elect of the American Association for Pediatric Ophthalmology and Strabismus

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Finally, adherence to medical therapy is difficult in an adult population; imagine how much more challenging it is in a pediatric population. A caregiver must instill the drops, and some are not as dedicated as they should be. Then, there is the bane of long-term follow-up. Managing glaucoma for a year or 2 can make you feel like a hero. When your patients come back to you for 20 years, you see your successes very clearly, but you also see those for whom you wish you could have done a better job.

About which innovations in the field of pediatric glaucoma are you the most excited?

We now know that there are specific genetic defects associated with cases of aniridia and glaucoma, Axenfeld-Rieger syndrome and glaucoma, and Peters anomaly and glaucoma. We know a lot about primary congenital glaucoma, although obviously not enough yet. Along with the excitement about our growing knowledge comes an impatience to use the information clinically. One problem is the tremendous amount of phenotypic heterogeneity. For example, in one of the families in my practice, the father and the uncle have Axenfeld-Rieger syndrome, but two of the children have something that looks clinically like aniridia. Clearly, they all have the same genetic defect, but it presents itself differently from one person to the next. That is one of the challenges we are going to face as we try to go from descriptive to genetic labels for types of glaucoma and as we hope to use genetics to help predict which intervention will work or, better still, will cure the disease.

In terms of diagnostics, the advent of optical coherence tomography has allowed me to objectively learn more about the optic nerve and changes to it in children who cannot perform a visual field test. I am very excited about the iCare rebound tonometer (iCare Finland Oy), because it has a tiny tip and can be used without any topical anesthetic. Often, children will cooperate until I instill an anesthetic drop that stings, whereupon they lose their trust and tranquility. Not only can the iCare instrument measure the IOP of many children who previously could not be tested awake in the clinic, but it is also easily taught to an adult who can then successfully monitor a child's IOP at home. I do not always know what to do with these data, but in select cases, the information can help me better understand how to treat a child with glaucoma.

How do you balance a busy academic practice, research, and the life of a wife and mother?

My dad is a famous basic scientist. He was and in many ways still is my inspiration, role model, and hero. He is a wonderful, loving father, never judgmental, one of the brightest people I know and is one of the most humble. He

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had my sister and me interested in science by the time we could walk. He has not taken a salary from Duke University in the past 17 years, but at the age of 82, he still goes to work every day. He reviews manuscripts and shares ideas freely, as he believes scientists should.

I grew up thinking that I, too, would be a biochemist, but during the second half of my college career, I decided to pursue medicine instead, because I loved the shadowing I did in the clinic and in the hospital. My decision not to pursue laboratory research came at the end of my research fellowship at Duke, when I worked with Bruce Shields and Diane Hatchell, PhD. I had just given birth to my second child, and I realized that I could not maintain a laboratory and a clinical career as well as be the type of parent I wanted to be. I compromised by treating the clinic as my laboratory and leaving the basic laboratory research to others.

In my role as a wife and mother, I am fortunate to have had a lot of help. My wonderful, understanding husband is also an academic clinician, and he has made many compromises on my behalf. My wonderful parents filled in when a baby sitter was sick, took children to school when I could not, and stayed home with a sick child so that I did not have to cancel 40 appointments with patients in a clinic. I absolutely recommend "a village" to help support every working professional parent and could not have done it alone. Every time somebody has accomplished terrific things, compromises and choices have been involved. It is important to make those choices intentionally, to choose one's compromises carefully, and to set priorities.

How did you survive 2 years with the Tar Heels?

I grew up in North Carolina, and I love it here. Because I am the child of a Duke faculty member and a Duke graduate myself, the Blue Devils have my allegiance when they play the Tar Heels. I was lucky enough to be at the University of North Carolina when the Tar Heels won the NCAA basketball championship, however, so I have no problem rooting for the Tar Heels under the appropriate circumstances. ■

Dr. Freedman acknowledged no financial interest in the product or company mentioned herein.