

# George Baerveldt, MD

Dr. Baerveldt discusses innovation, the future of glaucoma surgery, and the potential of a 24-hour IOP monitor.



## 1. Why did you design the Baerveldt Glaucoma Implant?

In order to achieve lower IOPs, I decided that a larger glaucoma implant was required than was then available. The challenge was to introduce a large implant through a single quadrant. My collaborators and I overcame the problem by using a flexible material that was composed of medical grade silicone impregnated with barium and gamma irradiated to create additional bonding in the material. As a result, the device was thinner but still flexible as well as radiologically opaque. The Baerveldt Glaucoma Implant (Advanced Medical Optics, Inc., Santa Ana, CA) was designed with a straight ridge so that it could be placed between the sclera and encircling element if the patient had a previous retinal detachment as a means of further increasing the surface area.

The addition of the pars plana model was in response to a retina specialist's request. With this implant, retina surgeons can reattach traction retinal detachments that usually occur in neovascular glaucoma and use panretinal photocoagulation to decrease the neovascularization.

## 2. What prompted you to develop the Trabectome?

During my residency in South Africa, I observed children who had undergone goniotomy in the morning running around in the afternoon with no patches on their eyes. In contrast, in the adult wards, the patients who had undergone full-thickness filters usually stayed in the hospital for 10 days and had multiple complications. When I asked the senior resident why they did not perform goniotomies on adults, he said the approach did not work. This fact remained in my mind,

and, from then on, I have conducted research with various lasers in an attempt to punch holes through the trabecular meshwork.

I moved to the University of California, Irvine, in 1999 to further my research on how to remove the trabecular meshwork. I wanted to be working in Orange County, because it has a large concentration of ophthalmic device companies. After I had patented my idea, Richard Kratz, MD, of Fullerton, California, advised me to approach NeoMedix Corporation (Tustin, CA). From this collaboration, the Trabectome was developed (for more on this product's development, read "Improving Ab Interno Trabeculotomy" on page 42).

## 3. Few innovators in ophthalmology have achieved clinical success. To what do you attribute yours?

My experience with patients has always fostered my interest in developing new instruments. The individuals who had undergone multiple failed full-thickness or trabeculectomy surgeries and required a glaucoma implant stimulated me to produce an implant with a larger surface area that could be inserted through one quadrant. The children I mentioned earlier who had undergone goniotomy were a major influence on my thought process for many years.

It took decades to solve the "simple" problem of how to remove a strip of trabecular meshwork without damaging the scleral wall and the collector channels. The inventor is the only person who truly believes in his invention. It therefore takes a lot of persuasion and perseverance to find a start-up device company that will invest heavily in your idea. An extremely close working relationship is required with the company for a quality instrument to be produced.

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### FAST FACTS

- Irving H. Leopold Professor and Chair, Department of Ophthalmology, University of California, Irvine, 2003 to present
- Inventor of the Baerveldt Glaucoma Implant and the Trabectome
- Founding member of the Los Angeles Glaucoma Society and Orange County Glaucoma Society
- Honored in The Best Doctors in America, 1997 to present
- Recipient of the AAO's Honor Award and Senior Achievement Award, 1990 and 2002, respectively

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**4. What will the surgical management of glaucoma be in 2017?**

I believe that angle surgery is going to be the major player in glaucoma. There has been great interest in new procedures and devices that are directed toward the angle. The Solx Gold Micro-Shunt (OccuLogix, Inc., Mississauga, Ontario, Canada) and the iStent (Glaukos Corp., Laguna Hills, CA), the Trabectome, and the iTrack microcatheter (iScience Interventional, Menlo Park, CA), for example, are all focused on the trabecular meshwork or angle. One of these procedures or something based on them will be used as a primary surgery in the year 2017. I naturally believe that the Trabectome will be the surgery of choice.

I think that trabeculectomies will still be performed but that surgeons will rely more on glaucoma implants. I believe that newer designs, materials, and shapes will continue to enhance the excellent results obtained with large-surface implants.

I am originally from South Africa, where I have seen that patients cannot afford glaucoma medications or stop taking them because they irritate their eyes. There therefore must be a greater push for surgical interventions in third world countries. The surgery needs to be simple and should not require complicated follow-up. I feel that the Trabectome surgery fulfills this role as well as glaucoma implants with large surface areas.

**5. Would ophthalmologists make use of a 24-hour IOP monitor if it became available, and what impact would such a device have?**

There is great interest in 24-hour IOP monitors. They could be on a contact lens or a scleral shell that patients would wear. The monitors could be used yearly on all glaucoma patients to determine their exact IOPs. The other option is to place an intraocular monitor that could be read with a handheld device operated by the patient. The pressure measurements would provide ophthalmologists with an excellent idea of IOP control at various times of day and would lead to the better management of each patient.

If we could identify the actual IOP for each patient, we could definitely set a better target pressure and could easily make medical or surgical decisions for every individual. The major problem in glaucoma is patients' compliance with medical therapy. As they age, I find that patients' adherence to prescribed drug therapy decreases, which becomes a major factor for our aging population. Intraocular monitoring would be extremely helpful for these individuals. □