

Looking Back and Forward: Where Retina Has Been and Where it Might Go

As fellows complete their programs, it is important to contextualize their present situation.

**BY CHRISTOPHER J. BRADY, MD; WITH WILLIAM E. BENSON, MD, FACS;
JAY FEDERMAN, MD; AND DAVID H. FISCHER, MD**

As young retina surgeons finishing our training and about to set out on our own, it is easy to lose track of the rapid pace of development in our field. Since we began residency 5 years ago, retina surgery has undergone many advances. We have seen the introduction of new vitrectomy machines, the adoption of valved cannulas, and improved small-gauge instrumentation. Over this same time frame, medical retina saw the approval of a second anti-VEGF treatment for age-related macular degeneration (AMD), the expansion of labeling for both anti-VEGF therapies to other conditions, and a new steroid implant for several conditions. It is sometimes easy to take for granted all we have in our armamentarium when we face our most challenging patients. To gain some historical perspective, we spoke with senior faculty members of the Wills Eye Hospital Retina Service to find out their opinions on where our field has been and where it is headed.

What is the most significant development in our field that you have seen during your career?

William E. Benson, MD, FACS: By far, the introduction of pars plana vitrectomy (PPV) by Robert Machemer, MD, was the most significant development because it has saved so much vision. Prior to PPV, people with diabetic vitreous hemorrhage often had permanent vision loss. Now, most have a return to useful, if not normal, vision. Also, PPV fostered multiple innovations, such as peeling of epiretinal membranes, closure of macular holes, repair of traction retinal detachments, repair of giant tears, and the quick and easy repair of rhegmatogenous retinal detachments. Another advance is the introduction of anti-VEGF agents by David Guyer, MD, with pegaptanib sodium (Macugen, Eyetech). Prior to

the availability of anti-VEGF agents, the best treatment we could offer patients with wet AMD was to send the patient to the low vision department for counseling and support products. Now, many of these patients continue to read and drive.

Jay Federman, MD: I agree with Dr. Benson: The greatest growth has been in automated microsurgical instrumentation for vitreous surgery and direct intravitreal drug delivery. I would only add the improvements of imaging technology to the list.

David H. Fischer, MD: For me, the most significant development in our field is the training of fellows with the ability to leave fellowship fully able to manage vitreoretinal cases independently, and to have the right mental framework in terms of clinical decision-making and patient care. In the past, young retina doctors had to figure these things out for themselves after their training. This system has improved spectacularly since I first started.

Are there underrated developments or discoveries that you have seen of which younger physicians may not be aware?

Dr. Benson: I cannot think of any, but I hope that Eugene de Juan Jr, MD, still receives proper credit for inventing iris hooks. I know that when I still performed surgery, they helped me save many eyes.

Dr. Federman: As far as something concrete, no. I do think it is easy to lose sight of the incremental developments of automation within our field. These sophistications now facilitate every step of our surgery, drug delivery, and imaging down to a cellular level. This, in turn,

allows both surgical manipulations and medical decisions and interventions to be as safe as possible for the physician and patient.

Do you think we need to be concerned about unintended consequences of new technologies? For example, will over-reliance on optical coherence tomography (OCT) and other imaging modalities or widefield viewing systems hinder the development of physical examination skills?

Dr. Benson: I do not think so. What I do know is that improvements in OCT have taught humility to a lot of ophthalmologists, including me. When it first came out, I called it a test in search of a use. I hope that Carmen Puliafito, MD, a co-inventor of OCT, has forgiven me! We used to think that we could see subretinal fluid. Now, we realize that our ability was limited. I cannot imagine going back.

Dr. Fischer: I agree. Younger physicians benefit from previous technological advances. These technologies come together to yield a better ability to take care of patients. This, of course, makes us all better physicians. New technologies actually help us improve our physical examination skills. Exams or fundus images that before were confusing or complex are now simple. Technology advances the state of the art.

Dr. Federman: I agree with Dr. Fischer and Dr. Benson. I think continued development and improvement of the technologies will continue to give us a better understanding of the microscopic physical expression of the pathology we see on physical exam. In ophthalmology, we were always able to see on exam what we learned in the eye pathology lab. Now, with the continued development of better in vivo imaging, we actually have a real-time cross-sectional evaluation of our physical examination of the fundus using the slit-lamp microscope.

What do you think the next great leap forward in our field will be?

Dr. Federman: I expect several exciting developments in the near future. First, I think we will have automated drug delivery with micro-mechanical pumps. Second, I think we will see continued miniaturization through nanotechnology of automated drug delivery. Third, we will be using virtual viewing systems for surgical procedures that will allow better imaging of pathology during a surgical procedure. Finally, I think we will see the development and refinement of electrophysiological neural interface systems for neural protection, neural regenera-

"I expect we will see more biologics and different delivery options in the future."

–David H. Fischer, MD

tion, and artificial vision.

Dr. Benson: The next great leap for me and my patients will be a means of treating AMD, diabetes, and other diseases without resorting to intravitreal injections.

Dr. Fischer: I agree. When I think of what would most affect my practice and the day-to-day care of the majority of my patients, it would be long-term pharmacologic treatment for all of the chronic diseases we manage monthly or near-monthly with intravitreal injections, or not at all yet, like dry AMD. I expect we will see more biologics and different delivery options in the future.

What was an important pearl you were taught in training or early in practice that has served you well over your career?

Dr. Benson: I will mention 3. The first is from Bascom Palmer's great Ed Norton, MD (also known as "The Chief"), who always taught that we should do the right thing. The second is from one of Wilmer's premiere retinal surgeons who said, "Your problems start when the patient has a retinal detachment and 20/20 vision." One can extend this to diabetic retinopathy and other conditions. The third is from one of Wills' great leaders, William Tasman, MD, who taught us about the system of "4's and 2's:"

- 4's are patients with whom you do something *for* the eye
- 2's are patients with whom you do something *to* the eye
 - 2a: Blind, but not painful
 - 2b: Blind and painful
 - 2c: Blind and painful, but not yet suing
 - 2d: I'll let the reader figure this out.

The worst thing you can do is to convert a patient from a "4" to a "2," continuing surgery after the objectives have been achieved.

Dr. Fischer: I have been attributing that system to you, Dr. Benson! That, however, was what I was going to mention also. For some patients, you sometimes have to step back and determine whether to keep spinning your wheels in the hopes of doing something that is a 4 rather

"We are privileged to be able to use the knowledge from our vitreoretinal training to maintain and improve vision of individuals within the populations we serve."

–Jay Federman, MD

than a 2. That still holds true today, maybe more so with each new technology or therapeutic option that becomes available. There are more things that can be a 2 eye now that might have previously been left alone earlier in the disease course, and not all the eyes we treat benefit.

Dr. Federman: For me, the mantra that has served me well is "Never stop learning." We are privileged to be able to use the knowledge from our vitreoretinal training to maintain and improve vision of individuals within the populations we serve. Through continued learning we must constantly seek the answers that will allow us to provide still better care. ■

William E. Benson, MD, FACS, is a Professor Emeritus in the Department of Ophthalmology, Thomas Jefferson University School of Medicine, Retina Service at Wills Eye Hospital in Philadelphia, PA.



David H. Fischer, MD, is a Clinical Associate Professor in the Department of Ophthalmology, Thomas Jefferson University School of Medicine. Dr. Fischer is co-director of the Retina Service at Wills Eye Hospital.



Jay Federman, MD, holds many staff and faculty appointments in New Jersey, Pennsylvania, and Delaware. Dr. Federman was a co-director of the Retina Service from 1991-1999 and a director of the Research Division of the Wills Eye Hospital from 1980-1995.



Christopher Brady, MD; John D. Pitcher III, MD; and Mike Dollin, MD, are second-year vitreoretinal fellows at Wills Eye



Institute in Philadelphia, PA, and members of the Retina Today Editorial Board. Dr. Brady may be reached at christopherjbrady@gmail.com. Dr. Pitcher may be reached at johndpitcher@gmail.com. Dr. Dollin may be reached at mike.dollin@gmail.com.