Highlights of the 2007 ARVO Meeting: A Technology Perspective

Featured Article

Ryan Alfonso, MPH
Managing Editor

FT. LAUDERDALE, May 10 -- ARVO always provides a glimpse of what the future of ophthalmology has in store. The Medcompare team joined vision researchers from around the globe to learn about the latest research and clinical findings. As usual, the exhibit hall and poster sessions were well attended in spite of the beautiful Florida weather. A recurring theme throughout the talks and poster sessions was that Lucentis®, (ranibizumab) was far superior to its competition, and has potential application in a wide variety of retinal ailments where VEGF or the inflammatory process is implicated in disease etiology (e.g., diabetic retinopathy, diabetic macular edema, retinopathy of prematurity, neovascular glaucoma).

A session entitled *"The Future of Glaucoma Aqueous Shunts"*, moderated by Don Minkler, MD, and Keith Barton, MD, covered the range of new approaches to an old problem. With George Baerveldt, MD and A. Mateen Ahmed, Ph.D. in attendance, presentations on the challenges of biomaterial selection, shunt placement, and design were given to a full house. The MIDI subconjunctival shunt (made of SIBS, the biocompatible polymer coating used in the Taxus paclitaxel-eluting coronary stent) and the Glaukos iStent (drains to Schlemm's canal) were featured in separate talks. The Solx and "Camras" shunts were also discussed in detail. The Q&A period following the presentations lead to a discussion of the use of the Trabectome in co-morbid cataract patients. The conclusion was that trabeculotomies should be done prior to phacoemulsification because viscoelastics can impair visualization of the trabecular meshwork.

In a session entitled *"The Potential Role of Imaging Technologies in Clinical Trials for Non-neovascular Age-related Macular Degeneration"*, fluorescein angiography and fundus photography were reviewed in the context of geographic atrophy visualization. Importantly, fundus auto-fluorescence can really be helpful in assessing the rate of progression of dry AMD by showing irregularities in the morphology of the zone peripheral to the damaged macula. Those whose disease is likely to rapidly progress can easily be distinguished from those with relatively stable vision loss.

Wiley Chambers of the FDA presented a concept of great relevance to the clinical research community. From the FDA's perspective, there is no basis for suggesting a biomarker can be used as a surrogate for a clinical endpoint. Which is to say, "ok, so the retinal thickness has decreased 30%. Does this mean the patient can see better now?" Direct relationships between biomarkers and clinical endpoints have yet to be established for the biomarkers typically cited in research.

This same session had Phil Rosenfeld, MD of the Bascom Palmer Eye Institute discuss some computer enhanced 3D modeling they've been doing with spectral domain OCT to create 3D maps of drusen formation; a very visually appealing technique. This method enables the calculation of the net volume of drusen, but it remains unclear if the overall volume of drusen matters clinically. The topographical mapping was certainly impressive. The utility of this method may be in clinical trials to quantify disease progression, or regression in response to treatment. But again, does this biomarker mean anything in terms of a useful clinical endpoint?

Always a crowd favorite, Austin Roorda, Ph.D., from UC Berkeley's Vision Science department showed further data on the invention he and his colleagues have been working on for several years; the Adaptive Optics Scanning Laser Ophthalmoscope, or AOSLO. The foundation of this is the concept of "adaptive optics". Using image stabilization and wavefront mapping, they can correct for structurally induced aberration (using a pretty remarkable MEMS deformable mirror) and actually visualize the photoreceptor mosaic *in vivo*, in real-time, with enough resolution to clearly image individual rods and cones. They can stimulate each rod or cone individually with a pin-point of light, and even project letters of various sizes onto the retina to measure the limits of visual acuity. Over the years they have refined this technology to an amazing degree. You can see individual white cells floating by in the choroidal vasculature.

Finding a clinical application for this imaging technology and the rest of the innovations shown at this year's ARVO meeting is essential. Just how valuable is it to assess the ocular biomechanics and physiology to the degree now made possible with these technologies? Will it help define treatment options or diagnose anything with greater sensitivity? Time will tell. This is the beauty of ARVO.