

# Highlights of the AGS Annual Meeting

The latest research findings from the 24th annual meeting of the American Glaucoma Society, held February 26th to March 2nd.

**BY GEOFFREY T. EMERICK, MD**

Membership in the American Glaucoma Society (AGS) and attendance at the organization's annual meeting continue to grow. This year, almost 1,000 registrants enjoyed poster and paper presentations highlighting the latest in glaucoma research. Preceding the 2014 AGS meeting in Washington, DC, were an advocacy day and an FDA/AGS workshop on innovation in microinvasive glaucoma surgery. A full day of the annual AGS meeting was devoted to glaucoma surgery, and the following days included several symposia, roundtable discussions, and many other opportunities for attendees and presenters to share ideas and information. Some highlights of the meeting were lectures by Paul F. Palmberg, MD, PhD; George Baerveldt, MD; Janey L. Wiggs, MD, PhD; and Guest of Honor Donald S. Minckler, MD. Of the original research presentations, I have chosen several with the most immediate clinical relevance.

## TUBE SHUNT SURGERY

The use of glaucoma drainage devices continues to rise, divided primarily between the Ahmed Glaucoma Valve (New World Medical) and the Baerveldt glaucoma implant (Abbott Medical Optics). Donald L. Budenz, MD, presented the 5-year results of the Ahmed Baerveldt Comparison (ABC) Study.<sup>1</sup> Two hundred seventy-six patients with refractory glaucoma received either an Ahmed FP-7 Glaucoma Valve or a Baerveldt 350-mm<sup>2</sup> glaucoma implant. The mean baseline IOP was about 30 mm Hg. Forty percent of patients had primary open-angle glaucoma, and 28% had neovascular glaucoma. Forty-two percent had previously undergone trabeculectomy surgery.

More than 60% of patients were observed for the full 5 years. At 5 years, IOP (mean  $\pm$  standard deviation) was 14.6  $\pm$  4.5 mm Hg in the Ahmed group and 12.7  $\pm$  4.5 mm Hg in the Baerveldt group ( $P = .015$ ) on 2.1  $\pm$  1.4 and 1.8  $\pm$  1.5 medications, respectively ( $P = .34$ ). Failure was defined as an IOP higher than 21 mm Hg or lower than 6 mm Hg, an IOP reduced by less than 20% from baseline, reoperation

for high IOP, explantation of the device, or a loss of light perception. At 5 years, the cumulative probability of failure was equal in both groups at about 40%, but the reasons for failure differed. Ahmed devices tended to fail due to high IOP, requiring reoperation in 23 eyes versus nine reoperations for high IOP in the Baerveldt group. Baerveldt implants tended to fail for other reasons, including hypotony and loss of vision. A loss of visual acuity to no light perception was especially common in eyes with neovascular glaucoma: 41% in the Baerveldt group versus 20% in the Ahmed group. The investigators hypothesized that the larger surface area of the Baerveldt implant may result in lower mean IOPs.

## SUPRACHOROIDAL STENTS

Although not yet approved by the FDA, ab interno suprachoroidal stents such as the CyPass Micro-Stent (Transcend Medical) and iStent Supra (Glaukos) are the subject of active clinical investigations. Both devices are placed through a small clear corneal incision into the suprachoroidal space.

Jonathan Myers, MD, presented the results of iStent Supra placement in 80 patients who also received postoperative travoprost.<sup>2</sup> These individuals will be observed for 5 years, and half of them have reached the 2-year mark. All eyes were phakic with open-angle glaucoma.

Preoperative IOP on two medications was 20.4  $\pm$  2.4 mm Hg and, after washout, was 24.8  $\pm$  1.7 mm Hg. Mean postoperative IOP on travoprost was 12.7 mm Hg at 1 year and 11.9 mm Hg at 2 years. Travoprost was stopped temporarily at both time points, and after washout, the IOP was 16.7 mm Hg at 1 year and 17 mm Hg at 2 years. Complications were uncommon and included transient hypotony in two eyes, worsening glaucoma requiring trabeculectomy in one eye, and progression of cataract in five eyes. No other causes of decreased visual acuity were observed. Of note, 90% of eyes achieved an IOP of 15 mm Hg or less at 2 years on a single medication. The future of suprachoroidal devices appears promising.

## MACULAR IMAGING IN GLAUCOMA

Imaging in glaucoma has concentrated primarily on the optic nerve and peripapillary retinal nerve fiber layer. An examination of the macula is also important, as has been demonstrated through improvements in the resolution and interpretation of macular imaging. David Huang MD, presented data from the Advanced Imaging for Glaucoma (AIG) Study using Fourier-domain optical coherence tomography (RTVue; Optovue).<sup>3</sup> Among many other criteria, investigators examined a measure of the ganglion cell-inner plexiform layer, referred to as the “ganglion cell complex” or GCC on the RTVue and “ganglion cell analysis” or GCA on the Cirrus (Carl Zeiss Meditec). In a multivariate analysis, the most significant risk factor for progression to perimetric glaucoma was inferior hemisphere GCC thickness. Every 10 µm of decreased thickness conferred more than a two-fold increase in the risk of developing a visual field defect.

A separate study using the same database examined patients who already had perimetric glaucoma.<sup>4</sup> The most significant risk factor for visual field progression was baseline GCC focal loss volume, a measure of deviation from normal controls. The baseline overall GCC thickness was also a significant independent risk factor.

This examination, guided by optical coherence tomography, of ganglion cell loss adds significant useful information to the standard evaluation of axonal loss in the peripapillary nerve fiber layer.

## LONG-ACTING LATANOPROST

Sustained-release ocular hypotensive agents have been sought for many years with limited success. Tina Wong, MD, from the Singapore National Eye Center presented promising results of a study using liposomal latanoprost.<sup>5</sup> Six patients were given a single subconjunctival injection of 0.1 mL (100 µg) of latanoprost and monitored for 3 months. Baseline IOP was 25 to 33 mm Hg. After injection, a decrease in IOP was seen after 1 hour, and an average IOP reduction of 9 mm Hg or 30% was sustained for 3 months. No complications were observed. The investigators are hopeful that the IOP lowering will be sustained even longer, allowing for an in-office injection every 6 months instead of daily drops for prostaglandin monotherapy.

## RHO KINASE INHIBITORS

Several agents in this new class of glaucoma medication, the Rho kinase (ROCK) inhibitors, are under investigation. One of these, AR-13324 (Aerie Pharmaceuticals), inhibits both ROCK and the norepinephrine transporter. ROCK inhibitors block the contraction of trabecular meshwork cells, increasing trabecular outflow. Inhibiting norepinephrine transporter may decrease aqueous production, providing a dual mechanism of action for this medication.

Jason Bacharach, MD, presented a study of 224 patients randomized to AR-13324 or latanoprost.<sup>6</sup> Mean baseline IOP was 25 to 26 mm Hg. On day 28, mean IOP was 20 mm Hg in the AR-13324 group and 19 mm Hg in the latanoprost group, representing a decrease from baseline of 5.6 and 6.8 mm Hg, respectively. The only notable adverse event was conjunctival hyperemia, which occurred in a significant number of patients but seemed to improve over the 4 weeks of the study. Phase 3 clinical trials of AR-13324 are scheduled to begin shortly.

## FOLATE AND EXFOLIATION GLAUCOMA

Dietary factors are often of great interest to patients with glaucoma. In addition to promoting atherosclerosis, homocysteine may play a role in the development of exfoliation glaucoma. Serum homocysteine levels are greatly affected by dietary factors. Folate and other B vitamins help break down homocysteine. To further investigate their role in exfoliation glaucoma, Louis Pasquale, MD, and colleagues used data from the Nurses' Health Study and the Health Professionals Follow-up Study.<sup>7</sup>

The investigators identified 399 cases and suspected cases of exfoliation glaucoma and determined dietary vitamin intake using questionnaires. Although the intake of vitamins B<sub>6</sub> and B<sub>12</sub> was not associated with exfoliation glaucoma, the consumption of folate was. Individuals with the highest intake of folate had a 25% decreased risk of exfoliation glaucoma. Of note, about half of these health professionals were not getting the recommended daily allowance of 400 µg. Folate is found in fruits and leafy green vegetables, and the researchers suggested recommending these foods to patients with exfoliation syndrome as a possible way of decreasing their risk of glaucoma. ■

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1. Budenz DL. Outcomes in the Ahmed Baerveldt Comparison (ABC) Study after 5 years of follow-up. Paper presented at: The 24th Annual AGS Meeting; February 27, 2014; Washington, DC.
2. Myers JS, Katz LJ. Results of suprachoroidal stent and topical travoprost for reduction of IOP and medication in open-angle glaucoma. Paper presented at: The 24th Annual AGS Meeting; February 27, 2014; Washington, DC.
3. Huang D, Zhang X, Loewen NA, et al. Baseline Fourier-domain optical coherence tomography risk factors for glaucomatous visual field conversion in the Advanced Imaging for Glaucoma Study. Paper presented at: The 24th Annual AGS Meeting; February 27, 2014; Washington, DC.
4. Zhang X, Tan O, Varma R, et al. Baseline risk factors for event and trend-based visual field glaucoma progression using Fourier-domain optical coherence tomography in the Advanced Imaging for Glaucoma Study. Paper presented at: The 24th Annual AGS Meeting; March 1, 2014; Washington, DC.
5. Wong TT, Novack GD, Ho CL, et al. A pilot study of the ocular hypotensive efficacy and safety of a subconjunctival injection of liposomal latanoprost. Paper presented at: The 24th Annual AGS Meeting; February 28, 2014; Washington, DC.
6. Bacharach J, Levy B, Kopczynski C, Novack GD. Double-masked, randomized, dose-response study of AR-13324 ophthalmic solution compared to latanoprost in patients with elevated intraocular pressure. Poster presented at: The 24th Annual AGS Meeting; March 1, 2014; Washington, DC.
7. Pasquale LR, Loomis S, Kang JH, et al. A prospective study of folate, vitamin B6 and vitamin B12 in relation to exfoliation glaucoma or exfoliation glaucoma suspect. Paper presented at: The 24th Annual AGS Meeting; March 1, 2014; Washington, DC.