News in Review

COMMENTARY AND PERSPECTIVE

Study Ranks Methods to Slow Myopia

DESPITE LINGERING QUESTIONS about the causes of a burgeoning myopia epidemic, a network meta-analysis of 30 randomized controlled trials (RCTs) involving 5,422 eyes has found that more than one effective intervention exists for slowing myopia progression in children.[1] "We have clear evidence that the gold standard—simply treating children with glasses—falls far short by comparison," said coauthor Ian Flitcroft, DPhil, FRCOphth, ophthalmologist at the Children's University Hospital in Dublin, Ireland.

The study looked at 16 interventions with a treatment duration of at least 1 year. The primary outcomes were mean annual change in refraction and mean annual change in axial length—a quicker, more accurate method than refraction for assessing myopia, he said.

Effective therapies. Consistent with previous results, pharmacologic treatments were found most effective. Although high-dose atropine (1%) showed the strongest benefit among all therapies in curbing myopia progression, low-dose atropine (0.01%) was almost as effective—and had minimal side effects. "That's the real game-changer," said Dr. Flitcroft. "However, the big caveat here is that almost all the atropine studies came from 1 racial group: Asians."

In addition, 3 other approaches—orthokeratology, soft contact lenses with peripheral defocus–modifying designs, and progressive addition spectacle lenses—significantly slowed myopia progression in terms of refraction or axial length. Other interventions studied had minimal or statistically insignificant effects.

The researchers also found that Asian children appeared to benefit more from treatment than white children and that most interventions were less effective during the second year of treatment.

Robust information. In the past, most studies of myopia interventions lacked multiple head-to-head comparisons. Unlike a conventional pairwise meta-analysis, this network meta-analysis simultaneously analyzed both direct and indirect comparisons of interventions based on a common comparator, providing increased sample size and more robust information.

"It allowed us to create a single theoretical trial, ranking and comparing multiple interventions in a consistent way," said Dr. Flitcroft. In addition, the researchers performed sensitivity analysis to ensure that trials with unusually good or bad results did not skew the average and change the conclusions.

SOLUTIONS IN SIGHT? *Childhood myopia is a growing problem. A recent meta-analysis compared 16 methods theorized to slow its progression.*

Time to act? This trial is just the beginning, not the end of the story, said Dr. Flitcroft. Myopia control is an entirely new therapeutic area, he said, with no protocols or guidelines; and many questions remain about whom to treat and when, as well as long-term safety and tolerability.

However, Dr. Flitcroft challenged colleagues to consider acting sooner rather than later. "High levels of myopia lead to myopic maculopathy, one of the top 5 causes of blindness in the working-age population in the United States and other countries," he said. "And even low levels of myopia increase the risk for macular degeneration, glaucoma, cataract, and retinal detachments."

This meta-analysis now shows what's effective, he said, adding, "How effective does a treatment need to be before we use it?" —*Annie Stuart*

1 Huang J et al. *Ophthalmology.* 2016;123(4):697-708.

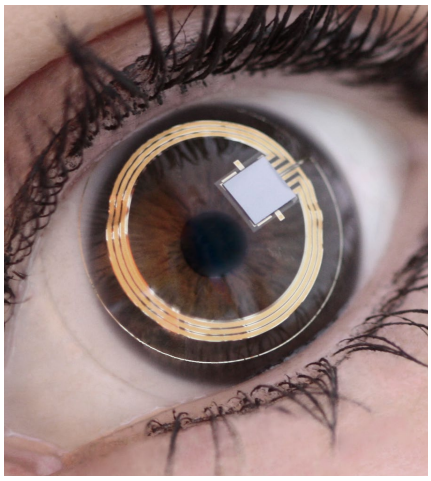
Relevant financial disclosures: Dr. Flitcroft—None.

GLAUCOMA MONITORING

Smart Lens Helps Predict Progression

GLAUCOMA SPECIALISTS HAVE LONG struggled with a diagnostic challenge: How do you get a true measure of IOP, which varies throughout the day, peaking at night and in the early morning, when patients typically are sleeping? Researchers at Columbia University Medical School reported that they have found an answer with a contact lens that has a built-in sensor (CLS).[1] This "smart lens," the Sensimed Triggerfish, detects a 24-hour IOP pattern, or "signature," which corresponds to tonometric readings made in a sleep laboratory.

Moreover, they say that IOP monitoring with the CLS—performed while patients carry out their usual routines at home—gives valuable insight into glaucoma progression. "In a single day, using the 24-hour IOP information, we can do a better job in predicting progression than multiple visits over years taking snapshot IOP measures," said lead author Carlos Gustavo De Moraes, MD, MPH. He is associate professor of ophthalmology at Columbia.



TRACKING CHANGE. *The contact lens detects change in corneal shape as a surrogate for IOP change and transmits the data to a wireless recorder.*

Study details. The prospective cross-sectional study evaluated 40 treated (using an average of 2.6 medications) open-angle glaucoma patients between ages 40 and 89. For at least 2 years before the date of CLS monitoring, subjects underwent 8 or more visual field (VF) tests. On the basis of the VF tests, half of the subjects were classified as slow progressors, and the other half as fast progressors. IOP measurements during the study period were 20 mm Hg or less, averaging 16 mm Hg.

After placing the lens in the participants, the researchers looked at individuals' IOP patterns over 24 hours. The CLS does not measure IOP directly; rather, it senses changes in the corneal curvature, which are strongly associated with IOP. As eye pressure fluctuates, the curve changes, which generates an electrical signal that

CATARACT CONCEPTS

Office-Based Cataract Surgery

Would it be safe and effective to relocate routine cataract surgeries from an outpatient surgery center to an office procedure room? Definitely so, according to a large study of Kaiser Permanente patients in Colorado.[1]

Good outcomes in more than 21,000 cases. The retrospective review of more than 21,000 consecutive cases (13,507 patients) in the HMO's Denver metropolitan area found good visual outcomes, without greater risk of adverse events, when the surgeries were performed in a minor procedure room (MPR).

"Overall vision outcomes were excellent, with mean postoperative best-corrected visual acuity of 20/28 Snellen. Surgical reintervention was required in only 0.6% and 0.7% of patients at 3 and 6 months postoperatively, respectively," the authors wrote. There were no cases of endophthalmitis, nor were there any intraoperative complications necessitating transfer to the hospital.

Efficient for surgeon, comfortable for patient. "What I've found is that it's a much more efficient setting. I think it's safer, faster, and a better experience for the patient," said coauthor David Litoff, MD, a Kaiser Permanente ophthalmologist in Lafayette, Colo.

The 15 cataract surgeons at the 3 Kaiser Permanente Colorado medical offices in the study began transitioning to office-based surgery in 2006. By 2015, more than 95% of their cataract procedures were performed in an MPR. The MPR staff typically consists of a surgical technician and 2 registered nurses certified in advanced cardiac life support (1 circulating nurse and 1 monitoring/charting nurse). No anesthesiologist is present, and no intravenous lines or injections are routinely used.

"We found that when we got the anesthesiologist out of the equation it was a little easier for the patient to have their procedure," Dr. Litoff said. "We weren't sticking the patients with any needles, we weren't starting any IVs, and we weren't starving them. They could have breakfast or a snack right before their surgery."

But sometimes more is needed. The Kaiser Permanente surgeons have found that in a small number of cases—probably under 1%—a hospital operating room and IV sedation are required because of particularly complex cataract surgeries or severe comorbidities. "So office-based surgery is not for every single case, but I would say that in the vast majority of cases with an experienced cataract surgeon, you can do it," Dr. Litoff said. *—Linda Roach*

1 Ianchulev T et al. *Ophthalmology*. 2016;123(4):723-728.

Relevant financial disclosures: Dr. Litoff—None.

is transmitted to a wireless recording device worn by the patient.

Patterns linked with progression. The researchers then assessed the relationship between the 24-hour CLS parameters and the classification of fast or slow progression as measured by VF mean deviation. They found that the parameters significantly associated with faster glaucoma progression included the number of large peaks in pressure, the troughs, the magnitude of a peak, and how quickly it occurred. The best predictors of fast progression were the number of long peaks and the mean peak ratio when patients were awake.

Dr. De Moraes noted that by the time of lens placement, the speed of progression had slowed significantly for many of the fast progressors, probably as a result of their medical therapy. Nevertheless, some patients were still progressing faster than others. For example, patients with steeper spikes recorded overnight and a greater number of peaks in the profile tended to have faster glaucoma progression. "Without information from the contact lens system, those patients would continue to progress at an undesired fast speed in the following years," he said.

Future developments. A larger study of up to 1,000 patients is now under way to further elucidate the results of this exploratory study. The Triggerfish, already available in Europe, just received FDA approval, and Dr. De Moraes predicted "in the near future, ophthalmologists will monitor IOP in a very different way than they do today."

In the meantime, he said, the study shows the importance of looking at IOP variation over 24 hours, and not just at single measurements during office hours. "With the information we can obtain through the contact lens system, we can now tailor therapy and prevent progression in high-risk patients." —*Miriam Karmel*

1 De Moraes CG et al. *Ophthalmology*. 2016; 123(4):744-753.

Relevant financial disclosures: Dr. De Moraes—Sensimed: C.

SMART TECHNOLOGY IN ACTION

Novel Method for Creating 3D Videos

"BEING THERE" HAS NEVER BEEN easier. With a couple of iPhones and the kind of virtual reality (VR) headset used in video gaming, a group in England has invented a way to make three-dimensional (3D) videos that display what otherwise can only be seen directly through a slit lamp or an operating microscope.[1]

New approach to the stereoscope concept. The group's novel technique connects 2 iPhone 4S's to a slit lamp or an operating microscope. Each of the smartphones records a video through one of the eyepieces. The 2 videos are then synchronized, with the images side by side, into a single video displayed on an iPhone, which is then placed in the VR headset for 3D viewing.

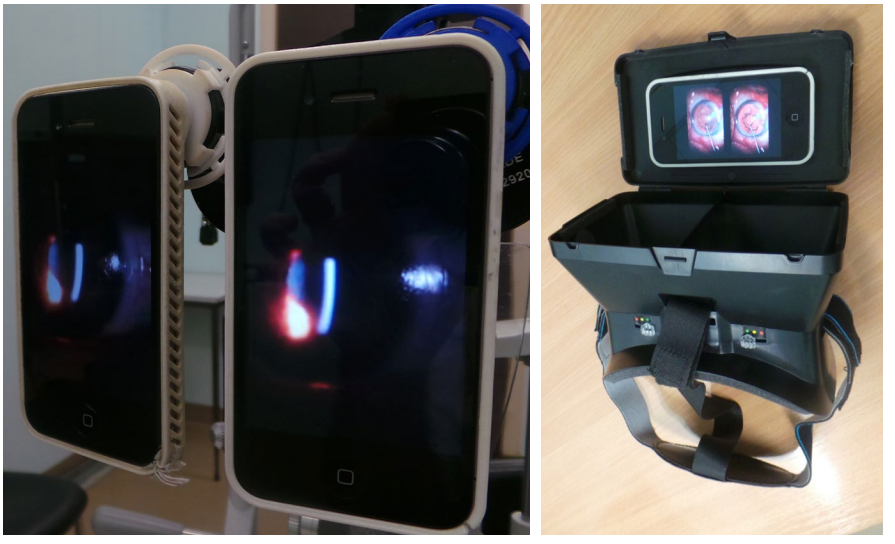
"It is the same principle as the stereoscope, which was invented in the 1800s, but using modern technology," said Kevin Gallagher, FRCOphth, a registrar in the department of ophthalmology, Royal Free Hospital, London.

Educational applications. In many situations, 3D is superior to 2D viewing, he said. For example, in cataract surgery, where there are changes in anterior depth or instrument position, 3D makes it easier to appreciate these changes in depth. "Seeing surgical techniques in 3D can convey more information than the same video in 2D," he said.

With the advent of this new technique, that information may become more accessible. "There are other systems that can produce 3D video from the operating microscope, but these systems are not cheap and not widely adopted," Dr. Gallagher said. "The idea was to have a technique that could be used by anyone without the need for expensive equipment or technical expertise." —*Miriam Karmel*

1 Gallagher K et al. *Eye*. Published online Jan. 22, 2016.

Relevant financial disclosures: Dr. Gallagher—None.



3D TOOLS. *Video recorded through a phone attached to each of the eyepieces and played through a VR headset creates a stereoscopic viewing experience.*

Kevin Gallagher, FRCOphth

Smartphones in the Clinic

Thinking of bringing smartphone photography into your clinic? Get started by reading "Smart Phoneography" on EyeWiki (www.eyewiki.org), for a primer on how to take slit-lamp images and videos with an iPhone.

For the financial disclosure key, see page 10. **For full disclosures,** including category descriptions, view this News in Review at www.eyenet.org.