

## Implantable IOP Sensor May Boost Adherence

**AN IMPLANTABLE INTRAOCULAR** pressure (IOP) sensor recently earned the European Union's CE mark after proving safe, well-tolerated, and reliable

in patients with primary open-angle glaucoma.<sup>1</sup> Moreover, evidence suggests that the Eyemate-IO (Implandata Ophthalmic Products) may improve therapeutic intervention and patient compliance.

"There is strong anecdotal evidence—based on patient self-reporting—that the experience of seeing the IOP decrease after eyedrop application leads most patients to be more vigilant in their eyedrop use," said Lars Choritz, MD, at University Eye Clinic in Magdeburg, Germany.

**Designed for indefinite implantation.** The Eyemate consists of a foldable sensor ring, which is injected through a clear-corneal incision of at least 3.2 mm and then into the ciliary sulcus during cataract surgery. IOP is recorded on a battery-powered handheld reader that stores up to 3,000 pressure readings.

During a prospective observational study, the sensor was implanted in 22 patients with controlled IOP who were scheduled for cataract surgery. Patients were instructed to measure their IOP

four times daily at self-determined intervals. They averaged 7.9 measures daily. There were few surgical complications and no unexpected adverse events related to the device, which remained in all eyes to the end point at 12 months. Complications occurred early and were attributable to the additional manipulation necessary for device implantation, compared to cataract alone.

**Good concordance.** Eyemate measurements were 3.2 mm Hg higher than those recorded via Goldmann applanation tonometry, with the difference between the two devices relatively stable over time.

The difference in readings was not unexpected, Dr. Choritz said, as "the Eyemate sensor measures absolute pressure and is unaffected by corneal parameters like central corneal thickness and rigidity."

**And a surprise.** IOP variability in each patient surprised the researchers. Whereas conventional tonometry requires the patient to sit upright and still, the Eyemate records pressures

## CATARACT

## Long-Term Impact of Phakic IOLs in Myopic Eyes

**WHILE IMPLANTATION OF AN IRIS-FIXATED PHAKIC IOL** provides excellent visual and refractive results in highly myopic adults, researchers have found that older age at time of surgery and age-related axial elongation adversely affected long-term predictability and efficacy.<sup>1</sup> Specifically, increasing axial length (AL) over time, possibly together with cataract formation, resulted in significant myopization. This caused a decrease in both corrected and uncorrected distance visual acuity (CDVA and UDVA).

"Iris-fixated phakic IOLs remain a valid treatment for highly myopic patients," said Soraya M.R. Jonker, MD, at University Eye Clinic Maastricht in the Netherlands. "But our data show the possibility of axial elongation that should be taken into account" in highly myopic patients who receive one of these IOLs.

**What happens after 10 years?** The researchers looked for refractive and visual changes in eyes that received one of two types of iris-fixated phakic IOLs from 1998 to 2016—rigid myopic (n = 379) or rigid toric (n = 81). They found mean myopization of -0.79 D, with 52% of eyes within  $\pm 1.0$  D of target.

In other 10-year findings, the researchers found that

anterior chamber depth did not change over time. However, there was a 1.09% incidence of retinal detachments in these patients, which was higher than that reported in studies with shorter follow-up periods (0.25%-0.39%).

**The cataract effect.** A subset of 24 eyes that received phakic IOLs—and later underwent explantation and cataract surgery—experienced a significant increase in AL of 0.11 mm per year, or 1.14 mm after 10 years.

After eight years, 10% of the IOLs were explanted because of cataract formation. The higher incidence of eyes requiring cataract surgery in this study is represented by post-op changes in Snellen UDVA lines. At one year postoperatively, UDVA in 51% of eyes was similar or superior to the preoperative CDVA. By the 10-year mark, that number had fallen to 30%.

While cataract formation rates were higher in this cohort than in other studies, the researchers attributed the cataract to older age and longer mean AL rather than to the phakic IOL itself. They stressed that the influence of cataract formation versus AL elongation on myopization remains uncertain.

**Patient selection.** "Applying our criteria that refractive correction should be stable for two years prior to phakic IOL implantation, patients with known progressive axial elongation (and accompanying refractive change) would not be advised to undergo refractive surgery of any kind," Dr. Jonker said. "Also, older presbyopic

during real-life activity. As such, it revealed short-term IOP variability within seconds and upon any type of external stimulus. “IOP variability was much greater than expected, with fluctuations as high as 20 mm Hg in many patients,” Dr. Choritz said.

Patients who observed the fluctuations began to experiment on their own to see what happens to their IOP during a range of activities—for example, when drinking coffee or lying down for a nap. Their curiosity appears to have fostered improved adherence, Dr. Choritz said.

“We believe that access to the wealth of data provided by the self-measurements may potentially lead to better individualization of therapy,” he added. “Future studies will show whether the increased frequency of self-measuring leads to better therapy outcomes.”

—Miriam Karmel

1 Choritz L et al. *Am J Ophthalmol*. Published online Sept. 20, 2019.

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and near-presbyopic patients are not preferred candidates for traditional monofocal phakic IOL implantation, due to their reduced accommodative capacity.”

On the other hand, healthy, near-presbyopic eyes without axial elongation could be candidates for a refractive lens exchange, but doctors should factor in the risk of a retinal detachment in highly myopic eyes.

Dr. Jonker advised refractive surgeons to inform highly myopic patients of the long-term changes in visual outcomes and the possibility of axial elongation over time after phakic IOL implantation. “Changes are likely to be very slow, but they might influence the refractive correction in the long term.”

—Miriam Karmel

1 Jonker SMR et al. *J Cataract Refract Surg*. 2019;45(10):1470-1479.

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## TESTING

# Diagnostic Ability of Metagenomic Deep Sequencing Confirmed

### IN A SMALL PROOF-OF-CONCEPT

study, researchers at the University of California, San Francisco (UCSF) have confirmed that metagenomic deep sequencing (MDS), which comprehensively samples all genomes in a clinical specimen, can be used to enhance clinicians’ ability to diagnose corneal infections.<sup>1</sup>

**Study specifics.** Researchers in the UCSF lab of Thuy Doan, MD, PhD, set out to compare MDS with standard microbiologic testing for diagnosing corneal, scleral, and conjunctival infections in nine patients. MDS was able to identify all disease-causing organisms, whether they were of parasitic, fungal, bacterial, or viral origin.

“A traditional culture favors the known organisms; MDS may be better for unexpected or atypical infections,” said Gerami D. Seitzman, MD, at UCSF. “The sequence information can give us not only the name of the organism but also outline its antibiotic susceptibility.”

**Barriers to use.** “MDS for ocular infections is still in an experimental phase; to use it, you have to be part of a treatment trial. At the present time, there aren’t any CLIAA-certified labs using it as a formal diagnostic test specifically for the eye,” Dr. Seitzman said.

Additional challenges include the following:

**Cost.** Currently, the researchers said, “the base reagent and sequencing cost of MDS for a single patient (two swabs each) range from \$300 to \$1,000 depending on the extent of parallel library processing and the type of sequencing machine used.”<sup>1</sup>

“Overall, MDS will be several times more expensive” than a standard culture, Dr. Seitzman acknowledged. “However, it becomes more cost-effective for treatment-resistant cases—that is, in



**UNEXPECTED FINDING.** In this patient, MDS detected *Auricoccus indicus*, which is not known to be associated with ocular infections, as well as *Purpureocillium lilacinum*.

cases where the diagnosis is unknown and the disease progresses.” In these instances, she noted, “We often perform numerous repeat cultures.”

**Cross-contamination.** This may prove to be the biggest challenge to solve. As Dr. Seitzman pointed out, “There is so much DNA in the air or [on surfaces] in a treatment room. MDS is such a sensitive test that may be prone to cross-contamination, even from just talking during the swabbing.”

**Bottom line.** “As the technology improves, the cost will become lower and our bioinformatic algorithms will continue to improve—and so will our ability to differentiate causative organisms from flora and background,” Dr. Seitzman said.

Eventually, it may be that MDS will not be needed to identify typical community-acquired organisms and will find its greatest benefit at referral centers where more complex or treatment-resistant ocular infections are often seen. That was the instance in this investigation, she noted. “Essentially, this study selected for unusual cases; these patients were previously treated and were referred to us because they were not doing well.”

—Jean Shaw

1 Seitzman GD et al. *Ophthalmology*. 2019;126(12):1724-1726.

Relevant financial disclosures—Dr. Seitzman: None.

See the financial disclosure key, page 10. For full disclosures, including category descriptions, view this News in Review at [aao.org/eyenet](http://aao.org/eyenet).