Future of technology for presbyopia treatment

by Maxine Lipner EyeWorld Senior Contributing Writer

AT A GLANCE

- Corneal inlays, including the newly approved Raindrop Near Vision Inlay, are among the new technologies practitioners are relying on to tackle presbyopia.
- The extended depth of focus lens option elongates the visual focal point and can provide presbyopes with a greater range of vision.
- New non-surgical treatment options for presbyopia are on the horizon; these eye drops can stimulate miosis without accommodation and are under investigation as a way to offer presbyopes near vision without compromising distance.

Physicians discuss what's on the horizon as new options for presbyopia solutions are emerging

Modern presbyopia technology is constantly evolving, with good reason, according to **Sumit (Sam) Garg, MD**, medical director, Gavin Herbert Eye Institute, University of California, Irvine, California. "Presbyopia is one of the most common refractive disorders we are presented with on a daily basis," Dr. Garg said, adding that there are an estimated 2 billion presbyopes worldwide.

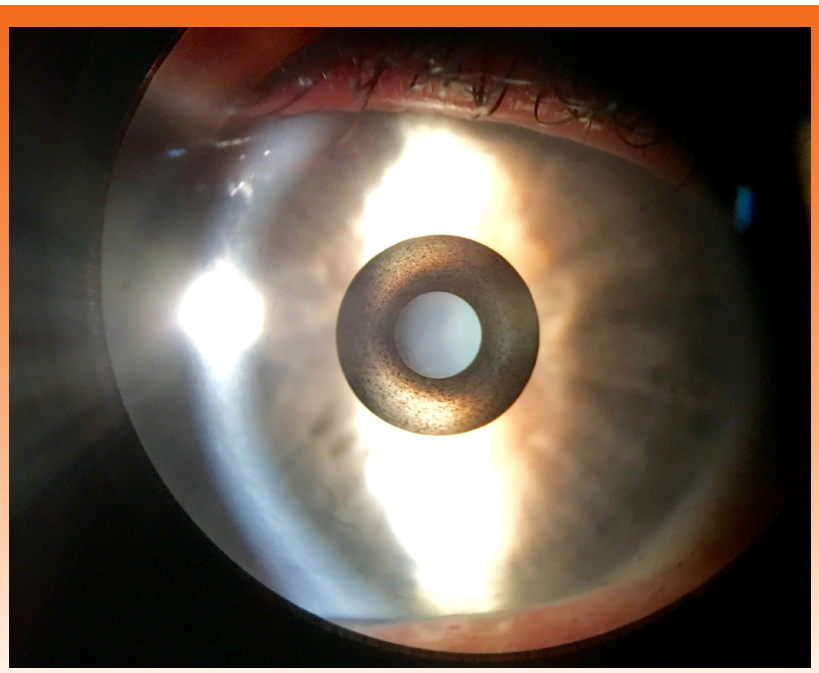
Mounting demand for technology

While spectacles or monovision traditionally have been the go-to technologies, new options are beginning to emerge, with many clamoring for better technology. Dr. Garg views this new demand for better presbyopia options as the result of the popularity of refractive surgery in the 1990s and early 2000s, with many of these patients who have now become presbyopic looking for near vision solutions with fewer drawbacks. The fact is, Dr. Garg said, while monovision works, it also has its downsides. These include decreased binocularity, fixed focus at either near or intermediate for the non-dominant eye, decreased at all distance, and an intolerance of the technology for some.

Preeya Gupta, MD, assistant professor of ophthalmology, cornea and refractive surgery, Duke University Eye Center, Durham, North Carolina, agreed that newly presbyopic patients, many of whom have already experienced the benefits of laser vision correction, are now seeking something that is safe and effective to fix their presbyopia without compromising binocular vision.

Another mainstay of presbyopia treatment is the use of multifocal intraocular lenses at the time of either cataract surgery or refractive lens exchange. "The ideal candidate for that type of procedure is someone who is presbyopic and who has some kind of refractive error," Dr. Gupta said, adding that this gives patients who have already lost accommodation and don't have clear distance acuity a better range of vision. However, there are drawbacks here also, with some patients not seeing well with such lenses due to halos or contrast vision alterations, as well as the fact that it involves intraoperative surgery, Dr. Gupta noted.

She pointed out that "for many aging patients, years prior to developing a significant cataract, vision quality isn't as good as it could be, and there are some patients who really notice this." This phenomenon has been termed dysfunctional lens syndrome.

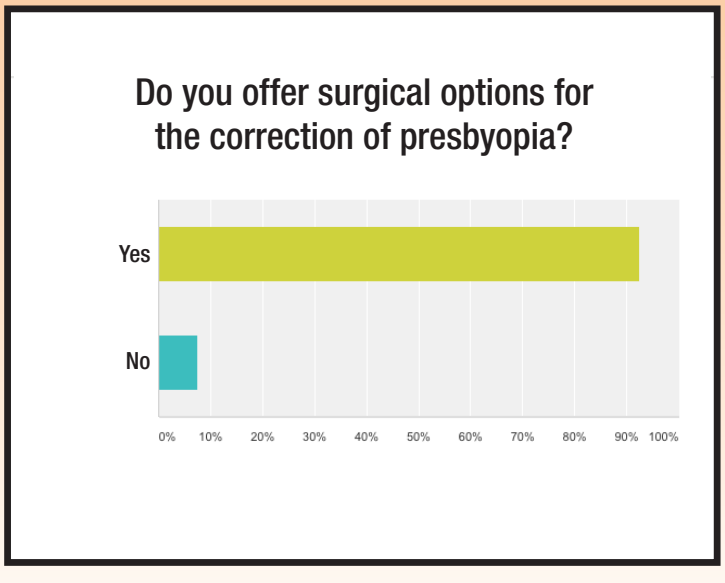


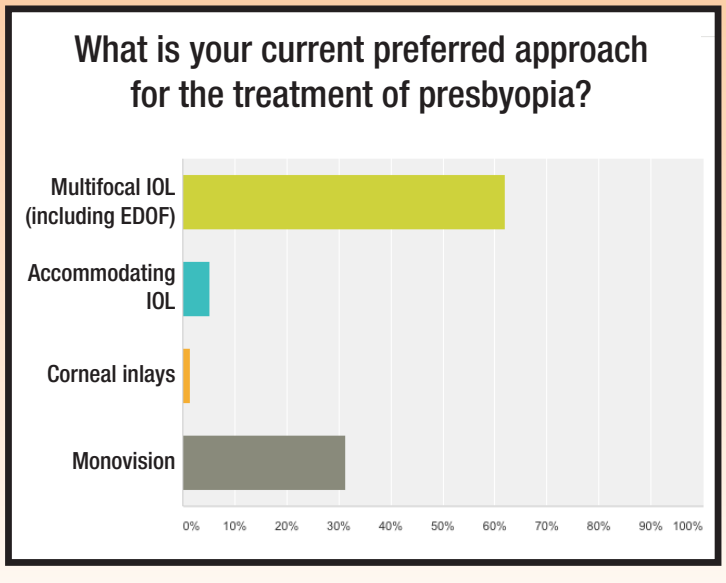
The Kamra Inlay offers near vision while maintaining distance acuity by using a small aperture to extend the depth of focus.

Source: William Wiley, MD

EyeWorld Monthly Pulse *Presbyopia treatment*

EyeWorld Monthly Pulse is a reader survey on trends and patterns for the practicing ophthalmologist. Each month we send an online survey covering different topics so readers can see how they compare to our survey. If you would like to join the physicians who take a minute a month to share their views, please send us an email and we will add your name. Email carly@eyeworld.org and put "EW Pulse" in the subject line.





Dr. Garg agreed. "I think the concept of dysfunctional lens syndrome gives us a construct to better explain presbyopia and the progression to early cataracts," he said. "Patients need to understand that what they are experiencing is real and that they have options." Openly discussing the pathophysiology is a natural opportunity to discuss treatment options, Dr. Gupta noted.

Latest options

New technology continues to emerge. Laser vision correction in the form of presbyLASIK is one option, Dr. Gupta pointed out. "That involves applying a laser treatment to induce spherical aberration to make the cornea more multifocal," she said. "There is extended range of vision." However, Dr. Gupta finds this option hasn't yet gained as much traction. "Future improvement in ablation profiles may make that more popular," she said.

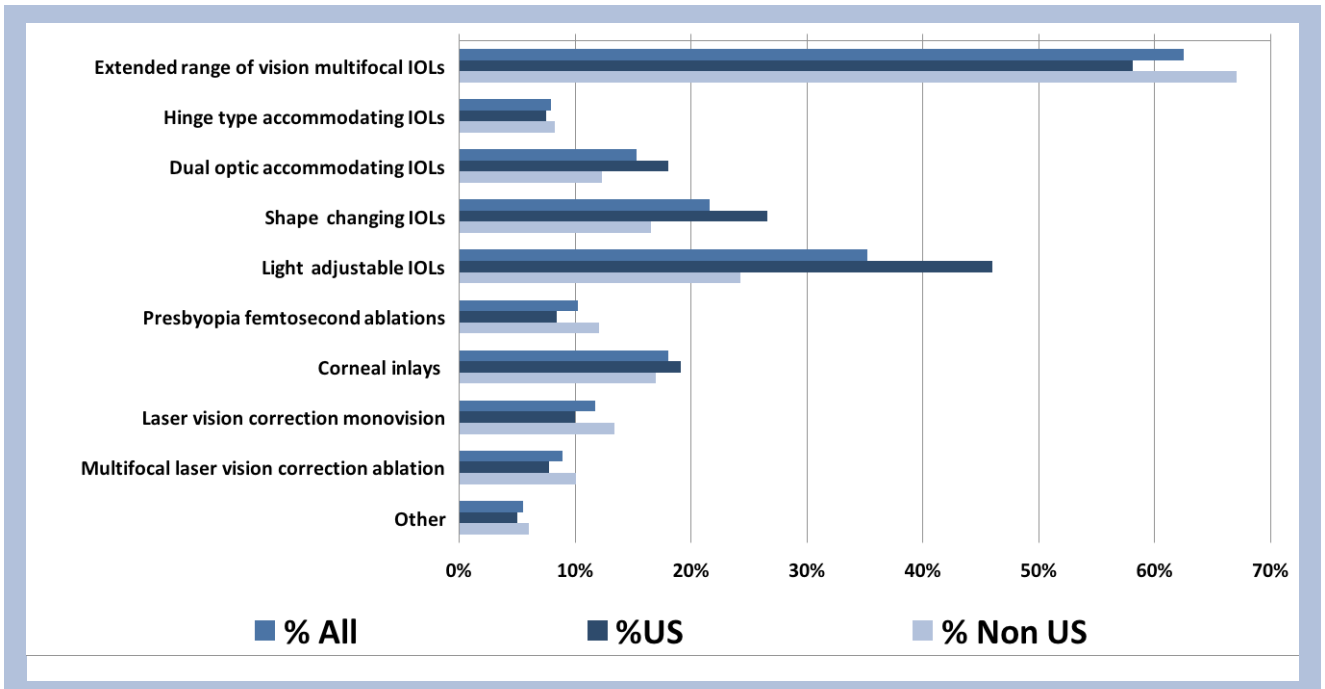
Corneal inlays are also an option for presbyopic patients. Dr. Garg said there are currently 2 corneal inlays that are FDA approved: the KAMRA (AcuFocus, Irvine, California) and, as of June 29, 2016, the Raindrop Near Vision Inlay (ReVision Optics, Lake Forest, California). With this increased availability, Dr. Garg thinks there will be more patients asking about the technology. This new addition to the armamentarium is likely to provide practitioners with another valuable tool in tackling presbyopia, he thinks. "With more than one option, we may be better able to tailor the benefits of a particular technology, depending on the patient's needs," Dr. Garg said.

The 2 corneal inlays work very differently, he pointed out. "The KAMRA works by using a small aperture to extend the depth of focus while maintaining distance vision," he explained. "The Raindrop adds a refractive lenticule (hydrogel) to change the central refractive power of the cornea."

Dr. Gupta said that also in the corneal inlay pipeline is the Presbia Flexivue Microlens (Presbia, Dublin), which doesn't rely on the pinhole

continued on page 56

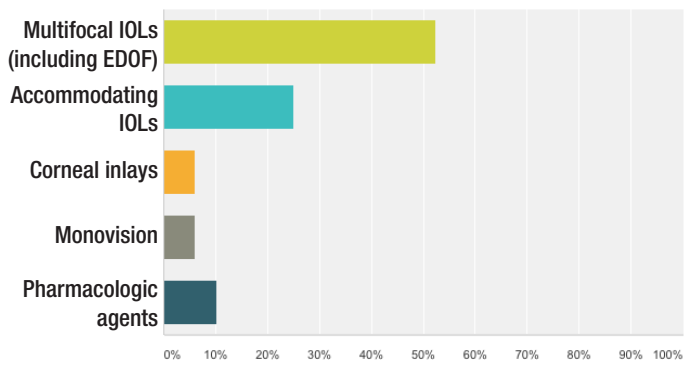
ASCRS Clinical Survey 2015



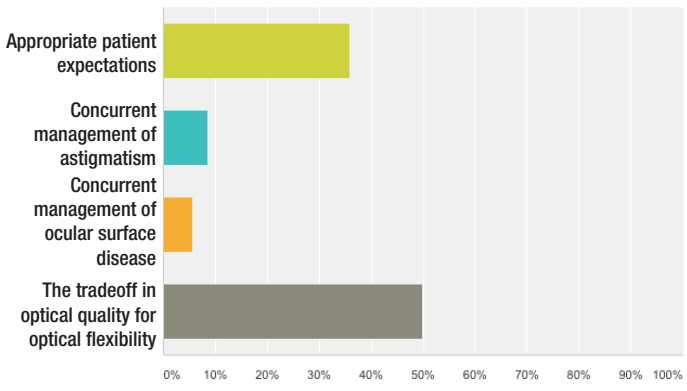
In the 2015 ASCRS Clinical Survey, members were asked, "Not withstanding FDA approval status, which of the following presbyopia-correcting technology are you are most interested in integrating in the next 5 years?" Of the respondents, 63% were most interested in integrating extended range of vision multifocal IOLs into their practice in the next 5 years. Additionally, 35% were interested in light adjustable IOLs and 22% in shape changing IOLs.

Poll size: 198

What approach to presbyopia treatment do you think holds the most promise for the future?



What do you think is the biggest obstacle to successful treatment of presbyopia?



Future continued from page 55

effect. It uses rings with powers that progress from +1.50 to +3.50 D, surrounding a central plano zone to create a multifocal cornea. As with other corneal inlays, there is a laser pocket that is created and then the inlay is applied to the cornea and centered over the pupil, Dr. Gupta explained. She likes the idea of the corneal approach in general. "I think it's a novel concept to have presbyopia correction in the cornea," she said, adding that the clinical trials have shown these to be reasonably safe and provide a number of patients with a greater range of vision.

Also in the pipeline is the FluidVision lens (PowerVision, Belmont, California). Dr. Gupta described this as an accommodating intraocular lens. This IOL relies on the eye's ciliary body to move fluid in and out of the optic and change the lens' shape. "It helps to restore accommodation so that patients can get that broader range of vision," Dr. Gupta said.

Another option is the Tecnis Symfony IOL (Abbott Medical Optics, Abbott Park, Illinois), an extended depth of focus lens. "It has been available in Europe for some time and patients are getting excellent vision with it," Dr. Gupta said, adding that such lenses can help to mitigate some of the issues that patients have with multifocals such as glare and halos or contrast vision loss. While they might not have as good near vision, patients are often happy because the quality of vision is not compromised as much and they still get reasonable near acuity, she explained.

The Tecnis Symfony lens smooths out the defocus curve by creating one elongated focal point rather than a small area of single focus with a typical monofocal lens or 2 distinct focal points for near and far, Dr. Gupta said. "It's a blend between a multifocal and monofocal," she said.

Dr. Garg views this as an exciting option. "The unique way in which the lens elongates focus will allow for extended range of vision without dead zones in the patient's vision," he said. "The optical quality is also enhanced by chromatic aberration correction, which is greater than the natural crystalline lens." Additionally, in clinical trials the IOL appeared to be more resistant to residual astigmatism and refractive misses.

Another exciting technology is the Light Adjustable Lens (Calhoun Vision, Pasadena, California), Dr. Garg said. If this works as practitioners hope, it will allow them to precisely attain and if necessary change refractive powers, while in the patient's eye. "This flexibility will allow us to try monovision and change the focal point if needed," he said. "I'm hopeful there will be a presbyopia-correcting Light Adjustable Lens platform as well."

Dr. Gupta pointed out that there are non-surgical treatments emerging for presbyopia. Currently there are 3 drops in trials: EV06 (Encore Vision, Fort Worth, Texas), PRX-100 (Presbyopia Therapies, Coronado, California), and PresbV Tears (Popayán, Colombia). "These are new pharmacological agents that stimulate miosis without accommodation," Dr. Gupta said. The issue with drops that stimulate miosis without accommodation is that patients lose their distance vision as the result of a myopic shift. In addition, they may feel as if their peripheral vision is very narrow and of poor quality until the drop effect wears off, Dr. Gupta explained. "What's interesting about all 3 drops is that preliminary results are showing that patients have improved near and intermediate vision without distance compromise," she said.

Overall, Dr. Gupta is most excited about the future of non-surgical options, but also thinks that the corneal inlay technology is continually improving. "The KAMRA is a great solution at the moment and as other types of inlays are developed, I think they will have an appeal to patients in the sense that they're very similar to the LASIK-type procedure patients are familiar with," she said. "Inlays are not overly invasive, and from the data we've seen, patients are achieving good near vision. I think this is an area that's going to expand." Dr. Gupta envisions many products in each category emerging in the future. "There isn't going to be just one corneal inlay, one eye drop, one multifocal implant, or one extended depth of focus implant. I think there is going to be a lot of innovation in this area, and it's going to continue to get better," she concluded. **EW**

Editors' note: Dr. Garg has financial interests with Abbott Medical Optics (Abbott Park, Illinois). Dr. Gupta has financial interests with Abbott Medical Optics and Alcon (Fort Worth, Texas).

Contact information
Garg: gargs@uci.edu
Gupta: preeyakgupta@gmail.com