

# A CUSTOMIZABLE MULTICOMPONENT IOL

The Precisight IOL allows fine-tuning of the initial refractive result through exchange of one of the implant's optical elements.

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## Minimizing the Need for Secondary Touchups



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A variety of IOL designs have appeared over the past decade due to high patient satisfaction, successful surgeries, and low complication rates. Even with modern cataract surgery and accurate IOL power calculations, however, patients may be faced with unwanted visual side effects and residual refractive errors that

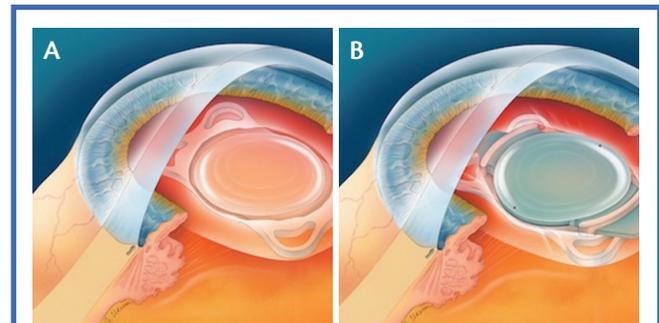
necessitate retreatment or IOL exchange.

Although PRK and LASIK can be used to enhance refractive results after phacoemulsification, recovery times can be long and patients can develop dry eye. Another option for postoperative enhancement is use of the Light Adjustable Lens (Calhoun Vision), although adjustment is feasible for only a few weeks after the procedure and cannot be changed after the lens power is locked in. Piggyback supplemental IOLs such as the Sulcoflex (Rayner Intraocular Lens) are also possible solutions for postoperative residual refractive errors; however, alignment, optical aberrations, and interlenticular fibrosis are all concerns.

The Precisight IOL (Infinite Vision Optics; Figure 1) is a foldable multicomponent IOL with an optically integrated lens system that enables customized correction of all degrees of sphere, cylinder, and multifocality during primary cataract surgery. The optical properties of the lens can be refined or reversed at any time postoperatively, thereby eliminating the need for any complex secondary touchup procedures. As the total lens spherical power is shared by both lens components, injection of the lens can be performed through small incisions, perhaps as small as 1.3 mm.

### EXCHANGE OF THE LENS COMPONENT

Recent reports have shown that multicomponent IOLs can be safely implanted and yield excellent visual outcomes;<sup>1-4</sup> the primary procedure entails risks similar to those of routine cataract surgery. The enhancement



## THE PRECISIGHT MULTICOMPONENT IOL

Figure 1. Two components comprise this IOL: a base lens that serves as a docking station (A) and an exchangeable front lens located outside of the capsular bag (B). The front lens can be adjusted repeatedly throughout patients' lifetimes, in order to add and combine presbyopic and astigmatic corrections. This can negate the need for total lens explantation.

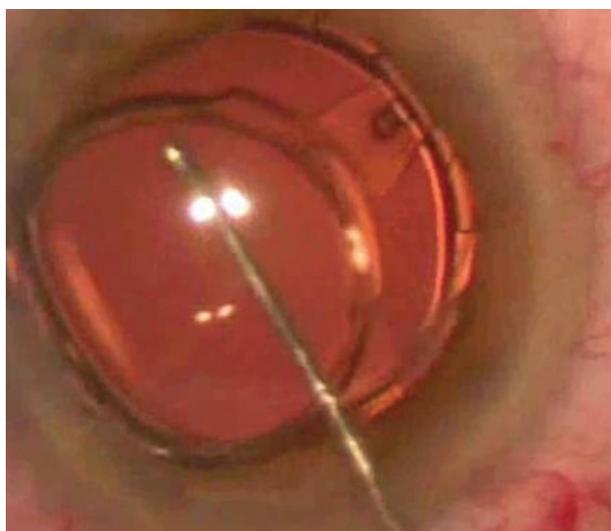
Figures courtesy of Infinite Vision

procedure, in which one lens component is exchanged postoperatively to correct residual refractive errors or allow fine-tuning of the initial refractive result (Figure 2), is quicker and simpler than cataract surgery and other types of complete IOL exchange procedures. Refractive adjustments can be made in response to short- or long-term changes in vision (eg, due to wound healing, age-related factors, capsular contraction, or development of age-related macular degeneration), and interlenticular fibrosis is not a risk in this multicomponent closed system.

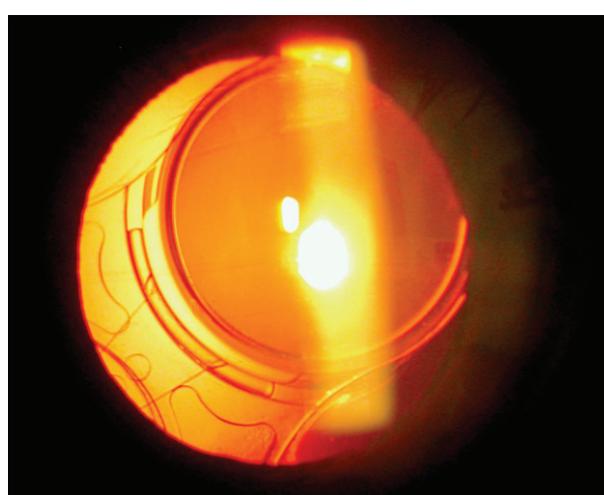
### CUSTOMIZED PRESCRIPTION

With current premium IOL cataract surgery, 25% to 50% of patients may need a refractive touchup. Refractive surprises after cataract surgery are difficult to manage, and conventional lens exchange remains a complex task. A multicomponent adjustable IOL such as the Precisight lens can provide cataract

Courtesy of Francisco Sánchez León, MD



**Figure 2.** Assembly of the muticomponent IOL during cataract surgery.



**Figure 3.** Clinical slit-lamp photo of the Precisight IOL in an adult patient. The exchangeable front lens component is mechanically secured to the permanent base lens.

Courtesy of Dimitra M. Portaliou, MD, PhD

surgeons with a customized prescription at the time of primary cataract surgery, theoretically minimizing the need for secondary touchups. Maintaining a manageable inventory of multi-component IOLs (fewer than 100) is not difficult.

Future applications of multicomponent IOLs may allow the correction of higher-order aberrations to achieve optimum vision quality and also may be useful in the management of congenital cataract (see *Precisight IOL in Pediatric Cataract Surgery*). Furthermore, the secondary IOL may be able to serve as a reservoir for sustained pharmacologic delivery of drugs for diseases such as glaucoma.

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## Precisight IOL in Pediatric Cataract Surgery



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Cataract surgery in pediatric patients presents unique challenges to the cataract surgeon as well as to the

patient's family. Because the refractive state of the pediatric eye changes with time, IOL surgery must be adjustable to

keep pace with the changing refractive status of the maturing eye. Conventional IOLs do not have this capability, and repeatedly exchanging conventional IOLs in a pediatric eye over many years is virtually impossible. The common alternative, a contact lens prescription, presents further challenges for the patient and his or her family, including constant care, lens removal, cleanliness, risk of infection, and compliance.

An appropriate solution to this problem is an adjustable IOL system that can address refractive issues commonly seen in pediatric patients, such as adjustments for changes in refractive error and astigmatism. The Precisight lens system serves all of these functions.

### ACCOMPLISHED IN TWO PROCEDURES

**Primary procedure.** During the primary pediatric cataract procedure, an aphakic correction with or without astigmatism is performed. At this time, one of the lenses is placed in the capsular bag, and the second, which is attached to the first, is situated in front of the capsulorrhexis. This allows the surgeon to surgically exchange the second lens at any postoperative time period, even several years after the primary surgery, because capsular fibrosis does not overlie the front lens haptic.

**Exchange procedure.** The secondary exchange procedure allows the correction of any spherical or astigmatic errors that develop over time. This phase of the procedure can be repeated at several time points in the pediatric patient's life if necessary.

To date, both the primary and exchange surgery procedures have been performed in adult patients (Figure 3). Spherical adjustments up to 2.00 D have been accomplished, with a residual error of 0.25 D.<sup>1</sup>



## AT A GLANCE

- A multicomponent adjustable IOL such as the Precisight can provide cataract surgeons with a customized prescription at the time of the primary cataract surgery, thus theoretically minimizing the need for secondary touchups.
- Secondary exchange can be performed in adults for refractive adjustments needed due to short- or long-term changes in vision.
- Secondary exchange procedures can be repeated in pediatric patients to meet the evolving refractive requirements of the pediatric eye.

Interlenticular fibrosis (ILF) and interlenticular opacification (ILO) have historically been major concerns when two lenses are implanted in a piggyback fashion. Infinite Vision has several proprietary design solutions to address this problem. All of our previous surgical procedures (in adults), which have more than 5 years of follow-up observation, have demonstrated no evidence of ILO or ILF.

## CONCLUSION

The Precisight lens system offers an easily adjustable IOL solution to meet the evolving refractive requirements of the pediatric eye, as the secondary exchange procedure can be repeated throughout the pediatric patient's life if necessary. ■

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