Integrating patient-specific visual needs, biometric data, and defocus curves for optimal lens selection.

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P roper IOL selection is critical to optimizing cataract surgery outcomes. To address patients' diverse visual needs and ocular conditions, we developed IOL Match, an innovative software application designed to transform the IOL selection process.

THE NEED FOR PERSONALIZATION

Cataract surgery has evolved well beyond vision restoration. With the development of advanced technology IOLs, particularly those for presbyopia correction, surgeons can now greatly enhance patients' quality of life. The growing range of available IOL options, however, including enhanced monofocal, extended depth of focus, and multifocal lenses, presents the challenge of selecting the lens that best aligns with each patient's needs and expectations. Defocus curves are emerging as an effective predictor of visual outcomes.

KEY FEATURES OF IOL MATCH
Visual Behavior Analysis

IOL Match is a free app available on smartphones and web browsers (Figure 1). It administers a detailed questionnaire on patients' visual habits, including their average waking hours and time spent on various visual tasks. IOL Match identifies patients' preferred visual distances, enabling surgeons to understand each patient's unique visual requirements. This level of analysis ensures that the chosen IOL closely aligns with the patient's daily visual demands.

Figure 1. The IOL Match interface displaying a comparison of defocus curves on a smartphone.

Biometric Integration

IOL Match incorporates essential biometric data, including corneal and retinal health, aberrometric parameters, and tear film status, to help optimize IOL selection.

Integration of Medical History

Patients' relevant surgical history, such as prior refractive and lens procedures, and the defocus curve of an existing implant in their eyes may be entered into the app. This feature can assist with matching a second implant to the first and addressing refractive issues or presbyopia correction in an eye that has already undergone surgery. Surgeons can also simulate the addition of a piggyback lens for enhanced correction.

Defocus Curve Comparison

The app can display a side-by-side comparison of defocus curves for various IOLs, allowing surgeons to assess the potential visual performance of each option.

Educational Tool

Surgeons can use IOL Match to help educate their patients about IOL options and expected outcomes. The app is also an excellent resource for new surgeons because it allows them to explore different implants and understand their unique optical properties.

Enhancing the Selection Process

By incorporating parameters often overlooked in traditional IOL selection methods, IOL Match offers multiple advantages. The app provides a thorough comparison of IOL defocus curves alongside the patient's visual habits to support the decision-making process. Additionally, by acting as a comprehensive checklist, the app minimizes the likelihood that critical factors will be overlooked during the selection process.

With visual representations of defocus curves and clear explanations of various IOL options, IOL Match also enhances patients' understanding and their engagement in the decision-making process. Additionally, the app allows them to try various monovision strategies.

Continuous Improvement and Accessibility

IOL Match is designed as a dynamic platform with continuous collaborative updates. The app is regularly updated with new implants as they become available.

REAL-WORLD APPLICATIONS

Example No. 1: Comparison of Multifocal Implants

A candidate for a refractive lens exchange wants to optimize their uncorrected intermediate visual acuity (UIVA) for working on a laptop positioned 55 to 65 cm from their eyes. IOL Match is used to compare two multifocal implants with similar indications for intermediate and near vision performance.

The app identifies which lens implant aligns more closely with the patient's desired vision range (Figure 2). This data-driven approach enables IOL selection based on the lens' functional optical performance, helping to ensure that the implant will meet the patient's specific needs and preferences.

Example No. 2: Monovision for a Patient Undergoing Cataract Surgery on Their Second Eye

A patient with a monofocal lens in their left eye is scheduled to undergo cataract surgery on their right eye. They desire improved UIVA for tasks such as cooking, which typically requires a focal range between 40 and 65 cm. IOL Match simulates monovision using a monofocal plus

Figure 2. Comparison of how the defocus curves for two multifocal IOLs align with a patient's specific visual needs.
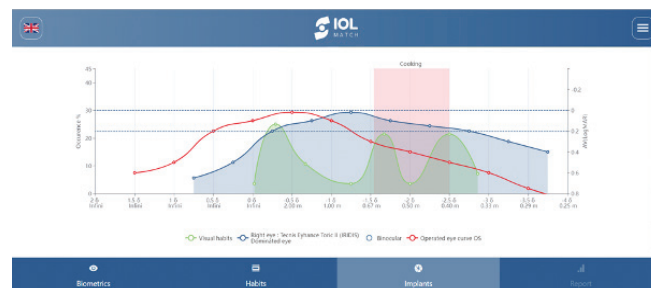

Figure 3. Simulation of monovision with a 1.25 D offset to enhance a patient's UIVA.

implant with a 1.25 D offset for intermediate enhancement. The patient is able to experience how their UIVA may improve at the desired distance and note that they will need additional correction for visual tasks within 45 cm (Figure 3).

CONCLUSION

As personalized medicine becomes the standard of care, IOL Match represents a significant step forward in cataract surgery. By offering a data-driven, patient-centric approach to IOL selection, this innovative, free application has the potential to enhance both patient satisfaction and surgical outcomes.

As the capabilities of IOL Match are expanded and refined, surgeons are invited to explore and contribute to the app's development (scan the QR code to access the app). Collaboration can help advance the field toward a future where every cataract patient receives an IOL tailored to their unique visual needs and lifestyle. ◼

TRY IT NOW

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