Until recently, eye-care professionals had to rely on office-based refraction and objective slit lamp examinations to gain insight into patients’ visual complaints. With wavescan technology, we could evaluate the quality of the uncorrected refractive state. By characterizing wavefront information into lower- and higher-order components, thereby generating a point spread function for the optical system, surgeons gained insight into how each eye focused visual information. And a generation of excimer laser treatments addressed the totality of mathematically translated wavefront information.

However, even with the arrival of such precise laser vision correction outcomes, occasional concerns about visual function quality remained.

Enter optical scatter quantification with the AcuTarget HD from AcuFocus. The brainchild of vision scientist Pablo Artal, this technology assesses the degree of scatter to evaluate visual function, diagnose the source of visual complaints and prognosticate refractive surgery outcomes.¹

We have been using the AcuTarget HD on every patient in our clinic for the past six months. It helps us understand how well they are seeing — because the number one issue that affects the quality of vision is the Optical Scatter Index (OSI). It is the signal strength that is not as good; or as Jack Holladay, MD has called it, “the dark side of vision.” A perfectly focused eye can’t see in a fog because of the poor quality of light transmission.

OPTICAL SCATTER
An optical scatter measurement of the optical system allows us to discern the uniform distribution of light over a wide region of the retina.

The AcuTarget HD objectively measures and quantifies the amount of light passing through the tear film, cornea and crystalline lens and provides an OSI grading.²
Many sources influence optical scatter in the human eye, including environmental issues (dust, water droplets, sand or pollution) and anatomical influences (tear film, cornea, crystalline lens, aqueous and vitreous).

To calculate OSI, the AcuTarget HD produces low energy laser light at a 780-nm wavelength, which projects into the eye and quantitatively analyzes the quality of the transmission of that light through the ocular media. Then, OSI is graded on a 1-to-10 scale. This information provides a real-time understanding of the projected image onto the patient’s retina and the quality of the visual image produced by the focused eye. Also, it gives us a true understanding of visual function by showing how much light transmission is lost by the phenomenon of light scatter in the optical system.

**CLINICAL SETTING APPLICATIONS**

Higher OSI scores can help quantify tear film, cornea and crystalline lens issues. This helps to identify early cataract formation, tear film inadequacy and corneal density problems. This information can be very important in assessing candidacy of patients for refractive surgery, as well as predicting the expected quality of visual outcomes following surgery. The surgeon can use the information generated by the AcuTarget HD to follow patients’ progression following surgery. Also, the surgeon can chart OSI before and after surgery to monitor the eyes’ healing process.

Conversely, normal OSI readings for patients presenting with visual complaints can indicate retinal or optic nerve issues.

**EVALUATING REFRACTIVE SURGERY CANDIDATES**

The AcuTarget HD allows for the understanding of signal strength and quality in the eye by quantifying the objective measurement of ocular scatter. With this information, we can understand quality of vision across the range of optical aberration in both general patient evaluation and screening those as potential refractive surgery candidates. The technology translates the OSI into a prediction of visual acuity potential expectation and helps to delineate and explain factors that might influence post-op visual outcomes such as corneal clarity or early crystalline lens changes.

**TEAR FILM ANALYSIS**

The AcuTarget HD measures tear evaporation rate and thus can assess tear film quality and stability — vital when evaluating patients prior to laser vision correction or corneal inlay implantation. Further, this metric can be used to assess treatment rendered to improve the tear film prior to surgery as dry eye can significantly influence postoperative vision quality and with that visual outcomes.

**KAMRA CORNEAL INLAYS**

The AcuTarget HD can provide an objective assessment of preoperative accommodative range to predict postoperative depth of focus. This measurement is critical when counseling patients on refractive surgery and setting post-op near-vision function expectations. In fact, surgeons who wish to use the recently approved KAMRA presbyopia corneal inlay (see page 14) must use the AcuTarget HD to assess for patient candidacy and to attain accurate inlay centration. This information is critical in the assessment of postoperative outcomes through comparison of depth of focus measurements.

The HD records the position of the first Purkinje image vs. pupil center to guide accurate placement and diagnose potential postoperative issues. Assessing these landmarks both pre-operatively and immediately postimplantation can assure proper corneal inlay placement.

**CONCLUSION**

The addition of the AcuTarget HD allows for a new and reliable determination of quality of vision. OSI measurements permit the surgeon to assess the patient as a candidate for laser vision correction or KAMRA inlay implantation in the treatment of presbyopia and to reinforce realistic patient expectations following refractive surgery. It helps patients understand why they see as they do and allows a metric to predict refractive surgical outcomes as well as response to treatment.

**REFERENCES**
