

# A Novel Approach to Patients' Assessment

Objective measure of the optical quality of patients' vision can improve efficiency and clinical decision making.

BY ERIC T. BROOKER, OD

Recent changes in eye care delivery have increased the pressure on physicians to see more patients in less time. It is increasingly challenging for eye care professionals to maintain quality care while making decisions under this time crunch. The solution to this problem may be in better diagnostic testing that can provide more and improved objective information to the physician about a patient's visual system.

One instrument that has the capacity to change the way we evaluate patients is the HD Analyzer (Visiometrics), which is being distributed in the United

States by Visual Performance Diagnostics. Formally known as the OQAS (Optical Quality Analysis System), the latest version of this device features improvements that can quickly capture and quantify the quality of a patient's vision.

## FUNCTIONALITY AND CLINICAL BENEFITS

The HD Analyzer utilizes a double-pass technique to provide a measure of the optical quality of patients' visual systems by assessing ocular scatter and the effect of higher-order aberrations on the light entering the eye.<sup>1-3</sup>

The HD Analyzer determines an OSI using a point-spread function, which determines how a point source of light is imaged on the retina. This index provides physicians with data about the quality of the image being formed on the retina, with a higher score indicating degradation of the quality of patient's vision.<sup>4</sup> In addition, the HD Analyzer can also be used to determine an eye's depth of focus and to assess the optical quality of the tear film in 0.5-second intervals, which allows the physician to see real-time effects of tear film evaporation on optical quality.

The clinician can use the snapshot provided by the HD Analyzer to instantly triage patients based on the results. A high OSI indicates that the patient has some form of pathology affecting the quality of vision, which is resulting in poor

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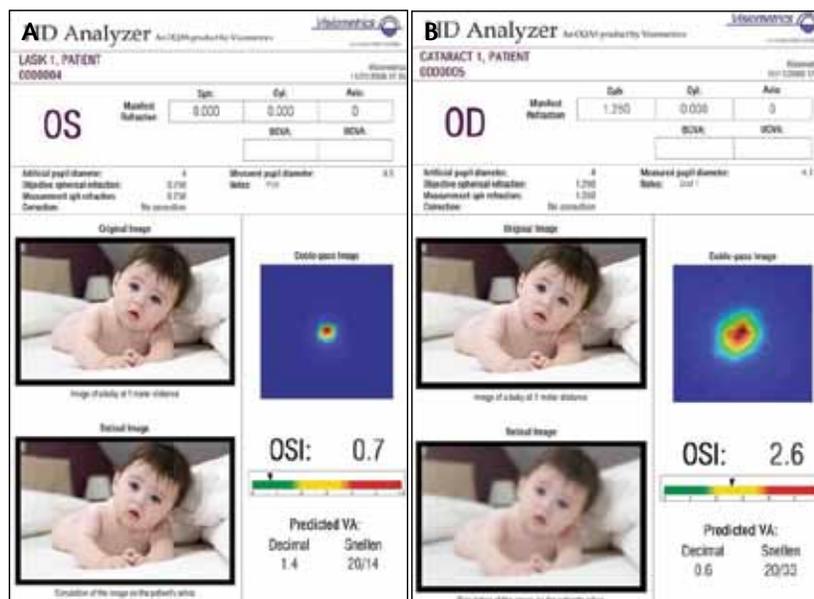


Figure 1. A patient with a perfect optical system indicated by a low objective scatter index (OSI) score (A). The image on the right (B) shows a patient with a higher OSI score, which indicates the patient perceives a poorer visual image due to pathology or distortions in the optical system.

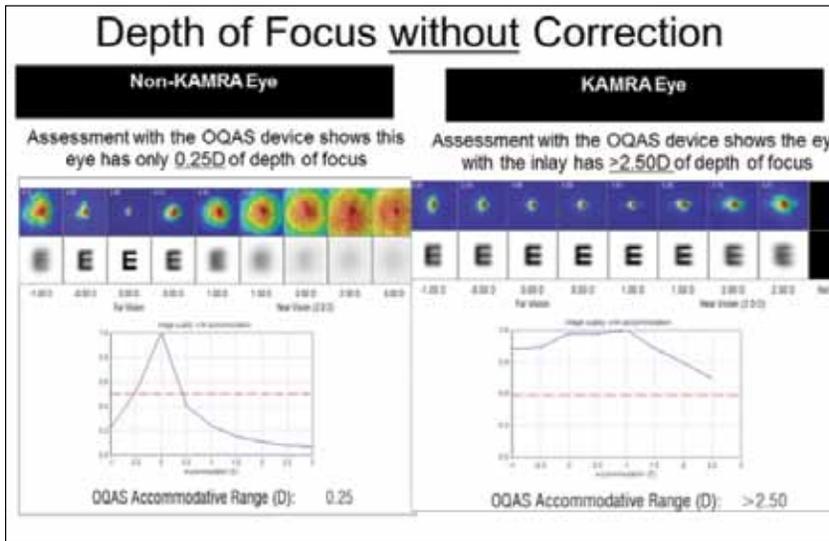


Figure 2. The image on the left demonstrates a patient with a small accommodative range in one eye (A). The image on the right (B) shows the other eye of the same patient who has undergone surgery for implantation of a corneal inlay (Kamra, AcuFocus, Inc.) and now has a much larger accommodative range.

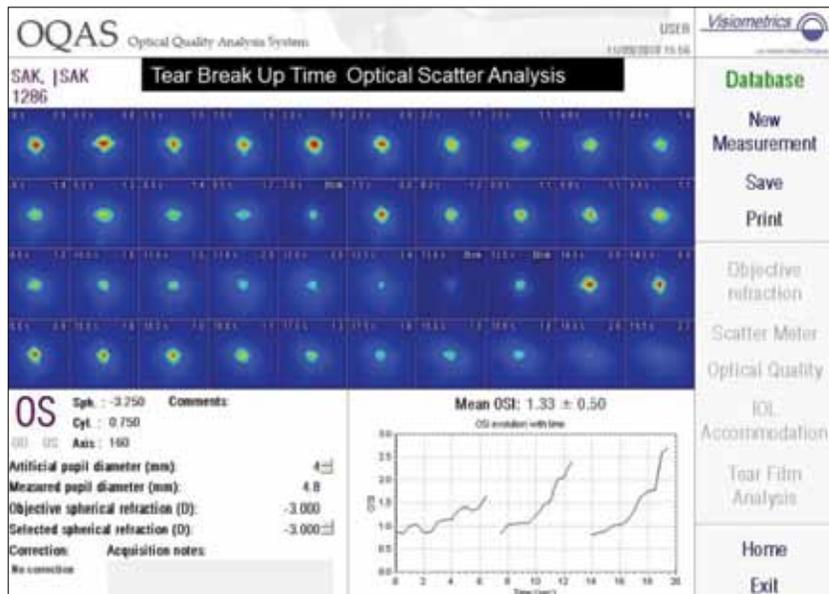


Figure 3. Demonstration of tear breakup time on the HD Analyzer. This is useful for analyzing patients' tear film and its relation to visual quality in 0.5-second intervals based on the OSI score.

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contrast sensitivity and/or visual acuity (Figure 1). This could be a tear film abnormality, a corneal disorder, or some form of cataract. If the patient has a low OSI, the clinician knows that the patient has a good quality of vision; if the BCVA does not correlate with the result (that is, it does not align with the clinical impression from the HD

Analyzer), the clinician can deduce that the problem is likely neurologically based.<sup>4,5</sup>

**APPLICATIONS**

The data output from the HD Analyzer have several potential applications in eye care.

**Depth of Focus**

Discerning depth of focus becomes more important for patients aged 40 years and older when presbyopia starts to become more common. A large depth of focus allows patients to have good quality of vision at all distances without the need for added power in their spectacles. It is beneficial for practitioners to understand patients' depth of focus when counseling patients exploring presbyopia-correcting options such as contact lenses, laser vision surgery, or lensectomy. After refractive surgery, it indicates how patients are seeing at all distances and quantifies the optical quality. For presbyopic patients who have undergone the placement of a corneal inlay, the HD Analyzer output provides an educational tool to demonstrate for the patient the improvement in his or her depth of focus. With the Kamra corneal inlay, for example, patients may have an improved depth of focus as early as 1 day postoperatively (Figure 2).<sup>6</sup>

**Tear Film Analysis**

The importance of dry eye disease and tear film analysis has increased a great deal in the last 10 years. Understanding the impact a poor tear film has on patients' vision is

invaluable. The HD Analyzer allows the clinician to see the visual quality in between each blink, and it is correlated with potential visual acuity at each time point (Figure 3).<sup>7</sup> This is ideal for analyzing patients who have fluctuating acuities due to dry eyes and correlating symptoms, because it gives confidence to the clinician in diagnosing the condition and providing an explanation to the patient.

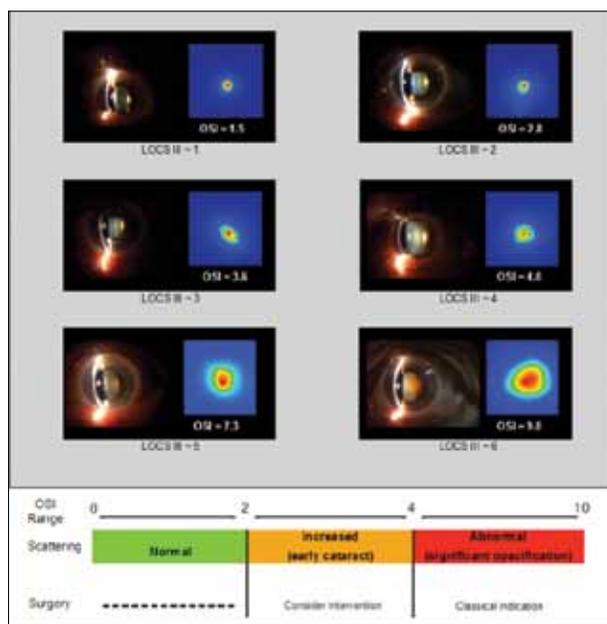


Figure 4. The relationship of OSI and cataract progression with a guide for recommended intervention below the scaled images.

### Corneal Pathology Analysis

A normal corneal structure is essential for proper light refraction, and any disturbance to its integrity can cause forward light scatter and distortions in vision. The HD Analyzer can assess even subtle alterations due to corneal edema, corneal dystrophies, degenerations, and femtosecond laser-induced stromal bed irregularities<sup>3-8</sup> and give an indication of disease progression. This is often the missing piece of information when differential diagnoses overlap.

### Refractive Surgery Screening

Refractive surgeons are continually trying to improve their screening process for permanent vision correction so as to eliminate complex cases where everything goes perfectly but the patient is still unhappy. The HD Analyzer can assist refractive centers in screening for patients who have poor quality of vision despite being fully optically corrected at the spectacle or corneal plane. Patients with high ocular scatter will not achieve good visual quality results and will most likely be unhappy with their surgical outcome, which they typically will blame on the surgeon. The HD Analyzer arms the surgeon with the necessary information to educate the patient preoperatively and avoid those who will monopolize chair time postoperatively and be unhappy.<sup>8,9</sup>

### Objective Cataract Evaluation

Assessing the current state and progression of a cataract is subjective. BCVA and a visual inspection are

the most common tools optometrists use to determine the degree of a cataract and whether the patient should be referred for cataract surgery.<sup>4,10,11</sup> Because it has the ability to demonstrate patients' visual quality and provide information about cataracts that most clinicians would grade as subclinical (ie, they are not affecting vision), the HD Analyzer removes the subjective element of this task (Figure 4). The HD Analyzer also incorporates educational demonstrations to help patients understand the impact their cataract is having on their vision.

### CONCLUSION

Many refractive surgical centers have already started using the HD Analyzer to screen patients. This supplemental test is not covered by insurance, but many patients are willing to pay out of pocket for it. Centers are successfully charging \$45 to \$90 per assessment. Because it engenders improved diagnostic capabilities and it can help educate patients, the HD Analyzer may be the next instrument to gain widespread use as a routine screening test. Yet, it is also a specialty test that helps maintain high-quality care while accelerating examination times and improving clinical decision making. In my practice, we are offering it at a lower price as a screening test for all new patients along with retinal photographs and at an increased price for specialized testing in patients with dry eyes and cataracts. ■

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