

ASSESSING THE OCULAR SURFACE

This update on in-office testing describes three currently available devices and how the author uses them in his practice.

BY KENNETH A. BECKMAN, MD



With the continued progress in anterior segment surgery, the outcomes of both cataract and refractive surgery continue to improve. These advances have raised patients' expectations. Recently, attention has focused on the ocular surface, as ophthalmologists have come to understand its tremendous impact on surgical outcomes and on patients' vision in general. Several diagnostic tests made available during the past few years allow eye care practitioners to evaluate the ocular surface. This article describes three of the diagnostic tests available and discusses how I use them in my practice.

TEAR FILM OSMOLARITY

There are many methods by which to evaluate the tear film but no consensus on which is the best. It can be quite difficult to interpret results and to monitor patients' response to therapy with many of the existing methods. For these reasons, the assessment of tear film osmolality has assumed a prominent role in the analysis of the ocular surface. An increase in tear film osmolality is a hallmark of dry eye disease (DED) and is considered to be the predominant mechanism in the development of surface damage from the disease.^{1,2} In fact, tear film osmolality has been reported to be the single best marker for DED.^{1,2}

Tear film osmolality analysis became much easier upon the release of the TearLab Osmolarity System (TearLab; Figure 1). I have multiple units in my office and could not function without them. Whereas many of the other methods of evaluating the tear film are subjective, the TearLab Osmolarity System gives me an objective number with which to grade the tear film. Not only does this feature help me to diagnose DED and assess its severity, but it also gives me a reliable tool with which to monitor patients' response to therapy. I also regularly use this system to evaluate my preoperative patients. Quite often, the tear film is overlooked prior to cataract or refractive surgery, even though its health can affect the final

outcome of the procedure. With this device, I can detect tear film abnormalities that need to be treated before proceeding with surgery. A poor ocular surface can render preoperative measurements and IOL calculations inaccurate and lead to postoperative visual aberrations and patients' complaints.

INFLAMMADRY

Ocular surface inflammation is thought to lead to damage in patients with DED. Numerous inflammatory components have been found to be elevated in DED. Among these constituents is matrix metalloproteinase 9 (MMP-9).³ InflammADry (Rapid Pathogen Screening) detects the presence of MMP-9 in the tear film. A positive test result, indicating inflammation, may suggest the



Figure 1. The TearLab Osmolarity System.



Figure 2. The AdenoPlus diagnostic test.

SINGLE-CENTER STUDY OF NOVEL CATIONIC NANOEMULSION DEMONSTRATES RELIEF FOR DRY EYE SUFFERERS

BY CONNI BERGMANN KOURY, EXECUTIVE EDITOR

In an ongoing effort to provide dry eye disease (DED) sufferers with a long-lasting, effective artificial tear option, researchers recently evaluated the efficacy of a novel lubricant, Retaine ophthalmic emulsion (OcuSoft), in subjects with moderate to severe DED.¹ The agent is a proprietary cationic oil-in-water nanoemulsion technology with novel bioadhesive properties, marketed outside the United States as Cationorm (Santen).

In the phase 4, single-center study, 42 subjects received one to two drops of the emulsion twice daily for 2 weeks. At the close of the study, subjects demonstrated significant improvements in corneal fluorescein staining. At the second visit, subjects had significantly less staining in the superior ($P = .002$), central ($P = .017$), and corneal sum regions ($P = .011$), in addition to all regions combined (ie, the score of both corneal and conjunctival fluorescein staining) ($P = .038$). Because Ousler and others have shown a link between central corneal staining and visual function, this reduction is of particular clinical relevance. To that point, study subjects experienced a 41% longer time at BCVA (time to 1 line of loss of BCVA) on the second visit compared to the first ($P = .0697$), demonstrating a correlation between reduced central corneal staining and improved visual function.

Other sign assessments included the measurement of corneal exposure. Using a video-based technology (OPI 2.0; Ora), study subjects were observed to have a 40% reduction in corneal exposure on the second visit between the predose and the postdose time points ($P = .026$), indicating an immediate-onset improvement in tear film stability.

An artificial tear that has a positive response from the patient is of the utmost importance in this symptom-driven disease. In this study, subjects noted symptomatic improvements in their ocular discomfort ($P = .0017$), dryness ($P < .001$), grittiness ($P = .0217$), and all symptoms combined ($P < .001$). Additionally, subjects reported a significant improvement in their ocular discomfort at night when they worked on a computer ($P = .044$), and while reading, watching television, and driving. Finally, the study drug was well tolerated; when prompted to select three terms that best described the drops, 45% of the subjects selected only positive descriptors (*comfortable, cool, refreshing, smooth, soothing, thick, filmy*), and only 2% selected only negative descriptors (*sticky, burning, itchy, fuzzy, stinging, irritating, gritty*).

After just 2 weeks of dosing, study subjects noticed dramatic improvements in their symptoms and quality of life, while researchers were able to tangibly measure ocular surface improvements. The therapeutic effect of Retaine on all facets of DED indicates that it is an effective option for patients suffering from the disease.

1. Ousler III G, Devries DK, Karpecki PM, Giolino JB. An evaluation of Retaine ophthalmic emulsion in the management of tear film stability and ocular surface staining in patients diagnosed with dry eye. *Clin Ophthalmol*. 2015;2015(9):235-243.

use of anti-inflammatory medications. I prefer not to perform punctal occlusion initially for an eye with significant inflammation. On the other hand, in the absence of inflammation, punctal occlusion may be appropriate treatment for an aqueous-deficient patient.

ADENOPLUS

Quite frequently, a patient presents to the office with red, irritated eyes. Although DED is frequently included in the differential diagnosis, infection should also be considered. Conjunctivitis is frequently seen by ophthalmologists, optometrists, and primary care physicians and in urgent care or emergency room settings. Because the type of infection is usually difficult to determine, it is not unusual for patients to receive a prescription for an antibiotic eye drop even though they do not have a bacterial infection. The AdenoPlus device (Rapid Pathogen Screening) is sensitive and specific for detecting the adenovirus as the source of the infection,⁴ which may significantly alter patients' management (Figure 2).

Just recently, I saw a patient with red, itchy eyes. I initially diagnosed blepharitis and felt that there was probably an allergic component to her symptoms as well. My plan was to prescribe an antibiotic-steroid drop. To my surprise, her AdenoPlus test result was positive for adenovirus. I therefore did not prescribe the fixed-combination drop, because the antibiotic was not necessary. Instead, I gave her lubricants and explained to her the expected course of this type of infection. The test result also alerted my staff to clean the examination room extensively so as not to expose other patients to this highly contagious virus.

CONCLUSION

This article discusses just three currently available devices and my thoughts on how they can be incorporated into the ophthalmology practice. More options are on the way. ■

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3. Sambursky R, Davitt WF, Latkany R, et al. Sensitivity and specificity of a point-of-care matrix metalloproteinase 9 immunoassay for diagnosing inflammation related to dry eye. *JAMA Ophthalmol*. 2013;131(1):24-28.
4. Sambursky R, Trattler W, Tauber S, et al. Sensitivity and specificity of the AdenoPlus test for diagnosing adenoviral conjunctivitis. *JAMA Ophthalmol*. 2013;131(1):17-22.

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