Ocular surface testing insights: Tear osmolarity

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Tear osmolarity testing provides an important piece of the puzzle in a comprehensive ocular surface assessment

In 2007, the International Dry Eye WorkShop (DEWS) reported that tear hyperosmolarity is a central mechanism in dry eye disease (DED).[1]

Tear hyperosmolarity, which results in ocular cell damage, can only be assessed by laboratory analysis of the tear fluid. With the point-of-care TearLab Osmolarity System, technicians use a pen-like instrument with an attached disposable test card to test osmolarity of the tears in each eye.

Detecting hyperosmolarity

This test can be particularly important in cataract and refractive surgery patients. Epitropoulos et al. reported that patients with tear hyperosmolarity had greater variability in keratometry readings, which could result in less accurate IOL power calculation before cataract surgery.[2]

Researchers have reported a predictive accuracy as great as 88.6% to 98% for tear osmolarity, as well as a sensitivity of 72.8% and specificity of 92%.[3,4] Abnormal results or inter-eye differences greater than 8 mOsm/L indicate tear film instability and the need for further investigation. However, if osmolarity is normal, it does not rule out DED or ocular surface disease. Osmolarity may fluctuate significantly if the tear film is unstable.

Integrating the test

Tear osmolarity is only one piece of the puzzle in our diagnostic process. I also rely on Placido disc imaging (Figure 1) and fluorescein staining (Figure 2). When incorporating tear osmolarity testing, physicians need to establish a protocol determining when it will be used and who will perform the test.

Our screeners ask a set of mandatory questions. Based on their responses, technicians perform tear osmolarity testing before other eye drops are instilled. This test is also performed in all patients considering cataract or refractive surgery. However, insurance only covers this test in patients who have signs or symptoms.

As I examine patients, I ask about their medical history. For example, connective tissue or certain endocrine disorders affect osmolarity and the ocular surface.

I also perform tear breakup time and lissamine green and fluorescein dye staining at the slit lamp so I can examine how the lid margin, conjunctiva, and cornea pick up the dye. I inspect the meibomian gland orifices, the meibomian glands themselves, and the lashes and lash base.

I use all of this information to make the diagnosis, sharing results with the patients. We discuss how we will work together to optimize their ocular surface before preoperative measurements are performed.

After I develop a personalized treatment regimen, I use tear osmolarity in follow-up visits to monitor treatment efficacy.

Tear osmolarity testing is valuable in diagnosing DED and assessing treatment results, whether clinicians are preparing a patient for cataract surgery or fitting contact lenses. Patients are usually grateful when we diagnose and treat their DED because they often have seen other eyecare professionals who have not been able to diagnose their condition.

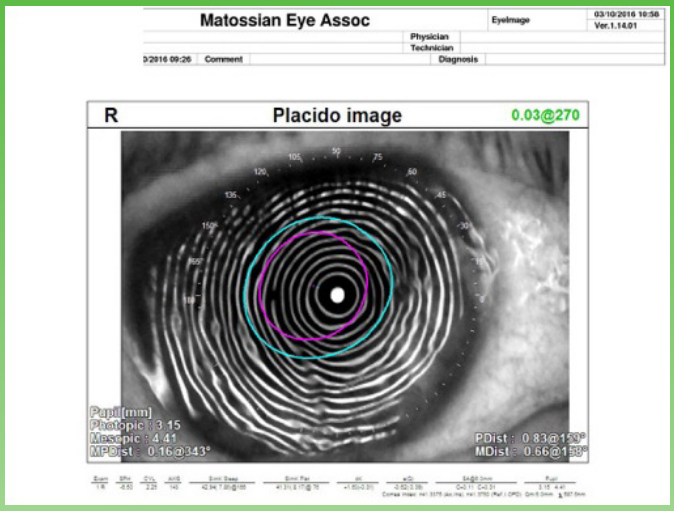

Figure 1. Placido disc image of severe OSD with irregular mires

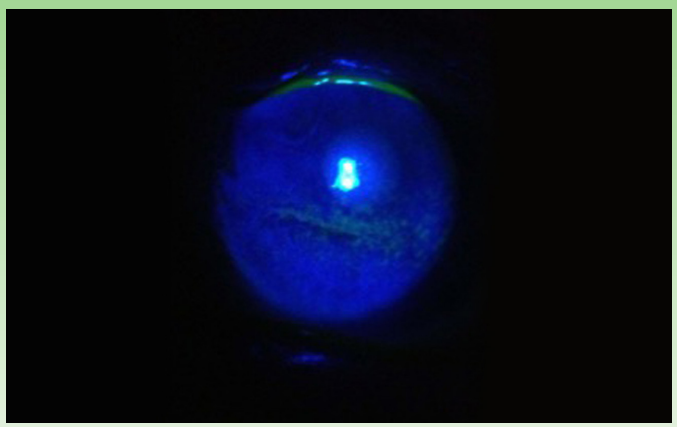

Figure 2. Slit lamp image of same patient as in Figure 1 with fluorescein staining of the cornea

References

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