

The utility of normal tear osmolarity results

Rule out dry eye, rule in the real diagnosis

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Hyperosmolarity is a well-established fundamental characteristic of dry eye disease (DED).¹

When patients have dry eye symptoms, osmolarity testing is a logical step to confirm the diagnosis, but what does it mean when the tear osmolarity test is normal in a patient with symptoms suggesting DED?

In the early days of point-of-care tear osmolarity testing, many practitioners faced with this diagnostic dilemma assumed the test was inaccurate because it went against their clinical judgment. When osmolarity testing disagreed, our early reaction was often that the machine must be wrong. We now know otherwise.

Just as tear osmolarity can help us diagnose DED, it can also help us know when to pause and look for an alternative diagnosis. My colleagues and I conducted a study exploring how osmolarity testing can help make alternate diagnoses in symptomatic patients.

Key to alternate diagnosis

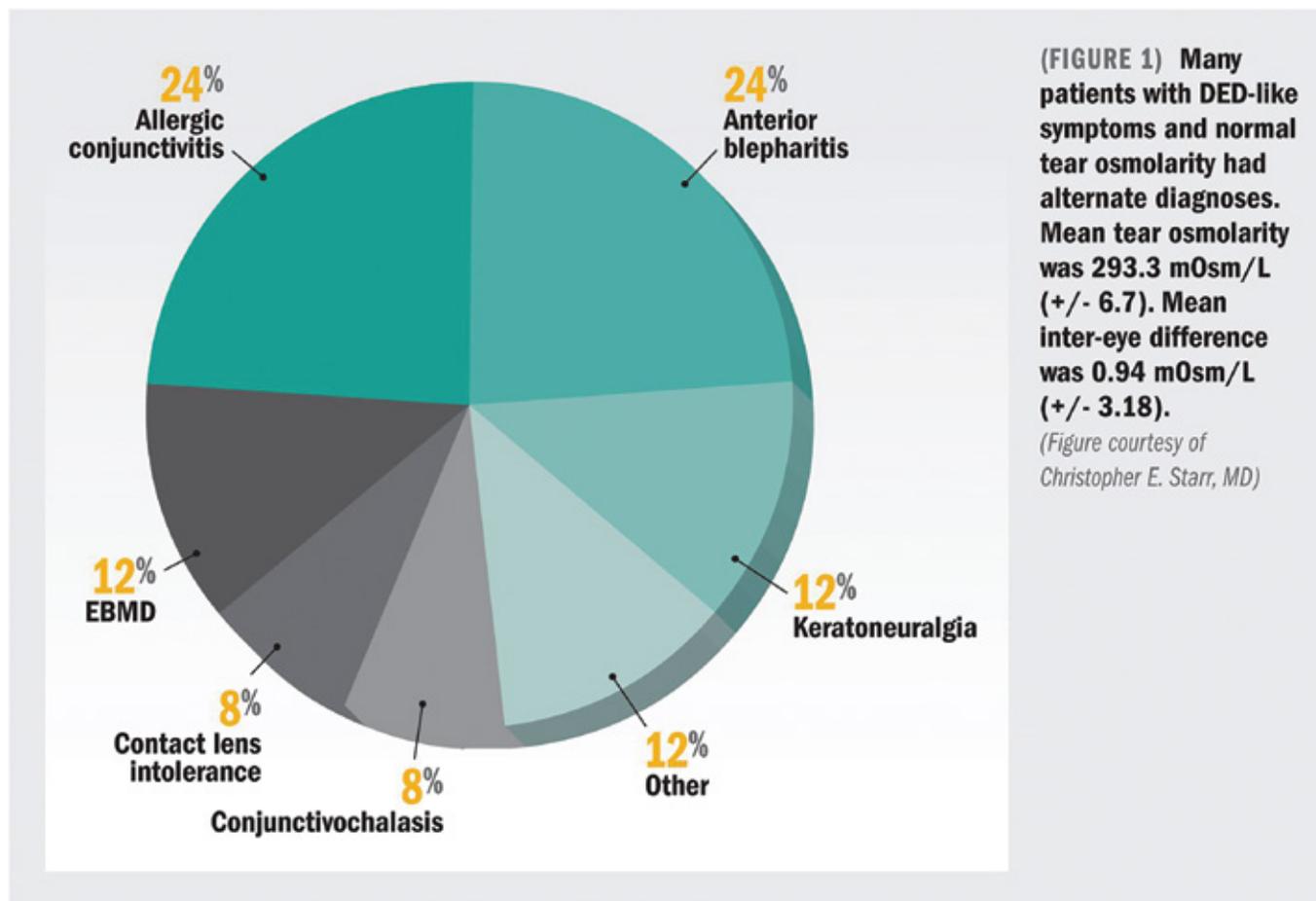
To see how tear osmolarity testing could be used in daily practice, my colleagues and I followed our standard dry eye screening protocol. Patients completed a dry eye questionnaire, and positive answers triggered our technicians to perform dry eye testing, including tear osmolarity (TearLab Osmolarity System, TearLab).

take-home

► Patient symptoms are not an effective method to diagnose dry eye, as they often overlap with other pathologies. Tear osmolarity results provide clues for alternative diagnoses.

The study group included 50 consecutive patients with normal osmolarity and at least one suggestive symptom of DED, such as ocular irritation, foreign body sensation, itching, dryness, gritty feeling, fluctuating visual acuity, or redness.²

For this study, normal osmolarity was defined as < 308 mOsm/L in both eyes and an inter-eye difference of < 8 mOsm/L.



In all 50 patients, we were able to make an alternate primary diagnosis other than DED, which explained their symptoms (Figure 1). The most common alternate diagnoses were allergic conjunctivitis and anterior blepharitis (each 24%); epithelial basement membrane dystrophy (EBMD, 12%) (Figure 2 on next page); keratoneuralgia (12%); contact lens intolerance (8%); conjunctivochalasis (8%); and computer vision syndrome/situational DED (6%). Less common diagnoses included trichiasis and cyclosporine-A treated DED.

The everyday impact of accuracy

Consider what was achieved by getting the right diagnosis--and what was avoided by not insisting these 50 patients had simple DED.

Treatment was ultimately different than what would have been prescribed for dry eye. If we assumed these patients had DED and treated them for it, they would return unsatisfied with ongoing or worsening symptoms, leading to both patient and physician frustration.

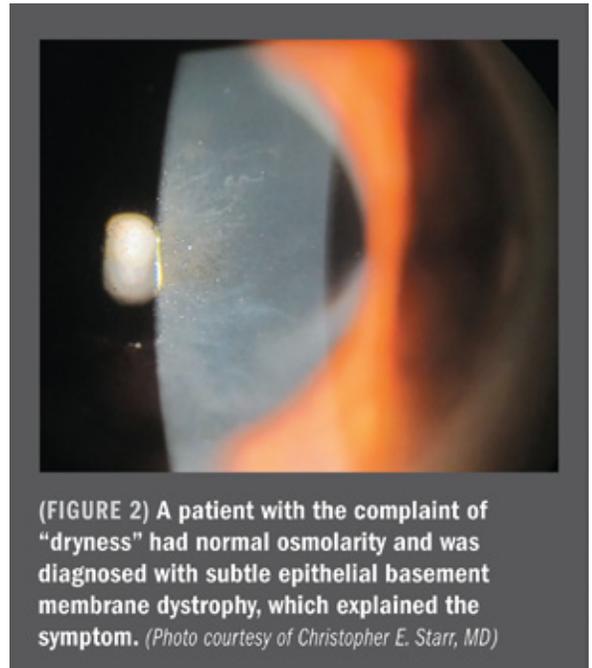
Making the right diagnosis and targeting the treatment regimen to that specific problem on the first visit leads to happier patients, more referrals, and less chair time.

Normal tear osmolarity flags me to look for something else. By trusting the normal osmolarity result and adjusting my exam accordingly, I save a lot of time by homing in on a potential alternative diagnosis to DED. I get a clearer picture of where the real pathology might be.

When the alternate diagnosis is obvious - for example, a large entropion with trichiasis causing foreign body sensation - tear testing is clearly unnecessary. When the symptoms and/or signs are subtle, which is often the case, the diagnostic value of normal or abnormal osmolarity testing increases dramatically.

The whole picture

In our study, my colleagues and I concluded symptoms are not the best feature by which to diagnose DED. They overlap too frequently with other anterior segment pathologies for this to be an accurate approach. Measuring tear osmolarity is a simple way to rule out DED so we can look for an alternate diagnosis.



In addition to tear osmolarity, other point-of-care diagnostics contribute to building a complete picture of DED severity and its subtypes, as well as to helping to rule in alternate ocular surface diagnoses. These include tear MMP-9 (InflammaDry, RPS), meibography and lipid layer thickness (LipiView, TearScience), tear IgE and lactoferrin (TearScan, Advanced Tear Diagnostics), and others.

We are now learning more about how to evaluate these tests by themselves and in combination as a basket of data. What if a patient with dry eye symptoms has normal osmolarity and a negative MMP-9 test, or normal osmolarity and elevated MMP-9?

At first glance, this might seem to add diagnostic complexity, but if you have faith in the results and follow a comprehensive diagnostic algorithm incorporating all the testing combinations, you will save time by knowing when to pause and look for alternative diagnoses.

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References:

1. The definition and classification of dry eye disease: report of the Definition and Classification Subcommittee of the International Dry Eye WorkShop (2007). *Ocul Surf.* 2007 Apr;5(2):75-92. PMID: 17508116
2. Brissette AR, Bohm KJ, Starr CE. The utility of a normal tear osmolarity test in symptomatic patients. Poster presented at: The 8th International Conference on the Tear Film & Ocular Surface: Basic Science and Clinical Relevance; 2016 Sept 7-10; Montpellier, France.