

## IRREGULAR TEAR FILM: IMPLICATIONS FOR SURGICAL PLANNING

Tear osmolarity may predict the accuracy of preoperative assessments for refractive surgery.

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Dry eye disease (DED) can affect ocular surgery. One of the most obvious ways is that undetected disease may influence how successful patients consider their procedure to have been. If they do not learn that they have DED before the postoperative period, they may blame the procedure. Fairly or not—as in most cases, there is not much correlation—

DED discovered after surgery is viewed as a complication. On the other hand, patients who receive forewarning can at least understand the nature of any potential visual symptoms.

Additionally, undetected DED is a leading cause of refractive surprises after cataract or refractive surgery. The condition can cause visual disturbances on its own, which is one potential explanation of why a refractive target was not met. A potentially more serious cause of postoperative refractive surprise is that DED may affect the accuracy of preoperative measurements, including biometry, topography, and keratometry. Inaccurate biometry can lead to inappropriate IOL power selection for cataract patients. For those with astigmatism, the wrong toric IOL power or axis of alignment can cause significant problems. In the setting of refractive surgery, the ablation pattern may be off center or inaccurate if DED affected the topography readings, and, as topography-guided LASIK becomes a more popular option, undetected DED becomes a greater cause for concern, because it leads to corrupted data and, therefore, corrupted ablation profiles.

This article focuses on how an irregular tear film can affect the results of refractive surgery.

### INSTITUTIONAL STUDY

Because irregularities at the level of the tear film appear to affect the accuracy of preoperative readings, I became curious as to the extent to which they could impede the laser's programming ability to design an accurate ablation pattern for patients considering topography-guided LASIK. This form of laser vision correction uses topography to create individualized treatment plans that eliminate the effect of aberrations at the corneal surface. The ablation pattern for topography-guided LASIK is constructed using a Placido-disc topographer with data gathered via reflection of the tear layer.

Similar to the rationale of the study by Epitropoulos et al,<sup>2</sup> my colleagues and I sought to determine if tear osmolarity could serve as an index for the accuracy of the topographic map used for ablation in eyes undergoing topography-guided

LASIK. For our study, we performed osmolarity testing on 20 patients and then evaluated whether the topographic map generated by the Wavelight Allegro Topolyzer Vario (Alcon) was accepted by the software.

Our study demonstrated that the higher the osmolarity was, the more likely the software was to reject the topographic data due to poor quality acquisition. On the other hand, the treatment plan was more likely to be accepted in eyes with a normal osmolarity score.

Based on this study, osmolarity appears to be a useful surrogate for the accuracy of preoperative data. When the topographic map is automatically approved, it means there is less need to manually override or correct the treatment plan and a higher potential to perform an accurate ablation.

### CONCLUSION

Differing measurements on the various technologies used for preoperative planning can cause confusion and complicate planning an ablation pattern for refractive surgery. Tear osmolarity testing may be useful for detecting abnormality common in both aqueous-deficient and evaporative DED. It may also serve as an index of the accuracy of preoperative assessments, which should provide surgeons with more confidence in their surgical plan and reduce the potential for postoperative refractive surprises.

My colleagues and I look forward to validating our initial findings in this institutional study that demonstrated the potential application of tear osmolarity testing for predicting the accuracy of topographic maps for constructing LASIK ablation patterns. It is perhaps too early to suggest changes to clinical protocols based on our results, but they provide an intriguing additional application of a validated diagnostic used for assessing DED. ■

1. Lemp MA, Bron AJ, Baudouin C, et al. Tear osmolarity in the diagnosis and management of dry eye disease. *Am J Ophthalmol*. 2011;151:792-798.

2. Epitropoulos AT, Matossian C, Berdy GJ. Effect of tear osmolarity on repeatability of keratometry for cataract surgery planning. *J Cataract Refract Surg*. 2015;41(8):1672-1677.

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