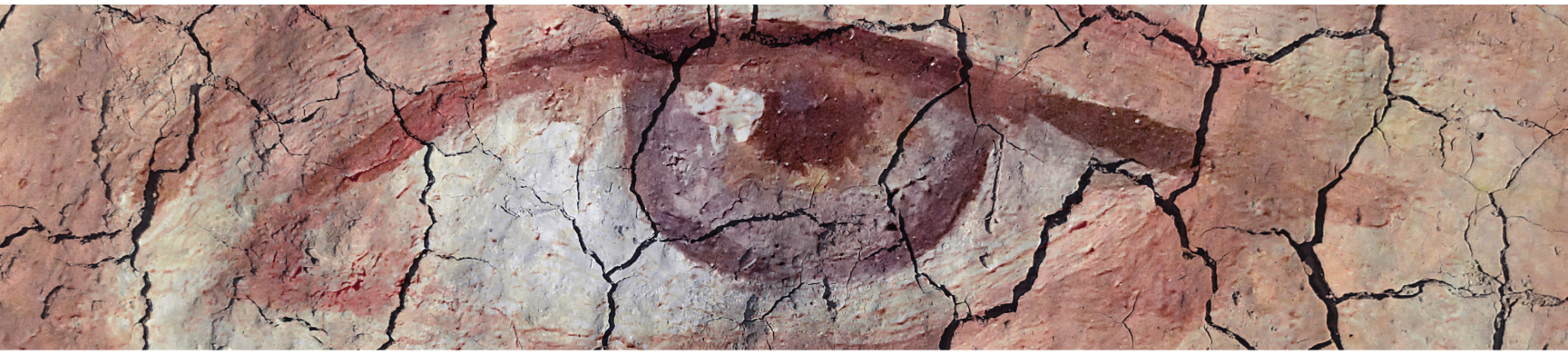

ESSENTIALS FOR DIAGNOSING OSD

Two tools in particular make economic and clinical sense.

BY SEEMA NANDA, OD

Patients consult eye care providers about dry eyes after having visited all of the drug stores within a 100-mile radius of their homes and having tried every preserved and nonpreserved tear drop, gel, and ointment available. Despite the availability of numerous diagnostic tools, a challenge lies in determining the best tests to identify dry eye disease. Optometrists must also consider how to optimize revenue generation while minimizing overhead expenses. Given these parameters, performing meibography and testing inflammatory markers in the tear film are comparatively cost-effective and informative strategies.

MEIBOGRAPHY

A cursory inspection of a patient's meibomian glands can indicate whether they are clear, turbid, inspissated, or completely atrophied. However, documenting meibomian gland dysfunction (MGD) can be subjective. The optometrist can use an ordinary slit lamp and transilluminator to view a gland, but he or she will not be able to determine whether it is partially blocked or has withered completely.

A more modern and useful approach is to use a meibography unit to evaluate the structure of the gland (Figure 1). A technician can easily perform this assessment during pretesting. Documentation becomes faster, more effective, and—most important—objective. In addition, meibography is billable with Current Procedural Terminology code 92885 by way of slit-lamp photography.

After establishing the severity of disease, the optometrist can develop a treatment plan. For a patient who has mild to moderate MGD, options include warm compresses and nutritional supplements containing gamma-linoleic acid, eicosapentaenoic acid, and docosahexaenoic acid. Handheld lid-warming devices and thermal pulsation units can be used to augment therapy in patients with moderate MGD. For those with severe MGD, intense pulsed light therapy can offer a powerful option for management.

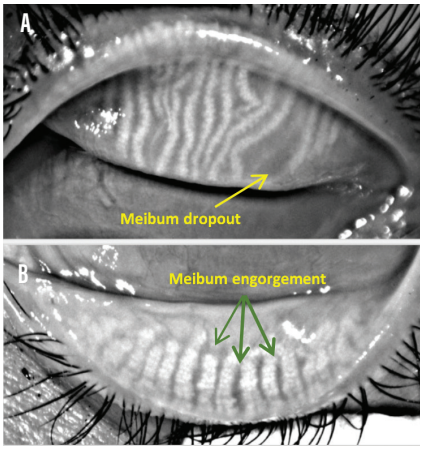

Figure 1. View of meibomian glands. Meibum dropout can be seen in the upper lid (A), while engorgement is evident in the inferior tarsus (B).

INFLAMMATORY MARKERS

Testing

The ocular surface may exhibit signs of desiccation, as indicated by superficial punctate keratitis. This disorder may be a result of poorly produced meibum from the lipid layer, or inflammation may be a contributing factor.

Matrix metalloproteinase-9 (MMP-9), an inflammatory marker in the tear film, can now be detected with a simple point-of-care diagnostic test, InflammaDry (Quidel). MMP-9 is a non-specific indicator that is primarily a proteolytic enzyme produced by stressed epithelial cells on the ocular surface.[1] Patients with ocular surface disease (dry eye) demonstrate elevated levels of MMP-9 in their tears.[1] The level of this marker in healthy eyes normally ranges between 3 and 41 ng/mL in the tear film and correlates with clinical examination findings.[1] Increased MMP-9 destabilizes the tear film and contributes directly to corneal barrier dysfunction by breaking down tight junctions and facilitating

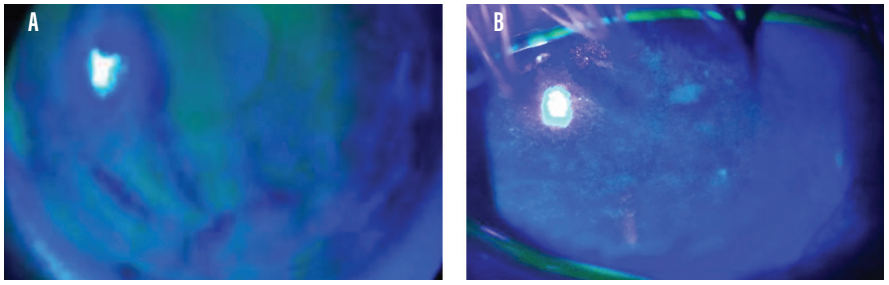

Figure 2. Anterior segment photos show smoothness of the epithelial cells in a healthy eye (A) and moderate disruption of the smooth epithelial layer in the eye of a patient with DED (B), a finding that indicates elevated MMP-9 levels in the tear film.

Photo courtesy of Quidel.

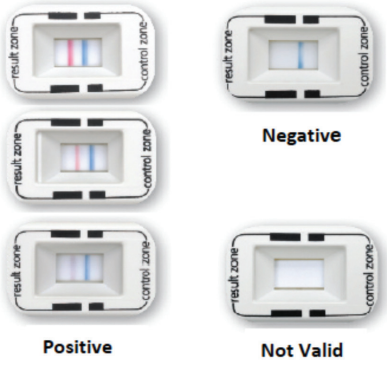

Figure 3. MMP-9 marker testing. Any intensity of a pink line is a positive result. The window on the top left shows grade 3 (a strong positive result). The middle left window shows grade 2 (a positive result). The bottom left window shows grade 1 (a weak positive result). A blue line (top right) indicates a negative result, whereas no line (bottom right) indicates an invalid test result, which means the test must be repeated.

inflammatory cell migration.[1-4] Epithelial cell disruption leads to corneal staining. Prolonged elevation of MMP-9 levels irritates corneal cells and incites epithelial cell desquamation (Figure 2).

MMP-9 testing (Figure 3) helps practitioners to detect the inflammatory component of dry eye disease (DED) and to monitor therapeutic outcomes. As with meibography, the severity of the findings guides treatment, and testing is billable with Current Procedural Terminology code 83516.

Treatment

Short-term bursts of a steroid or a nonsteroidal antiinflammatory drug can provide immediate relief. Long-term treatment, however, is essential. Options include a 0.05% cyclosporine ophthalmic emulsion (Restasis, Allergan), a 0.09% cyclosporine ophthalmic solution (Cequa, Sun Ophthalmics), and lifitegrast ophthalmic solution 5% (Xiidra, Novartis). After 6 to 8 weeks of therapy, patients should return for follow-up testing.

If patients adhere to prescribed medical therapy, MMP-9 levels should decrease over time. If they do not, then other management options should be considered. Possible modalities include, but are not limited to, cryopreserved amniotic membrane, autologous serum drops, and other biologics. More potent alternatives may be necessary to calm severe or recalcitrant DED.

CONCLUSION

As is the case with most diseases and disorders, early recognition of signs and symptoms, plus prompt diagnosis, can minimize the potential for severe or chronic complications. A comprehensive eye and vision examination with an in-depth evaluation of the ocular surface and adnexa is a good first step to take when seeing a patient who exhibits signs of ocular surface disease or complains of related symptoms. Tools to diagnose DED should be efficient and cost-effective. The newer modalities using meibography and inflammatory marker testing will aid optometrists in reaching that goal. ■

1. Li DQ, Lokeshwar BL, Solomon A, et al. Regulation of MMP-9 production by human corneal epithelial cells. *Exp Eye Res*. 2001;73(4):449-459.
2. Corrales RM, Stern ME, de Paiva CS, et al. Desiccating stress stimulates expression of matrix metalloproteinases by the corneal epithelium. *Invest Ophthalmol Vis Sci*. 2006;47(8):3293-3302.
3. Sobrin L, Liu Z, Monroy DC, et al. Regulation of MMP-9 activity in human tear fluid and corneal epithelial culture supernatant. *Invest Ophthalmol Vis Sci*. 2000;41(7):1703-1709.
4. Chotikavanich S, de Paiva CS, Li dQ, et al. Production and activity of matrix metalloproteinase-9 on the ocular surface increase in dysfunctional tear syndrome. *Invest Ophthalmol Vis Sci*. 2009;50(7):3203-3209.

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