



HOMEOSTASIS

CONTACT LENSES AND OCULAR HOMEOSTASIS



A look at how each affects the other.

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The earlier that dry eye disease (DED) is diagnosed, the better patients' quality of vision and quality of life will be over time. Being proactive in your diagnosis of DED can improve your patients' ocular comfort and thus contact lens-wearing time for those who use this form of vision correction. It's therefore important to understand how a prosthetic device such as a contact lens constantly disrupts the balance of the tear film.

A LOSS OF BALANCE

The definition of DED has evolved over the years. It was first defined as a multifactorial disease in 2007 by the Tear Film and Ocular Surface Society's Dry Eye WorkShop (TFOS

DEWS).¹ After 10 years of extensive research, this group published the TFOS DEWS II report, which updated the definition as follows:

*Dry eye is a multifactorial disease of the ocular surface characterized by a loss of homeostasis of the tear film, and accompanied by ocular symptoms, in which tear film instability and hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities play etiological roles.*²

The concept of lost balance is something likely to resonate with any clinician who has observed rapid tear break-up times (TBUTs) in dry eye patients.

HOMEOSTASIS CRASH COURSE

The term *homeostasis* describes a state of dynamic equilibrium in the

body with respect to its various functions and the chemical composition of its fluids and tissues. Homeostasis is found in all systems in the body, not only in the tear film and ocular surface. It is how bodies regulate core temperature and blood glucose levels and how blood remains oxygenated.

The body's systems work together to maintain balance. A shift or disruption in homeostasis may prevent normal functioning. In a patient with DED, the body is no longer able to regulate homeostasis, and the tear film becomes unbalanced. Hyperosmolarity is a key indicator of this lost balance. If dysregulation of the tear film continues, inflammation develops, as demonstrated by corneal and conjunctival changes, vital dye staining, meibomian gland dysfunction (MGD),



AT A GLANCE

- ▶ **Homeostasis describes a state of dynamic equilibrium in the body with respect to its various functions and the chemical composition of its fluids and tissues.**
- ▶ **In a patient with DED, the body is no longer able to regulate homeostasis, and the tear film becomes unbalanced.**
- ▶ **Once identified, DED, resultant contact lens discomfort, and contact lens-induced dry eye can be treated to improve patients' ocular comfort and tear quality and reduce the odds of their discontinuing contact lens wear.**

and elevated levels of cytokines such as matrix metalloproteinase 9.

The tear film is dynamic, constantly changing its composition to protect the ocular surface. The eye remains open during waking hours, and the body acts to maintain its moisture. Contact lens wear disrupts this environment.

CONTACT LENSES AND THE OCULAR SURFACE

According to Gullion et al, contact lens wear destabilizes the tear film, as evidenced by decreased tear breakup time (TBUT) soon after lens insertion.³ Placing a contact lens on the eye's surface disrupts homeostasis by splitting the tear film into a prelens tear film (ie, the tear layer on top of the contact lens' front surface) and a postlens tear film (ie, the tear layer between the ocular surface and the back surface of the contact lens). A contact lens is about 100 μm thick, whereas the tear film is between 5 μm and 7 μm thick on average.⁴ Disrupting the tear film with a contact lens can produce biochemical changes that may decrease TBUT. These changes in homeostasis may result in hyperosmolarity and, ultimately, DED.

In one study, 50% of all lens wearers reported experiencing ocular dryness and discomfort at the end of the day.⁵ What's more, 25% to 30% of all contact lens wearers ceased lens wear at some point, sometimes temporarily

but sometimes permanently.⁵

TFOS DEWS convened a group of thought leaders in the areas of contact lenses and DED to study the sources of contact lens-related discomfort.^{6,7} Patients who develop signs and symptoms of DED only after beginning contact lens wear are likely experiencing contact lens-induced dry eye (CLIDE). Risk factors include female sex, young age, poor tear quality and quantity, allergies, medications, dehydration, smoking, and alcohol consumption.

RESTORING BALANCE

Once identified, contact lens-related discomfort, CLIDE, and DED can be treated to improve patients' ocular comfort and tear quality and to minimize the risk of contact lens dropout. Healthy tears make for happy patients. Following are four ways you can help patients restore homeostasis.



No. 1. Artificial Lubricants

The instillation of preservative-free lubricating drops before contact lens insertion and during lens wear can improve ocular comfort both initially and throughout the day. Be sure to instruct patients to avoid drops containing benzalkonium chloride.



No. 2. Lens Materials

Changing a patient's contact lens replacement schedule is a common strategy for combatting ocular discomfort. New technology is challenging the status quo. The Bausch + Lomb Infuse daily disposable lens (Bausch + Lomb) features ProBalance Technology that infuses the lens with moisturizers essential to maintaining ocular surface homeostasis.⁸



No. 3. MGD Therapy

In a majority of patients, DED is related to evaporative disease and MGD. It is therefore critical to evaluate the health of the meibomian glands of all contact lens-wearing patients at each evaluation.

Improving gland health through the use of heat, daily lid cleansing, and supplementation is a good starting point. The duration of heat treatment matters. Beaded microwavable heat masks are generally effective for mild MGD, but patients with moderate to advanced MGD need daily treatment with masks that provide a longer duration of moist heat such as those offered by Eye Eco. Supplementation with a triglyceride form of an omega-3 fatty acid can also effectively thin meibomian gland secretions.

Cleansing the lids aids in reducing the biofilm. Hypochlorous acid cleansers such as Avenova Antimicrobial Eyelid and Lash Cleanser (Avenova), Zenoptiq 0.01% Hypochlorous Acid Spray (Focus Laboratories), and SteriLid Antimicrobial Eyelid Cleanser (TheraTears) are preferable to detergent-based cleansers for daily use.

If the aforementioned treatments fail to increase the number of meibomian glands secreting clear meibum, consider thermal pulsation, gland expression, and even intense pulsed light therapy. Blackie et al found an increase in the number of functional meibomian glands and an increase of up to 4 hours

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in comfortable contact lens wear time after a single in-office treatment with the LipiFlow Thermal Pulsation System (Johnson & Johnson Vision).⁹



No. 4. Treating Inflammation

Vital dye staining is an essen-

tial part of a contact lens evaluation. The application of fluorescein and lissamine green dyes aids the detection of surface inflammation.

For affected patients, consider initiating therapy with cyclosporine ophthalmic emulsion 0.05% (Restasis, Allergan), cyclosporine ophthalmic solution 0.09% (Cequa, Sun Ophthalmics), 0.1% cyclosporine A (Cyclasol, Novaliq), cyclosporine 0.1% ophthalmic emulsion PF (Klarity-C Drops, ImprimisRx), or lifitegrast ophthalmic solution 5% (Xiidra, Novartis) to decrease inflammation and help restore homeostasis to the ocular surface.

“THE TEAR FILM IS DYNAMIC, CONSTANTLY CHANGING ITS COMPOSITION TO PROTECT THE OCULAR SURFACE. ... CONTACT LENS WEAR DISRUPTS THIS ENVIRONMENT.”

ACT EARLY TO AVOID PROBLEMS

Any compromise of the cornea in contact lens patients increases their risk of decreased visual acuity and quality of vision and increases their risk of infection. Actively looking for tear film changes facilitates early detection and treatment that can keep patients comfortable and in their contact lenses. ■

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