Editorial

Taiwan J Ophthalmol 2025;15:503-504

Access this article online

Quick Response Code:

Website:
http://journals.lww.com/TJOP

DOI:
10.4103/tjo.TJO-D-25-00185

Current therapeutic landscape of dry eye and meibomian gland disease

This issue of the *Taiwan Journal of Ophthalmology* brings together a diverse collection of studies that collectively expand the therapeutic landscape of dry eye disease (DED) and meibomian gland dysfunction (MGD). The central focus lies on interventions that target the primary etiologies – aqueous deficiency and meibomian gland-related tear film instability while also emphasizing the importance of adjunctive domains such as inflammation, microbial imbalance, and mucin deficiency. Taken together, these contributions highlight how modern ocular surface management increasingly integrates pharmacologic, biologic, and device-based strategies to restore homeostasis rather than merely relieve symptoms.

Sun *et al*. and Koh *et al*. deepened understanding of mucin secretagogues as mechanism-driven therapies for reinforcing the tear film's mucin layer. Sun *et al*. detailed the pathways – $P2Y_2$ receptor activation, epidermal growth factor receptor (EGFR)–mitogen-activated protein kinase (MAPK) signaling, and cytokine modulation (Interleukin [IL]-13 and tumor necrosis factor-alpha [TNF-α]) – that regulate secreted and membrane-associated mucins, explaining how diquafosol and rebamipide enhance goblet-cell secretion and epithelial repair. Koh *et al*. placed these agents within the tear film-oriented Diagnosis framework, summarizing evidence from randomized and real-world studies showing improved tear stability and ocular surface staining. Both reviews emphasized that these agents are now essential in Asian practice and represent a transition from supplementation to biologic restoration of mucin integrity.

Extending beyond pharmacologic treatment, Ahn *et al*. provided a procedural overview of Intense Pulsed Light (IPL) therapy for MGD, synthesizing evidence from over 100 clinical studies. Rather than focusing on molecular mechanisms, their review examined practical aspects of treatment delivery – including device parameters, pulse energies, treatment intervals, and the incorporation of adjunctive procedures such as gland expression and heated masks. By identifying common procedural patterns (typically three to four sessions at two-to 3-week intervals) and emphasizing consistency in technique, they proposed a structured approach for optimizing the outcomes and tailoring IPL regimens to individual patients. This work reframes IPL as a protocol-dependent, procedure-centered therapy.

Lee *et al*. introduced a novel quantitative imaging approach for assessing the bulbar conjunctival microvasculature in patients with dry eye. Using a deep-learning-based optical system, they compared Sjögren's and non-Sjögren's subtypes and found that vessel diameter was significantly greater in autoimmune-associated dry eye, despite comparable symptoms and tear parameters. In non-Sjögren's cases, blood flow rate correlated with meibomian-gland indices, highlighting an interplay between lipid-layer dysfunction and conjunctival microcirculation. These results suggest that conjunctival microvascular morphology may serve as a biomarker for subtype differentiation and

How to cite this article: Seo KY. Current therapeutic landscape of dry eye and meibomian gland disease. Taiwan J Ophthalmol 2025;15:503-4.

Submission: 06-11-2025
Accepted: 06-11-2025
Published: 22-12-2025

reflect chronic versus acute inflammatory states in dry eye pathophysiology.

Recent advances have also deepened understanding of microbial imbalance as both a cause and a perpetuating factor in ocular surface inflammation. Arita *et al*. provided an updated synthesis on the role of antibiotics in MGD, demonstrating that both oral and topical macrolides and tetracyclines improve tear-film stability, meibum quality, and lid-margin inflammation. Their review emphasized the dual antimicrobial and anti-inflammatory actions of these agents – suppression of matrix metalloproteinases, cytokine modulation, and normalization of lipid secretion – while calling for judicious, individualized use given concerns about resistance and microbiome alteration. These findings position antibiotics as targeted, time-limited adjuncts within a comprehensive, multifactorial approach to MGD management rather than as long-term maintenance therapies.

Inflammation and oxidative stress remain central targets in DED therapy. Kim *et al*. identified liquiritigenin, a licorice-derived flavanone, as a dual anti-inflammatory and antioxidant compound that restored goblet-cell density and reduced cytokine (IL-1 β, IL-6, IL-8, and TNF-α) and reactive oxygen species (ROS) levels in experimental models. Transcriptomic profiling revealed modulation of the aldo-keto reductase superfamily and suppression of MAPK/nuclear factor-kappa B (NF-κB) signaling, illustrating how redox control complements inflammation regulation. This study highlights antioxidant modulation as an emerging axis within anti-inflammatory strategies.

Collectively, these advances demonstrate the convergence of pharmacologic, biologic, and procedural innovations in ocular surface medicine. Anti-inflammatory and antimicrobial agents interrupt the inflammatory – infectious cycle; mucin secretagogues restore the epithelial – mucin barrier; and IPL modulates lipid secretion and inflammation. Alongside conventional treatments such as artificial tears, punctal occlusion, and lid hygiene, these modalities move modern DED and MGD therapy toward restoration of pathophysiologic homeostasis. Management today emphasizes integration over fragmentation – a continuum from molecular modulation to structural restoration – transforming dry-eye care into a precision discipline grounded in ocular surface biology.

Kyoung Yul Seo*
Department of Ophthalmology, Yonsei University College of Medicine, Seoul, Korea

***Address for correspondence:**
Prof. Kyoung Yul Seo,
Department of Ophthalmology, Yonsei University College of Medicine, 50 Yonsei-ro, Seodaemun-gu, Seoul 03722, Republic of Korea.
E-mail: SEOKY@yuhs.ac