

Comprehensive Assessment of the Meibomian Glands by Meibography: Why the Upper Eyelids Matter

Upper Eyelid Meibography plays an important role in the early diagnosis or prevention of:

- CL dropouts
- Cataract surgery-induced DED
- Sjögren's Syndrome (SS)
- Thyroid Eye Diseases (TED)



REVIEW

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Comprehensive Assessment of the Meibomian Glands by Meibography: Why the Upper Eyelids Matter

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Abstract: The clinical value of upper eyelid meibographic imaging remains relatively underexplored; consequently, it is not commonly used in clinical assessments. However, its significance could be particularly important for the early detection of various ocular diseases and systemic conditions related to the eyes. An analysis of the current literature from the PubMed database, covering the years 2005 to 2023, with additional relevant papers added from cited references was conducted. Failure to diagnose dry eye disease and meibomian gland dysfunction associated with conditions such as Sjögren syndrome or thyroid eye disease in the early stages and taking appropriate action may result in persistent signs and symptoms. This could potentially lead to the development of chronic conditions that directly affect a patient's visual quality, functionality, and overall well-being. Therefore, this review aimed to demonstrate

Key Words: meibomian gland dysfunction, meibomian gland structure, upper eyelid meibography, Sjögren syndrome, thyroid eye diseases

(*Cornea* 2025;44:128–135)

TECHNOLOGICAL DEVELOPMENTS IN MEIBOGRAPHY AND CHALLENGES OF THE MEIBOMIAN GLAND EXAMINATION

The diagnostic significance of meibography has undergone extensive scrutiny, establishing it as a fundamental component in managing meibomian gland dysfunction (MGD) and dry eye disease (DED). Its integration into ophthalmic practice has provided deeper insights into the

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Meibography: Upper Lid Evaluation

Evaluating upper eyelids can potentially help identify high-risk individuals and aid in diagnoses, especially in the following patients: ¹

- *Contact lens wearers*
- *Cataract surgery patients.*
- *Autoimmune-related DED.*
- *Thyroid eye disease.*

Meibography is an objective tool for the detection of MG loss.

- The correlation with TBUT and better inter-examiner agreement on dropout by grading, the upper lid might be the preferred lid to make an evaluation.²

Contact Lens Dropout

- Contact lens wearers with worsening upper eyelid meibum quality, gland plugging, and tortuosity are more likely to discontinue lens use due to discomfort.
- Although the lower eyelid glands tend to be wider, this has no clinically significant impact on contact lens success.
- The CLASS Group study found that increased upper eyelid meibomian gland tortuosity significantly raises the risk of contact lens dropout.
- The meibography of both lower and upper eyelid can assist in patient education on maintaining MG health for prolonged contact lens wear.

Cataract surgery-induced DED

- Preoperative upper eyelid meibomian gland loss could be a significant predictor of postoperative DE symptoms, while the lower eyelid gland loss may not correlate.
- The subjective DE symptom onset following cataract surgery was associated with the baseline upper eyelid gland loss before surgery.
- Upper eyelid changes may precede those in the lower eyelid.
- Integrating upper eyelid meibography into preoperative evaluations can help identify high-risk patients and positively impact post-op recovery.

1. Fujimoto H, Ochi S, Inoue Y, Kiryu J. Upper eyelid meibomian gland dysfunction is a risk factor for dry eye symptoms following cataract surgery in the early phase. Clin Ophthalmol 2022;16:293-302. doi: 10.2147/OPHTH.S346606.

Sjögren's Syndrome (SS)

- The upper eyelid meibomian gland dropout is significantly higher in SS patients than in non-SS.
- Changes in the upper eyelid are probably responsible for the differences between SS and non-SS patients.
- The upper eyelid changes can serve as an early diagnostic marker, aiding to quick decision- making and timely interventions that may prevent severe gland dysfunction.

Thyroid Eye Disease

- Thyroid eye disease (TED) has been linked to significant upper eyelid meibomian gland loss due to factors like incomplete blinking, proptosis, and eyelid retraction.
- TED patients exhibit higher upper eyelid meiboscores and greater central gland dropout than other DED patients, correlating with increased ocular surface inflammation and oxidative stress.
- Comprehensive assessment of both upper and lower eyelids can assist in accurately diagnosing of TED-related dry eye and implementing effective management strategies.