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The Latest Diagnostic and Therapeutic Tools for DED

An update on three noteworthy developments.

By Pablo Dighiero, MD, PhD

The increased prevalence of dry eye disease (DED) is creating a heightened need for new diagnostic tools and therapeutic advances. Even a decade ago, clinicians were limited to offering patients a handful of treatments with varying levels of efficacy and, in some cases, reactively versus proactively managing their condition. Now, however, myriad options are available for patients, who are seeing true impacts on their symptoms and quality of life. Furthermore, DED is often managed earlier in the disease state thanks to advances in diagnostics. This article reviews three noteworthy developments in DED: a new diagnostic score, new therapeutic tools for DED treatment, and intense pulsed light (IPL) protocols.

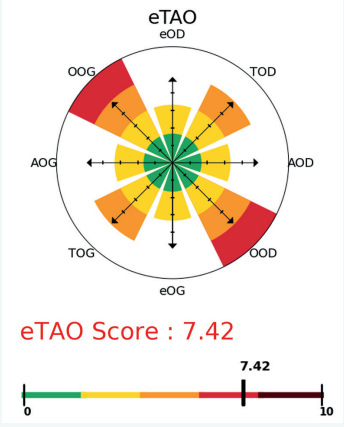
DEVELOPMENT 1: ETAO DED SCORING

In the past, one of the biggest concerns for refractive surgeons was identifying the risk of post-LASIK ectasia preoperatively. A key in the past was to determine if the patient had a normal topography. Other known risk factors included residual stromal bed and central corneal thicknesses. Over time, the specific formulas were created to identify eyes at risk for post-LASIK ectasia, including the Ectasia Risk Scoring System and the Percent Tissue Altered metric, and the incidence has decreased.[1-3]

More recently, the biggest preoperative concern has shifted to DED. The systematic diagnosis and management of DED requires the use of validated measures of both the signs and symptoms of disease. Subjective scores include the Ocular Surface Disease Index (OSDI), Standardized Patient Evaluation of Eye Dryness (SPEED), Dry Eye Questionnaire-5 (DEQ-5), and Symptom Assessment in Dry Eye (SANDE). These questionnaires are typically used in conjunction with clinical examination findings (eg, corneal staining, conjunctival staining, tear film breakup time, and Schirmer testing), point-of-care testing (eg, tear osmolarity and MMP-9), and meibography.

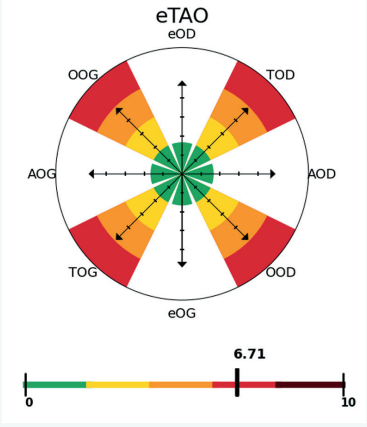
As a result of consensus in the Association des Centres de l'Oeil Sec, my colleagues and I have now developed a reliable way to score DED risk. The epithelium-Telangiectasis-Atrophy-Obstruction (eTAO) score is designed based on the results of a prospective review of 10,000 dry eye consultations performed at several clinics across France. All data for ocular staining, OCT, and meibography were analyzed, and four objective and reproducible risk factors (corneal epithelium, telangiectasias, meibomian gland atrophy, and meibomian gland obstruction) were found. The predominance of obstruction was the main factor in DED risk. The reproducibility of eTAO was clinically validated in 1,000 cases from six centers in France. All patients had right/left eye symmetry.

Case No. 1. A 27-year-old man presented for a LASIK consultation. His eTAO score was 7.42 because of huge telangiectasias and significant obstruction of the meibomian glands (Case No. 1). We therefore determined that LASIK was contraindicated.



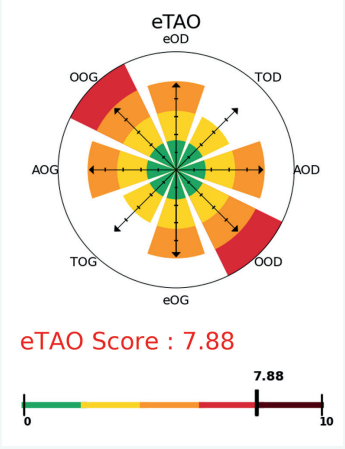
Case No. 1. The eTAO score for a 27-year-old man who presented for a LASIK consultation.

Case No. 2. A 49-year-old woman presented for a presbyopic LASIK consultation. Her eTAO score was 6.71 because of severe bilateral obstruction of the meibomian glands and evidence of ocular rosacea (Case No. 2). She was told she was not a good candidate for the procedure, but she underwent LASIK at another clinic. The patient returned to our center after surgery complaining of unbearable pain and DED symptoms. This case is the perfect example of the benefits of preoperative screening before LASIK and the prevention of post-LASIK dry eye. We hope that eTAO can be one solution.



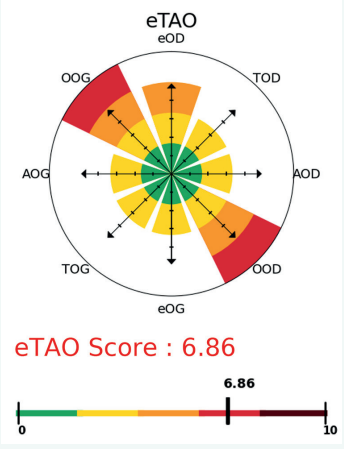
Case No. 2. The eTAO score for a 49-year-old woman with severe meibomian gland obstruction and ocular rosacea who underwent LASIK despite being counseled that she was not a good candidate for the procedure.

Case No. 3. A 67-year-old man presented with irritated and dry eyes. He had been taking travoprost and brinzolamide for 2 years to control his IOP. The patient's eTAO was 7.88 because of severe obstruction, a damaged cornea, and diffuse telangiectasias (Case No. 3). We performed selective laser trabeculoplasty (Optimis Fusion, Quantel Medical/Lumibird Medical) and intense pulsed light treatments, and the patient was able to eliminate his eye drops and regenerate his ocular surface.



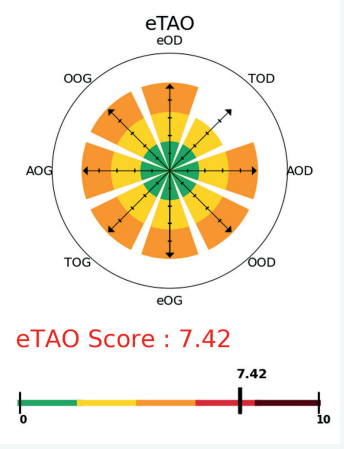
Case No. 3. The eTAO score for a 67-year-old man with severe meibomian gland obstruction.

Case No. 4. An 81-year-old woman with a damaged ocular surface underwent cataract surgery with multifocal IOL implantation. Despite perfect visual results, she was very uncomfortable after surgery. eTAO was not performed before cataract surgery. Postoperatively, eTAO was 6.86 (Case No. 4). If eTAO was used preoperatively, we could have counseled the patient that a monofocal or an extended depth of focus (EDOF) IOL was a more appropriate choice, likely preventing the ocular surface discomfort after surgery.



Case No. 4. The eTAO score for an 81-year-old woman who experienced ocular surface discomfort after cataract surgery.

Case No. 5. A 77-year-old woman presented for cataract surgery with a damaged ocular surface. She had an eTAO of 7.42 (Case No. 5). The patient was counseled that an EDOF IOL was preferred to a multifocal IOL. After surgery, she was extremely happy with her results.



Case No. 5. The eTAO score for a 77-year-old woman who presented for cataract surgery.

eTAO ranges on a scale of 1 to 10. It can be useful for a variety of clinical consultation protocols, including the diagnosis and monitoring of patients with DED, prevention of DED after refractive surgery (particularly LASIK), and prevention of corneal toxicity from the use of hypotensive eye drops. Further, eTAO can be used as a parameter when choosing the best IOL for a cataract surgery patient. The sidebar includes five clinical cases to demonstrate the usefulness of the scoring system.

DEVELOPMENT 2: THERAPEUTIC TOOLS FOR DED

The therapeutic goals of DED management are to treat the inflammation, relieve neuropathic pain, regenerate meibomian gland atrophy, and open the obstructed glands. The best treatment for an individual patient depends on the management goal.

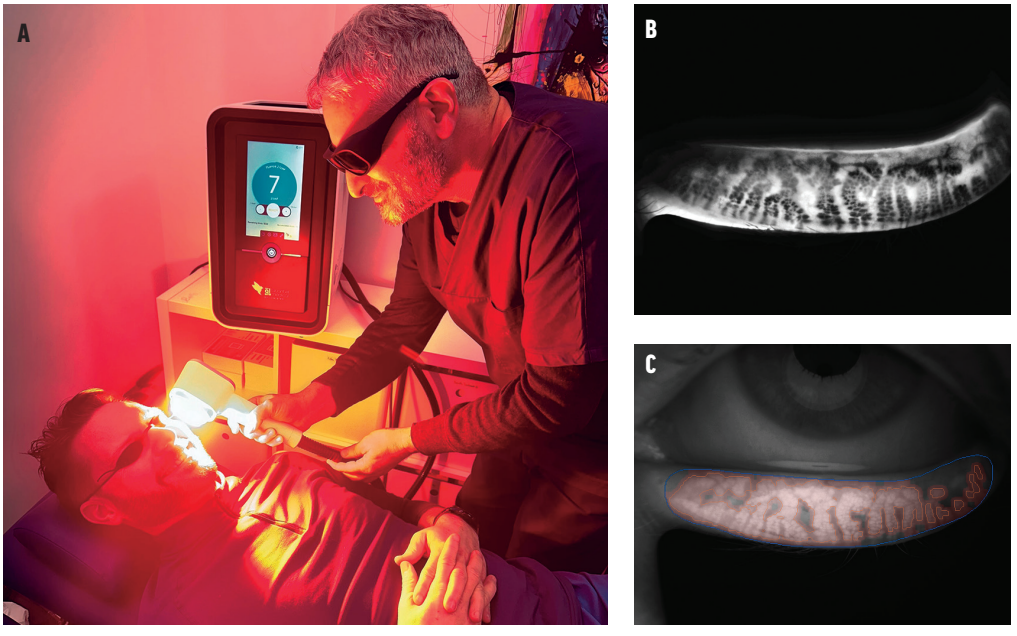


Figure 1. The C.STIM® IPL treatment (A) and Meibography in Transillumination Infrared & Standard Infrared with C.DIAG® (B and C).

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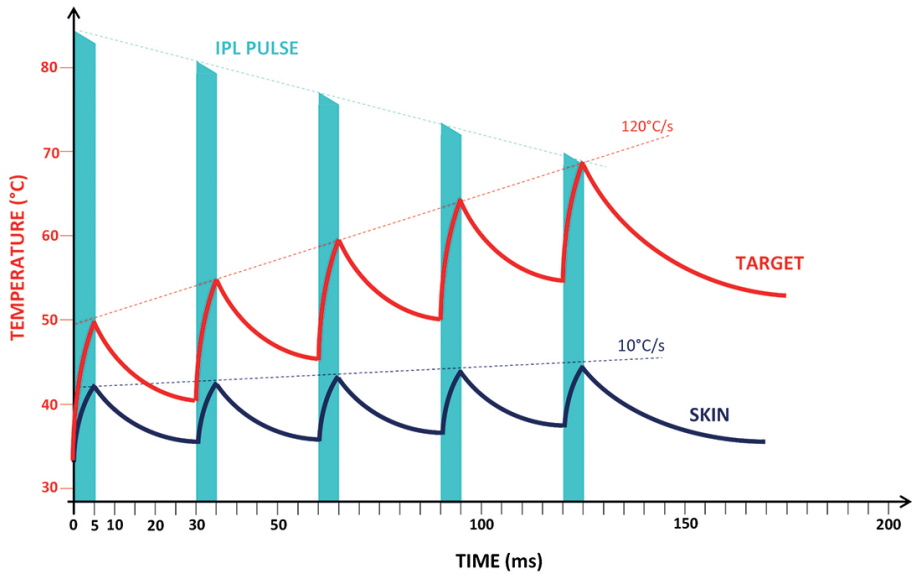

Figure 2. Train of five pulses.

Figure 3. Phototypes 1 to 5.

To control inflammation, IPL is the best choice. To treat neuropathic pain, the best option is also IPL and possibly quantum molecular resonance electrotherapy, and for gland obstruction it is still IPL, associated with the following options: meibomian gland expression, LipiFlow Thermal Pulsation (Johnson & Johnson Vision), or Systane iLux (Alcon). The optimal treatment for gland atrophy, however, is still unknown. Pipeline therapies include stem cell and human growth factor treatments.

IPL is clearly the most useful and relevant treatment to achieve these goals. Not all IPL devices, however, are created equal. In our center, we use the C.STIM® (Lumibird Medical), designed to treat the root causes of meibomian gland dysfunction (MGD)–inflammation and Demodex blepharitis–and to stop the vicious cycle of DED (Figure 1). The IPL C.STIM® has a unique train of five pulses (Figure 2) and a specific patented optical module (Stim-ULI™ technology), which are more efficient, safer, and more comfortable on most skin types. The treatment consists of five pulses with a pulse duration of 5 ms and an inter-pulse delay of 25 ms. It is suitable for most pigment types (phototypes 1 to 5; Figure 3).

DEVELOPMENT 3: IPL PROTOCOLS

The most frequent indication is ocular rosacea, followed by obstructive MGD. For the latter, IPL can be combined with meibomian gland expression to open the obstructed glands both before and after IPL treatment. These are followed in frequency for IPL treatment by the following conditions: dry eye during glaucoma treatment and after refractive or cataract surgery, as well as repeat intravitreal injections. If DED is induced by hypotensive eyedrops, it is recommended to change the treatment from drops to laser with selective laser trabeculoplasty. It may be possible to initiate IPL treatment shortly after the eye is healed from any surgery.

Our treatment protocols differ for classical DED, rosacea, and dark skin. For patients with dark skin phototypes, the fluence cannot exceed 4 J/cm2. Again, the indications depend on the IPL device, and first-generation devices without pulse strain and with bulky light guides should not be compared to second-generation devices with regulated pulse strain and easy-to-use light guides.

CONCLUSION

The eTAO scoring system is a reliable tool to assess DED risk and guide preoperative screening and clinical decision-making for patients undergoing refractive and cataract surgery. Additionally, IPL is a crucial component of DED management because it can address inflammation, neuropathic pain, and gland obstruction effectively.

Much progress has been made to enhance the precision of DED detection and help clinicians treat the underlying case of patients' symptoms, ultimately improving their quality of life. ■

1. Klein SR, Epstein RJ, Randleman JB, Stulting RD. Corneal ectasia after laser in situ keratomileusis in patients without apparent preoperative risk factors. *Cornea*. 2006;25(4):388-403.
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