

# THE ROLE OF OCULAR SURFACE ANALYSIS PRIOR TO CATARACT SURGERY



Screening and measurements with the Keratograph 5M are an indispensable part of my preoperative workup in challenging cases.

BY MARGUERITE B. MCDONALD, MD, FACS

As the Director of the Dry Eye Center of Excellence at Ophthalmic Consultants of Long Island (OCLI), I see a lot of patients with severe dry eye disease (DED), but I also see my fair share of patients with mild DED. Many times, when these patients have developed cataracts, they will come to see me and ask that I perform their cataract surgery.

For this reason, I probably perform cataract surgery on a higher percentage of DED patients than the average surgeon, and with this experience I have come to adopt a preoperative screening process that I believe in and have come to rely on. A good screening protocol is integral to the success of cataract surgery, as is proper treatment of DED before cataract surgery.



Figure 1. The Keratograph 5M.

## THE BASICS

All patients who present for cataract surgery complete the Standardized Patient Evaluation of Eye Dryness (SPEED) questionnaire, regardless of whether I have met or treated them previously at OCLI's dry eye center. The SPEED questionnaire helps us to identify signs and symptoms of DED and, after repeated tests, to track symptoms over time.

If patients check off even one symptom on the SPEED questionnaire, this allows our technicians to proceed legally with dry eye testing before I even see them. These tests include tear osmolarity (TearLab) and matrix metalloproteinase 9 (MMP-9) testing (InflammaDry, Quidel). If the osmolarity is 317 mOsm/L or higher, and/or if the MMP-9 is positive, we know that ocular surface disease is present. At that time, the technicians will administer further testing.

The device that I rely most heavily on for these patients is the Keratograph 5M (Oculus). The Keratograph 5M, an advanced corneal topographer with a built-in keratometer and a color camera optimized for external imaging (Figure 1), measures DED in several ways, including noninvasive tear film breakup time (TBUT) and tear meniscus height. It can also be used to examine the meibomian glands and evaluate the lipid layer. The meibography on this device provides clear imaging, and in fact, meibography and TBUT are my two favorite features of the Keratograph 5M.

Meibography is an excellent noninvasive tool to evaluate the meibomian glands and assess the damage caused by conditions like posterior blepharitis. This is important

because between 86% and 92% of people with DED have an associated blepharitis, and uncovering the extent of the damage can help me to select the most appropriate treatment in each case.

Once the technician obtains measurements with the Keratograph 5M, the preoperative cataract examination is halted. I meet the patient, conduct a brief slit-lamp exam, and tell the patient that we must treat the dry eye first in order to make accurate preoperative measurements and to "stack the deck" in favor of safe and accurate surgery. The patient is prescribed the proper treatment to restore his or her ocular surface. It is helpful to show patients their own meibography images, which gains their trust and helps them to understand the effects that DED has on their ocular surface.

It is important to make time to briefly explain to patients why we cut the exam a bit short, and why we have to treat DED before cataract surgery. I let them know that the treatments we have today work very quickly. I tell them, "We'll have you back here in as little as 2 weeks, and all the measurements will be so much more accurate. You will sail through the surgery, and your chance of a complication goes down."

Patients appreciate that you are being careful, they come to understand the importance of treatment, and they do not mind waiting 2 weeks for follow-up measurements and to schedule surgery. To my knowledge, I have never lost a surgical patient by being cautious, thoughtful, and proactive.

## THE FOLLOW-UP

At the 2-week follow-up, measurements

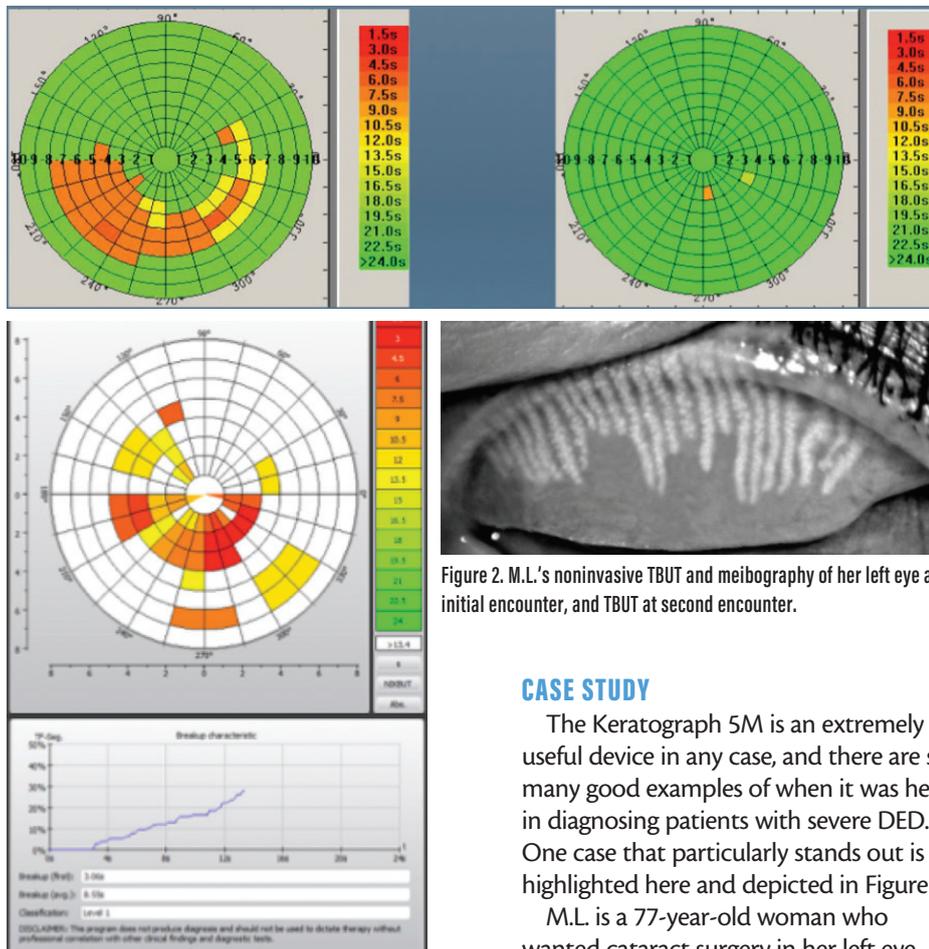


Figure 2. M.L.'s noninvasive TBUT and meibography of her left eye at initial encounter, and TBUT at second encounter.

### CASE STUDY

The Keratograph 5M is an extremely useful device in any case, and there are so many good examples of when it was helpful in diagnosing patients with severe DED. One case that particularly stands out is highlighted here and depicted in Figure 2.

M.L. is a 77-year-old woman who wanted cataract surgery in her left eye due to significant glare and halos while driving at night. Her BCVA was 20/25 OD and 20/50-2 OS. Her SPEED questionnaire documented the presence of several DED symptoms. Her tear osmolarity measurements were 318 and 325 mOsm/L, and her MMP-9 tests were markedly positive OU.

Because one of the two tests (in this case, both) were positive, a Keratograph 5M evaluation was performed. It showed a rapid TBUT and moderate gland tortuosity and dropout on meibography (Figure 2).

The technicians showed me M.L.'s test results before I entered the room. I met with her, conducted a slit-lamp examination, and told her that she had significant dry eye and blepharitis, both of which needed treatment before the exam could be completed accurately. I briefly mentioned all the positive tests above, and I showed M.L. her meibography images. I prescribed lifitegrast ophthalmic solution (Xiidra, Shire) BID OU, preservative-free tears in a bottle (FreshKote, EyeVance Pharmaceuticals) QID OU and PRN, and omega 3 nutritional

supplements (Tozal, Focus Laboratories). M.L. also underwent a combined in-office treatment of microblepharoexfoliation/thermal pulsation therapy treatment (BlephEx [BlephEx]/LipiFlow [Johnson & Johnson Vision]) the same day. She was prescribed loteprednol etabonate (Lotemax SM, Bausch + Lomb) QID OU for 1 week.

When M.L. returned 2 weeks later, her tear osmolarity scores were 302 and 298 mOsm/L. Her MMP-9 tests were faintly positive OD and negative OS. On Keratograph 5M testing her TBUT was also improved. M.L. then had the rest of her preoperative exam: manifest refraction, IOLMaster, Pentacam, OCT of the macula, and a dilated exam.

She was told that she could now consider a premium IOL, as her ocular surface had improved significantly within 2 weeks; she opted for a Symphony lens (Johnson & Johnson Vision). At 1 week postoperative, M.L. was 20/20-2 OS, 20/25-2 at intermediate, and J3 at near. She then scheduled surgery on her second eye.

### CONCLUSION

DED affects a significant proportion of the worldwide population, with side effects that include increased ocular surface inflammation and damage. In addition to being associated with significant discomfort and limiting patients' abilities to perform daily activities, the presence of DED can also affect the dioptric accuracy of cataract and refractive surgical outcomes. Therefore, it is crucial that all patients be evaluated for DED before surgery.

Devices like the Keratograph 5M can aid in our ability to accurately measure DED, to judge its severity, and to subsequently prescribe the best treatment to patients so that the ocular surface is healthy enough for accurate preoperative measurements and safe and effective surgery. ■

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with the Keratograph 5M are repeated, as well as tear osmolarity and MMP-9. The vast majority of patients have markedly noticeable improvement to their ocular surface at this visit; these patients then receive the remainder of their preoperative evaluation. In our office, this includes manifest refraction, IOLMaster (Carl Zeiss Meditec), Pentacam (Oculus), OCT of the macula, and a dilated exam. Often, the improvement in the ocular surface allows us to discuss more IOL options than the patient would have had before (ie, multifocal and extended depth of focus IOLs). They are then scheduled for cataract surgery.

However, if MMP-9 is still positive or the tear osmolarity is extremely high, additional treatments are prescribed and the patient is monitored until his or her ocular surface improves and measurements stabilize. In my experience, this happens very rarely. Most eyes respond well to the initial treatments, as long as the patient is compliant.