

# Novel diagnostic system sheds light on treatment paradigm for dry eye

Technology builds on light sensitivity, dry eye correlation for objective measure of syndrome

By **Fred Gebhart**; Reviewed by *Harvey Fishman, MD, PhD*

**RECENT FINDINGS** that correlate light sensitivity with dry eye disease may be the first truly objective measure of the syndrome. A series of dry eye patients showed significant photophobia while similar patients did not show sensitivity to light.

“Light sensitivity is one of the major signs of dry eye disease, but I had no idea just how consistent photophobia is in patients with dry eye disease,” said Harvey Fishman, MD, PhD, founder of Fishman Vision, Palo Alto, CA. “We can measure dry eye disease quantitatively by probing how much light they can tolerate and what wavelength is most uncomfortable for them,” he said.

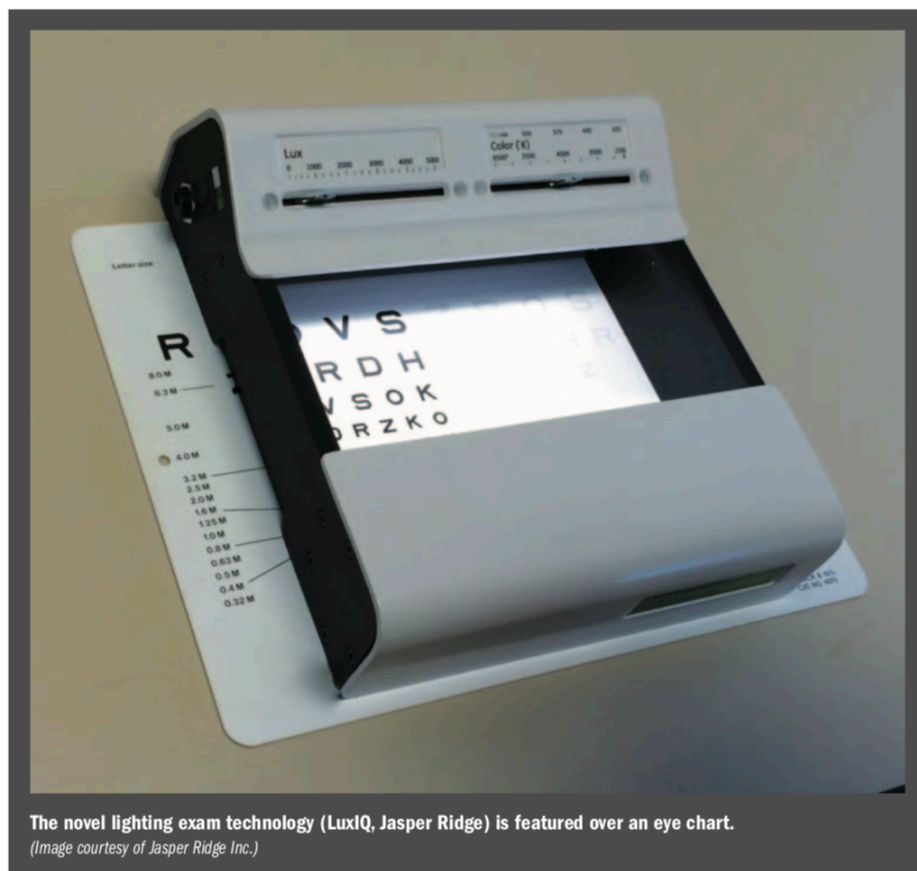


Dr. Fishman

## DIVING DEEPER

Dr. Fishman measured photophobia in a series of 15 patients with dry eye using new lighting exam technology (LuxIQ, Jasper Ridge). Each patient was asked to adjust the device to his or her preferred illumination and color temperature on a 40-cm near vision chart.

The device is designed to quantify near vision performance over a broad range of light levels, 0 to 5,000 lux) and color temperatures (2,700°K to 6,500°K). It is intended to be used to evaluate patients whose vision loss may be



The novel lighting exam technology (LuxIQ, Jasper Ridge) is featured over an eye chart. (Image courtesy of Jasper Ridge Inc.)

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— *Harvey Fishman, MD, PhD*

due to impaired light sensitivity and to individualize task lighting levels.

Dry eye patients tested could tolerate a mean of 1,750 lux compared with a mean of 2,643 lux for patients who did not have dry eye syndrome, with some tolerating levels of only 500 to 1,000 lux.

Dry eye patients preferred 4,507°K compared with 5,000°K for those without dry eye.

The finding that dry eye patients have measurable light sensitivity fits the dry eye syndrome, Dr. Fishman noted.

“The connection between dry eye disease and measuring photophobia with the [device] was entirely serendipitous,” he said.

Most patients with dry eye do not visit the ophthalmologist because they have blurry vi-

sion—they go in because they have pain or light sensitivity or burning.

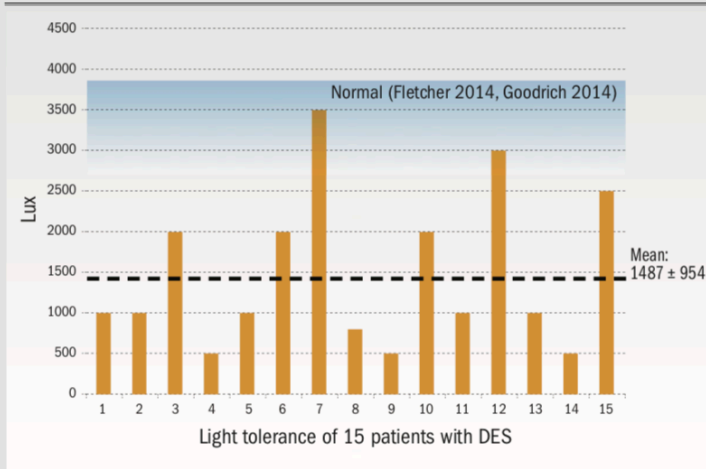
“Dry eye disease is ultimately a pain syndrome,” Dr. Fishman said. “One possible model is that dry eye disease sensitizes the trigeminal ganglion pain center. Light stimulates the intrinsically photoreceptive retinal ganglion cells, which are plugged directly into the trigeminal ganglion system and create pain and photophobia when sensitized by dry eye disease.”

Not only do patients with dry eye disease exhibit photophobia, Dr. Fishman said, they are particularly sensitive to specific wavelengths that can be filtered out using fl-41 rose-colored lenses.

The device allows clinicians to objectively assess dry eye disease based on photophobia

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(FIGURE 1) Most patients with dry eye syndrome are measurably light sensitive, according to data presented by Harvey Fishman, MD, PhD (ARVO 2017).  
(Figure courtesy of Harvey Fishman, MD, PhD)

and assess treatment response using repeated measures. The standard clinical assessments, including non-invasive tear break-up time, Schirmer and osmolarity, have very low correlation with each other and with severity of dry eye symptoms as reported by patients.

“We have all had situations where you tell the patient that his or her osmolarity is normal, but the patient tells you it doesn’t feel any better,” he said. “Or you may tell a patient that their cornea looks so much better and they tell you it doesn’t feel any better. That’s the disconnect between signs and symptoms that we see over and over again in the literature.”

Dr. Fishman likened the measurement of photophobia as an objective measure of dry eye disease to visual field testing to assess glaucoma, age-related macular degeneration, and other visual disturbances. Objective testing quantitates what is essentially a qualitative assessment of vision by the patient.

“This device gives us a whole new realm of how we think about dry eye,” he said.

“We have always been treating with a variety of modalities—such as anti-inflammatory drops and meibomian

gland therapy—without any way to quantitate the pain response that often brought the patient into the office in the first place,” Dr. Fishman said. “Measuring photophobia allows

you to figure out exactly what wavelength of light is most painful or disturbing to the patient and prescribe the appropriate tint to filter it out.”

A seemingly beneficial treatment for severe dry eye is to address light sensitivity by giving the patient dark sunglasses, he added.

However, not only is the psychological effect devastating for many patients, but they may lose vision and impair safe mobility because of the low light levels. Being able to maintain standard lighting conditions while filtering out the most deleterious wavelengths using colored lenses is an entirely new approach to dealing with dry eye disease.

“Until now, dry eye disease did not have any quantitative way to measure discomfort from dry eye disease, before and after treatment,” Dr. Fishman said.

This is the first quantitative device to measure pain from dry eye disease, he noted.

“We have already learned that oph-

thalmologists have to be concerned about the types of light dry eye patients are being exposed to and being able to block specific wavelengths,” Dr. Fishman said. “This device gives us a new treatment paradigm for dry eye disease.” ■

**HARVEY FISHMAN, MD, PHD**

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This article was adapted from Dr. Fishman’s presentation at the 2017 meeting of the American Academy of Ophthalmology. He did not indicate financial interest in the subject matter.

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