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# Corporate ODs form association

## Corporate-affiliated doctors partner with EyeCare Pro

**By Gretchyn M. Bailey, NCLC, FAAO**
*Editor in Chief, Content Channel Director*

Corporate-affiliated optometrists announced in mid July that they will form an association to facilitate networking, collaboration, and education. This new organization will be called Energeyes, the Association of Corporate-affiliated Optometrists, and it will be open to all corporate-affiliated optometrists.

Approximately 3,200, or 11% of practicing optometrists, hold leases with Walmart and Sam's Club, according to Mark J. Uhler, OD, member of the Energeyes organizing committee and Walmart and Sam's Club leaseholder.

In a video statement, Dr. Uhler said that many optometrists affiliated with Walmart and Sam's Club feel very much alone. "Many of us feel the need for better collaboration, networking, education, and representation that is specific to our needs," he said in the statement. We all share a common experience with our affiliation in Walmart and Sam's Club, specifically our passion and desire to be the best optometrist we can be. Working together, I believe we can accomplish more."

Dr. Uhler has been a corporate optometrist for 17 years and says the new organization should not be viewed as an adversary to the American Optometric Association (AOA)— Energeyes will add services rendered through the AOA and other organizations.

"Energeyes is a way to help members in

See **Energeyes** on page 5

### AT A GLANCE > Energeyes

**11%** Percentage of North American optometrists that will be represented

**3,200** Number of leasing ODs for Walmart and Sam's Club

**1,000** Number of members that organizers anticipate enrolling within 12-16 months

**Goals:** Networking, mentorship, camraderie, vendor suport, education

**Organization:** There will be an committee of 14 that will provide leadership to become an organization

**National meeting:** April 25-27, 2014, location TBD

"You're going to see an organization with a very positive attitude." — MICHAEL PORAT, EXECUTIVE DIRECTOR

## Judge rules against AOS in bankruptcy case

**By Gretchyn M. Bailey, NCLC, FAAO**
*Editor in Chief, Content Channel Director*

A recent court judgment in the American Optometric Society (AOS) bankruptcy case moved the case from Chapter 11 reorganization to Chapter 7 liquidation. Under Chapter 7 bankruptcy, an entity is required to stop all operations and go out of business. Then, an appointed trustee liquidates the entity's assets in order pay off debt.

Judge Mark S. Wallace converted the case for cause, including substantial or continuing loss to or diminution of the estate and the absence of a reasonable likelihood of rehabilitation. He also stated in the ruling that there is bad faith in filing the petition and the debtor's' plan.

"The AOS clearly lost the lawsuit last year, and they owe us $462,000," says Paul Ajamian, OD, chairman of the American Board of Optometry (ABO) board. "They have no plan to pay us back. They don't have the money to pay us back. The judge saw that by calling [the lawsuit] a bad faith effort. We've won every legal battle along the way. We are now happy to say that it's over. There will be a court-appointed trustee to disperse whatever assets they have. I don't expect that they as individuals will go away and will continue to attack us."

While the judge has ordered the dismantling of the AOS organization itself, AOS President Pamela Miller, OD, FAAO, JD, DNAP, believes that the force behind the organization remains.

"I can assure you that the AOS isn't going away by any stretch of the imagination," Dr. Miller says. "The passion and spirit of our members continue, regardless of any organization they belong to, and that will continue to be a powerful force in our profession. We have been able to speak for the individual optometrist, who has become disenfranchised by some of the 'leaders' in organized optometry. We have exposed many truths and many lies in a dedicated effort to make our profession

See **Bankruptcy** on page 5

**INSIDE: Special Section**

**Equipment**

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*Optometry Times* is an optometry-driven publication that disseminates news and information of a clinical, socioeconomic, and political nature in a timely and accurate manner for members of the optometric community.

In partnership with our readers, we will achieve mutual success by:

- Being a forum for optometrists to communicate their clinical knowledge, insights, and discoveries.
- Providing management information that allows optometrists to enhance and expand their practices.
- Addressing political and socioeconomic issues that may either assist or hinder the optometric community, and reporting those issues and their potential outcomes to our readers.



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# In Brief

## Essilor buys majority stake in Transitions Optical

**Pinellas Park, FL—**PPG Industries and Essilor International have struck a deal for Essilor to acquire PPG Industries' 51% stake in Transitions Optical, according to news releases from PPG and Essilor. Essilor has held a 49% share of Transitions Optical since the business was founded in 1990.

Dave Cole, president, Transitions Optical, noted the history that PPG and Essilor have with Transitions: "We look forward to a continued strong relationship with PPG, because they will be providing ongoing research and development services and optical dyes to Transitions Optical under multiyear agreements with Essilor.

"This transaction is a continuation and enhancement of a relationship that has brought value to us and to our industry. There are tremendous opportunities to boost expansion of photochromic products, particularly in fast-growing markets," Cole added.

The transaction is projected to close in the first half of 2014. Until then, it will be business as usual, Cole said. Transitions Optical will continue as a separately managed and operated business. According to the company, supplies of Transitions lenses will not be affected, and will continue to be available through other lens manufacturers. **ODT**

## Bankruptcy

Continued from page 1

stronger and our sister organizations respectful and representative of their membership and optometry. We remain committed to our membership and to our desire to help bring our profession together."

The ABO, launched in 2009, is one of several groups offering board certification to optometrists. The group is approaching 10% involvement of ODs who have taken a board-certifying exam or registered for an upcoming exam, according to Dr. Ajamian. "A lot of people are waiting in the wings because they don't feel the need to [take the exam]. They will wait and see if they're forced to do it. A lot of people will sit on the sidelines for anything unless they have to do it."**ODT**

## Energeyes

Continued from page 1

growing their practices and elevating the perception of the member practices," he says. "Corporate-affiliated doctors don't have a prestigious perception within the industry. That needs to be changed. Energeyes can do that. We want to build a community of like-minded optometrists."

The AOA supports the association of corporate-affiliated optometrists. "I wish them well and hope that as this new organization comes together, we recognize that all optometrists, regardless of practice location, require substantial advocacy efforts in Washington to insure patients have access to the full scope of the care they require and that optometrists are best positioned to provide that care," says Mitchell T. Munson, OD, FAAO, president of the AOA.

> 'We want Energeyes to be a positive and supportive association.'
>
> Mark J. Uhler, OD

Dr. Uhler's video statement was part of EyeCarePro's "CEing is Believing" (CEiB) virtual clinical conference. EyeCarePro has partnered with the Walmart optometrists interested in forming an association.

"Back in February, we volunteered to assist the practitioners who came up with the idea that the doctors of Walmart could be organized," says Michael Porat, EyeCarePro COO. EyeCarePro presented a business plan to the organizing optometrists, who then hired the company to a 2-year term as the managing partner of Energeyes. Porat will remain as EyeCarePro COO while also acting as Energeyes executive director.

The newly formed association will launch its Web site in early September. The site will contain additional details on becoming a member, membership benefits, membership dues, and more. Also included will be information on the first Energeyes national conference. The planned dates are April 25-27, 2014, with the venue yet to be determined. The initial board of directors for Energeyes will be decided at the meeting.

One member benefit will be a mentorship program. New optometry graduates or doctors who are considering entering into a corporate affiliation will have an opportunity to work with an affiliated doctor before making that choice.

In addition to mentorship, other member benefits will include networking, camaraderie, vendor support, and education, according to Dr. Uhler.

Porat says the new association will also be sensitive to the needs of vendors. Vendors who partner with Energeyes will be treated with respect, asked what they want to achieve, and told if it's not possible before the association takes their money, he said.

Energeyes will a positive force in the profession, according to Porat. "We put together a set of philosophies that will differentiate us as a group of optometrists who you want to be working with and be a member of," he says. "One of the philosophies is that whatever we ask for in dues, a member should be able to see a significant return on those dues upon registering. Why would someone join yet another optometric association? Put your money where your mouth is and show me, before you get my money, that what you ask for is dwarfed by what you hand me in benefits. That's going to make us different. You're going to see an association with a very positive attitude."

Dr. Uhler anticipates enrolling 1,000 members within 12-16 months. "We want Energeyes to be a positive and supportive association," he says.

Energeyes will join Association of Leaseholding LensCrafters Doctors (ALLDOCS) as a group for corporate-affiliated optometrists.**ODT**

## MY FAVORITE APP

### Genius Scan


My favorite app has to be Genius Scan. A patient told me about this free app, which turns your device into a pocket scanner. It enables you to quickly scan documents on the go, and e-mail the scans as JPEG or PDF, color or black and white. I have scanned all sorts of things to export via e-mail or text message. You will find plenty of uses for this handy app!

**—Kathy Mastrota, OD, New York City**

Cover: Thinkstock/iStockphoto

# It's all about the ocular surface!

**Ernest L. Bowling, OD, MS, FAAO,**
Chief Optometric Editor

When I wrote about my learning curve with cataract surgery a few months back, I mentioned the need to deal with any ocular surface matters before cataract evaluation. A compromised ocular surface can negatively affect IOL calculations, and dry eye induced by cataract surgery can affect visual outcomes.[1] Post-op manifest refractions may not be what was predicted preoperatively, resulting in less-than-optimum best-corrected visual acuities (BCVAs) and subsequently, unhappy patients.

Yet, my ocular surface concerns ought to go far beyond cataract surgery. Elevated lactoferrin levels—a key marker for dry eye—have been shown to play a role in post-operative LASIK BCVAs, with one initial study showing that elevated pre-op lactoferrin levels resulted in a post-op refractive error that was more hyperopic than expected. This study concluded that pre-LASIK lactoferrin levels are a statistically significant predictor of post-LASIK spherical refractions.[2] The interaction between the ocular surface and contact lenses (CLs) is a major factor in CL patient comfort and, likewise, CL dropouts. The main reason for CL-associated dry eye is not the lack of tears, but the lack of tear film *stability* due to meibomian gland dysfunction (MGD), which reduces the lipid film of tears.[3] Eighty-six percent of patients with dry eye demonstrate signs of MGD.[4]

We have all had the routine patient who, despite our best efforts, just can't quite get to 20/20 when, on slit lamp exam, we discover—lo and behold—his ocular surface is compromised. A week of heavy lubrication therapy usually clears up the compromised ocular surface and restores BCVA to optimal levels.

*Everyone knows this, Ernie. Why are you talking about it?*

Because we optometrists ought to **own** ocular surface disease (OSD):

- It is a disease process we can treat without co-management.
- All treatment options are at our disposal.
- We know well the devastating impact severe OSD can have on quality of life.

Just throwing artificial tears at OSD won't solve the problem. We have to own OSD from initial diagnosis to management and use all the diagnostic tools at our disposal. There are some really great new objective tests to aid in the diagnosis of dry eye, such as the TearLab Osmolarity System, the RPS InflammaDry Detector, and Advanced Tear Diagnostics' MicroAssay unit (see "MicroAssay system tests for two tear film biomarkers," Page 25).

It is time for us to step up our game and make use of our diagnostic and therapeutic tools, and give OSD the respect it deserves. Our patients, many of whom suffer silently with the disease, will appreciate our efforts.**ODT**

## References

1. Stephenson M. The relationship between dry eye and cataract surgery. *Rev Ophthalmol* November 2007.
2. Bethke W. An objective look at dry eye syndrome. *Rev Ophthalmol* December 2012.
3. Khaireddin R. Contact lens associated dry eye: Current study results and practical implementation. *Ophthalmologe* 2013; 110(6): 511-514.
4. Lemp MA, Crews LA, Bron A J, *et al.* Distribution of aqueous-deficient and evaporative dry eye in a clinic-based patient cohort: a retrospective study. *Cornea* 2012; 31(5): 472-478.

# At what price service?

**Gretchyn M. Bailey, NCLC, FAAO**
Editor in Chief, Content Channel Director

I belong to an online discussion forum with women from around the country. I've been part of this group for more than 15 years. I consider this group of people as solid friends.

Just today, I addressed my online buddies yet again on the concept of online optical retailing. Now and again, an eye question crops up, and the subject line of the thread tends to be, "Hey Gretchyn, eye question!" (My invisible friends know I work in the eyecare field.) For the past week, a friend had been discussing her frustration with her poor vision, and her plan to see her local eyecare provider to see what could be done. Of course, I offered advice.

Today she posted a link to Warby Parker.

This friend is in her mid 40s, and she is a contact lens dropout due to poor comfort and vision. She spends a lot of time online (reading our message board, no doubt, as do the rest of us). She has computer glasses that work only when she sits at a certain angle, and that's not an option due to her freelance projects…and on it goes. She's an engineer without being an engineer.

*And she posted a link to Warby Parker.*

Even if Warby Parker sold PALs (which it doesn't, she pointed out, clearly disappointed) or if she required a single-vision Rx, I can't see that transaction going well, can you?

Chief Optometric Editor Ernie Bowling recently wrote about a situation in which a patient returned with incorrect glasses purchased online and expected Dr. Bowling to fix the problem. I can picture my friend going through a similar scenario if her desire for an online spectacle purchase was realized.

In previous discussions with my invisible friends, I've talked about the benefits of seeing optometrists, how to address dry eye, suggestions for helping their kids wear contact lenses, and the occasional explanation for IOP, contact lens care solutions, and more. My advice was sought and gladly welcomed. But somehow, that hasn't been the case when I've talked about online optical dispensing.

The reason? Cheap pricing was king! Someone got great frames and lenses that worked for $20! Why wouldn't *everyone* do this? they wondered. After gentle probing, I heard about the problems with the order, and the pair of glasses that was sent back. *But it was $20*! My words about service, frame selection, proper lens measurement and fitting, consideration of the Rx, all fell on deaf ears.

I was surprised, and, frankly, a bit hurt, that my credibility apparently went out the window when dollars came into the picture. Don't rinse GP lenses with tap water? Sure, I can do that, no problem. Talk to my husband about the importance of adhering to his glaucoma drops? I'll absolutely do that. Stop for a minute to think about the elements of service I won't receive by buying glasses online? No, that doesn't matter if I can get them cheap. Until it *does* matter.

Have you had such conversations with patients or friends? How are *you* addressing the concept of price vs. service? Let me know your strategies and tactics. I could use some good advice for my friends.**ODT**

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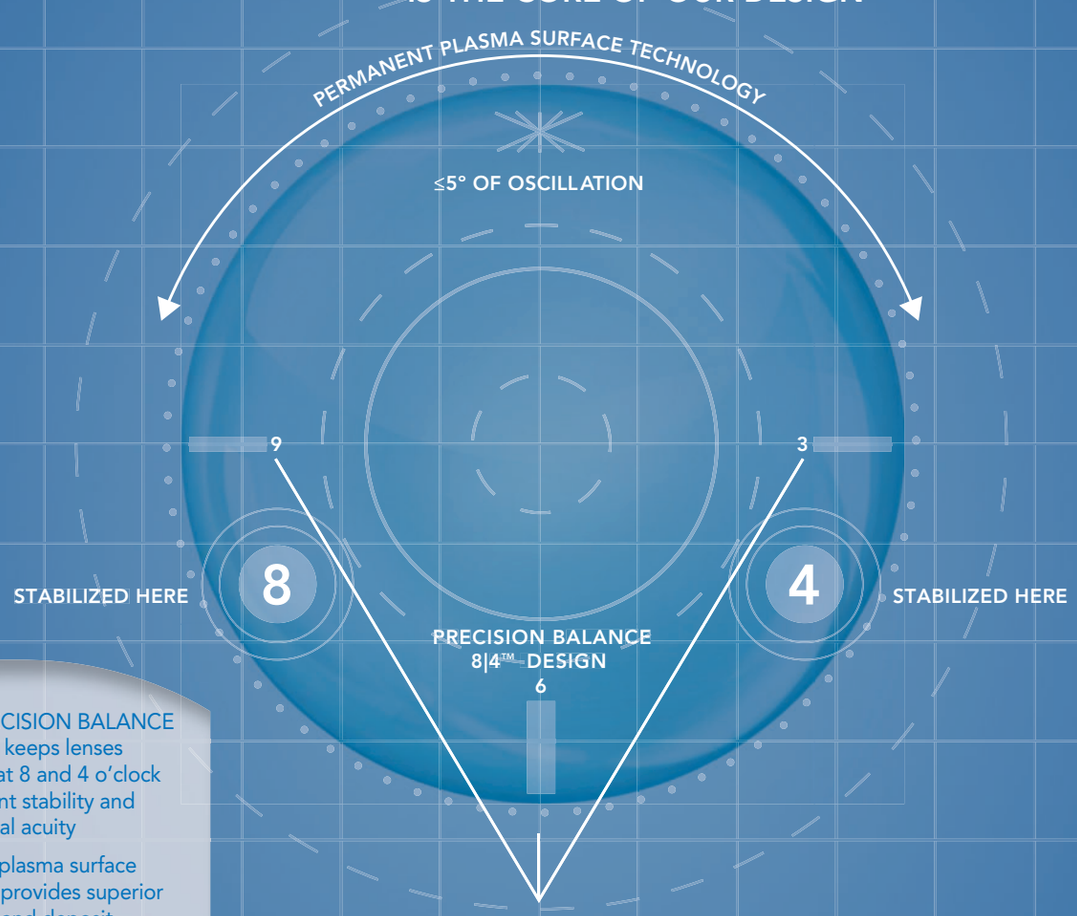


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**References: 1.** In vitro measurement of contact angles on unworn spherical lenses; significance demonstrated at the 0.05 level; Alcon data on file, 2009. **2.** Ex vivo measurement of lipid deposits on lenses worn daily through manufacturer-recommended replacement period; AOSept Plus used for cleaning and disinfection; significance demonstrated at the 0.05 level; Alcon data on file, 2008. **3.** Nash W, Gabriel M, Mowrey-Mckee M. A comparison of various silicone hydrogel lenses; lipid and protein deposition as a result of daily wear. *Optom Vis Sci.* 2010;87:E-abstract 105110. **4.** Davis RL, Eiden SB. Evaluation of changes in comfort and vision during weeks 3 and 4 of monthly replacement silicone hydrogel contact lenses. American Academy of Optometry; 2012; E-abstract 125401.

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# You *are* smarter than your OCT

## SD-OCT technology is sophisticated, but clinicians must interpret and apply the findings

In this age of spectral or Fourier domain optical coherence tomography (SD-OCT), we are almost as close to *in vivo* histology as we can get. With resolution down to just a few microns, it's amazing that this technology will likely get even better in the near future. What a fun time to be an optometrist!

It is important to understand that an SD-OCT does not measure what it interprets as human tissue. SD-OCT measures differences in optical reflectivity.[1] Now, it happens to measure those differences very well, but when clinicians interpret SD-OCT images, we need to watch out for a ton of potential variables lurking nearby.

Below is a case in which an unrelated finding complicates assessment of the retinal nerve fiber layer (RNFL). This case illustrates how visually assessing the RNFL directly can yield more qualitative information than SD-OCT scans provide.

### The patient presents

A 92-year-old African-American female was referred to our clinic for a glaucoma consult by her retina specialist. She had a history of ischemic superior hemispheric retinal vein occlusion (HRVO) OD and a severe cortical cataract OS The patient was status post focal laser OD for HRVO. Entering corrected visual acuities were 20/30 OD and count fingers at 5 feet OS. Intraocular pressures were 16 mm Hg OU. OS posterior segment was obscured by the patient's cataract. The OD posterior pole is shown in Figure 1. Laser scars are visible in the superior macular area, and the RNFL is noticeably thin superiorly, especially between 10 o'clock and 12 o'clock, where there is essentially no RNFL left. The anomalous vessels on the superior portion of the optic nerve head are shunt vessels.

We performed Cirrus (Carl Zeiss Meditec) SD-OCT scans of the patient's OD (Figures 2, 3, and 4); OS scans were unattainable. At first glance, the RNFL didn't look nearly as bad as it should have, especially superiorly, but it wasn't until we examined the extracted tomogram and 3-D images that we came to understand just what was throwing off the scan. This patient had a posterior vitreous detachment that was still partially adhered to the optic nerve head and its surrounding tissues. In the areas of adherence, the vitreous had tented up the neurosensory retina, which made the RNFL appear thicker in those areas than it really was.

Pachymetry measurements were average OU. The patient was open to ciliary body with no angle neovascularization in either eye by gonioscopy. She was unable to complete visual field studies, and we continue to monitor her for change without treatment.

### Interpreting the scans

In reviewing this patient's SD-OCT scans, several points became apparent. First, while it is tempting to jump right to the RNFL thickness deviation when interpreting a SD-OCT printout, a clinician can attain good and meaningful qualitative information from the RNFL thickness map and the extracted tomogram. When the tomogram is compared to the TSNIT curve (Figure 3), it becomes quite apparent that the vitreous adherence to the inner retina sur-

**By Benjamin P. Casella, OD, FAAO**

Dr. Casella, a 2007 graduate of University of Alabama at Birmingham School of Optometry, practices in Augusta, GA , with his father in his grandfather's practice. He is a member of Allergan's speakers' bureau.

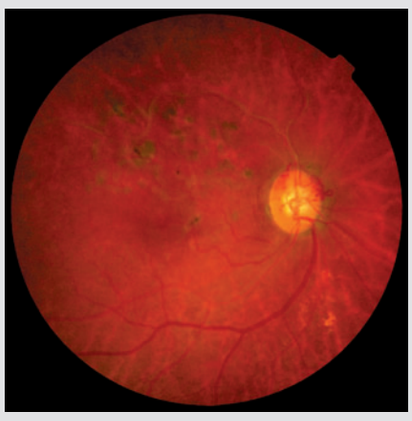

**Figure 1. Fundus photo of the right eye. Laser scars and shunt vessels are seen along with a very thin RNFL superiorly.**

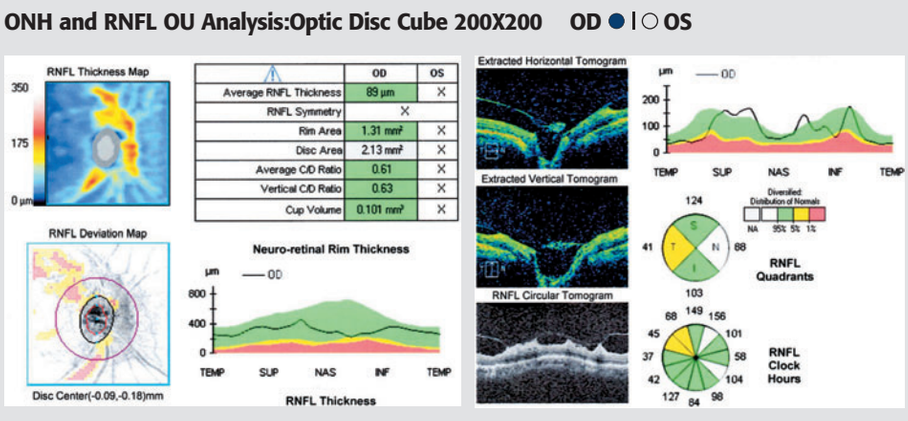


**Figure 2. SD-OCT optic nerve and RNFL printout for the patient's right eye.**

This should be the case with every patient: We see things clinically and use technology, such as SD-OCT, to confirm or deny what we already suspect.

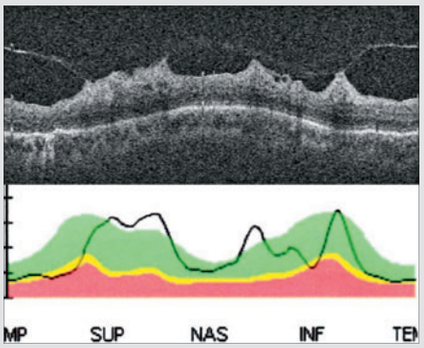


**Figure 3. Extracted Tomogram compared to the TSNIT curve—areas of vitreous adherence are noticeably tenting up the inner retina, thus throwing off the RNFL thickness measurements.**

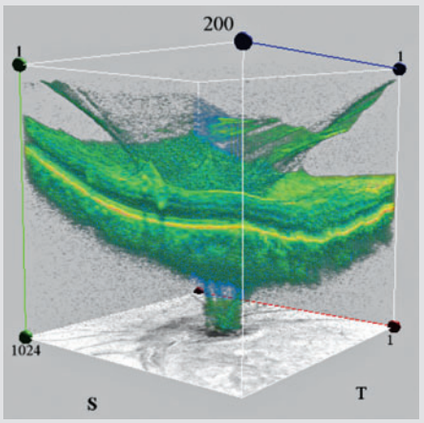


**Figure 4. 3-dimensional image of the peripapillary vitreous adherences.**

rounding the optic nerve is making this patient's RNFL look a lot thicker than it really is. We learned more from just looking directly at this patient's fundus than we did from what the SD-OCT had to say. This should be the case with every patient: We see things clinically and use technology, such as SD-OCT, to confirm or deny what we already suspect.

SD-OCT is, by far, the most exciting and useful advance in diagnostic technology for the human eye since I've been in practice. However, it is of paramount importance to realize that SD-OCT, as sophisticated as it is, does not think or interpret. That is solely the job of the clinician.**ODT**

## Reference

1. Puliafito CA, Hee MR, Lin CP, et al. Imaging of macular diseases with optical coherence tomography. *Ophthalmology.* 1995 Feb;102(2):217-229.

# Strategy, tactics basis for practice success

## A focused business vision lets you and your team earn professional, profitable rewards

Optometry is a great profession for many reasons, but my favorite aspect is the diversity of the ways we practice. Thanks to the countless dedicated professionals who came before us, we can dedicate our practices to providing care to our patients, or we can serve those who have lost their vision. We can concentrate on niche arenas, such as complicated contact lens fits, vision therapy, low vision, high-fashion eyewear, or ocular disease. We can focus solely on those people who are the neediest or limit our practice to the most demanding.

This diversity, while it brings me the most delight in practicing, has also brought me a great deal of frustration. I sometimes find myself exasperated by trying to do it all. Vision therapy and low vision are two of the most needed services that I have the ability to provide. I want to provide those services and feel like I should, but I have tried several times, and it's clear they're not for me.

### We all do it

For years, I have been working with doctors who just want to straighten up their practices. Experience has shown me that this is a common mistake in optometry, and in everything else. Very few of us have a clear vision about what type of practice we are building. Because of that, every time we learn of a successful strategy from one of our buddies, we want to try it. Have you ever invested in an expensive set of specialty lenses that a colleague told you about, only to throw it away a few years later? If you haven't—you will.

But, growth is all about taking chances—don't worry about it, but do learn from it.

### Decide who you are

In business terms, a plan begins with a clear, well-thought-out vision—the concept of what the business will become. The **vision** dictates the **mission**, which determines the **goals** that frame the available **resources** and **processes** to support **delivery** of the product or service your practice will provide.

**By Michael Rothschild, OD**
Dr. Rothschild founded his practice in Carrollton, GA, in 1999 and is a 1997 graduate of Southern College of Optometry.

Successful businesses always begin with the vision and move forward, taking disciplined steps toward the delivery. For a vision statement to be clear, it has to be written out, defining what the practice is and what it is not. If you can get a clear idea of the practice you want to build, then you can share that with your team and they can support the ideals that will help you build that vision. Once everyone is on board about what you want to accomplish, the mission can be narrowed down to accomplishable goals. Then, decisions can be made specifically how to achieve those goals and how that will help deliver eye care.

But, for the vision of a business to work, you have to take the steps in order.

### A level of efficiency

The vision for my practice includes respecting patients' time, so much that I strive for patients to never wait for us. Don't misunderstand—we have a long way to go, but we keep trying. Here are some of the things we do to make this a reality:

- Online paperwork is entered in the patient's record before he or she arrives; don't ask for it again.
- Technicians greet the patient upon arrival arrive and take him or her straight to an exam room.
- Pre-testing avoids redundancy.
- Checkout stations in all exam rooms, the contact lens room, and the optical.
- No phone at the front desk.
- And we have a lot of things planned.

With this level of efficiency being our first concern, you can see where any service that requires focused, specialized attention will be a tough fit. But, it also limits our ability to do everything we want to do.

When I hear about great success that someone is having fitting scleral lenses, I want to do that, too. And rather than thinking about how that would affect the overall flow of our systems, I may buy the fitting set or go to the seminar. This is an example of doing it backward.

When non-businesspeople, such as doctors, run businesses, we tend to go backward and start by changing the delivery of care first. Remember—that part is supposed to be last.

While creating a vision statement for your practice may sound simple, the diversity of our profession makes it tough. Naturally, all of us want to do it all, even though we realize nobody can be everything to everyone. So, we created Vision Builder App, a free tool that helps you get started. We built it to be used, so use it.

I encourage you not to make another practice decision until you have a clearly defined vision that everyone on your team understands. Then, try to look back at it before any big decision.**ODT**

## Step by step to business success

Follow each essential step, one at a time, to create the perfect vision statement for your practice.

1. Vision
2. Mission
3. Goal
4. Resources
5. Processes
6. Delivery

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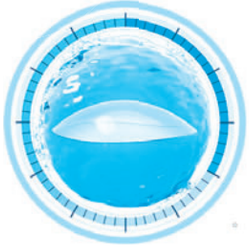

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REFERENCES:
**1.** Data on file, Alcon Research Ltd. **2.** Lally J, Ketelson H, Borazjani R, et al. A new lens care solution provides moisture and comfort with today's CLs. *Optician* 4/1/2011, Vol 241 Issue 6296, 42 -46. **3.** Campbell R, Kame G, Leach N, et al. Clinical benefits of a new multi-purpose disinfecting solution in silicone hydrogel and soft contact lens users. *Eye & Contact Lens* 2012:38(2);93-101. **4.** Davis J, Ketelson HA, Shows A, Meadows DL. A lens care solution designed for wetting silicone hydrogel materials. Poster presented at: ARVO; May 2010; Fort Lauderdale, FL.




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# Is it all about itch?

## Allergic conjunctivitis means that dryness, watery, redness, and swelling play equally important roles in diagnosing and treating allergies

Time and again, we hear the mantra about itch and allergy—if it itches, then it's allergy. For most patients, this holds true. But, there are times when there are no itch symptoms, but allergy is present. Experience has taught one clinician that there are 5 symptoms that mean allergic conjunctivitis.

### 5 symptoms of allergic conjunctivitis

- Itch (of course)
- Redness
- Watery eyes
- Swelling
- Dryness

It's almost to the point where our obsession with itch can mislead, rather than lead, to the right diagnosis.

What I have learned the hard way is there are five symptoms I look for in allergic conjunctivitis:

- Itch (of course)
- Redness
- Watery eyes
- Swelling
- Dryness

Redness and swelling are classic signs of inflammation. But, watery eyes *and* dryness? Yes, this seems contradictory in itself.

> Our obsession with itch can mislead rather than lead to the right diagnosis.

*How did I come up with this nonsensical conclusion*?

I participated in a study on itch and tear meniscus heights.[1] In our small study, we found a negative correlation between the severity of itch and meniscus heights measured with OCT (see Figure 1). In other words, the lower the tear meniscus height, the more severe the itch becomes. We know that low tear meniscus heights indicate poor tear volume (aqueous tear deficiency) or dryness. So, the drier the eye, the worse the itch gets.

*Do we see itch when the eye is watery or when it is dry*?

Most likely, when it is dry. Why is this? When there is a lower tear volume, the concentration of inflammatory factors in the tears goes up and elicits the itch response. Basically, I see the itch and dryness linked together, and watery eyes as another symptom that occurs at a different time point during the allergic response.[2]

Now I look beyond itch for allergic conjunctivitis. Dryness, watery eyes, redness, and swelling play equally important roles.**ODT**

**By Milton M. Hom, OD, FAAO, FACAAI (Sc)**
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### References

1. Hom MM. Nguyen AL. Bielory L. Tear meniscus height by optical coherence tomography (OCT) and ocular itch. Academy of Asthma Allergy and Immunology. 2013 Poster #410 Session #3210.
2. Bielory L. Ocular symptom reduction in patients with seasonal allergic rhinitis treated with the intranasal corticosteroid mometasone furoate. *Ann Allergy Asthma Immunol.* 2008 Mar;100(3):272-279.

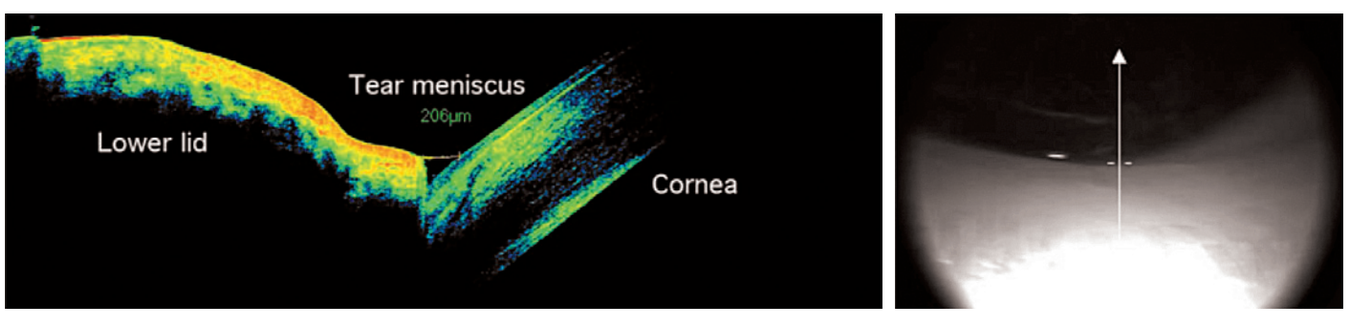


**Figure 1. OCT image of tear meniscus height.**

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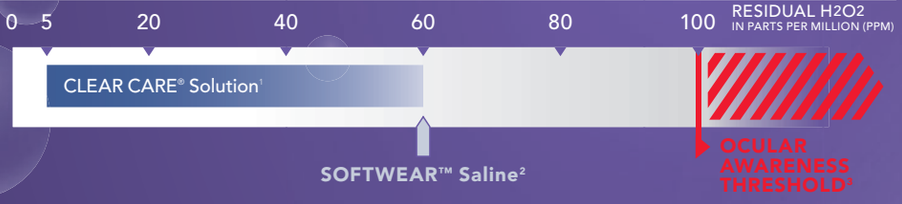


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# Multiple sclerosis and optometry

## MS presents the challenge of eye care compounded with neurological impact

**By Mark Swanson, OD, MSPH**

Multiple sclerosis (MS) is a complex neuro-inflammatory disorder affecting about 400,000 Americans.[1] MS isn't a single disorder, but a family of disorders categorized by the disease course. There are four major forms of MS:

- **Relapsing-remitting.** The most familiar form, and consequently the one most seen at the time of diagnosis (85%).[1] Relapsing-remitting is characterized by acute episodes of neurological symptoms followed by complete or partial recovery of function. Optometrists are most likely familiar with this form which occurs in patients who present with an acute episode of diplopia or optic neuritis that clears over a period of weeks to months.
- **Primary progressive.** This form has a slow downhill course from the beginning, with no distinct episodes or relapses.
- **Secondary progressive.** This form occurs in patients who initially present with relapses and remissions, but these patients later convert to a progressive downhill course. About 50% of MS patients initially diagnosed with the relapsing-remitting form convert to the secondary progressive form within 10 years of the initial episode.[1]
- **Progressive relapsing.** In the least common of the forms (5%), the course is initially progressive, but punctuated by definite neurological episodes.[1] Unlike the patient with typical relapsing-remitting MS, patients with this form don't recover function after acute episodes.

### Take-Home Message

Multiple sclerosis (MS) is a complex neuroinflammatory disorder that can result in diplopia, optic neuritis, and myelin loss around the optic nerve. Optical coherence tomography (OCT) findings have been useful for investigating retinal parameters measured by OCT. For patients with MS, several treatment options are available, including injectable and oral medications.

Early diagnosis of MS is important for both treatment and counseling purposes. The McDonald criteria are the most common set of clinical guidelines used to diagnose MS.[2] These criteria were developed in 2001 by an international working group and revised in 2010. The diagnosis of MS is marked by the concepts of separation in space and separation in time. In general, two separate documented neurological episodes (in time) consistent with MS and not associated with fever are needed to diagnose the disease. This may be supported by lesions seen on T2 weighted magnetic resonance imaging (MRI) images in separate locations (in space) of the central nervous system or with new lesions documented on repeated MRI scans (in time).

In 2008, the 15-year results of the Optic Neuritis Treatment Trial were released.[3] The primary outcome of interest was determining the best way to treat acute non-arteritic optic neuritis, but a secondary goal was to determine the rate of MS diagnosis among the subjects. All subjects in the trial were experiencing their first episode of optic neuritis and didn't carry a diagnosis of MS at the time they entered the study. By 15 years out, 50% of all subjects were diagnosed with MS. The rate was much higher (72%) among those subjects whose initial MRI scans were positive for brain plaques consistent with MS than among subjects who didn't have lesions (25%).

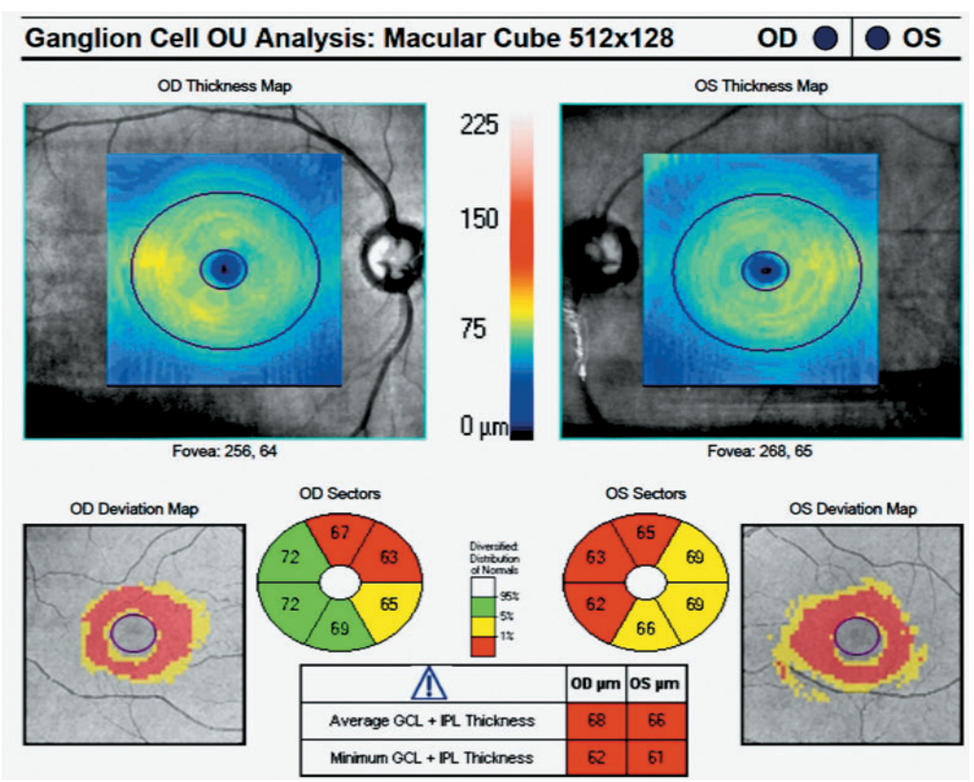


**Figure 1. Ganglion cell complex analysis in a patient recently diagnosed with relapsing remitting multiple sclerosis.**

### OCT and MS

The McDonald criteria recommend the use of visually evoked potential (VEP) as a marker for MS episodes among those with previous visual symptoms, similar to MRI for general central nervous system lesions. The 2010 paper reporting the McDonald criteria mentioned optical coherence tomography (OCT) as a potential substitute for VEP without endorsing its use.[2] However, that report recommended further study. Along this line, the past 7 years have seen an explosion of studies looking at retinal parameters measured by OCT as biomarkers for a host of neurodegenerative disorders, including MS.

The initial study of the relationship of OCT findings to MS appeared in 1999. The results showed a correlation between the retinal nerve fiber layer (RNFL) thickness and electrophysiology results in MS patients with a previous episode of optic neuritis.[4] Study in the area went

silent until 2006, when new papers began to be published, and the pace has not slowed since. The overarching goal of recent research into OCT and MS has been to determine whether OCT-measured retinal parameters are associated with the level of disease in MS patients regardless of a history of clinical episodes of optic neuritis. Post-mortem studies of persons with MS have shown a strong disease predilection for the optic nerve with almost 95% to 100% showing demyelination at autopsy.[5] The mechanism of retinal involvement in MS is thought to be retrograde degeneration of the nerve fiber layer and ganglion cell layer (both thinned) in response to myelin loss in around the optic nerve beyond the lamina.[5]

Most studies of OCT parameters and MS have shown good correlation between the overall peripapillary RNFL thickness and ganglion cell complex (GCC) thickness with the length of time a person has had MS as well as the patient's reported disability level.[5] In general, studies have shown that GCC has a slightly better correlation to both disease and disability than RNFL thickness. Deeper retinal layer thickness (inner nuclear/outer nuclear) has also been shown to be thinned with some speculation that this may be due to more retina-specific MS findings, like periphlebitis.[5] A study published in the January issue of *JAMA Neurology* reported GCC thickness and peripapillary RNFL thickness were associated with intracerebral gray matter volume and white matter volume in the cerebellum and brainstem. Inner nuclear layer thickness was shown to correlate to the results of fluid attenuated inversion recovery (FLAIR) MRI, which is particularly useful in MS, by showing periventricular white matter lesions.[5] A serendipitous finding in this study was the association of retinal OCT parameters to intracranial volume in normal subjects. The usefulness of OCT findings in MS is an evolving area. In the not too distant future, OCT may be a recommended test for all diagnosed MS patients.

## Treatment options

For patients with MS, there are more treatment options available than ever before.[1] The majority of treatments are targeted at the relapsing-remitting form and aimed at lengthening the time between relapses. Treatment options for the progressive forms are, unfortunately, limited.

In 1993, injectable interferon β-1b (marketed using the brand names Betaseron [Bayer] and Extavia [Novartis]) was shown to reduce the number of relapses in MS by about one-third. Since that time, interferon β-1a (Avonex [Biogen Idec], Rebif [EMD Serono]) injection has also been shown to be effective at reducing relapses. The interferons continue to be the first-line treatment for MS. Their main limitation is painful injection and infection risk. Mitoxantrone (Novantrone, EMD Serono), glatiramer (Copaxone, Teva), and natalizumab (Tysabri, Biogen Idec]) are effective second-line drugs, but they carry a much higher risk profile than do the interferons. Natalizumab has also shown benefit as a first-line drug. Glatiramer has also drawn interest for its potential neuroprotective effects in glaucoma. Three new oral medications have also become available—fingolimod (Gilenya, Novartis), teriflunomide (Aubagio, Genzyme), and dimethyl fumarate (Tecfidera, Biogen Idec). The yearly cost of these medications is $45,000 to $60,000 per year.

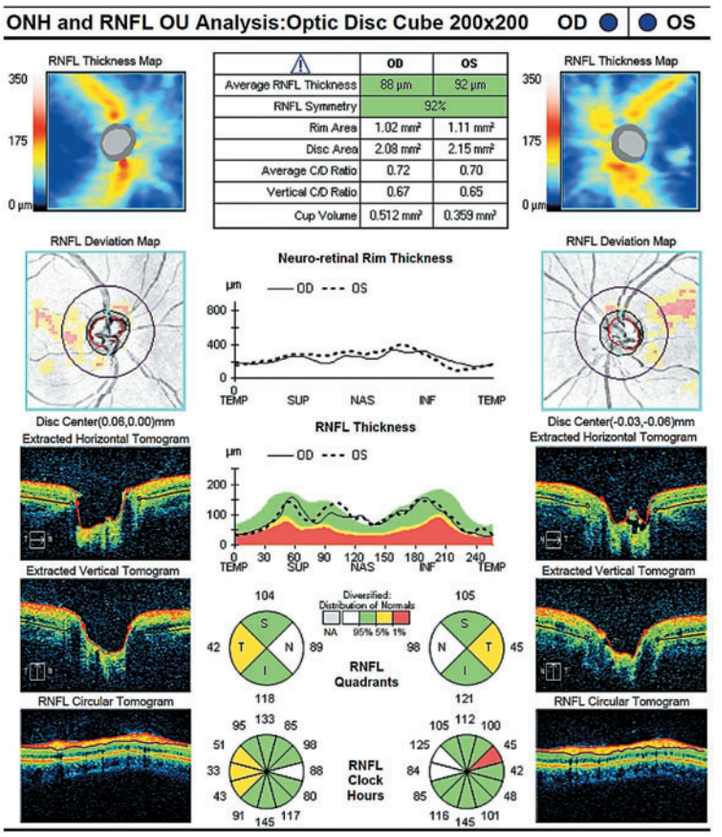


**Figure 2. Normal nerve fiber layer analysis in the same patient.**

Fingolimod is of interest to optometrists because it has been shown to carry an increased risk of a reversible macular edema. Fingolimod is an analog to sphingosine-1-phosphate, a messenger that normally closes vascular endothelial junctions.[6] For reasons that are not clearly understood, fingolimod opens rather than closes vascular junctions in the retina. The sphingosine-1-phosphate pathway has drawn attention and is currently under study in diabetic macular edema and macular degeneration. The current recommendations for patients going on fingolimod are a baseline eye exam before and 3 to 4 months after starting the drug. Optometrists should consider adding an OCT for both drug effects and disease monitoring if asked to see these patients.**ODT**

## References

1. National Multiple Sclerosis Society. What is Multiple Sclerosis? *http://www.nationalmssociety.org/about-multiple-sclerosis/what-we-know-about-ms/what-is-ms/index.aspx*. Accessed June 10, 2013.
2. Polman CH, Reingold SC, Banwell B, et al. Diagnostic criteria for multiple sclerosis: 2010 Revisions to the McDonald criteria. *Ann Neurol*. 2011 February; 69(2):292–302.
3. The Optic Neuritis Study Group. Multiple Sclerosis Risk after Optic Neuritis: Final Optic Neuritis Treatment Trial Follow-Up. *Arch Neurol*. 2008 June; 65(6): 727–732.
4. Parisi V, Manni G, Spadaro M, et al. Correlation between morphological and functional retinal impairment in multiple sclerosis patients. *Invest Ophthalmol Vis Sci*. 1999 Oct;40(11):2520-2527.
5. Saidha S, Sotirchos ES, Oh J, Syc SB, et al. Relationships between retinal axonal and neuronal measures and global central nervous system pathology in multiple sclerosis. *JAMA Neurol*. 2013;70(1):34-43.
6. Jain N, Bhatti MT. Fingolimod-associated macular edema: incidence, detection, and management. *Neurology*. 2012 Feb 28;78(9):672-680.

## Author Info

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# Time outdoors and myopia

## Production of vitamin D lowers the probability of emmetropic children becoming myopic, according to results of the CLEERE study

**By Donald O. Mutti, OD, PhD**

One of the most common stereotypes about the young myope is that he or she is a reader. The Internet age may modify our picture somewhat, but parents and optometrists probably still imagine the young myope reading under the covers at night, although now with a tablet or smartphone instead of a book.

But, is reading the problem? Can children read themselves into becoming myopic or needing a stronger spectacle prescription? Research funded by the National Eye Institute and conducted over the past 23 years suggests that the answer is no. Avoiding reading or the computer or other near work is not the way to maintain emmetropia or to slow myopia progression.

### Take-Home Message

The CLEERE study followed approximately 5,000 children over time to determine what factors were different between those who became myopic and those who remained emmetropic. Study investigators recently reported that myopic children engage in more near work than emmetropic children, although near work did not cause the myopia. It appears, however, that time spent outdoors lowers the risk of becoming myopic.

The Collaborative Longitudinal Evaluation of Ethnicity and Refractive Error (CLEERE) study, conducted by optometrists at 4 sites across the U.S. followed nearly 5,000 children over time to determine what factors were different between those who became myopic and those who remained emmetropic. Study investigators recently reported that myopic children do in fact fit the stereotype and engage in more near work than emmetropic children.[1] The surprising finding was that near work did not cause the myopia. Children who became myopic did no more near work before the onset of myopia than children who remained emmetropic.[2] Once myopic, children's near work also had no effect on their rate of progression.[3]

### Nature vs. nurture

If excessive near work does not cause myopia, is it all genetic? Is there any environmental influence on refractive error?

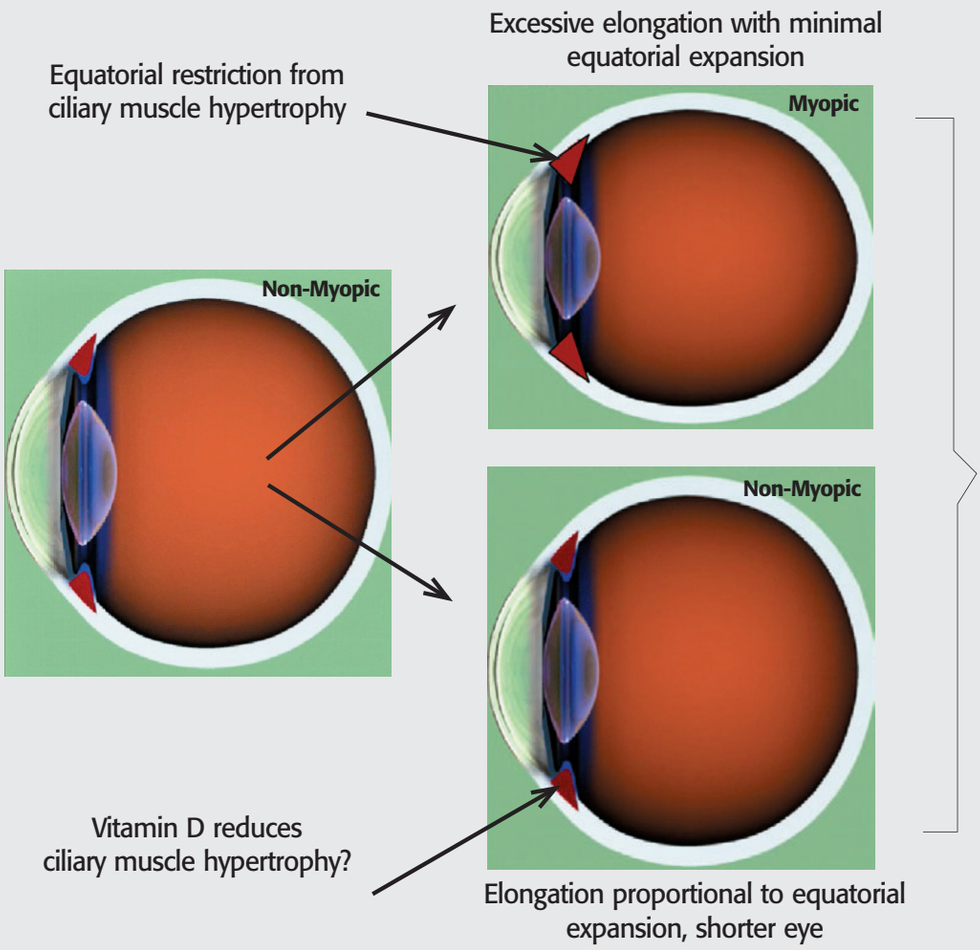


**Figure 1. Ocular growth might be restricted equatorially if a thick ciliary muscle restricts expansion. The eye would become longer and more myopic. A more normal ciliary muscle might allow for uniform expansion and a shorter, non-myopic axial length.** (Photo provided by Donald O. Mutti, OD, PhD.)

Time outdoors, not near work, is the behavioral factor that affects the probability that an emmetropic child will develop myopia.

CLEERE has shown that time outdoors, not near work, is the behavioral factor that affects the probability that an emmetropic child will develop myopia.

More time outdoors lowers the probability of onset, and potentially by a large amount. Emmetropic children with two myopic parents (which is the largest genetic risk) who spent the lowest amount of time outside (5 hours or fewer per week) had about a 60% chance of becoming myopic. However, for emmetropic children with two myopic parents who spent 14 hours per week or more outside, the probability of becoming myopic was reduced to 20%. Children with one or even no myopic parents also benefitted from more time outdoors.[2]

## The great outdoors

One might wonder whether children who spend more time outdoors are just spending less time reading, but this tradeoff behavior does not seem to be happening. The effect of time outdoors is independent of near work with no evidence of a negative correlation between them.[2] Oddly, the evidence from CLEERE also shows that more time outdoors does not affect the rate of progression of myopia.[3] The benefit seems to occur only in emmetropic children, suggesting mechanisms that lead to myopia onset may be different than those related to progression of myopia.

Mechanisms that lead to myopia onset may be different than those related to progression of myopia.

The next wave of research seeks to understand the mechanism by which time outdoors lowers the chances of becoming myopic. Some researchers have suggested that increased physical activity while outside may be important, but careful measurement of activity levels by survey or by objective sensors in studies from Australia, Singapore, and England do not offer strong support for this idea.[4-6]

## Seeing the light

A more widely accepted hypothesis is that the brighter light outdoors stimulates release of dopamine from the retina that inhibits the growth of the eye.[4] However, not all myopia in animal experiments is inhibited by light. Myopia as a result of form deprivation, in which the eye is deprived of high-contrast vision, seems the most sensitive to the effects of light.[7,8] Myopia induced by lenses, where the eye grows longer to compensate for hyperopic defocus imposed by minus lenses, is not inhibited by light in recent studies on research monkeys.[9]

This difference is important because lens-induced myopia is far more relevant to human myopia than form deprivation. The other problem is that bright light should have a general inhibitory effect on eye growth, should inhibit ocular elongation both before and after myopia onset, but that does not seem to happen. As mentioned earlier, time outdoors lowers the risk of onset, but does not seem to affect myopia progression.[3]

## The vitamin D factor

Another effect of spending more time outdoors is greater cutaneous production of vitamin D from exposure to ultraviolet (UV) light. Myopes spend less time outdoors, but even adjusted for this factor, they had 20% lower levels of vitamin D in their blood than nonmyopes, according to a recent report.[10] CLEERE examined genetic variations within the vitamin D receptor gene (VDR) and the group-specific component (Gc, vitamin D-binding protein) gene, finding four significant variations in Caucasians related to myopia less severe than -4.00

See **Myopia** on page 18

# Myopia

Continued from page 17

D.[11] These variants explained 12-18% of the total variation in the sample, a very high percentage compared to the 2.9-3.4% of the variance explained by the many polymorphisms related to myopia identified in recent genome-wide association studies.[12,13]

How might vitamin D help prevent the onset of myopia? Results from CLEERE show that emmetropic axial elongation is nicely matched by compensatory decreases in crystalline lens power and thickness. The crystalline lens thins, flattens, and loses power to maintain emmetropia, probably through a process of simple mechanical stretch provided by the connection between the growing eye, ciliary muscle, zonules, and lens. The onset of myopia is characterized by the sudden cessation of this stretch.[14] The growth of the eye essentially becomes disconnected from changes in the crystalline lens.

When that connection is broken, all axial elongation translates into negative diopters of myopia (Figure 1). We hypothesize that this disconnect occurs because of changes in the ciliary muscle. When stretched, smooth muscles in other parts of the body, such as blood vessels or the bladder, tend to hypertrophy, resulting in altered structural properties.[15,16] A thick ciliary muscle might act like a restraining O-ring, preventing a growing eye from stretching the crystalline lens.

If hypertrophy of the ciliary muscle plays a role in the onset of myopia—a large "if" at this stage—vitamin D might help. Vitamin D improves bladder function during obstructive disease in both rats and humans in which muscle wall stretch produces hypertrophy and impaired contraction.[17,18] Increased vitamin D levels might have a similar beneficial effect on ocular ciliary muscle. A more pliant ciliary ring might preserve the stretch on the crystalline lens during growth and may prevent or delay the onset of myopia. Vitamin D would not affect the growth of the eye directly, perhaps explaining why more time outdoors does not affect the rate of progression once myopia has occurred.

Discovering that spending more time outdoors reduces the risk of the onset of myopia represents a major advance in our understanding of refractive error. But, we need to figure out what's so good about more time outdoors—exercise, brighter light, vitamin D synthesis, or some combination. Being outside is a common behavior that can be influenced to have a beneficial effect, not only on the eye, but also on risk factors for other diseases in children, such as obesity and diabetes. Caution should be used before making any sweeping recommendation about children spending more time outdoors. UV light outdoors has known, harmful effects on the skin and the eye.

The question becomes this: do we need more light or more dietary vitamin D? Once we find the answer, children might be able to come out from under the covers and use their tablets or smartphones without their parents telling them to stop ruining their eyes.**ODT**

## REFERENCES

1. Jones-Jordan LA, Mitchell GL, Cotter SA, Kleinstein RN, Manny RE, Mutti DO, et al. Visual Activity before and after the onset of juvenile myopia. *Invest Ophthalmol Vis Sci* 2011;52:1841-1850.
2. Jones LA, Sinnott LT, Mutti DO, Mitchell GL, Moeschberger ML, Zadnik K. Parental history of myopia, sports and outdoor activities, and future myopia. *Invest Ophthalmol Vis Sci* 2007;48:3524-3532.
3. Jones-Jordan LA, Sinnott LT, Cotter SA, Kleinstein RN, Manny RE, Mutti DO, et al. Time outdoors, visual activity, and myopia progression in juvenile-onset myopes. *Invest Ophthalmol Vis Sci* 2012;53:7169-7175.
4. Rose KA, Morgan IG, Ip J, Kifley A, Huynh S, Smith W, et al. Outdoor activity reduces the prevalence of myopia in children. *Ophthalmology* 2008;115:1279-1285.
5. Dirani M, Tong L, Gazzard G, Zhang X, Chia A, Young TL, et al. Outdoor activity and myopia in Singapore teenage children. *Br J Ophthalmol* 2009;93:997-1000.
6. Guggenheim JA, Northstone K, McMahon G, Ness AR, Deere K, Mattocks C, et al. Time outdoors and physical activity as predictors of incident myopia in childhood: a prospective cohort study. *Invest Ophthalmol Vis Sci* 2012;53:2856-2865.
7. Ashby R, Ohlendorf A, Schaeffel F. The effect of ambient illuminance on the development of deprivation myopia in chicks. *Invest Ophthalmol Vis Sci* 2009;50:5348-5354.
8. Smith EL, 3rd, Hung LF, Huang J. Protective effects of high ambient lighting on the development of form-deprivation myopia in rhesus monkeys. *Invest Ophthalmol Vis Sci* 2012;53:421-428.
9. Smith EL, 3rd, Hung LF, Arumugam B, Huang J. Negative lens-induced myopia in infant monkeys: effects of high ambient lighting. *Invest Ophthalmol Vis Sci* 2013;54:2959-2969.
10. Mutti DO, Marks AR. Blood levels of vitamin D in teens and young adults with myopia. *Optom Vis Sci* 2011;88:377-382.
11. Mutti DO, Cooper ME, Dragan E, Jones-Jordan LA, Bailey MD, Marazita ML, et al. Vitamin D receptor (VDR) and group-specific component (GC, vitamin D binding protein) polymorphisms in myopia. *Invest Ophthalmol Vis Sci* 2011;52:3818-3824.
12. Verhoeven VJ, Hysi PG, Wojciechowski R, Fan Q, Guggenheim JA, Hohn R, et al. Genome-wide meta-analyses of multiancestry cohorts identify multiple new susceptibility loci for refractive error and myopia. *Nat Genet* 2013;45:314-318.
13. Kiefer AK, Tung JY, Do CB, Hinds DA, Mountain JL, Francke U, et al. Genome-wide analysis points to roles for extracellular matrix remodeling, the visual cycle, and neuronal development in myopia. *PLoS Genet* 2013;9:e1003299.
14. Mutti DO, Mitchell GL, Sinnott LT, Jones-Jordan LA, Moeschberger ML, Cotter SA, et al. Corneal and crystalline lens dimensions before and after myopia onset. *Optom Vis Sci* 2012;89:251-262.
15. Christ GJ, Andersson KE. Rho-kinase and effects of Rho-kinase inhibition on the lower urinary tract. *Neurourol Urodyn* 2007;26:948-954.
16. Ren J, Albinsson S, Hellstrand P. Distinct effects of voltage- and store-dependent calcium influx on stretch-induced differentiation and growth in vascular smooth muscle. *J Biol Chem* 2010;285:31829-31839.
17. Dallosso HM, McGrother CW, Matthews RJ, Donaldson MM. Nutrient composition of the diet and the development of overactive bladder: a longitudinal study in women. *Neurourol Urodyn* 2004;23:204-210.
18. Schroder A, Colli E, Maggi M, Andersson KE. Effects of a vitamin D(3) analogue in a rat model of bladder outlet obstruction. *BJU Int* 2006;98:637-642.

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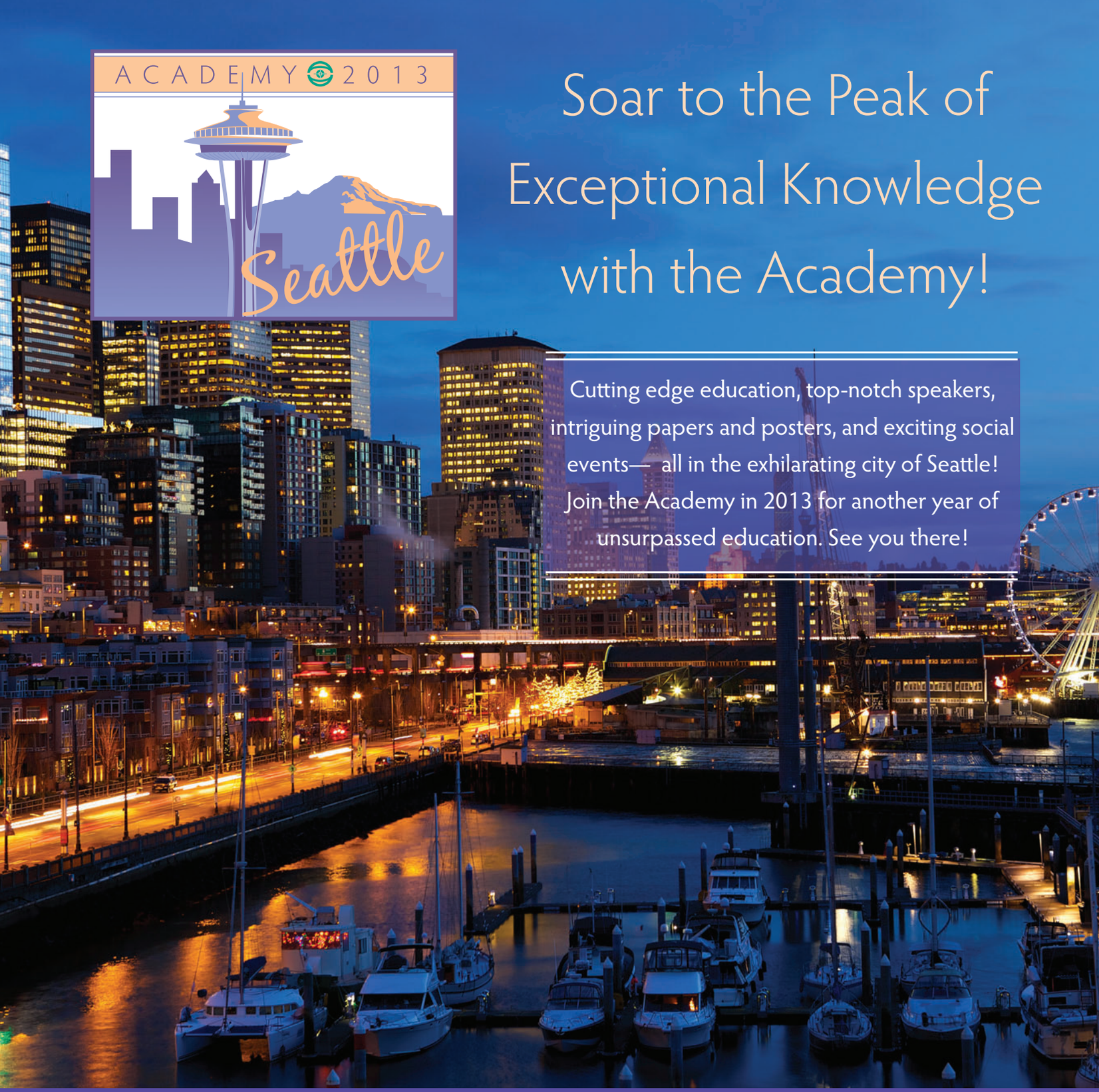


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# Zero in on a differential diagnosis of uveitis

## Reduce the vast number of possibilities by using detailed and methodical classification—along with lab results—to help you nail the diagnosis

**By David P. Sendrowski, OD, FAAO**

Developing a differential diagnosis for a patient with uveitis is often challenging, not only for the optometric physician, but for uveitis specialists as well. Patients affected with uveitis from both idiopathic and secondary etiologies present with a multitude of ocular and systemic signs and symptoms. It is in this grab bag of signs and symptoms that the diagnostician finds some clinical gems that assist him or her in finding the underlying etiology of the ocular inflammation.

**10%** of visual impairment in the world today is due to uveitis.[1]

Uveitis is estimated to account for 10% of visual impairment in the world today.[1] It is also responsible for 30,000 new cases of blindness each year.[1] Uveitis can occur in any age group, but affects those aged 20 to 44 years more commonly.

The incidence of uveitis in elderly patients may be higher than previously suspected, according to a recent study of adults 65 years of age and older.[2] In this study, anterior uveitis was the most common form of uveitis encountered with an average of 243.6/100,000 persons per year. It is important to mention that in this age group, masquerade syndrome should always be considered as part of an ocular examination rule-out. Malignant tumors of the anterior segment ciliary body melanoma may seed the anterior chamber with what appears to be inflammatory cells but, on close inspection, do not fit the diagnosis of uveitis.

Anterior uveitis has been reported to be the most common of the uveitic presentations to eyecare professionals (ECPs). It accounts for 50-60% of all uveitic cases in tertiary referral centers.[3] Posterior uveitis is the second most common and accounts for 15-30% of all cases.[3] Toxoplasmosis retinochoroiditis is the most common type of posterior uveitis that is diagnosed by ECPs.[3] Intermediate uveitis remains the least common form of uveitis, and the idiopathic form of intermediate uveitis is the most commonly encountered.

### Take-Home Message

A sound differential diagnosis of a patient with uveitis begins with known risk factors for uveitic entities and should be the first thing to consider. Spend time to take a thorough history. You'll find that the huge number of possibilities has been trimmed to a manageable number, which can then be evaluated by direct examination and laboratory testing for an underlying disease.

### Classifying uveitis

A good differential diagnosis begins with known risk factors for uveitic entities and should be the first thing to consider. Systemic conditions, such as human immunodeficiency virus (HIV) or chemotherapeutic medication use or malignancies, may predispose individuals to certain diseases, for instance, herpetic viral retinitis, a posterior type of uveitis. Discuss the patient's recent travel history, unusual dietary habits, such as consuming rare or uncooked meat, particularly pork or goat products, or newly acquired household pets, especially cats or puppies. Acquisition of a new puppy by a young male patient with leucokoria and vitritis may lead the diagnostician to suspect toxocariasis canis as the cause of

Anterior uveitis, the most common of the uveitic presentations to ECPs, accounts for 50-60% of all uveitic cases in tertiary referral centers.

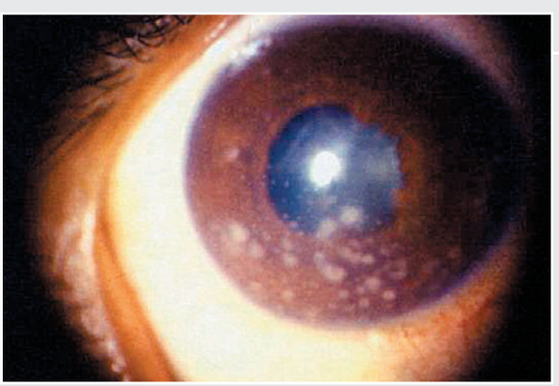

**Figure 1.** The ocular examination facilitates identification of keratic precipitates on the corneal endothelium and inside the anterior chamber.

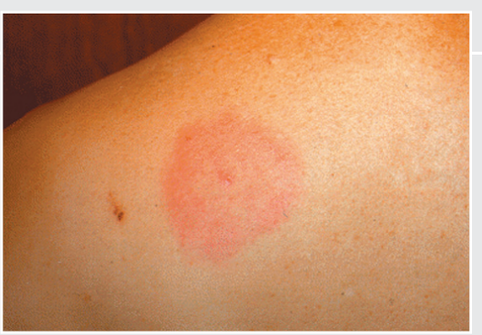

**Figure 2.** Sarcoid granulomas or erythema chronicum migrans, secondary to Lyme disease, can have very characteristic skin rashes from the disease state.

(Photos courtesy of David P. Sendrowski, OD, FAAO)

the posterior uveitis. Patients should also be queried about recent camping or hiking trips, which may lead to the possible diagnosis of Lyme disease.

After identifying the known risk factors, classify the uveitis patient in as detailed a fashion as possible. Start by examining patient demographics, including: age, race, sex, medical ailments, medications, and family medical history. This serves as an excellent foundation. Many types of uveitis are very specific for age, race, and sex, but several systemic diseases are associated with uveitis (such as arteritic spondylopathies), which are genetically passed on from direct blood relatives of maternal and paternal origins.

- **Where is the inflammation greatest in the eye?** Using the International Uveitis Study Group classification scheme,[4] classifying uveitis as anterior, intermediate, posterior, or panuveitis can narrow down the causes of the inflammation. Noting involvement of the cornea (keratouveitis), sclera (sclerouveitis), or retinal vasculature (retinal vasculitis) can also be helpful in detecting the etiology of the uveitis.
- **Is the ocular inflammation acute or chronic?** Acute types of uveitis are of sudden origin (1-2 weeks) while the chronic type can last 6 weeks or more. Most occurrences of anterior uveitis, such as the HLA-B27–associated uveitis and idiopathic uveitis, fall into the acute type. Chronic uveitis patients are commonly diagnosed with juvenile idiopathic uveitis (younger females under the age of 6), post-surgical uveitis from operative irritation or infection, or systemically induced uveitis from sarcoidosis.
- **Describe the type of inflammatory cells you observe with biomicroscopy.** The ocular examination offers the opportunity to determine the type of infiltrating inflammatory cells that appear on the corneal endothelium—called keratic precipitates, or KPs—and inside the anterior chamber (Figure 1). Granulomatous KPs or "mutton-fat" KPs, named because of their larger size and greasy appearance, can be a useful diagnostic clue. Many patients with granulomatous KPs have a history of a chronic disease with insidious or chronic onset and frequently have posterior segment disease in addition to their anterior segment inflammation.
- **Is the ocular disease unilateral or bilateral?** Although one eye may be affected first, uveitis resulting from most causes involves both eyes within the first several months. Diseases that frequently invade a single eye tend to be parasitic with the exception of toxoplasmosis. The recent post-surgical eye or the post-traumatic eye with an intraocular foreign body may also present as a unilateral entity.
- **What associated symptoms does your patient present with?** The ECP must be careful not to lead the patient. "Do you have" or "did you have" are poor questions to ask. It might be better to lead the patient with open-ended questions such as: "What other symptoms have you had recently?" An African-American female patient with anterior and posterior uveitis with associated breathing difficulties, headaches, and salivary problems might signal the ECPs to consider sarcoidosis as a possible etiology. A young male patient with an anterior uveitis and lower back pain that is more prominent in the morning may lead one to consider ankylosing spondylitis as the cause.
- **What physical signs are present on patient examination?** As ECPs, we don't routinely perform physical exams in our offices. Simple examination of the skin of the arms and legs can be rewarding in diagnosing uveitis. Sarcoid granulomas or erythema chronicum migrans (Figure 2), secondary to Lyme disease, can have very characteristic skin rashes from the disease state. Also, a brief examination of the joints of the hands and wrists for signs of inflammation can be useful if you believe the etiology of the uveitis to be rheumatic in nature.

## Six questions to ask in uveitis differential diagnosis

1. Where is the inflammation greatest in the eye?
2. Is the ocular inflammation acute or chronic?
3. Describe the type of inflammatory cells you observe with biomicroscopy.
4. Is the ocular disease unilateral or bilateral?
5. What associated symptoms does your patient present with?
6. What physical signs are present on patient examination?

Although one eye may be affected first, uveitis resulting from most causes involves both eyes within the first several months.

The differential diagnosis for various uveitic etiologies may be vast, but determining the etiology has improved over the past several decades. Next time you come across a patient with uveitis, spend a little more time taking a thorough patient history. You'll find that your vast number of possibilities has whittled down to a manageable number, which can then be evaluated by direct examination and laboratory testing for an underlying disease in your uveitic patient.**ODT**

### References

1. Nussenblatt RB. The natural history of uveitis. *Int Ophthalmol* 1990;14:303-308.
2. Reeves SW, Sloan FA, Lee PP, et al. Uveitis in the elderly: Epidemiological data from the national long-term care survey Medicare cohort. *Ophthalmology* 2006 Feb.;113:307-315.
3. Wakefield D, Chang JH. Epidemiology of uveitis. *Int. Ophthalmol Clin* 2005;45:1-13.
4. Jabs DA, Nussenblatt RB, Rosenbaum JT. Standardization of uveitis nomenclature (SUN) Working Group: Standardization of uveitis nomenclature for reporting clinical data. Results of the first International Workshop. *Am J Ophthalmol* 2005;140:509-516.

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**Learning Objectives**

- Describe recent guideline protocols for diagnosing dry eye disease (DED), classifying DED severity, and differentiating underlying etiologies of DED
- List the current recommendations for the treatment and follow-up of DED by level of severity and underlying etiologies.

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# Meibomian Gland Dysfunction: Prevalence of An Overlooked Cause of Dry Eye

**Donna is a 55-year-old attorney who works extensively on her computer each day, frequently reading intricate documents. Several months ago, she began suffering from bilateral contact lens intolerance, ocular discharge, and sensitivity to light. To date, she has visited three different eye care professionals to try to resolve her symptoms. She was diagnosed with chronic bacterial conjunctivitis and prescribed moxifloxacin and artificial tear drops, but she continues to experience symptoms. Donna now reports to your office to seek another opinion.**

- What steps would you take to make an accurate diagnosis of Donna?
- Are you versed in the various conditions that fall under the umbrella of dry eye disease, particularly meibomian gland dysfunction?
- And, are you familiar enough with this complicated condition to properly treat Donna?

**To learn more about Donna's diagnosis and treatment, go to www.iche.edu/dryeyecase1 and earn even more CE credit!**

## Dry Eye Disease

Dry eye is a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tear film instability, with potential damage to the ocular surface if undiagnosed. It is accompanied by increased osmolarity of the tear film and inflammation of the ocular surface.[1] In the United States, 6% to 10% of women and 4% to 8% of men live with chronic dry eye; the prevalence of the condition increases with age.[2,3]

Dry eye can be classified into various subtypes based on its underlying cause. One of the intrinsic causes of evaporative dry eye is meibomian gland dysfunction (MGD), a chronic, diffuse abnormality of the meibomian glands, commonly characterized by terminal duct obstruction and/or qualitative/quantitative changes in the glandular secretion. It may result in alteration of the tear film, symptoms of eye irritation, clinically apparent inflammation, and ocular surface disease.[4,5] The actual prevalence of MGD is unknown since it is likely underdiagnosed and therefore underreported, but it does appear to have a higher prevalence in Asian populations.[6]

## Diagnosis of MGD-Related Dry Eye

Patients presenting with either ocular surface symptoms (eg, dryness, grittiness, or foreign body sensation) or morphological lid signs of MGD (orifice plugging or lid margin vascularity) should be assessed for evidence of dry eye and ocular surface damage. MGD can exist by itself or as a cause of concomitant evaporative dry eye. The diagnostic goal with these patients is to first identify dry eye of any type and then to distinguish between aqueous-deficient dry eye and MGD-related or other forms of evaporative dry eye.[4,6]

A variety of characteristics are evaluated with tests for MGD, including dry eye symptoms, meibomian function, tear quality, tear volume/secretion, and ocular surface inflammation. Although many of these tests are performed only in specialty clinics, any general eye care clinic can perform a subset of these tests in order to differentiate MGD-related dry eye from other forms of dry eye.

Determining the specific type and cause of dry eye is crucial because this approach permits the clinician to treat the underlying cause of the disease rather than simply reducing or masking the symptoms. In the case of MGD-related dry eye, since MGD is a chronic but treatable condition, symptoms can be dramatically reduced and permanent damage to the meibomian glands can be prevented with proper management.

## Treatment of MGD

Treatment of MGD varies widely, likely due to the lack of an accepted staging system or treatment algorithms and the absence of rigorous clinical trials providing level I evidence for specific therapies. However, both a staging system and treatment algorithm have been recently proposed by the International Workshop on Meibomian Gland Dysfunction.[4] The number of therapies recommended increases proportionally with the stage of MGD, and more severe disease supports the addition of supplementary therapies to existing treatments rather than replacing milder therapies with a more aggressive approach (see **Figure 1**).

### *Patient Education/Behavior Modification*

With all forms of MGD (stage 1 to stage 4), patients should be educated on the effect of diet and physical environment on MGD. Behavior modifications, including taking essential fatty acid dietary supplements, particularly omega-3, and modifying the environment to improve ambient humidity, should also be considered as MGD severity increases.[7,8]

### *Lid Hygiene*

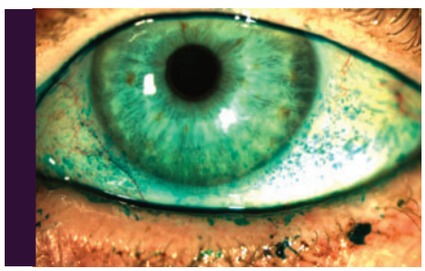
Lid hygiene, which includes both lid warming and mechanical massage of the eyelids, should be considered for stage 1 disease and should be implemented for all other stages. Lid warming is generally achieved by applying warm compresses to the eyes for 5 to 10 minutes once to twice daily, but studies and surveys have demonstrated a wide range of variability in both instructions for lid warming and adherence to this therapy.[7] Mechanical massage of the eyelids serves to express blocked glands. Gland expression has only recently come into clinical focus, and it represents an increased awareness by eye care professionals that eyelid health can impact dry eye symptoms.[9] Eyelid massage should be performed immediately after lid warming because the increased temperature facilitates the flow of meibum via melting of the meibomian lipids.[7,10] As with lid warming, mechanical massage is poorly standardized and has poor compliance.[7]

### *Lubricants*

Non-preserved artificial tears should be considered for patients with stage 2 MGD and implemented for those with more severe disease. Artificial tears are considered a mainstay of treatment,[7] but effective lubricants can take other forms as well, including ointments and lipid-containing liposomal sprays and emollient eye drops. Lubricant ointments have a thicker formulation compared with artificial tears and are used for overnight relief because they may cause unacceptable blurring during the day. Patients with stage 3 or 4 MGD could consider an ointment at bedtime.[7,11] Lipid-containing artificial tears, designed to supplement tear film lipids and stabilize the tear film, are recommended for patients with stage 2 through stage 4 disease.[7,11] Cyclosporine ophthalmic emulsion 0.05% has been shown to improve signs and symptoms of MGD by suppressing inflammation and improving tear film stability directly or through its lipid vehicle.[11,12,13]

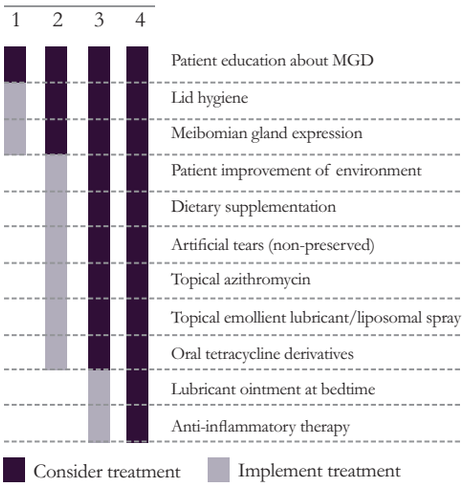
### *Macrolide Antibiotics*

Macrolide antibiotics not only have antimicrobial properties but anti-inflammatory effects as well. Commonly used macrolides include azithromycin, clarithromycin, and roxithromycin, which offer better ocular penetration than older macrolides, such as erythromycin.[7] An open-label study of topical azithromycin added to warm compresses demonstrated that patients receiving both treatments showed significant improvements in meibomian gland plugging, quality of meibomian gland secretions, and eyelid redness compared with compresses alone.[14] A course of topical azithromycin is recommended for patients with stage 3 or 4 MGD [7]; this has been shown to increase comfortable wearing time of contact lenses in an open-label study of patients with contact lens discomfort.[15]



**MGD with lissamine green staining of lid margin and inferior cornea and conjunctiva**

***Severity Stage*** (Figure 1)




### *Oral Tetracycline Derivatives*

Although tetracycline is a bacteriostatic antibiotic, it is mainly used to treat MGD because of its anti-inflammatory and lipid-regulating properties rather than its antimicrobial properties. Oral tetracyclines studied in clinical trials have demonstrated the ability to improve both the signs and symptoms of MGD,[16] and they are recommended for use in stage 3 or 4 MGD. Treatment options include tetracycline and derivatives, including oxytetracycline, minocycline, and doxycycline.[7] A clinical trial of all 4 antibiotics demonstrated that minocycline and doxycycline are clinically effective at lower doses than the other 2 agents.[17]

### *Anti-inflammatory Therapy*

As mentioned, some therapies, such as topical macrolide antibiotics and oral tetracycline derivatives, have anti-inflammatory properties in addition to other useful biological activities. In some cases, these may be sufficient to control the ocular inflammation associated with MGD. In other cases, additional anti-inflammatory therapy may be needed. Topical corticosteroids, such as loteprednol, fluorometholone, prednisolone, dexamethasone, and difluprednate, are a well-accepted treatment option for ocular inflammation,[18] but they do have potential complications, including elevation of intraocular pressure and cataractogenesis.[19] Thus, this type of therapy is restricted to the short-term treatment of those individuals with the most severe form of MGD (stage 4).

## Novel Therapies

A number of novel therapies have recently been developed to improve the management of MGD, including several lid-warming devices. The iHeat Warm Compress® is a waterless eye mask that holds a heated pouch over each eye to provide controlled warmth for 3 to 5 minutes, multiple times per day, to reduce dry eye symptoms.[20] Blephasteam® warms the lids to 42ºC, which is 7ºC above the melting temperature for meibum in MGD patients and safely below the 45ºC safety threshold for corneal temperature.[21] Although currently only available in Europe, Blephasteam has shown a 32% reduction in tear evaporation after a single treatment, as well as significant improvements in visual acuity and non-invasive tear break-up time (TBUT).[22,23] LipiFlow®, the only lid-warming device approved by the U.S. Food and Drug Administration, is a thermodynamic pulsatile treatment that not only warms the lid but simultaneously produces a mechanical massage to express the meibomian glands. In a randomized trial comparing LipiFlow to the iHeat Warm Compress in patients with MGD, a single, 12-minute, in-office treatment with LipiFlow produced significant improvements in both meibomian gland secretion and TBUT for up to 9 months.[24]

A novel way to treat obstructive MGD is through the use of intraductal meibomian gland probing. With this technique, a thin steel probe is inserted through each blocked meibomian glandular orifice and duct after anesthetizing the lids. In a retrospective study, patients with obstructive MGD experienced immediate relief after intraductal probing, as well as symptom relief 4 weeks after treatment.[25] Another novel therapy being studied to treat MGD is topical N-acetylcysteine, which has shown significant improvements in TBUT and Schirmer's scores, although the mechanism of action in MGD remains unclear.[26,27]

## Conclusion

MGD is a prevalent condition that can create bothersome symptoms, damage the ocular surface, and permanently destroy meibomian glands. Thus, MGD should be diagnosed in a timely manner using a battery of tests to not only identify this condition but also determine if it is accompanied by evaporative dry eye. Once diagnosed, a multifaceted treatment approach should be planned, based on the severity of the condition. Current therapies, including a chronic management component, can provide significant improvement of the signs and symptoms in most patients. As interest in MGD increases, novel therapies are being developed to further enhance the management of this condition.

This activity is sponsored by
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# Introducing premium care in the optometrist's chair

## The ORA System can acquire a more precise calculation to improve a cataract patient's acuity

**By Marc R. Bloomenstein, OD, FAAO**

Cataract extraction and replacement of the natural crystalline lens is not a rite of passage marking the transition to senior adulthood or a negative effect of aging. The procedure should be seen as an opportunity to obtain better quality of vision. Modern-day cataract surgery has to be viewed as a refractive procedure. Eyecare professionals (ECPs) have the ability and the technology to offer patients the opportunity to see as clearly as when they were in their 20s and 30s, which to many patients is an exciting prospect. Every patient I diagnose with a cataract is educated about premium surgical care with the ORA System (WaveTec Vision) and how the technology may yield better results with newer lens options.

### Talking points

My discussions with patients about cataract and refractive surgery are based on making two points:

- Cataract surgery is one of the safest and most advantageous procedures that ECPs can perform.
- It is a one-time opportunity for patients to regain better vision.

The ORA System's Optiwave technology optimizes intraoperative wavefront data to calculate IOL power and guide standard, premium, or toric IOL selection and limbal relaxing incision (LRI) placement. I also explain to patients that, even though there are a variety of high-quality lenses available, the selected lens is only as good as the measurement that determines its power. The ORA measures true refractive power, and its optimized algorithms produce highly accurate measurements.

As the primary gatekeeper for our patients, we as optometrists need to continually educate our patients about the benefits of new technology related to cataract surgery. Because this surgery is not titratable, we need to make certain the first and only removal of the cataract is done as accurately as possible. The ORA System conveys to our patients that we are partnering in their surgery, we want the most accurate measurement, and we are technologically advanced.

### What can the ORA system do?

In my practice, I see a good number of patients who have had previous surgery, whether it is PRK, RK, or LASIK, which presents a challenge when assessing a measurement. Additionally, other obstacles may stand in the way of obtaining an accurate lens measurement, such as astigmatism, measuring patients while they are in a supine position, and small aberrations or distortions that can change the quality of vision. Using a technology that can capture, *in vivo*, an intraoperative wavefront measurement is ideal for any patient, but especially for patients with challenging circumstances.

### Postoperative success

It is not uncommon for the surgeon's measurement to be off target by 0.50 D or even 0.75 D, creating some patient dissatisfaction. Using ORA can secure a more precise calculation and improve the patient's acuity. This small dioptral difference can also be a determiner of whether a corrective surgery—such as LRI, PRK, or LASIK—is necessary. When another corrective surgery is needed, the patient may lose confidence in the procedure, the surgeon, and ultimately the optometrist for being involved. Using the ORA System to obtain more precise measurements may yield better patient satisfaction and improve patients' confidence levels.

### What optometrists need to know

The most important thing to remember—something we as ECPs have known for the past 10 to 15 years—is that wavefront aberrometry measurements change when patients have cataracts. The cornea is a stable piece of tissue unless keratorefractive surgery is performed, in which case the cornea and corneal measurements change. Knowing there is a technology that can map out accurate astigmatism is a benefit to us. Optometrists can participate in the evolution of premium surgical care by simply making sure that patients are aware that innovative technology is available and guiding them to a clinic that offers it. Optometrists should build alliances with surgeons who offer different platforms of lenses (such as toric, presbyopic, aspheric) to provide the best quality of vision. Optometrists should also ensure that their philosophy of providing premium surgical care is in line with that of the physician to whom they are referring patients. Speak with the surgeon about his or her philosophies before referring patients there, and then, in turn, inform the patient prior to surgery.

> A technology that can capture an intraoperative wavefront measurement is ideal, especially for patients with challenging circumstances.

Optometrists have the opportunity to improve patients' lives. Like most things in life, that chance comes as an added cost to patients—a cost many patients are willing to pay in return for a lifetime of optimal vision.

Let the patient decide whether or not the investment is worthwhile by educating him or her about premium surgical care. Don't make that decision for the patient. Discuss and guide your patients through the available options that will enable them to not only experience the best quality of vision but also to see the difference your practice makes. **ODT**

Author Info

**By Marc R. Bloomenstein,OD, FAAO** Dr. Bloomenstein is director of optometric services at Schwartz Laser Eye Center in Scottsdale, AZ. E-mail him at mbloomenstein@gmail.com.

# Microassay system tests for two tear film biomarkers

Device enables in-office dry eye diagnosis, has potential for additional testing and diagnostic uses

**By Ernie Bowling, OD, FAAO**

Since the late 1980s, the ophthalmic-scientific community has widely recognized that certain ocular surface disorders could be accurately diagnosed and graded by analyzing certain biomarkers in the tear film. Units for measuring tear film osmolarity have been commercially available for several years, as well as a new diagnostic test for adenovirus. The TearScan MicroAssay System (Advanced Tear Diagnostics [ATD]) is a new in-office diagnostic laboratory-testing platform for tear lactoferrin and IgE.

For years, doctors have had to rely on patient symptoms and subjective evaluation of clinical signs to diagnose dry eye. With this system, we now have more objective means of determining whether or not a patient has dry eye or ocular allergy. Moreover, the device has significant applications outside of dry eye.

## Tear biomarkers

The TearScan system measures the amount of lactoferrin and IgE in the patient's tear film. Lactoferrin, lysozyme, and tear lipocalin are the main tear proteins of lacrimal gland origin. The concentrations of these proteins have been shown to remain constant in both non-stimulated and stimulated tear samples.[1] Lactoferrin, an iron-binding protein secreted directly by the acinar cells of the lacrimal gland, is an important component of the non-specific host defense mechanism of the external eye[2] and exhibits anti-bacterial, anti-viral, anti-fungal, anti-parasitic[3] and anti-inflammatory[4] biologic properties. Lactoferrin is produced in quantities roughly linear to other biologics produced by the lacrimal gland, including aqueous tears.

**Figure 1.** Disposable microcassette

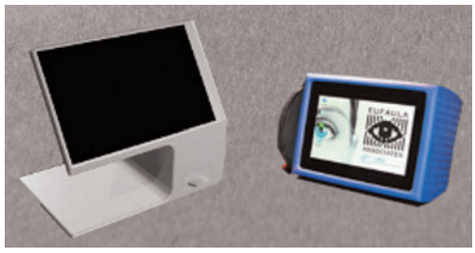

**Figure 2.** TearScan Microassay units

### Take-Home Message

The TearScan MicroAssay System (Advanced Tear Diagnostics) enables a clinician to diagnose dry eye or ocular allergy. This in-office, diagnostic platform tests for tear lactoferrin and IgE, but it could also be used for screening patients in advance of refractive surgery or contact lens fits.

While lactoferrin's direct actions have little to do with dry eye disease, this near-linear relationship between lactoferrin and the tear-secreting function of the lacrimal gland[5] allows lactoferrin to serve as an accurate biomarker for assessing aqueous production. The concentration of lactoferrin has been shown to be significantly decreased in tears of dry eye not associated with Sjögren's syndrome, as well as in those dry eye patients with Sjögren's or Stephens-Johnson syndrome.[6] Tear lactoferrin has shown a high specificity (95%) and good sensitivity (72%) when combined with qualitative tear tests (Schirmer's, vital dye staining) in the diagnosis of dry eye.[7] In a study of 156 dry eye patients experiencing minimal ocular irritation, statistical analysis showed the Schirmer test in conjunction with lactoferrin assay provided the best balance between high test sensitivity and false positive rates.[8]

The ocular allergic response results from exposure of the conjunctiva to an environmental allergen and binding with specific IgE on the conjunctival mast cells, triggering a cascade of inflammatory mediators.[9] Tear IgE has long been established as the key immunologic mechanism in allergic conjunctivitis,[10] and the measurement of tear IgE concentrations can be used to confirm the condition.[11] Because total IgE in tear fluid increases with the severity of the allergic response,[12] determining the total IgE concentration is useful not only for making a clinical diagnosis of allergic conjunctivitis, but also for the severity of the allergic presentation.

In dry eye disease, the presence of an allergen often mimics the signs and symptoms of dry eye disease,[13] so it would be clinically useful to assess the presence of an allergen during the initial dry eye workup to confirm, or rule out, its presence. The evaluation of antigen-specific IgE and tear dynamics are important for the differential diagnosis of patients with allergic conjunctivitis and dry eye.[14] With the TearScan system, we have the ability to test for two biomarkers essential in the differential (evaporative vs. aqueous deficient) diagnosis of dry eye and ocular allergy. This capability is clinically important because the two conditions have different mechanisms of action and are managed differently, yet an allergic episode can aggravate a concurrent dry eye, worsening symptoms that had been tolerable.

## The test

The microassay tests begin by collecting 0.5 microliter of tears from the patient's canthus via a micropipette. The sample is placed in a diluent and shaken to amplify the biomarker. This mix is then put in a small well in a disposable cassette (see Figure 1), and the cassette is introduced into the microassay unit, a small device that can easily sit on counter space in your office (Figure 2). The microassay unit measures the amount of biomarker in the test sample via a reflectance photometer specifically designed to interpret concentration from small tear samples.

The test time for lactoferrin is approximately 90 seconds, while the test time for IgE is approximately 5 minutes. ATD reports a 83% sensitivity for the lactoferrin test and a 93% sensitivity for the IgE microassay. The specificity for both tests exceeds 96%. Each test has its own separate CPT code:

Lactoferrin 83520 (immunoassay for analyte other than an infectious agent)

IgE 82785 (Immunoglobulin E, quantative, total)

Each microassay is reimbursable through Medicare and private insurers. The cost for the disposable cassettes is $10 per eye per test. The American Medical Association rec-

See **Microassay** on page 26

# Microassay

Continued from page 25

ommends using the "-59" modifier for the second eye to indicate a "distinct procedural service." The unit output can go to a paired or wireless printer, and can push the data to a server- or cloud-based EMR. The test unit requires a license from Clinical Laboratory Improvement Amendments (CLIA), and this license number must be shown on all claims for reimbursement.

## What is a CLIA license or waiver?

The Centers for Medicare and Medicaid Services (CMS) regulates all laboratory testing—except research—performed on humans in the U.S. through CLIA.[15] Any person or facility that performs laboratory tests on human specimens for the purpose of diagnosis or treatment is required by law to have a CLIA certificate. As defined by CLIA, waived tests are categorized as "simple laboratory examinations and procedures that have an insignificant risk of an erroneous result."[16] The categorization of commercially marketed *in vitro* diagnostic tests under CLIA is the responsibility of the Food and Drug Administration (FDA). This categorization includes the process of assigning commercially marketed *in vitro* diagnostic test systems into one of three CLIA regulatory categories based on their potential for risk to public health:[16]

- Class I: Waived tests (i.e., adenovirus)
- Class II: Tests of moderate complexity
- Class III: Tests of high complexity

The ATD microassay tests of are considered Class II tests and, as such, require all persons involved in the taking, processing, or reading of lab samples to be properly licensed. Upon receipt of the proper license, each laboratory will be issued a CLIA number that must accompany any and all reimbursement requests. The regulatory burden associated with applying for, receiving, and maintaining a CLIA Class I (waived) or Class II license is not overwhelming. In fact, it is pretty simple and straightforward.

"ATD will assist with the CLIA application process," says Jeffry Busby, global sales officer for ADT.

While CLIA regulations cover specific educational, training, and experience requirements needed for proper CLIA licensure by the federal government, states have varying requirements. With few exceptions, optometrists and ophthalmologists meet the regulatory requirements to serve as lab director.[17]

"While currently the device requires a Class II CLIA license, ADT is actively pursuing a CLIA waiver for all tests," said to Marcus Smith, chief executive officer of ADT.

## Other clinical utility

The applications of the ATD system go far beyond the differential diagnosis of dry eye and ocular allergy. In a small, unpublished pilot study of 32 LASIK patients, by Bill Rafferty, OD, and Alan Carlson, MD, at Duke University, and Terry O'Brien, MD, of Bascom Palmer, the researchers found that preoperative lactoferrin levels may be associated with post-operative LASIK results. All the patients with low lactoferrin levels pre-operatively had a post-operative refractive correction of -0.25 D to -1.50 D. Only 19% of the patients with normal pre-operative lactoferrin levels had post-operative refractions outside the -0.25 to +0.25 range, while 80% of the patients with high pre-operative lactoferrin levels had post-

See **Microassay** on page 28

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**TABLE 1 Interpretation and Application of ATD's Tear Diagnostic Tests**

| | Tear Chemistry | Indication | Possible Cause |
|---|---|---|---|
| Dry Eye or Allergy | Normal lactoferrin and normal IgE | 1. Normal lacrimal function<br>2. No allergic component | Evaporative dry eye |
| | Normal lactoferrin and high IgE | 1. Normal lacrimal function<br>2. Ocular allergy present | Ocular allergy and possible evaporative dry eye |
| | Low lactoferrin and normal IgE | 1. Suppressed lacrimal function<br>2. No ocular allergy present | Aqueous deficient dry eye |
| | Low lactoferrin and high IgE | 1. Suppressed lacrimal function<br>2. Ocular allergy present | Aqueous deficient dry eye, ocular allergy |
| | **Tear Chemistry** | **Indication** | **Possible Risk** |
| Contact Lens Applications | Normal lactoferrin and IgE | 1. Normal lacrimal function<br>2. No ocular allergy present | Good CL candidate |
| | Low lactoferrin | 1. Suppressed lacrimal function<br>2. CL desensitization | Hypoxia, bacterial conjunctivitis and/or CL dehydration |
| | High lactoferrin | Elevated tear proteins | Excess CL deposits |
| | High IgE | Ocular allergy present | GPC or inflammation |
| | **Tear Chemistry** | **Indication** | **Possible Risk** |
| LASIK or PRK Applications | Normal lactoferrin and IgE | 1. Normal lacrimal function<br>2. No ocular allergy present | Good LASIK candidate |
| | Low lactoferrin | Suppressed lacrimal function | Myopic outcome |
| | High lactoferrin | Elevated tear proteins | Hyperopic outcome |
| | High IgE | Ocular allergy present | Regression, PRK haze, DLK |

**Note:** Supporting data available on ATD Web site or by contacting ATD.

# Microassay

Continued from page 26

LASIK hyperopic refractions of +0.50 D or greater. The researchers concluded "lactoferrin serves as an excellent marker for pre-existing conditions that influence the post-LASIK healing response. Pre-LASIK lactoferrin levels are a statistically significant predictor of post-LASIK spherical refractions." The authors added: "Lactoferrin should be considered as one tool in assessing the pre-surgical corneal health of all LASIK candidates."[18]

The level of IgE is increased in the eyes of some silicone-hydrogel wearers during an acute event of contact lens-related papillary conjunctivitis.[19] Similarly, lactoferrin levels are decreased in patients with giant papillary conjunctivitis[20] and vernal conjunctivitis.[21] Knowing the presenting levels of both lactoferrin and IgE in potential contact lens wearers and refractive surgery patients may help guide treatment options and avoid unwanted outcomes (Table 1).

"I'm excited about the science behind this technology," says Young Choi, MD, a group practitioner in Homewood, AL. "I've been using the device for several months now, and the great thing about this test is that it's accurate. The device helps me fine-tune the diagnosis in my dry eye patients."

Dr. Choi sees the benefits in surgical cases as well. "I perform the lactoferrin microassay on all my potential LASIK patients," he adds. "It is now part of my LASIK pre-op protocol."

The steadily growing use of in-office ocular diagnostic laboratory testing will, over time, become so widespread it will be considered vital to the practice of primary ocular care. This shift is inevitable as eyecare professionals better understand the significant clinical and commercial benefits of ocular lab testing. This device likely will gain a place in our ocular surface disease diagnostic regimen. **ODT**

## REFERENCES


1. Fullard RJ, Tucker DL. Changes in human tear protein levels with progressively increasing stimulus. *Invest Ophthalmol Vis Sci* 1991;32:2290-2301.
2. Ballow M, Donshik PC, Rapaz P, et al. Tear lactoferrin levels in patients with external inflammatory ocular disease. *Invest Ophthalmol Vis Sci* 1987;28:543-545.
3. Jenssen H, Hancock RE. Antimicrobial properties of lactoferrin. *Biochimie* 2009; 91(1):19-29.
4. Conneely OM. Anti-inflammatory properties of lactoferrin. *J Am Coll Nutr* 2001; 20 (5 Suppl): 389S-395S.
5. Danjo Y, Lee M, Horimoto K, et al. Ocular surface damage and tear lactoferrin in dry eye syndrome. *Acta Ophthalmol (Copenh)* 1994;72(4):433-437.
6. Ohashi Y, Ishida R, Kojima T, et al. Abnormal protein profiles in tears with dry eye syndrome. *Am J Ophthalmol* 2003;136(2):291-299.
7. DaDalt S, Moncada A, Priori R, et al. The lactoferrin tear test in the diagnosis of Sjogren's syndrome. *Eur J Ophthalmol* 1996;6(3):284-286.
8. Goren MB, Goren SB. Diagnostic tests in patients with symptoms of ketatoconjunctivits sicca. *Am J Ophthalmol* 1988;106 (5):570-574.
9. Leonardi A, Motterle L, Bortlotti M. Allergy and the eye. *Clin Exp Immunol* 2008;153(S1): 17S-21S.
10. Friedlaender MH. Ocular allergy. *Curr Opin Asthma Clin Immunol* 2011;11:477-482.
11. Martinez R, Acera A, Soria J, et al. Allergic mediators in tears from children with seasonal and perennial allergic conjunctivitis. *Arch Soc Esp Ofthalmol* 2011;86(6):187-192.
12. Mimura T, Usui T, Yamagami S, et al. Relation between total tear IgE and severity of acute seasonal allergic conjunctivitis. *Curr Eye Res* 2012;37(10):864-870.
13. Bowling EL. Is it dry eye, allergy, or both? Rev Cornea Cont Lens. September 2012. http://www.revoptom.com/continuing_education/tabviewtest/lessonid/108499/. Accessed March 16, 2013.
14. Fujishima H, Toda I, Shimazaki J, et al. Allergic conjunctivitis and dry eye. *Br J Ophthalmol* 1996;80:994-997.
15. CLIA waiver. Available at: *www.nm-pharmacy.com/Pharmacy_Resources/CLIA_Waiver_information/HowtogetCLIA-Waiver.ppt.* Accessed March 16, 2013.
16. CMS. Clinical Laboratory Improvement Amendments (CLIA). Available at: *www.cms.gov/Regulations-and-guidance/Legislation/CLIA/downloads/howtoobtaincertificateofwaiver.pdf.* Accessed March 16, 2013.
17. Advanced Tear Diagnostics Web site. Available at : *www.teardiagnostics.com/resources/technical-manuals/CLIA-regulations/*. Accessed March 16, 2013.
18. Rafferty, Carlson, Cox, O'Brien, Myrowitz. Correlation of LASIK refractive outcomes with pre-surgical tear lactoferrin. Unpublished manuscript.
19. Zhao Z, Fu H, Skotnitsky CC, *et al.* IgE antibody on worn highly oxygen-permeable silicone hydrogel contact lenses from patients with contact lens induced papillary conjunctivitis (CLPC). *Eye Contact Lens* 2008;34(2):117-121.
20. Velasco-Cabrera MJ, Garcia-Sanchez J, Bermudez-Rodriguez FJ. Lactoferrin in tears in contact lens wearers. *CLAO J* 1997;23(2):127-129.
21. Rapacz P, Tedesco J, Donshik PC, *et al.* Tear lysozyme and lactoferrin levels in giant papillary conjunctivitis and vernal conjunctivitis. *CLAO J* 1988;14(4):207-209.


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**Ernie Bowling, OD, FAAO,** is in solo private practice in Gadsden, AL, and also is chief optometric editor of *Optometry Times*.

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# Vocalese

Continued from page 34

with the notion that you're being judged," Dr. Andrist said. "If you can turn that around in your mind, reframe it that you're giving a gift to the audience, you can think your way past stage fright."

All these tips have come in handy as Good Fourtune continues to perform for audiences about seven times each year, at a variety of venues—minor league baseball games singing the national anthem, and at local conventions, churches, civic group luncheons, or banquets.

A highlight of the group's career was recently qualifying for a district-wide regional competition to compete against 25 other barbershop quartets from North Dakota, Minnesota, Wisconsin, and Manitoba and Saskatchewan provinces in Canada.

> 'I found good friends who work hard to sing well enough so that other people want to listen.'
>
> Stan Andrist, OD

Meanwhile, Good Fourtune still performs at Great Plains Harmony shows twice a year, singing before audiences that sometimes number as many as 1,000 people.

"The songs we sing show off our strengths as a quartet," he said. "We hired a coach, a seasoned director of barbershop music, for several sessions to help us perfect our sound."

Although the barbershop quartet is paid a stipend for performing—which typically covers the cost of travel, music, dry cleaning their outfits, and other event-related expenses—individual members are never paid.

Back at the office, some of Dr. Andrist's patients have seen his shows, praising the quartet's performances. But, his optometry and singing careers rarely cross over. He never sings in the office or chats about his quartet, unless patients bring up the topic. He prefers to keep his two lives separate.

Meanwhile, singing barbershop-style music hits that sweet spot for him, he said. "It's a place where I found home. I found good friends who are amateur singers, who work hard to sing well enough so that other people want to listen. Singing is just one of those things that makes life worth living." **ODT**

## Author Info

**Stan Andrist, OD,** practices in Moorhead, MN. Contact him at standrist@moorheadvision.com or 218/233-1624.

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# Hitting the high notes of a life in song

Like melody and harmony, an OD balances singing with optometry to make beautiful music

Dr. Andrist's barbershop quartet, Good Fourtune. Left to right: Tim Noteboom, lead; Ryan Brehmer, tenor; Jeff Tweten, bass, and Stan Andrist, baritone.

**By Carol Patton**

Stan Andrist, OD, can't imagine his life without singing. Whether it's gospel, doo-wop, or barbershop harmony, he has been singing in front of audiences since he was a child.

"My mother was a piano teacher, and we always sang at church," recalled Dr. Andrist, who practices in Moorhead, MN. "As far back as I can remember, there was always singing in my home."

## Singing's shortcoming

Dr. Andrist chose to pursue optometry vs. singing as a career because his strengths have always been in math and science. While singing gives him a great deal of satisfaction, he said his voice is simply fair, joking that he makes a much better optometrist than singer.

Still, that never stopped Dr. Andrist from joining various choirs at church, middle school, and high school. While a student at the University of North Dakota, he belonged to the school's all-male chorus, The Varsity Bards, performing with the group for 3 years.

### Take-Home Message

For Stan Andrist, OD, singing barbershop-style music hits the sweet spot. Over the years, Dr. Andrist has sung with a series of barbershop quartets and continues to perform for a variety of local and regional audiences.

Then Dr. Andrist's career, marriage, and family took over, limiting his vocalizing mainly to church services on Sunday mornings. After their children were grown, Mrs. Andrist encouraged her husband to join a local choral group, Great Plains Harmony, which consisted of 45 members. While still part of Great Plains, he and other chorus members formed barbershop quartets.

## Still singing after all these years

That was roughly 10 years ago. Currently, Dr. Andrist sings with his third quartet, Good Fourtune, playing to audiences about seven times each year. Over the years, he has been in a series of barbershop quartets because the previous groups were forced to disband when members moved out of town.

While singing comes naturally to Dr. Andrist, the ability to sing in front of an audience is a totally different matter. He has rarely performed without experiencing stage fright.

"By junior high, I knew I wasn't one of those people who could walk out on stage and feel at home," he said. However, over the years his stage fright has decreased. Now, to minimize his tension or anxiety backstage before a performance, Dr. Andrist engages in deep breathing exercises and jokes around with other members of the quartet.

## Practice makes perfect

Likewise, the quartet rehearses, rehearses, and then rehearses some more. "The more prepared you are to sing a song well, the more confident you become about your performance," he said, adding that rehearsing also helps combat stage fright.

Another performer once gave him a helpful tip for overcoming stage fright: Realize that your singing is not being judged.

"As amateurs, you're frequently consumed

See **Vocalese** on page 33

Photo courtesy Stan Andrist, OD


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**References: 1.** In vitro measurement of contact angles on unworn lenses; significance demonstrated at the 0.05 level; Alcon data on file, 2009. **2.** Nash W, Gabriel M, Mowrey-McKee M. A comparison of various silicone hydrogel lenses; lipid and protein deposition as a result of daily wear. *Optom Vis Sci.* 2010;87: E-abstract 105110. **3.** Ex vivo measurement of lipid deposits on lenses worn daily wear through manufacturer recommended replacement period; CLEAR CARE® Cleaning and Disinfecting Solution used for cleaning an disinfection; significance demonstrated at the 0.05 level; Alcon data on file, 2008.

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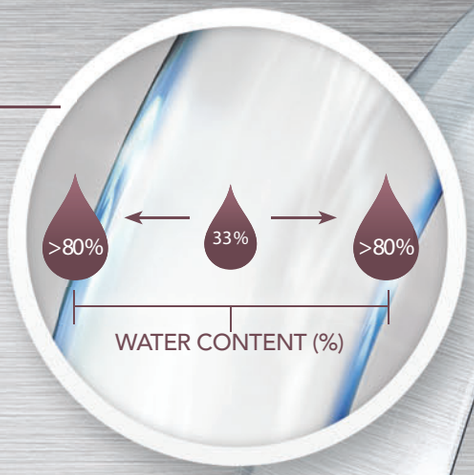


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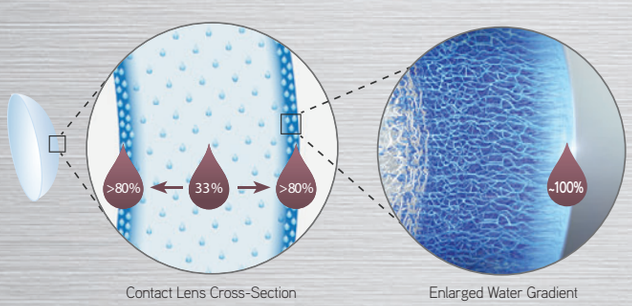


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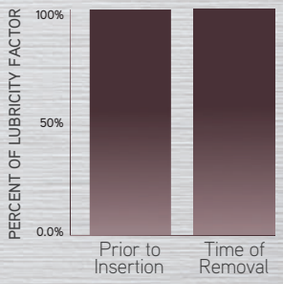


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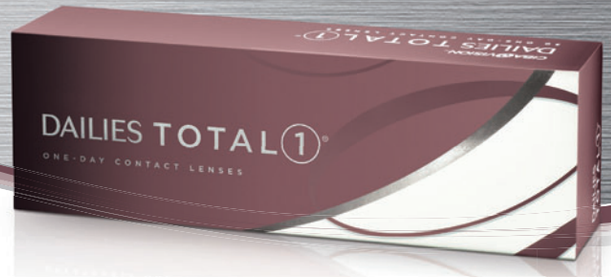


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1. Alcon data on file, 2011.
2. Brennan N. Contact lens-based correlates of soft lens wearing comfort. Optom Vis Sci. 2009;86:E-abstract 90957.
3. Coles CML, Brennan NA. Coefficient of friction and soft contact lens comfort. American Academy of Optometry. 2012;E-abstract 125603.
4. Kern JR, Rappon JM, Bauman E, Vaughn B. Assessment of the relationship between contact lens coefficient of friction and subject lens comfort. ARVO 2013;E-abstract 494, B0131.
5. Thekveli S, Qiu Y, Kapoor Y, Kumi A, Liang W, Pruitt J. Structure-property relationship of delefilcon A lenses. Cont Lens Anterior Eye. 2012;35(suppl 1):e14.
6. Angelini TE, Nixon RM, Dunn AC, et al. Viscoelasticity and mesh-size at the surface of hydrogels characterized with microrheology. ARVO 2013;E-abstract 500, B0137.

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