

Review *of* Cornea & Contact Lenses



MARCH 2012



Allergy and Dry Eye

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- How to Address CLIDE
- Just In Case
- Allergic Conjunctivitis: Causes And Cures
- A How-To Guide: Starting Your Own Specialty Practice
- New Additions to the Surgical Toolbox

Supplement to

REVIEW
OF OPTOMETRY

March 2012

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See "Allergic Conjunctivitis:
Causes And Cures," p. 22.



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I AM THE



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*Compliance with manufacturer-recommended replacement frequency.

Allergy & Dry Eye Issue

ON THE COVER

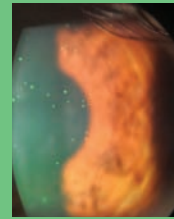
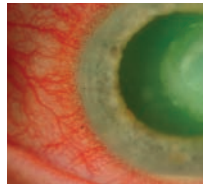
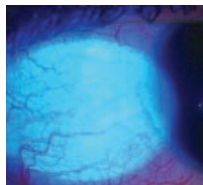


Photo: Christine Sindt, O.D.

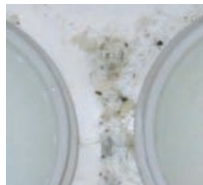
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In The News

- **Allergan** has launched Refresh Optive Advanced, a new over-the-counter artificial tear option for patients suffering from dry eye. The manufacturer says this new product is a lipid-enhanced tear with the low blur and comfort of an aqueous tear. It features a triple formula to reduce tear evaporation, hydrate and lubricate for dry eye symptom relief. For more information, visit www.allergan.com.

- **Acculens** releases two new scleral lens multifocals: Maxim Plus and Comfort SL Plus. Both new multifocals incorporate center near add technology with aspheric zone blend and are indicated for the management of corneal distortion and dry eye. Maxim Plus will correct presbyopia, while managing corneal distortion. Comfort SL Plus is indicated for normal corneas. For more information, visit www.acculens.com.

- The **Oasis Expander** (Oasis Medical) is a 7.0mm diameter polypropylene ring that expands and maintains access and visibility throughout the surgical procedure. The device is indicated for cases where miosis or intraoperative floppy syndrome is present. For more information, visit www.oasismedical.com.

- Heidelberg Engineering launches **MultiColor Scanning Laser Imaging**, a new product in their multi-modality fundus imaging line. The MultiColor uses multiple laser colors simultaneously to selectively capture and display diagnostic information originating from different retinal structures within a single examination. For more information, visit www.heidelbergengineering.com.

The **Contact Lens Society of America** announces the 57th Annual Education Meeting, to take place April 25-28, 2012 in Newport Beach, Calif. This year's theme is "Improving Vision. Changing Lives." For more information, visit www.clsa.info.

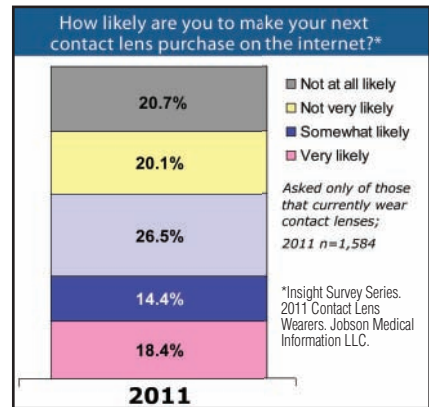
Vision Watch Study Shows Purchase Trends

The 2011 Contact Lens Wearer Insight survey from Jobson Optical Research found that 26.5% of the 1,584 contact lens wearer respondents are undecided on whether or not they will make their next contact lens purchase online. Convenience and price were the two main priorities when selecting where to purchase contact lenses.

A survey of where respondents made their last contact lens purchase showed that 17.1% preferred the Internet vs. 76.5% who chose a physical retail location. Of those that made their last purchase online, two-thirds (64.6%) said they did so because online retailers charged less. Almost one-third (32.8%) of all respondents

said they were very or somewhat likely to make their next contact lens purchase on the Internet.

For more information or to purchase the full report, visit www.jobsonresearch.com.



New MPS May Preserve Tear Proteins

Researchers at the University of Manchester found that BioTrue (Bausch + Lomb) contains protein-stabilizing agents including hyaluronic acid, poloxamine and sulfobetaine 10. This formulation can prevent the denaturation of human lactoferrin and lysozyme while the lens is stored overnight, allowing the stabilized proteins to maintain their antibacterial and bacteriolytic activity. The results of the study are published in the January 2012 issue of *Eye and Contact Lenses*.

Contact Lenses Deliver Extended Pain Relief

Researchers are developing a new contact lens, designed to provide a continuous supply of anesthetic medication to the eye for patients recovering from laser eye surgery. This new technology uses vitamin E to help release drugs automatically over time, thus eliminating the need for patients to repeatedly use medicine drops. Tests show that the time release of three commonly used anesthetics was extended from slightly less than two hours to a full day, and even a few days in some instances.

Dr. Chauhan and his colleagues found that vitamin E acts as a barrier to keep the anesthetic in place on the eye. In the future, the researchers say these lenses could be used as bandage contact lenses post-PRK surgery.

A complete report of the findings will appear in *Langmuir* (ACS Publications).



A Daunting Task

Study design flaws, inadequate data samples and undiagnosed cases make calculating device complication rates and associated risks a challenge.

In light of the tremendous advances in lens and solution research initiatives over the past few decades, is the rate of complications less and are the associated risks different today? If not, why is that? Let's go over why these are difficult questions to answer with certainty.

To begin, even the most careful of studies performed by scientists are often imperfect. There can be several reasons for this: inadequate sample sizes, poor study designs, researcher bias, financial interests and faulty statistical analysis can contribute to studies falsely purporting to reveal new truths.^{1,2}

Measuring errors and adverse events in health care can be especially foreboding. Eric J. Thomas, M.D., M.P.H., and Laura A. Petersen, M.D., M.P.H., admirably review seven ways to measure errors in medicine and adverse events. They discuss morbidity and mortality conferences, malpractice claims, administrative data analysis, chart review, electronic medical records, observation of patient care and clinical surveillance as effective methods to evaluate and measure errors.³ Unfortunately, most of these methods are expensive; of those that are not, there can be significant potential for bias.

Observation of patient care and clinical surveillance are generally more accurate and precise for detecting adverse events, but are not as good for detecting latent errors.^{2,3} Many studies and reports lack contemporary controls that reflect similar practice patterns in recommending lens type and solution care systems.

Consider the challenges in reporting contact lens adverse events. For example, let's look at infiltrative keratitis (IK) as an adverse event and consider the many impediments/obstacles we face. First, classification schema may impact incidence.^{1,4} The overall rate of non-infectious events is also highly dependent upon the diagnostician, as demonstrated by Phillip B. Morgan, B.Sc., Ph.D., and colleagues. In their study of 111 cases, three events were unambiguously diagnosed as microbial keratitis (MK), seven events could be diagnosed as MK or contact lens peripheral ulcer (CLPU) and two

cases could be either MK, CLPU or IK.⁵

A further confounder is that, unlike microbial keratitis, many of these non-infectious events are self-limiting and may not present to the eye care practitioner or be captured in any clinical trial design. I also believe geographical location of the patient may affect infiltrative events due to practice patterns and even water source contaminants.

Other investigators cite several challenges they encountered in designing a recent retrospective study looking for risk factors in corneal infiltrative events.⁶ These include incomplete data from retrospective chart reviews, assuring adequate contemporary controls with information on exposure, "the ever changing mix of products" investigated and obtaining an adequate sample size.⁶

To say that the challenge of reporting and interpreting results in research endeavors is daunting is an understatement. Nevertheless, phenomenal work has been done in reporting device complication rates and revealing their associated risks. Join me in thanking the dedicated researchers who have shed light on this topic. Although we still lack all the information on trends in risk and complication rates, I look forward to new data in years to come. RCCL

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Part II: Troubleshooting Astigmatism

Customizing scleral lenses might be a solution for your astigmatic patient.

Astigmatism is something we all troubleshoot on a daily basis. Most of the time, we are working with regular astigmatism produced by the shape of the cornea or the lens, but there is also irregular astigmatism caused by corneal dystrophies, degenerations and scarring. In this article, we are tackling both types of astigmatism by utilizing a customized scleral gas-permeable contact lens.

TH, a 51-year-old white male, visited our office for a corneal evaluation and possible contact lens fitting. He was seeking a second opinion on the progression and treatment of his keratoconus, which was previously diagnosed 10 years ago. Even though he was a well-adapted GP contact lens wearer, he still struggled to wear his corneal sized contact lenses for a full day. He battled with fluctuating vision and lens discomfort, and noted he has lost many lenses in the past due to an unstable fit.

Visual acuities were 20/50 O.D. and 20/40 O.S. through his current contact lenses. Subjective refraction yielded $-4.75-2.50 \times 075$ O.D. and $-4.00-4.25 \times 100$ O.S. There was no corneal scarring noted on slit lamp examination. Topographies were consistent with pellucid marginal degeneration and simulated keratometry readings were $43.87 \times 41.12 @ 064^\circ$ O.D. and $45.37 \times 42.12 @ 104^\circ$ O.S.

Scleral Lens for PMD

The corneal changes that occur with pellucid marginal

degeneration (PMD) can make for a challenging contact lens fitting. Soft toric contact lenses are unstable and typically don't provide adequate visual acuity. Corneal or intralimbal sized GP contact lenses often rest at a low position due to the inferior corneal steepening, especially in moderate or severe PMD. The most successful contact lens fittings take the corneal irregularity out of the fitting process and utilize a scleral contact lens design to better align with the regular curvature of the sclera.

We began the scleral contact lens fitting process after discussing their benefits, and how his problems associated with contact lens wear related to his corneal condition. The initial diagnostic lenses were Jupiter GP scleral contact lenses, 18.2mm in overall diameter. The selected base curves were 48.00D O.D. and 49.00D O.S.

There was adequate corneal and limbal clearance, with only mild conjunctival blanching. An over-refraction yielded about a diopter of astigmatism in each eye, with best corrected acuities of 20/20 O.D. and 20/25 O.S. New lenses were ordered with flatter peripheral curves and an increased center thickness to decrease lens flexure and eliminate over-refractive astigmatism.

At his dispensing visit, the new Jupiter scleral contact lenses were evaluated. Visual acuity was 20/20 O.D. and 20/30 O.S. The contact lens fit was satisfactory and an over-refraction yielded



Engraved markers at the three and nine o'clock positions aid in evaluation of rotation and rotational stability.

nearly a plano result O.D., but yet again, a diopter of astigmatism in the left eye at a similar axis to the over-refraction of the initial trial lens and his manifest refraction. A new scleral lens was ordered for TH in a toric front surface design to correct the over-refractive astigmatism.

Scleral Lenses for Astigmatism

When working with scleral contact lenses, a spherical over-refraction is usually all that is needed to correct the patient's vision. But, when a patient's acuity is less than satisfactory, consider a spherocylindrical over-refraction to maximize vision potential. Over-refractive astigmatism with a scleral contact lens results from a couple scenarios. The most common scenario is lens flexure, which is easily corrected by increasing the lens' center thickness by 0.1mm or 0.2mm. You can verify lens flexure by measuring the curvature of the lens surface by topography or an over-keratometry reading while the patient

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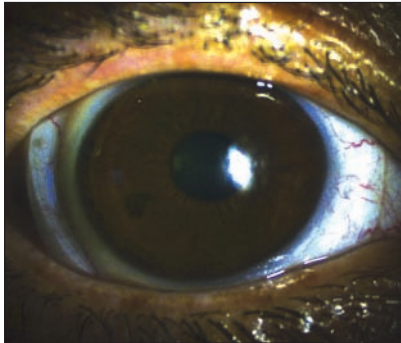
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This front surface toric lens is slightly rotated immediately after application.

is wearing the lens. The lens is flexing if the difference in keratometry readings correspond to the amount of astigmatism in the over refraction. If the keratometry readings are spherical, there is likely lenticular astigmatism, and utilizing a front-surface toric lens design can improve visual acuity and quality.


TH returned to the office wearing his new left lens, and was still unhappy with his vision. His visual acuity was 20/50 with a wearing time of less than one hour. Evaluation revealed that the toric lens was positioned obliquely, and once the lens was properly rotated on the eye his visual acuity improved to 20/20 with minimal over-refraction. The lens rotation remained stable for the remainder of the visit. TH was then instructed on how

to apply the lens with the toric markers properly positioned to allow the lens to settle quickly at the desired orientation.

Front Surface Toric Scleral Lenses

Front surface toric scleral contact lenses have engraved toricity markers at the three and nine o'clock positions. The lenses have a double slab-off peripheral curve system to create a rotationally stable contact lens. Most patients can easily identify the lens markings prior to applying the lens, which allows for near perfect vision immediately after application. If the patient cannot identify the lens markings due to poor uncorrected acuity or presbyopia, they are taught to apply the lens normally and then use a clean finger to spin the lens on the eye until their vision is clear and crisp.

At a follow up visit, TH was very pleased with his contact lenses. He raved about the lens comfort and stability, and noted that his vision was better than ever.

This case is just another example of ways to further customize a specialty scleral contact lens for the visual needs of our unique patients. 

Advertiser Index

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Aton Pharma, Inc.Pages 9, 11





Considering Lens Diameter

As large diameter GP lenses become an essential tool, practitioners must take the time to fully understand the design.

Gas-permeable lenses circulate fluid under the lens by the vertical movement with the blink. There is rapid turnover of the tears under the lens. When the Dk of lenses was negligible, these tears provided an important source of oxygen. But as Dk and diameter have increased, lens movement has decreased.

Large diameter GP lenses, such as intra-limbal, minisclerals and sclerals, present an interesting challenge to solution selection because of this change in fluid dynamics.

Fluid Dynamics

Large diameter lenses move fluid under the lens with a diaphragm movement, rather than by a vertical movement. The change in fluid dynamics creates two situations:

1. Solution in the bowl of the lens is “trapped” under the lens. It is pumped out relatively slowly—the solution will be in contact with the cornea for a longer period of time.

2. Tears and solutions stagnate under the lens causing an increase in tear viscosity. This will result in mucous rolling and debris formation, which in turn will stick to the back of the lens and to the cornea.

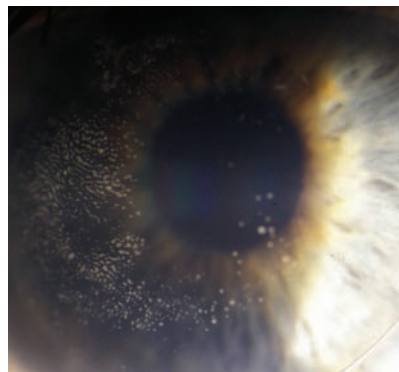
Taking Care with Solutions

Conditioning solutions are both wetting agents and cushioning solutions. In large diameter lenses, the viscosity agent may cause visual blur, which can last up to several hours, since the thick solution is not quickly removed by the tear pump. Since solution exchange occurs at a much slower rate, the preservative in many disinfecting

solutions may result in significant solution-induced corneal toxicity.

Beyond blur on insertion, a highly viscous solution will further slow fluid exchange and increase mucus formation. It has been long known that stagnating tears increase in viscosity and result in mucus clumping. Hydroxypropyl-methyl-cellulose (HPMC), a viscosity agent found in many lubricating and conditioning solutions, will further aggravate this situation. Interestingly, the diaphragm movement of the lens, as well as the central retinal artery pulse, will roll this mucus into rows. Mucous rolls will likely cause the patient complaint of foggy vision and the need to remove the lens several times per day. If the wettability of either the cornea or lens decreases, mucus may become adherent to the posterior lens surface.

Mucous plaque formation will cause discomfort. Eventually the lens will not be able to be inserted without pain and the plaque must be removed from back surface of the lens (*see image below*).



Mucous plaque formation.

Cleaning the Lens

When dealing with large diameter GP lenses, the following tips minimize solution/cleaning related complications:

- Since it is necessary to use solution to fill the bowl of the lens upon insertion to avoid trapped bubbles under the lens, a low viscosity/preservative-free agent will have better initial patient acceptance and eventual decreased mucus formation.

- Saline will not effectively wet the surface of the lens and non-wetting areas may result; however, preservative-free/buffer-free saline (0.9% sodium chloride respiratory therapy vials) may be used to fill the bowl. (For more information, see “Going Off Label,” *Lens Care Update, Review of Cornea & Contact Lenses*, March 2011.)

- Instruct the patient to diligently clean the inside of the lens.

- If the patient experiences heavy mucus formation, the lens may need to be removed and cleaned during the day. This is particularly true for corneal graft patients who may experience higher mucus formation rates.

- Progent (Menicon) is highly effective at removing mucous plaque formation and is now available for home use. A monthly application is recommended.

Extremely large GP designs have many benefits. For some irregular corneas they have become nearly essential. With these new designs, however, must come a new understanding of the importance of fluid dynamics and the solutions we use. [RCL](#)

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Please see Brief Summary of Prescribing Information on the adjacent page.

* In most patients, one LACRISERT® placed into each eye once daily is effective in providing all-day symptom relief. Some patients may require twice-daily use for optimal results.

References: 1. Koffler BH, McDonald M, Nelinson D, Improved signs and symptoms and quality of life with dry eye syndrome: hydroxypropyl cellulose ophthalmic insert patient registry. *Eye Contact Lens*. 2010;3:170-176. 2. LACRISERT [package insert] Madison, NJ: ATON Pharma, 2009.

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The Other Side of the Lens

Practitioners should keep tabs on new contact lens innovation such as drug delivery.

It's a time-honored tradition between parent and child: a scrape or a cut that leads to the drying of tears, cleaning of the injury and application of healing medicine. A Band-Aid is the final touch—after all the hard work that has been done to sterilize and treat the injury, the Band-Aid has traditionally been used to hold all of these initial steps together and to protect and allow the tissues to heal. Just as Band-Aids have evolved to incorporate modern medicinal advances such as the addition of antibiotics, so have bandage contact lenses.

Bandage lenses are used to protect the healing eye, and the drug/device conversation has included these lenses in hopes of improving the efficacy of certain drugs. Bandage lens use has become more widespread as a result of the increasing popularity of refractive surgery, as well as the technological innovations in contact lens materials. Knowledge of the importance, as well as the appropriate usage and care, is of the utmost importance for an eye care practitioner.

What Are They?

Bandage lenses are a group of soft, thin, highly oxygen permeable lenses of varying levels of water content that are typically fit loosely over the cornea for various therapeutic purposes. They are mainly used post-surgically. Bandage lenses are part of a larger group known as therapeutic contact lenses, which encompasses an array of lenses with purposes



The contact lens has evolved over time, benefitting the eye in a whole host of ways including protection as well as drug delivery.

varying from maintaining ocular surface hydration to providing a vehicle for drug delivery.

In the past, certain lenses were specifically indicated for therapeutic use; however, disposable soft contact lenses are frequently used today. There are four types of FDA-approved soft lenses for therapeutic use: Acuvue Oasys (Vistakon), PureVision (Bausch + Lomb), Air Optix Night & Day Aqua (Alcon) and Sof-Form 55 EW (Unilens Vision).

Bandage lenses can accelerate healing and reduce discomfort for patients with corneal injuries. These lenses not only protect the eye from the mechanical forces of blinking while the eye is healing below the lid, but they also protect delicate eye tissues from external sources of irritation, such as suture knots. The main disadvantage of their use comes with the risk of infection, especially with extended-wear lenses, as bandage contact lenses have been reported to be associated with a higher prevalence of polymicrobial keratitis.¹

Fitting the Lens

The AOA recommends therapeutic contact lenses as ophthalmic bandages following corneal trauma or refractive corneal surgery.² With proper patient selection, observation and management, therapeutic contact lenses provide an extremely effective therapeutic tool. However, we must caution lens care providers that proper fit is of the utmost importance, as a “one size fits all” approach or improper sizing may cause further trauma to a recovering eye.

In addition, the lens fit should be frequently assessed; ideally after approximately 20 minutes and again after an hour, due to the possibility of lens dehydration effects. Checking on patients is crucial: a 24-hour follow-up, followed by a second visit in a week or less, and a third visit at one to three months, depending on the condition, is recommended.³ Properly fitted bandage lenses must have corneal coverage with adequate mobility in order for the condition to be appropriately managed. Lastly, it is critical for the eye care practitioner to keep an eye on the healing process and to adjust lens measurements as the eye mends, if necessary.⁴

Contact Lens Drug Delivery

There are certain shortcomings of eye drops for patients suffering from glaucoma, corneal ulcers and other ocular surface diseases, including a decrease in compliance. Unfortunately, only about 5% of a topically administered drug enters

the anterior segment.⁶ Even when eye drops are applied six or more times a day, the amount of medicine that can be directed at a surface wound is low and constantly fluctuating.

Drug/device combination lenses may be a solution to this issue. Not only are lenses an appropriate measure for healing eyes, they also add a combative one-two punch of efficacy and therapy. Techniques investigated to integrate drugs and contact lens materials include soaking contact lenses in a drug, among others. The efficacy of this technique was examined by Zvi Friedman, M.D., and colleagues who demonstrated that a hydrogel soft contact lens (Sauflon PW) soaked in acetazolamide 5% solution caused a 6.3 ± 0.4 mm Hg mean reduction in intraocular pressure in albino rabbits.⁷ Lenses like these may act as a reservoir for topical medications, increasing the amount of time a medication stays in contact with the eye.

Drug/device combination lenses are on the horizon for a wide array of indications, such as the contact lens with ketotifen (Vistakon Pharmaceuticals), designed for the contact lens-wearing patient with allergic conjunctivitis, as well as an antifungal contact lens containing econazole used to treat fungal keratitis, though both are yet to be FDA-approved.^{8,9}

Whether for healing purposes or drug delivery, it's likely that therapeutic applications of contact lenses will continue to expand. It's essential for eye care practitioners to stay knowledgeable about these innovations in order to maintain the best possible standard of care. **RECL**

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Brief Summary of Prescribing Information

ATON
P H A R M A

ATON Pharma, a Division of Valeant Pharmaceuticals North America LLC
Madison, NJ 07940

Rx Only

LACRISERT® (hydroxypropyl cellulose) OPHThALMIC INSERT

DESCRIPTION

LACRISERT® Ophthalmic Insert is a sterile, translucent, rod-shaped, water soluble, ophthalmic insert made of hydroxypropyl cellulose, for administration into the inferior cul-de-sac of the eye.

Each LACRISERT is 5 mg of hydroxypropyl cellulose. LACRISERT contains no preservatives or other ingredients. It is about 1.27 mm in diameter by about 3.5 mm long. LACRISERT is supplied in packages of 60 units, together with illustrated instructions and a special applicator for removing LACRISERT from the unit dose blister and inserting it into the eye.

INDICATIONS AND USAGE

LACRISERT is indicated in patients with moderate to severe dry eye syndromes, including keratoconjunctivitis sicca. LACRISERT is indicated especially in patients who remain symptomatic after an adequate trial of therapy with artificial tear solutions. LACRISERT is also indicated for patients with exposure keratitis, decreased corneal sensitivity, and recurrent corneal erosions.

CONTRAINDICATIONS

LACRISERT is contraindicated in patients who are hypersensitive to hydroxypropyl cellulose.

WARNINGS

Instructions for inserting and removing LACRISERT should be carefully followed.

PRECAUTIONS

General

If improperly placed, LACRISERT may result in corneal abrasion.

Information for Patients

Patients should be advised to follow the instructions for using LACRISERT which accompany the package.

Because this product may produce transient blurring of vision, patients should be instructed to exercise caution when operating hazardous machinery or driving a motor vehicle.

Drug Interactions

Application of hydroxypropyl cellulose ophthalmic inserts to the eyes of unanesthetized rabbits immediately prior to or two hours before instilling pilocarpine, proparacaine HCl (0.5%), or phenylephrine (5%) did not markedly alter the magnitude and/or duration of the miotic, local corneal anesthetic, or mydriatic activity, respectively, of these agents. Under various treatment schedules, the anti-inflammatory effect of ocularly instilled dexamethasone (0.1%) in unanesthetized rabbits with primary uveitis was not affected by the presence of hydroxypropyl cellulose inserts.

Carcinogenesis, Mutagenesis, Impairment of Fertility

Feeding of hydroxypropyl cellulose to rats at levels up to 5% of their diet produced no gross or histopathologic changes or other deleterious effects.

Pediatric Use

Safety and effectiveness in pediatric patients have not been established.

Geriatric Use

No overall differences in safety or effectiveness have been observed between elderly and younger patients.

ADVERSE REACTIONS

The following adverse reactions have been reported in patients treated with LACRISERT, but were in most instances mild and transient: transient blurring of vision, ocular discomfort or irritation, matting or stickiness of eyelashes, photophobia, hypersensitivity, edema of the eyelids, and hyperemia.

DOSAGE AND ADMINISTRATION

One LACRISERT ophthalmic insert in each eye once daily is usually sufficient to relieve the symptoms associated with moderate to severe dry eye syndromes. Individual patients may require more flexibility in the use of LACRISERT; some patients may require twice daily use for optimal results.

Clinical experience with LACRISERT indicates that in some patients several weeks may be required before satisfactory improvement of symptoms is achieved.

Issued June 2007

Distributed by:

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Madison, NJ 07940

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LAC078-0112RCC



Derail Dropouts

By Mile Brujic, O.D., and Jason Miller, O.D., M.B.A.

Ocular Allergies: Treat It and Fit It!

For contact lens wearers who suffer from allergic conjunctivitis, a simple two-tiered approach can provide long-lasting comfort.

With peak allergy season around the corner, now is a good time to take a step back and reevaluate how we treat patients with ocular allergies. Epidemiological research shows an increase in the prevalence of all types of allergic reactions over the past three decades.¹ Potential causes of this phenomenon include increased industrialization and pollution. Although the estimated number of patients varies, at least 20% of the general population suffers from allergic conjunctivitis at some point in the year.²

Early diagnosis and treatment of the signs and symptoms of allergic conjunctivitis can help patients more comfortably wear their lenses and help bring back dropouts. Whether your patient has previously worn contact lenses and discontinued wear due to allergies, is a first-time contact lenses wearer or is currently suffering allergy-related discomfort due to allergies, educating and treating patients is critical. It is important to start with the basics: Understand the chronic nature of their condition, learn how it affects their eyes, explain how they are not alone in this problem and discuss strategies to best treat their condition.

Ocular Allergy

While we typically see a spike in office visits for allergic conjunctivitis during the high pollen seasons, remember that many patients suffer from year-round allergies, such as mold and pet dander. Seasonal (SAC) and perennial (PAC) allergic conjunctivitis are the two most

common forms of ocular allergy. Both are classified as type 1 or immediate hypersensitivity reaction: SAC typically involves an acute reaction to seasonal allergens, but may present as a chronic irritation in some patients, while PAC is typically a chronic condition caused by household allergens that are always present, but may present as an acute reaction in some situations. Seasonal pollens may exacerbate PAC.

Develop a Protocol

You can actively help relieve your patients' symptoms by developing a comprehensive ocular allergy treatment protocol. In order to maximize new contact lens fits and prevent lens dropouts when treating patients with allergies, it is essential to collect a detailed history. Some questions to ask include:

- What is your occupational environment?
- When are your allergies the worst? Is it a seasonal issue?
- Are you on any systemic medications?

Our role is to assess symptom severity so we can provide the best treatment options. For example, would any systemic medications

complicate the contact lens fitting process? Once we have determined the best treatment, it is our job to help our patients understand the plan we have recommended. This includes discussing how over-the-counter medications may help or hinder ocular relief. Keep in mind though that patients who are suffering from allergic conjunctivitis that is persistent enough to bring them into our office have likely already tried multiple OTC products and are now looking to us for quick, long-lasting and complete relief.

Remain Proactive

Take extra care with patients who may be asymptomatic at their visit. Start by learning more about the times when they do suffer from allergic conjunctivitis and then provide them the proper therapeutics, optimized contact lenses and a pre-scheduled visit plan before their symptoms start. This proactive approach will help minimize the negative impact of allergic conjunctivitis on successful contact lens wear.

Look for possible mild eyelid edema and conjunctival redness or chemosis during the physical exam (*figure 1*). Eversion of the upper eyelids may reveal the presence of papillae or other complicating factors; these can be seen more easily with the use of sodium fluorescein viewing in a cobalt blue light and wratten #12 filter (*figure 2*).



1. Conjunctival chemosis and injections associated with SAC.

A Treatment Plan

Consider using a simple two-tiered approach when addressing lens wearers with ocular allergies: Treat it first, then fit it second.

1. Treat it. Create an effective treatment protocol for your patient. Here is a general list of allergy medications to include:

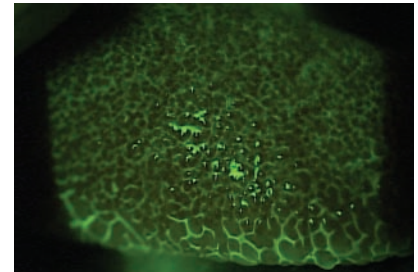
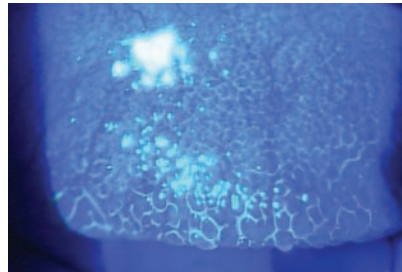
- **Mast cell stabilizers.** Mast cell stabilizers prevent the release of histamine and inhibit eosinophil migration into tissues, which cause allergy symptoms. Mast cell stabilizers must be taken prior to allergen exposure and typically do not provide immediate symptom relief. Common mast cell stabilizing medications include Alomast (pemirolast potassium, Vistakon), Crolom (cromolyn sodium 4%, Bausch + Lomb), Alomide (lodoxamide tromethamine, Alcon) and Alocril (nedocromil sodium 2.0%, Allergan).

- **Combination mast-cell stabilizers/antihistamines.** These combination agents offer the benefits of a dual mechanism of action in one drop. They provide relief from itching by their antihistaminic activity and protect against future allergen encounters by reducing mast-cell degranulation.

Medication in this category include: Optivar (azelastine hydrochloride 0.05%, Meda), Elestat (epinastine hydrochloride 0.05%, Allergan), Zaditor (ketotifen fumarate ophthalmic solution 0.025%, Novartis), Patanol (olopatadine hydrochloride 0.1%, Alcon) Alaway (ketotifen fumarate 0.025%, Bausch + Lomb).

Since Zaditor (Novartis) went over-the-counter in 2006, ketotifen fumarate—the active ingredient in Zaditor—is the most common compound in OTC allergy eyedrops.

Bepreve (bepotastine besilate



2. Tarsal plate seen with NaFI (left) and with a Wratten filter (right).

1.5%, Ista Pharmaceuticals) is a highly specific H1 histamine receptor antagonist and is dosed b.i.d. Pataday (olopatadine hydrochloride 0.2%, Alcon) has a higher concentration of olopatadine than Patanol and is approved for once a day dosing. The recently launched Lastacaft (alcaftadine ophthalmic solution 0.25%, Allergan) also offers a once-a-day dosing regimen.

- **Topical steroids.** A mild topical steroid may also be an option for patients who require topical treatment for their ocular allergy symptoms. Typically, steroids are used when a patient requires immediate relief.

Alrex (loteprednol etabonate 0.2%, Bausch + Lomb) or Lotemax (loteprednol etabonate 0.5%, Bausch + Lomb) are commonly prescribed steroids for acute allergic conjunctivitis. These products are typically dosed four times a day, so it may be difficult to wear contact lenses until the steroid treatment is complete. If you choose to dose steroids twice a day, patients should wait 15 minutes after the drops to insert the lens.³

2. Fit It. One viable option for allergy sufferers is to switch to daily disposable contact lenses. Patients

who use this modality typically have minimal issues with lens deposits and cleaning compliance. In fact, one study showed that patients with ocular allergies experienced a significant increase in comfort when fit with daily disposables.⁴

We are fortunate to have a wide range of daily disposable and toric options for our patients. But for some, the parameters required may be outside of the range available. Educate your patients about the importance of rubbing and rinsing their lenses. If this does not significantly improve symptoms, consider a hydrogen peroxide system with a rub and rinse step. You may also recommend a shorter replacement schedule; this may be more beneficial, albeit costly, to the patient.

A sound treatment protocol will help you more effectively treat patients who present with various allergy-related complaints. By proactively managing ocular allergies in your practice, you will not only provide your patients with relief and minimize contact lens dropouts, but also help grow the medical arm of your practice. [RCCL](#)

References are available at www.reviewofcontactlenses.com.



Down on the Pharm

By Elyse L. Chaglasian, O.D., and Jill Autry, R.Ph., O.D.

It's Time for Testosterone

When traditional treatment options don't work, androgen therapy may be one option.

A 75-year-old Hispanic female with chronic, severe symptoms of dryness has been visiting my office fairly regularly. She complains of an eight out of 10 level of pain, photophobia and lacrimation, which does appear to be out of proportion to her physical symptoms (*see image below*). We tried a variety of treatments including non-preserved artificial tears, ointments, nighttime goggles, steroids, Restasis, plugs and lid repair—all to little or no avail.

Understanding Dry Eye

Certainly treating dry eye disease (DED) is not an uncommonly encountered clinical situation. DED, or keratoconjunctivitis sicca, is in fact one of the most frequent complaints that eye care practitioners face in their practices, and is a major public health issue due to its negative affect on a patients' daily lives.^{1,2} As eye care practitioners, we are fortunate that commercially available over-the-counter and prescription products are both safe and effective for the majority of patients. However, what else can be done for a recalcitrant dry eye problem in a post-menopausal female, such as my patient?

Age, female gender, and menopause are well-documented risk factors for DED. Sex steroid hormones have been shown to be important for both lacrimal gland and meibomian gland function (MGD).³ David Sullivan, M.D., and colleagues at Harvard University hypothesized that female gender and androgen deficiency were major factors in the pathogenesis of both aqueous

deficient and evaporative dry eye in Sjögrens syndrome.⁴

According to the Canadian Dry Eye Epidemiology Study (CAN-DEES), the majority of those affected by dry eye are women.⁴ The researchers concluded that the topical application of androgen would be a safe and efficacious treatment.⁴

A subsequent study led by Debra Schaumberg, O.D., M.P.H., surveyed 39,876 women in the United States who were diagnosed with dry eye syndrome and participated in the Women's Health Study. They found the prevalence of dry eye increased with age—from 5.7% among women under the age of 50 to 9.8% among women 75 and older. The age-adjusted prevalence was 7.8%, or 3.23 million women, over the age of 50 in the United States.⁵

In 1998, William Mathers, M.D., and colleagues from the University of Iowa were the first to demonstrate that tear production is correlated with serum prolactin and sex hormone levels prior to and during menopause.⁶ Cengaver Tamer, M.D., studied the androgen levels of patients with non-autoimmune dry eye, either

with or without MGD, compared to a control group. He found that androgen levels of the patients with MGD was significantly depleted compared to the other groups.⁷

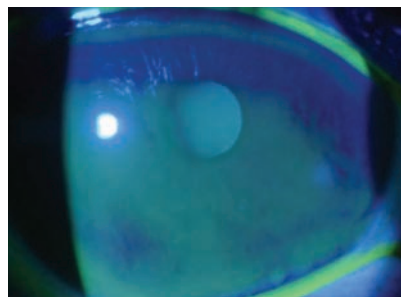
The Treatment

After consulting with my resident and other colleagues, I prescribed 3% testosterone cream to be applied to the upper eyelids twice a day. This cream was compounded at a local specialty pharmacy. Testosterone cream in various formulations has been anecdotally reported as safe and effective in post-menopausal dry eye patients, although large scientific studies have not been conducted.

New Research

Charles Connor, Ph.D., O.D., and Charles Haine, O.D., M.S., from the Southern College of Optometry have developed and studied the use of testosterone cream in DED. Over the years, it has been demonstrated to improve Schirmer scores and subjective symptoms on the Ocular Surface Disease Index (OSDI), as well as increase contact lens wearing time by both increasing tear production and improving meibomian gland secretions. Dr. Connor studied 10 contact lens intolerant female patients, with an average age of 53.5 years, who were treated with 5% transdermal testosterone cream twice daily for three weeks. After treatment, the average contact lens wearing time increased from one hour to 10.5 hours.^{8,9}

In a presentation at the American Academy of Optometry meeting in 2002, Dr. Connor presented work



Initial patient presentation shows reduced tear break up but no corneal staining.

on 20 subjects: five males and 15 females, ages 17 to 71.¹⁰ They were divided into two groups: those that applied transdermal cream without testosterone, and those that applied transdermal cream supplemented with 2.5% testosterone. Those that used the testosterone cream showed improved tear break up, Schirmer scores and prolonged contact lens wearing time. The greatest benefit was seen in post-menopausal females, while men had the least benefit.¹⁰

Transdermal testosterone promotes increased tear production and meibomian gland secretion, thereby reducing dry eye symptoms.¹⁰ Although testosterone is a steroid, it has been shown not to cause an elevation in intraocular pressure after longterm use.¹¹ Argentis Pharmaceuticals acquired three of their patents in 2008 and are currently awaiting FDA approval.¹²

The Conclusion

Two weeks after initiating treatment, our patient reported a significant improvement in her symptoms. For the first time since I met her, she wasn't wearing sunglasses when I entered the exam room.

The work of Drs. Connor and Haine, along with anecdotal reports discussed in the literature and amongst colleagues, suggests that transdermal testosterone cream is a viable addition to our toolbox, particularly when existing therapies may not be successful for some patients. However, at this time, it is not FDA approved and patients should be counseled about any off-label use. Long term effects are unknown, especially as they relate to the agent's conversion to testosterone and estrogen in patients with a medical history of breast or prostate cancer. **RCCL**

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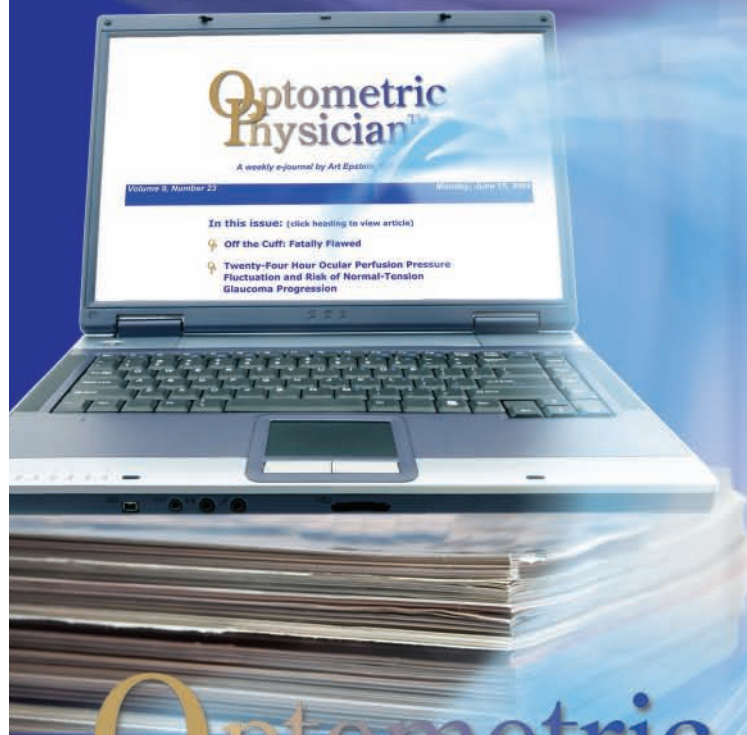
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Always Charge for Your Expertise

It is always appropriate and warranted to charge for your medical knowledge.

A patient comes in complaining of several symptoms including itchy and watery eyes. The practitioner easily diagnoses the problem as an allergy and tells the patient not to be concerned, that it isn't a big deal and that the drops he is offering will take care of the issue. When the patient asks whether there is an associated charge for the treatment, the practitioner dismisses the question reiterating that the issue is no big deal and the drops will take care of the symptoms.

While there may be times when a no-charge office visit is appropriate, the above scenario certainly isn't one of them. Yet, the simple act of dismissing allergies as minor is potentially costing your practice thousands of dollars in revenue and damaging your credibility and position as a trusted authority.

Why are practitioners compelled to give away such services? I believe it starts with the perception of the services: in the mind of the practitioner—not the patient—ocular allergies only rate a three (on a scale from one to 10 in complication) compared to more serious sight-threatening or painful conditions like iritis, glaucoma, progressive retinal disease or trauma. However, it is important to note that we own that scale.

Remember that patients are paying for your knowledge, the time it takes you to acquire that knowledge and the overhead costs needed to fix their problem. So

whether a patient calls you in a panic because they sneezed and now their eye is bleeding (likely a benign subconjunctival hemorrhage) or they can't stop their eyes from watering thanks to allergies, what the patient really needs is firm guidance and assurance that you understand what they are experiencing and can help them feel better.

Think about it: would you ever consider not charging a patient for diagnosing and treating astigmatism, which is maybe a two on the above mentioned scale? So, when you start to think caring for ocular allergies is really not a big deal and therefore you shouldn't charge for it, substitute that thinking with the following reasoning: Treating ocular allergies may not be a big deal, but I've spent years of my life, and tens of thousands of dollars, to know it's not a big deal.

I've often heard practitioners justify their decision to give away free services by asking whether their medical counterparts—an ophthalmologist or physician—would charge for such expertise. My response to that is simple: Would a car mechanic diagnose benign squeaky brakes and not charge you for his time?

The point is that we shouldn't be looking at the practice management techniques (in this case, charging vs. not charging) of ophthalmology or auto repair as the gold standard for what optometry should do. You should do what any clinically competent, astute business professional would do—

regardless of what others may or may not do. So, in this case, I'd highly recommend a straightforward formula: Do what is absolutely clinically best for the patient and charge for your expertise in being able to have the smarts to know what that is. Whether you recommend PRN cold compresses or an aggressive steroid regimen doesn't matter. The point is you are being paid for your ability to know what to do and you should be paid more for the knowing than the doing.

Practitioners should worry that by not charging for their services, they are inadvertently destroying the "brand" they have established and diminishing their credibility. Take this easy credibility test for yourself: With absolutely no other data available, which car would you say is the better one—the one that costs \$23,000 or the one that costs \$87,000? Consumers (in our case patients) equate quality with high price, whether that is right or wrong. If something costs more, it must be better. Conversely, if something costs nothing, how good can it be?

This type of brand erosion eventually leads to other issues in a slow and steady ominous way. It is difficult to put definitive boundaries on free advice. Today's free allergy consult could turn into the expectation of free medical guidance down the road. Instead, keep it simple: When you stop giving out expert clinical advice, that's when you can stop charging for it. [RCCL](#)



Reducing Lens Deposits: The Best Defense is Offense

Delivering a superior contact lens wearing experience hinges primarily on consistency of comfort. Whether the lens is replaced biweekly or monthly, patients desire and expect clear comfortable vision throughout the day as well as throughout the wear cycle. The deposition of contact lenses with substances derived from the tear fluid is a well-known clinical complication, resulting in reductions in comfort, vision and increased inflammatory responses.¹ Thus, reducing surface deposits is a key factor in promoting both healthy and comfortable contact lens wear. Instructing patients to clean their lenses each night prior to storing is a critical element. Yet, despite our best efforts compliance remains elusive.

So what else can we do? The answer lies in recognizing that the lens care system we recommend can play an equally important role. A multipurpose disinfecting solution, such as OPTI-FREE® PureMoist® MPDS, formulated to effectively remove protein deposits and reduce lipid deposition can prove an invaluable component to

foster consistently clean lenses and all day comfort.

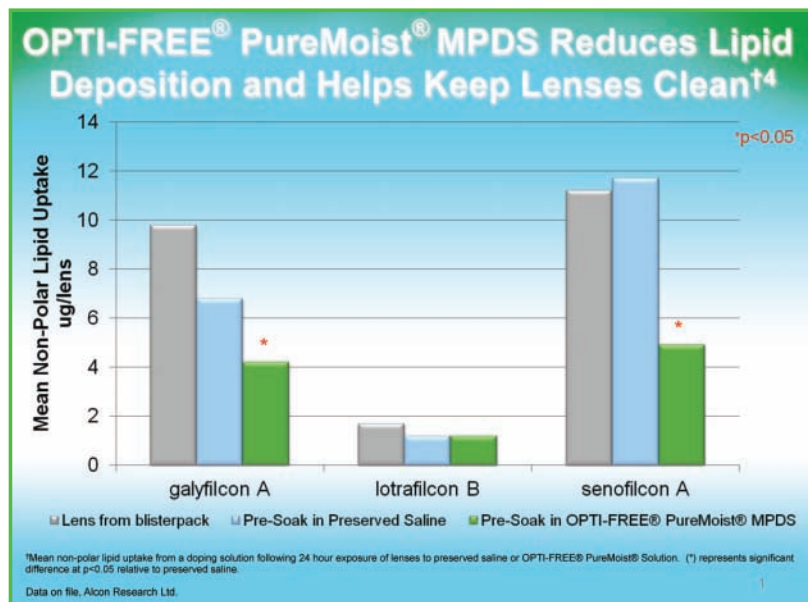
The migration of siloxane moieties to the material surface may result in the production of the hydrophobic surfaces of some silicone hydrogel lenses and, in turn, the marked lipid deposition. OPTI-FREE® PureMoist® MPDS with HydraGlyde® Moisture Matrix minimizes the hydrophobic nature of silicone hydrogel lenses, thereby

prescribed silicone hydrogel materials after a 24-hour soak in either preserved saline or OPTI-FREE® PureMoist® MPDS.³ Significantly fewer lipids were extracted from two of the three brands after soaking in OPTI-FREE® PureMoist® MPDS, than lenses soaked in the preserved saline. Thus, the seemingly passive step of lens soaking and storage can, indeed, prove to

be an active defense against lens surface deposition.

When prescribing silicone hydrogel contact lenses, “go on the offensive” and recommend a care system to optimize lens performance. If the best defense against reduced comfort and patient drop out are consistently clean, wet lenses, then your patients and your

practice may benefit from using OPTI-FREE® PureMoist® Matrix MPDS with HydraGlyde Moisture.



improving the surface wettability.² HydraGlyde Moisture Matrix contains a block copolymer, EOBO (polyoxyethylene polyoxybutylene), which boasts excellent affinity for both internal and external siloxane groups enabling it to competitively “block” the dry spots to which lipids can attach.

A study was conducted comparing lipid uptake among commonly

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How to Address CLIDE

Dry eye symptoms in contact lens wearing patients can present in several ways. Fortunately, there are also several ways to uniquely treat each presentation.

By Jeffrey Krohn, O.D.



Dr. Jeffrey Krohn is a partner at Fig Garden

Optometry in Fresno, Calif. Recently certified by the American Board of Optometry, he serves as an administrator for the Vision Source network of practices. He is a Fellow in the American Academy of Optometry, and a Diplomate in the Cornea, Contact Lenses and Refractive Technology section.

It is estimated that around 17 million individuals in the United States have contact lens related dry eyes.¹ While not typically responsible for permanent loss of vision, dry eyes can impose a significant amount of distress to those who are affected. Symptoms of dryness are often cited as the primary reason patients drop out of contact lens wear.

The condition of discomfort to the eyes due to dryness has been given many names: dry eye syndrome, ocular surface disease and dysfunctional tear syndrome, among others. It is generally accepted that there is an inflammatory component to a dry eye disorder, which indicates that your body is responding (or failing to respond) to the irritants and distresses of daily life (e.g. pollution, allergens, dust, etc). The publication of findings at the International Dry Eye Workshop Group (DEWS) has provided the definition currently guiding the field.

People with dry eye are significantly more likely to report problems with everyday activities such as reading, office work, using a computer,

watching television and driving. Overall, individuals with dry eyes are about three times more likely to report problems with their vision than those without dry eyes.

Many individuals have little to no trouble with their eyes or vision until they attempt to wear contact lenses. Dry eye is associated with contact lens discomfort and is believed to be one of the foremost reasons that some people give up wearing contact lenses. This phenomenon is known as contact lens induced dry eye (CLIDE).

Since dry eye of mild severity can have few objective clinical signs in the presence of subjective symptoms, the appearance of symptoms due to contact lens wear is said to induce the dry eye. It could also be possible that some of these patients have sub-clinical dry eye disease before contact lens wear. Contact lens wearers are more than 10 times more likely than emmetropes and five times more likely than patients wearing spectacles to complain of dry eye symptoms.²

Diagnosing Dry Eye

Accurate diagnosis of dry eye

disease begins with a case history. The prudent practitioner will ask about general symptoms of ocular discomfort. The answers are not likely to lock them into a particular diagnosis, but serve the purpose of determining that there is discomfort that needs relief.

- *Begin by asking whether your patient is experiencing any burning, stinging, itching or dryness.* The answer to this question will provide an adequate net to catch all those suffering from dry eye, lid disease, tear film dysfunction, allergies or some combination of the above. Follow up with more specific questions about grittiness, scratchiness or a sandy feeling.

- *Next, determine whether you are dealing with an acute or chronic condition by establishing a timeline of the symptoms.* While an acute allergic or infectious response to an exogenous stimulus will be encountered, the appearance, symptomatology and appropriate treatment will rarely confuse the astute practitioner. Instead, give more attention to the differentiation of symptoms related to lid disease, tear film dysfunction and chronic/seasonal ocular allergies.

Remember that toxins, desiccation and the allergic cascade will all be exacerbated with contact lens wear and will be reported by the suffering patient using similar vernacular. However, when a patient presents with a symptom like itching, you can start with a working diagnosis of either lid disease (blepharitis or meibomian gland dysfunction) or allergies. The next step is to ask where the itching occurs: from the skin of the eyelid or the eye itself.

- *Find out when the symptoms occur.* Details such as the time of day, duration of lens wear or extraneous irritants (ceiling fans, driving, wind, animals, etc.) are

especially valuable. Similarly, a history of previous styes would also be significant. For example, mucopurulent discharge leads us toward infectious etiology, but reports of tearing or watering deserve strong consideration as being allergic in nature. Knowing whether the watering comes from the eye nasally (over-production) or temporally (poor lid function) can be even more helpful.

- *Take time to compile a detailed contact lens history.* Symptoms of dryness should be cataloged. Do they occur upon awakening, with immediate lens application, after a specific duration of lens wear, only in certain locations or when performing certain tasks? Also, find out if there is a variation in dry eye symptoms depending on lens age. A tendency for overwear or under-cleaning should be noted, as should the use of older generation or generic multiple-purpose solutions. Objective assessment begins with external observation. Any erythema, swelling or weeping appearance to the eyelids, along with pointing of the lashes, is significant. A gross observation of the amount of ocular redness, its location and its asymmetry is also pertinent.

Biomicroscopic evaluation begins with the eyelid skin, lids and lashes. Pay particular attention to the quality and quantity of the lacrimal lake along the lid margin (tear meniscus height), as well as the patency of the meibomian gland orifices. This last observation, along with digital expression of the glands and evaluation of the expressed contents is perhaps the most often overlooked test in the evaluation of patients with ocular discomfort.

- *Use both fluorescein and lissamine green to evaluate the cornea, conjunctiva and tear film.* Pre-lens tear film thinning time

has been described as the finding most strongly associated with dry eye in contact lens patients. This finding correlates well with lipid layer thickness and stability, again emphasizing careful tear film assessment of the contact lens candidate or wearer. The presence of any corneal staining will confirm either lid or tear dysfunction; ocular allergic response rarely demonstrates staining.

- *Evaluation of the upper palpebral conjunctiva is important, but while the lid is everted, pay particular attention to the lid wiper—looking for breakdown and irregularity (staining with lissamine green).* Of particular interest is the heaviness, or redundancy, of the bulbar conjunctiva. It may take a practitioner some time to become familiar with normal bulbar conjunctival tension in order to properly identify edema (chemosis) and redundancy (conjunctivalchalasis). This latter condition is particularly noticeable in our older contact lens wearers and may require surgical correction.

Creative Management of CLIDE

Management can be a creative concoction, depending on the individual presentation. Here are some of the most useful treatments and recommendations in our arsenal:

- *Supplements and Nutrition.* There have been countless articles describing the role of inflammation in dry eye, and the suggested use of various supplements, diet and lifestyle changes. Researchers routinely suggest increased omega-3 essential fatty acids. Eye care practitioners should definitely make a careful study of the role of diet (oily fish), fish oil supplements (both OTC and Rx) and flaxseed oil supplements. In my opinion, any contact lens patient

experiencing any type of ocular discomfort should be educated about the benefits of introducing more omega-3 into their system.

• **Hygiene.** We should consistently recommend eyelid cleansing utilizing a commercially prepared product intended for that purpose. It is inexcusable to ignore a mild to moderate presentation of lid disease, but then suddenly become attentive when the lids are markedly indurated, erythematous and painful.

Most patients with ocular irritation will benefit from regular cleansing. It has been our observation that men, more than women, need this attention. Presumably, this is related to the lack of nightly eyelid makeup removal and/or the concern about getting soap in the eyes. It should be our message that a little soap—of the right composition—around the eyes is a good idea.

• **Lubrication.** It is a worthwhile endeavor for the practitioner to become aware and involved in the delicate differences between formulations. We have found most patients do best with an emulsion that attempts to mimic the lipid layer (e.g. Systane Balance or Soothe XP). However, these products are neither approved for lens wear, nor particularly formulated for their use. There is a controversy over whether practitioners should utilize such products “off-label,” taking the appropriate precautions and educational efforts, or only stick to approved contact lens rewetting drops. I personally believe that the aggressive use of new sophisticated lubrication products off-label is preferred to remaining at the mercy of pharmaceutical companies for approved versions of these helpful agents.

• **Hyperosmotic.** While salt-based ointments were our only

option until a few years ago, there has been a new place for the use of hyperosmotic therapy with the introduction of Fresh Kote. This novel medication provides wonderful relief for patients who have an irregular, poorly healing corneal epithelium. The patients who benefit from it most usually have concurrent lid disease and are also treated with an antibiotic with anti-inflammatory activities.

I use Fresh Kote to promote corneal healing and then taper off of the medication once healing has occurred. Because of its use in primarily therapeutic situations, it is rarely prescribed concurrent with contact lens wear. However, when necessary, such as in the case of recurrent corneal erosions, cautious use and close monitoring could be attempted (again, off label).

• **Antibiotics.** The use of both AzaSite (azithromycin 1% ophthalmic solution, Inspire Pharmaceuticals) and doxycycline for treating lid disease has been discussed extensively. Azasite works well as an off-label topical lid medication. We have the patient rub the drop into the lower lid and then rest the eyes closed for two to three minutes.

The use of an oral medication has its risks and benefits that should be considered carefully. Two unique formulations of doxycycline that I believe are well suited to lid disease management are Oracea (Galderma Pharmaceuticals) and Periostat (CollaGenex Pharmaceuticals). The first is a 40mg capsule with 30mg of immediate activity and 10mg of delayed release granules. The second is 20mg, a lower dose which can be more easily tolerated in those who have experienced difficulty from a reduction in normal bacterial flora, either intestinal or vaginal.

• **Wear Schedule.** With patients experiencing CLIDE, the goal is to eliminate all symptoms when wearing the lenses and provide that comfort for as many daily wear hours as possible; overnight wear should be avoided in patients with anything short of a pristine ocular surface.

When assessing the situation, you should set incremental goals with the patient. For example, if they are currently comfortable with their lenses for two to three hours, bump that up to five or six hours. I have found that being able to hit the work day expectation of nine to 10 hours of comfortable lens wear is deemed a success by the patient. If the patient is going out later that evening, a one to two hour soak in solution can often give them an evening of comfortable lens wear.

• **Lens Material.** Before we had silicone hydrogel materials, a practitioner could count on particular lenses behaving a certain way based on their thick/thin profile, water content and ionic characteristics—the four categories of hydrogel lenses. Nowadays, with the proprietary component to silicone hydrogel innovation and production, practitioners must test for themselves which material characteristics will be best tolerated on patients experiencing CLIDE.

While it is generally agreed that water content is not as important to lens hydration as once believed, there is increasing discussion about the role of friction between the eyelid and the lens surface.^{3,4} Lenses that can accommodate a pre-lens tear film similar to the healthy tears are most likely to provide successful lens wear. While manufacturers do point out the benefits of their particular silicone hydrogel lens, I've found that each patient needs a unique assessment with various lenses.

When supreme oxygen transmission can be compromised, standard hydrogel lenses with unique surface treatments can bring maximum wearing time to patients experiencing dryness. The Proclear family of lenses continues to be a strong performing lens in our practice, many times out-performing the silicone hydrogel lenses when faced with symptoms of dryness.

• **Replacement Schedule.** Reducing wear time and increasing replacement frequency are two ways to help alleviate acute symptoms. Patients who experience no symptoms the first few days of a two-week or monthly replacement lens do very well when switched to a daily disposable lens. There are now numerous daily disposable lenses with varying material compositions, surface treatments and lubricity enhancements. When a particular prescription is not available in a daily disposable—or a two-week or monthly lens performs well for a shorter-than-advertised number of days—do not be too timid to prescribe a more frequent replacement schedule such as every week for the two-week lens or every two weeks for the monthly lens.

• **Care Systems.** In cases when the daily disposable modality is not feasible, it is important to stress the importance of the care system. Peroxide based systems, such as Clear Care (Alcon), can be used as an alternative to multipurpose solutions. The general observation is that peroxide patients are less likely to move down the row and select an inferior generic product. However, a recent study showed that a multipurpose solution containing Aldox and Polyquad was superior at removing lipid depositions on silicone hydrogel lenses compared to peroxide.⁵

Practitioners who do choose to

prescribe (not recommend or suggest) a particular new formulation of a multipurpose solution should make it absolutely clear that generic products are not equivalent. You need to remain vigilant to ensure that your patients are using the best combination of products.

• **Oral Antihistamines.** Patients suffering from ocular allergies often also have systemic allergy symptoms, and are taking systemic allergy medications. These drugs, both over-the-counter and prescription, have been shown to increase dryness of the ocular surface. Topical agents should be the primary prescription written by eye care practitioners as they deliver high concentration of medication to the ocular surface with fewer side effects than oral medications. Remember to work with the patient's allergist or primary care physician before suggesting a switch from oral antihistamines to other topical agents (e.g. nasal sprays).

• **Topical Antihistamines.** When allergic conjunctivitis is thought to be a compounding factor with CLIDE, the use of a topical antihistamine/mast-cell stabilizer combination should be considered. A once-a-day instillation of these agents either before lens insertion or after contact lens removal at night can often bring great relief from the environmental irritants that are being held on the surface of the lens due dry eye.

• **Topical Anti-Inflammatories.** Topical corticosteroids can successfully reduce the inflammation typical of dry eye, but should be reserved for cases that are acute, moderate to severe in intensity or cases of atopic, vernal and contact lens papillary conjunctivitis.

Remember that corticosteroids are not generally regarded as a reasonable long-term treatment option

for successful contact lens wear in dry eye patients. In addition to the ocular side effects of prolonged use, including increased intraocular pressure and risk of cataract formation, the constant presence of a steroid during contact lens wear could create trouble if microbial keratitis occurred. However, a management course of “soft” steroids to normalize a patient prior to contact lens fitting can be very useful.

Cyclosporin A (Restasis) has been a wonderful adjunct in the management of CLIDE, making it possible for many patients to wear their lenses comfortably for longer periods before experiencing dry eye symptoms. Remember that it may take some time for the tear film to improve and increase with cyclosporine use, so you will need to educate the patient about this delay. I have found b.i.d. use of cyclosporine concurrent with lens wear—instillation before lenses are applied and after they are removed—to be very well tolerated.

Symptoms of ocular irritation are under-reported by patients. Therefore, it is the responsibility of the astute contact lens practitioner to initiate conversation about discomfort. Thorough evaluation, proper diagnosis and timely treatment and management are essential to the success of our dry eye contact lens patients. [rcccl](#)
Dr. Krohn has no current pertinent financial disclosures.

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Allergic Conjunctivitis: Causes and Cures

An overwhelming number of patients have allergic conjunctivitis. Understanding the specifics in each individual case will help you tailor the best treatment.

By Greg Black, O.D., and Julie Tyler, O.D.

Allergic conjunctivitis is a chronic condition that can greatly affect our patients' quality of life and may even cause ocular complications in severe cases. However, with a proper understanding of the condition, appropriate management and patient education, it is possible to manage.

Prevalence

An allergy is a hypersensitivity reaction to a specific allergen involving the immune system. There are a myriad of presentations associated with these allergic hypersensitivity reactions, such as rhinitis and asthma. Between 40%

to 60% of the allergic population report ocular symptoms.¹

The general term allergic conjunctivitis is used for a collection of hypersensitivity disorders that involve the conjunctiva, lid and/or the cornea. The triad of conjunctival injection, chemosis and itching is found in most allergic conjunctivitis cases. Population studies have historically reported a prevalence of 15% to 20% of allergic conjunctivitis, while more recent studies have found rates as high as 40%.²

Allergic conjunctivitis is a condition that tends to be self-diagnosed and self-medicated with only marginal success. This gives us a great opportunity to improve quality of life in patients suffering from allergic conjunctivitis. A Pitt and colleagues found that only 10% of

patients with symptoms of allergic conjunctivitis sought medical attention for their condition.³

Classifying Allergies

Ocular allergies can be classified as seasonal allergic conjunctivitis (SAC), perennial allergic conjunctivitis (PAC), atopic keratoconjunctivitis (AKC), vernal keratoconjunctivitis (VKC), contact dermatitis or giant papillary conjunctivitis (GPC). While the diagnosis typically is based on clinical findings, ancillary tests such as cytology, conjunctival provocation, confocal imaging and tear mediator analysis are available. When examining tear cytokine profiles in the active phase of the different allergic classifications, they differ primarily in quantities not qualities of cytokines present.⁴



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Goal Statement: An overwhelming number of patients have allergic conjunctivitis. This article will provide an overview of the specifics in each individual case to help you tailor the best treatment.

Faculty/Editorial Board: Greg Black, O.D., and Julie Tyler, O.D.

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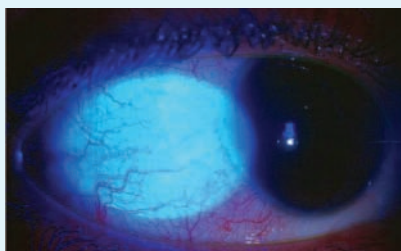
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1. Seasonal allergic conjunctivitis and perennial allergic conjunctivitis: Two of the most common types of ocular allergies, SAC and PAC, represent 25% to 50% of all allergic conjunctivitis cases.⁵ They both primarily affect the conjunctiva and possibly the lids, and share similar signs and symptoms. The conjunctival injection is typically mild to moderate, with a moderate amount of chemosis. Itching is present in both conditions. Tearing, white mucus and a glassy appearance may also be present.

Both SAC and PAC are caused by the typical immunoglobulin E (IgE)-mediated reaction to environmental allergens that are airborne and are Type I hypersensitivity reactions. This reaction increases tear levels of histamine, tryptase, prostaglandins and leukotrienes; and mast cell degranulation induces activation of chemokines, monocyte chemoattractant protein, interleukin-8, eotaxin, macrophage inflammatory protein, intercellular adhesion molecule and p-selectin.⁴ It is these factors that initiate the recruitment phase of inflammatory cells such as eosinophils, neutrophils, basophils and T lymphocytes in the conjunctiva.⁴ This results in an early phase of tearing, lid and conjunctival chemosis and vasodilation due to the degranulation of mast cells. This is followed by the late phase of infiltration of inflammatory cells, largely eosinophils.

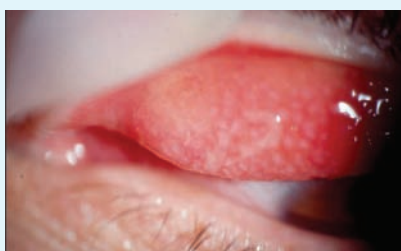
The difference between SAC and PAC is the allergen causing the reaction. SAC is usually caused by weed, tree and grass pollen present at certain times of the year (usually spring or summer) whereas PAC is caused by mites, mold or animal dander present throughout the year.



Seasonal allergic conjunctivitis.

2. Vernal keratoconjunctivitis and atopic keratoconjunctivitis: VKC and AKC affect the conjunctiva, eyelids and cornea and have the potential to be sight threatening due to their chronic and persistent nature. VKC and AKC are caused by a complex and systemic altered immune response resulting in both type I and type IV hypersensitivity reactions. While there is a IgE-mediated mechanism in VKC and AKC, there is also T cell-mediated responses and eosinophil activation. Recent research suggests that these are complex interactions between cytokines, chemokines, proteases and growth factors, rather than parallel pathways.⁴

VKC typically involves young, male patients in warmer climates. While patients experience the typical allergic symptoms found in other allergic conjunctivitis, the itching tends to be intensely severe and photophobia may also be present. The hallmark finding is large papillae on the upper lid tarsal conjunctiva. Ropy mucus discharge, punctate keratitis, subepithelial plaques and Trantas dots may also be present. Trantas dots



Giant papillary conjunctivitis.

are primarily accumulations of eosinophils at the limbus appearing as small, peri-limbal white spots. Trantas dots tend to be present during the acute phase and resolve when VKC is less active.⁶

Patients with AKC typically have a history of atopic dermatitis and are generally between 20 to 50 years old. The presence of the concurrent atopic dermatitis and blepharitis can aid in diagnosis of AKC. The AKC patient will often have leathery, darkened skin below the eyes and a positive family history of atopy. The conjunctival injection and chemosis varies in severity. Giant papillae and Trantas dots may or may not be present. Cataracts may also form at an earlier age than otherwise expected.

3. Contact dermatitis: Contact dermatitis is mediated by lymphocytes and is a slower process. There is an initial sensitization followed by a re-exposure in which an erythematous reaction slowly develops. Itching and redness occur. The common allergens are poison ivy, poison oak, latex, cosmetics, neomycin and brimonidine. The skin around the eye, the eyelids and the conjunctiva may be involved.

4. Giant papillary conjunctivitis: GPC is included in a discussion of ocular allergy because it shares similar signs and symptoms but it is a mechanical and possibly toxic irritation that is not IgE-mediated and therefore not a true allergic condition. The stimuli for the conjunctival findings are inert substances such as contact lenses, limbal sutures and ocular prostheses, not allergens.⁶ The result is conjunctival papillary hypertrophy. The mechanical trauma stimulates a lymphocyte-mediated immune response resulting in a higher level of inflammatory cells but no increased histamine release.⁷

Table 1. Comparison of Type 1 and Type 4 Hypersensitivity Reactions

	Type 1	Type 4
Antigen	Exogenous external	Endogenous tissues/organs
Time	Minutes	Days
Antibody	IgE	None
Transfer	Antibody	T Cells
Histology	Eosinophils/basophils	Lymphocytes/monocytes

While itching is the hallmark symptom of allergic conjunctivitis, it must be remembered that blepharitis, non-allergic conjunctivitis and dry eye may also present with itching. Another differential diagnosis of allergic conjunctivitis is blepharochalasis or recurrent bouts of painless eyelid edema. The primary goal of therapy in allergic conjunctivitis is to determine the causative agent and remove exposure to that agent; however, removal or discovery of some allergens is often not possible. To allow the patient to function within their environment, the optometrist is called upon to diagnose the condition, educate the patient and offer therapies that alleviate the symptoms with the fewest side effects in an economically feasible manner. The treatment is matched to the severity of signs and symptoms. Allergic conjunctivitis is a condition where the signs and symptoms often don't match—the symptoms are often greater than the signs.

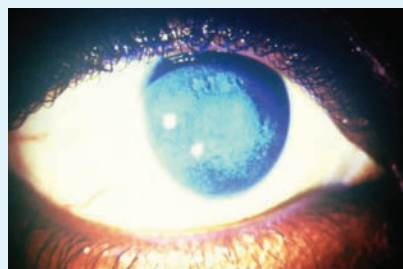
Management

Mild cases of allergic conjunctivitis can be managed with artificial tears to decrease the concentration of the allergen. Cool compresses also help to suppress the immune response. If the patient needs to use the artificial tears more than four times a day, recommend preservative-free artificial tears. Over the counter

vasoconstrictor/antihistamine drops can also be helpful in mild cases, but only if they can provide relief in two to four drops per day.

Oral antihistamines are usually reserved for allergic conjunctivitis if there is also concomitant rhinitis or other systemic allergic symptoms because they are slowly acting in regards to ocular symptoms. Oral antihistamines also tend to cause dryness of the mucus membranes, including the eyes, and often require the addition of artificial tears for the resultant dry eye.

Topical antihistamine, mast cell stabilizers and combination antihistamine/mast cell stabilizer drugs are also available for mild to moderate allergic conjunctivitis. Topical antihistamine drops work by blocking the action of histamine on H1 receptors. A side effect that is clinically seen with topical antihistamines is headache that resolves with discontinuation of the drop. Topical mast cell stabilizers affect mast cells by inhibiting the release of histamine by preventing degranulation.



Contact dermatitis.

While not commonly used due to transient pain on installation, non-steroidal anti-inflammatory agents (NSAIDs) are available for use in allergic conjunctivitis. Topical NSAIDs typically inhibit cyclooxygenase enzymes COX-1 and COX-2 and block production of inflammatory mediators like leukotrienes and prostaglandins.

A detailed patient history can be an invaluable resource in creating a management plan. For example, knowing that a patient's symptoms occur in the fall would allow a practitioner to start a mast cell stabilizer in the late summer, thus avoiding the allergic cascade. Remember that while an antihistamine drop can make an immediate impact, a mast cell stabilizing drop requires a few weeks to take effect. The combination drops of antihistamine/mast cell stabilizers do offer the convenience of immediate relief from the antihistamine while the mast cell stabilizer works to reduce symptoms long term and offer the convenience of once or twice a day dosing.

For more severe chronic cases or acute cases that don't respond to topical antihistamine drops, topical corticosteroid and immunomodulators are available. Just like with antihistamine and mast cell stabilizers, topical corticosteroids are fast acting and immunomodulators are slower acting. Topical corticosteroids inhibit the production of various mediators. These agents are potent but carry side effects such as increased intraocular pressure and cataract formation especially if used long term. Topical corticosteroids are often used for a short duration to get the condition under control to allow other therapies to offer relief. Occasionally, a strong steroid such as prednisolone acetate or difluprednate is necessary

especially in severe VKC cases, but usually a softer corticosteroid such as loteprednol is sufficient.

Immunomodulators, such as topical 0.05% cyclosporine and 0.03% tacrolimus, interact with the immune system either to stimulate or suppress. Topical cyclosporine inhibits eosinophilic infiltration of the conjunctiva. N. Ebihara and colleagues demonstrated that 0.1% topical cyclosporine was safe and effective in severe AKC and VKC patients.⁸ Typically, topical immunomodulators are reserved for AKC and VKC.

Other categories of recalcitrant allergies may also benefit from topical immunomodulators; however, such treatment has not been well documented and is not FDA approved for allergy treatment. Topical immunomodulators do work well in most patients and come with few side effects; HIV patients and patients with a history of herpetic eye disease are not good candidates. Topical immunomodulators are slower acting and may need additional therapy for the first two to six weeks.

In managing a patient with allergic conjunctivitis, the history is critical in the classification and ultimately the therapy. In addition to the general symptoms of itching, tearing and redness, try to elicit when it began and look for any associations such as a new pet or new cosmetic. Also, find out if this is a new or reoccurring complaint and whether the patient has attempted any self-treatment.

During the slit lamp exam, assess the overall inflammatory response and the extent of a papillary reaction. Look for corneal involvement and signs of chronic inflammation such as Trantas dots or the leathery lower eyelid skin seen in AKC.

Table 2. Diagnostic Characteristics for the Different Forms of Allergic Conjunctivitis¹⁰

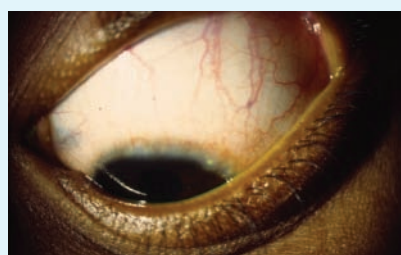
	SAC	PAC	VKC	AKC	GPC
Age	20-40	20-40	<10	<5 or 20-50	Any
Sex	M=F	M=F	M>F	M>F	M=F
Season	Spring, Fall	Perennial	Spring, Fall, Perennial	Any	Any
Papillae	Small	Small	Giant	Frequent	Giant
Serum IgE	78%	78%	Variable	Constant	Constant
Eosinophils in Scraping	25%	43%	Typical	Typical	Frequent
Goblet Cells	Increased	Increased	Increased	Reduced	Variable

With a thorough history and comprehensive slit lamp evaluation, a tentative diagnosis should be reached to help formulate a management plan to alleviate the patient's symptoms with the fewest risks/side effects and economic considerations. Remind your patient that while there is momentary relief from rubbing the eyes, it only worsens the condition by releasing more histamine. If there are systemic symptoms in addition to the ocular findings or if the classification of allergic conjunctivitis is unclear, be sure to refer your patient to an allergist or immunologist.

While there is no cure in sight for allergic conjunctivitis, we do have many good therapies in our arsenal to offer relief to our patients. Our challenge is to collect a detailed medical history—even if symptoms are not currently present—and to educate the

patient to manage their symptoms under the care of their optometrist rather than self-medicating.

As we look ahead, there is a significant amount of research being done in the area of allergy. N. Reyes and colleagues, for example, recently found that $\gamma\delta$ T cells were necessary for the full expression of the clinical manifestations and the late phase of allergic conjunctivitis.⁹ As the complex components of an allergic reaction are better understood, and new discoveries are made, improved therapies will emerge. [RCCL](#)



VKC with Trantas dots.

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Just in Case

Proper and effective lens case management is vital to your patient's eye health.

By Christine Sindt, O.D.

With reusable contact lenses, the storage case can be a significant source of microbial contamination and potential infection.¹ Understanding the complexity of lens case development, chemistry and microbial contamination is vital to keeping lens wearers safe and healthy.

FDA Regulations

The Food and Drug Administration (FDA) gives clearance for medical devices to be sold in the United States based on device categories. The FDA has three regulatory classifications of medical devices—Class I, Class II and Class III—assigned by the risk the medical device presents to the patient and the level of regulatory control needed to legally market the device.

As the classification level increases, the risk to the patient and FDA regulatory control increases. Accessories to medical devices are considered the same classification as the medical device (i.e., lens cases and contact lenses). Class I devices present the least amount of potential user harm and have the least amount of regulatory control, while class III devices present significant risk of illness or injury to the patient and are heavily regulated.

Class II: Contact Lens Cases

Contact lens cases are class II devices. Class II medical devices have potential user risk; however, there are existing methods/standards/guidance documents available to provide assurances of safety and effectiveness. Class II devices typically require pre-

market notification by submission and FDA review of a 510(k) clearance to market submission.² Class II devices are required to have special labeling, mandatory performance standards and postmarket surveillance.

As a class II device, contact lens cases must go through the 510(k) process to show substantial equivalence to a currently marketed lens case. The FDA does not require microbial testing of lens cases unless the manufacturer claims the case has antimicrobial properties. Clinical testing of the case alone is not required. Heat testing is needed only if the case is to be used specifically for heat disinfection. Unless the Material Safety Data Sheet from the manufacturer is supplied, the lens case plastic requires toxicity testing.

The Case Design

The well size determines how much biocidal storage solution surrounds the dormant contact lens. The International Organization for Standardization (ISO) 14729 is the “microbiological requirements and test methods for products and regimes for hygienic management of contact lenses.”³

A stand-alone test is a measure of the innate anti-microbial activity of the contact lens disinfectant to kill an appropriate level of microorganisms within the allotted period of time. Each solution is challenged with five different microorganisms. If the product meets the requirements of the test, the product can be labeled a contact lens disinfectant. If the product does not meet this standard, the contact



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lens must go through mechanical cleansing (a regimen) to meet the minimum disinfection requirements.

Therefore, the amount of solution needed for the lenses is in proportion to the efficacy of the disinfectant, how dirty the lens is and how long it will be stored. For patients, this means for a stand-alone (no-rub) product, the well size of the associated lens case is important and should be completely filled in order to achieve the FDA standards.³

Even if the product meets ISO standards, the lens storage container material may affect efficacy of the product. Biocide is constantly being absorbed and adsorbed by the lens case. When a disinfectant adheres to the container, it leaves very little in the solution to interact with the contact lens, leaving the lens vulnerable to contamination. Manufacturers generally design a special lens container to maximize the disinfection for their particular solution.⁴ Using alternate cases for a given solution may affect biocidal patterns. The topology of the lens case well grooves also affects biofilm formation and ease of contaminant removal.^{5,6}

What Grows Inside?

Lens cases are contaminated with bacteria, fungi or protozoa about 19% to 81% of the time.¹ Contamination can come from failure to clean and store cases properly, dirty fingers, climate, “topping off,” tap water and variable storage times.

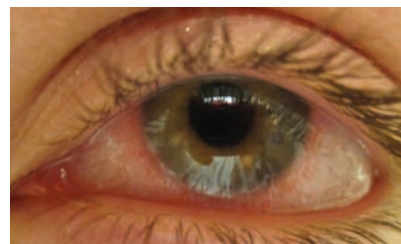
The most common pathologic organisms found in lens cases include *Pseudomonas*, *Serratia*, *Staphylococcus*, *Acanthamoeba* and *Fusarium*. Contact lens associated red eye has been associated with *Haemophilus influenzae*, *Acinetobacter* sp., *Pseudomonas aeruginosa*, *Aeromonas hydrophila*, *Serratia liquefaciens*, *Serratia marcescens* and *Pseudomonas putida*. Infiltrative

keratitis and CLPU have been associated with *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Abiotrophia defectiva* and *Acinetobacter* sp.¹

Amoebic contamination rates of lens cases ranges from zero to 20%. *Acanthamoeba*, both trophozoites and cysts, can rapidly adhere to the lens case after exposure to the organisms. There is evidence that adherence occurs at greater frequency in used cases than in new cases.⁶ This is probably due to surface roughness and residual water droplets.

In theory, these microorganisms should be killed when exposed to contact lens solution. In reality, microorganisms form biofilms, which protect them from biocidal destruction. Biofilms grow through a combination of cell division and recruitment, starting with the attachment of free-floating (planktonic) microorganisms to the lens case surface. Other planktonic cells can then attach to the adhered bacteria. Eventually there are many layers of microorganisms living within a matrix of extracellular DNA, proteins and polysaccharides.

A biofilm can be formed by a single microorganism species, but more often we find biofilms that consist of many species of bacteria, fungi, algae and protozoa. Biofilms have increased resistance to detergents and antibiotics, since the surrounding matrix and the outer layer of cells protect the inner colonies. A biofilm also produces high levels of antibiotic degrading enzymes. Repeated use of antimicrobial agents on biofilms can cause bacteria within



Contact lens-associated red eye.


the biofilm to develop an increased resistance to biocides. Data suggests that microbial keratitis events involve biofilm-forming organisms; therefore, removing the biofilm from the contact lens case is an important step in lens care compliance.⁷

Caring for Your Case

Numerous studies have now shown that mechanically wiping the contact lens case dry after lens removal will mechanically disrupt the biofilm and will significantly reduce the lens case bioburden.^{6,8,9} Air drying the lens case upside down further reduces contamination.

Silver impregnated lens cases have less biofilm formation than polypropylene lens cases. Silver has low toxicity and its multiple sites of action provide a low potential for developing bacterial resistance. The silver ions are only released when moisture comes into contact with the cases. Therefore, to continue the anti-microbial activity when not storing lenses, silver impregnated cases should be rinsed with solution and stored with the cap on—as opposed to conventional containers which should be stored with the cap off.¹⁰

“Using alternate cases for a given solution may affect biocidal patterns.”

Biofilm, topology, material and care of lens cases can and do affect our patients contact lens safety and wearing experience. We must take the time to understand and properly educate our patients on effective lens care. 

References available at www.reviewofcontactlenses.com.

New Additions to the Surgical Toolbox

With the advent of new technology, today's eye care practitioners must sort through new options when selecting a treatment plan for presbyopia.

By **James V. Aquavella, M.D.**

As our journey into the 21st century progresses, we look more and more to new technology to solve some of the basic difficulties associated with aging. While the correction of presbyopia has been a major concern for hundreds of years, the more recent emphasis on refractive surgical solutions has led to several different technological approaches.

The traditional reading add and bifocal spectacle techniques are still prevalent, however we are seeing more and more reliance on combined modified mono-vision techniques, with or without contact lenses. Multifocal contact lenses, intraocular lens surgery and refractive astigmatic procedures are commonplace, but the lure of a truly simple and effective surgical solution to eliminating residual presbyopia has continued to entice the medical and scientific community.

Intraocular Lenses

Restor (Alcon), ReZoom and Tecnis (Abbott Medical Optics) are examples of multifocal intraocular lenses that are currently being implanted. Keep in mind that there is a significant financial impact—including the cost of implants and increased surgeon reimbursements—associated with multifocal lens insertion.

Crystalens (Bausch + Lomb) is a popular version of today's accommodating intraocular lenses. All of these U.S. approved multifocal lenses work well in "good candidates," with a small but vocal number of unhappy recipients. Thus, the rate of removal or replacement of multifocal IOLs is much higher than that associated with traditional single focus lenses. There have been no long-term studies of this issue but cataract surgeons agree that careful selection of patients is necessary. The more discriminating, younger engineer types may not be the best of candidates. Hence, while we are finding success with accommodating intraocular lenses, the number of suitable candidates remains limited. But, when you consider that there are three million cataract procedures annually in the United States, we still have a large potential to use these lenses.³

With the development of a multi-element intraocular lens (telescope), there has been a resurgence of interest in the use of these lenses for accommodative presbyopia correction. In Europe, other IOLs are being evaluated.

- *Synchrony (Visiongen)* is a silicone accommodating model with a two-part optic.



Dr. Aquavella established the cornea research

laboratory at the University of Rochester and directed the cornea research and fellowship training programs for 25 years. He is currently a professor of ophthalmology at the University of Rochester Flaum Eye Institute.

- *Tetraflex (Lenstec)* is accommodating, but with a square edge optic design to respond to ciliary muscle contractions.

- *Nulens (Nulens)* has a piston like design and is said to provide up to 10 diopters of accommodation as it changes shape.

- *FluidVision (Power Vision)* lenses are based on fluid rather than solid mechanics. Even if FDA approved significant usage, time will be needed to judge the impact of surgeon and patient preferences.

Some surgeons are implanting different lens designs in each eye. One example would be a lens pair that increases the range and depth of field in one eye to provide more acute near vision, while simultaneously addressing clear distance vision problems in the other eye with the use of a single focus implant. This technique can achieve good results, but only if the practitioner has a good understanding of the patient's particular visual requirements and the patient accepts that there is an unknown possibility of optical change that will not be realized until after the bilateral surgery is complete and functional capacity is evaluated.

Corneal Inlays

While scleral expansion surgical techniques evolve, many previously unhappy refractive surgeons are looking toward the more elegant cornea and intraocular lens solutions. Keep in mind, however, that the truly multifocal contact lens has not yet surfaced—the cornea continues to defy attempts to create simultaneous distance and near imaging.

Cornea inlays have become more feasible with the development of precise laser technology enabling facile lamellar placement. A recent improvement allows the laser to alter the structure of the inlays, potentially allowing for secondary optical/refractive changes. Here is a

The Physiopathology of Presbyopia

One diversion has been the dispute concerning the basic physiopathology of presbyopia itself: Was Hermann von Helmholtz correct after all, or should we consider the more recent theories of Ronald A. Schachar, M.D., Ph.D.? Dr. Helmholtz postulated that, for distance vision, the ciliary muscle relaxation flattens the lens. Near vision ciliary muscle constriction and slackening of the zonules leads to more convex lens architecture.¹ Dr. Schachar proposed that with ciliary muscle contraction, zonular tension increases and steepens the lens curvature. As lens diameter increases with age, zonular tension diminishes and decreases the length of ciliary muscle contraction.²

list of some available corneal inlays:

- The *Presbylens (ReVision Optics)* is a hydrogel corneal inlay with a 2mm or less diameter, to be directly implanted on the center of the cornea. This procedure is appealing because it requires a very small incision close to the visual axis. However, the closer to the visual axis, the higher the potential for complications, such as reduced best corrected distance acuity. Presbylens is currently approved for use in euro zone common market European countries. It is not yet approved for use in the United States.

- The *Flexivue (Presbia)* cornea inlay is similar in concept to the hydrogel Presbylens, with a larger 3mm diameter. It too is an intralamellar insertion but the lens is supplied with a patented single use implantation device. It is approved for use in Brazil.

- *Kamra (Bausch + Lomb)* lens is an intralamellar inlay, with a 4mm large diameter, that uses pinhole technology to increase depth of focus without altering the cornea curvature. It uses multiple laser-created microfenestrations, much the same as a keratoprosthesis back plate, which enables the facile passage of nutrient material. The Kamra is in clinical trails and not yet approved.

The patient's pupil size is the key factor in deciding which particular model should be implanted. Inlay design, refractive index and biocompatibility of the materials are all additional factors that should

be considered. The inlays may be inserted in a corneal pocket or following a LASIK-type flap procedure. The target population is much younger than those commonly fitted with multifocal IOLs; the best candidates are generally early presbyopes, 40 to 50 years of age, and in need of an easily reversible procedure.

Future Developments

IntraCor is a femtosecond intralamellar laser procedure that creates concentric rings in the stroma outside the visual axis to alter the corneal curvature without changing corneal thickness. This procedure is being developed in Columbia and Germany.

At the University of Rochester's Flaum Eye Institute, laser-initiated alterations of the cornea refractive index without modification of curvature are being explored.

It is clearly premature to speculate which of these new technological approaches the medical community will adopt and which will fail to achieve satisfactory results. Patients need to rely on the advice of their physicians and recognize that no procedure will satisfy every patient. Today's surgeons should become involved in evaluating the various techniques while maintaining a high level skepticism to sort through the numerous claims of excellence and superiority. It's simple: One size will not fit all. [RCCL](#)

References available at www.reviewofcontactlenses.com.

A How-To Guide: Starting Your Own Specialty Practice

Your success as an independent practice lies in your ability to set yourself apart from others.

By Robert L. Davis, O.D., and S. Barry Eiden, O.D.

Establishing a specialty practice in optometry hinges on one concept: differentiation. As you think about starting your own specialty practice, think about how you want to define yourself and what qualities you have that will separate you from the average practitioner.

There are several ways to single out your practice—price, convenience and customer service are a good start. However, offering the lowest price is challenging for the private practitioner, and is likely a losing battle when you factor in competition from “big box” vision retailers. Similarly, using convenience as a platform to set yourself apart is difficult in today’s world of seven-day-a-week retail and the power of the Internet. Keep in mind, it is impossible to satisfy both the patients who are looking for convenient service and those only interested in price. Differentiating ourselves through stellar customer service can be difficult too since exceptional patient customer service is considered the norm these days in optometry.

That leaves us with one timeless, and always successful, differentiating factor: professional expertise, or the power of the specialist. Use your

advanced professional education and experience, along with knowledge of and access to the most advanced technologies, to position your specialty practice as something quite different from the norm.

Dedication

Dedication to a specialty is not easy. To be a true specialist, you must first accept that you cannot be an expert in all areas of eye care. Instead, you have made the decision to select an area of specialized service to commit to.

There are two distinct approaches to specialty practice. The first is to select your area of specialization and dedicate your practice to that one area of distinction; examples of such specialty practices include specialty contact lenses, pediatrics, binocular vision, low vision rehabilitation and glaucoma management, to name a few. Professional integrity stems from your ability to know when to refer out cases that require care from other specialists in areas outside your sphere of expertise. In fact, optometry, as a profession, would greatly benefit from an expansion and emphasis on inter-optometric referrals.

The second approach is to create a



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Dr. Eiden is president and medical director

of North Suburban Vision Consultants, a multispecialty eyecare practice in Deerfield and Park Ridge, Ill. He is co-founder of EyeVis Eye and Vision Technologies and Research Institute and immediate past chair of the AOA's Contact Lens and Cornea Section.

multi-specialty group practice where each associate would have his own area of expertise and specialization. In such an environment, most inter-optometric referrals would occur within the multi-specialty practice.

Education

Education is the cornerstone of a specialty eye care practice. A true specialist will have the knowledge and patient management skills to validate the perception of expertise. There are numerous ways to gain the advanced knowledge required to specialize in a specific area of eye care, starting with a residency program. These placements offer the required advanced training—academic and clinical—in a relatively short period of time. During a residency, practitioners have the opportunity to see a large number of cases within the specialty area, interact with highly experienced attending optometrists and educators, conduct research and network at professional meetings.

If you are working in a clinical environment that has other experienced specialists and a high volume of patients, you can, in essence, experience an “unofficial residency.” In many cases, the combination of clinical experience, dedicated ongoing continuing education, regular readings of new publications in your specialization and involvement in niche organizations can be equivalent to an official post-doctorate residency program. And, remember that experience can only be gained through extensive patient management.

Continue your education by joining professional organizations, specialty sections and fellowships such as the American Optometric Association, American Academy of Optometry, College of Optometrists in Vision Development, American Academy of Orthokeratology,

Optometric Council on Refractive Technologies, Ocular Surface Society/Tear Film Ocular Surface Society, Glaucoma Society, Retinal Society and Neuro-Optometric Rehabilitation Association, to name a few. These memberships help you network and brand yourself as a specialist, while giving you a glimpse of the new research being conducted in the field. Take advantage of the opportunity to join a leadership role. Finally, maintain academic affiliations with optometry colleges or hospitals and medical centers; these institutions often see unique cases, giving you a chance to develop your own expertise and learn from other experts in the field.

Staff Lessons

Once you have the education and experience necessary to open a specialty practice, the next step is to find an equally educated and experienced staff. Most optometric practice staff can be divided into three basic organizational departments: administration (business staff, reception, billing), professional services (optometric/ophthalmic technicians) and optical. For a successful practice, all three must independently and collectively understand your mission and be knowledgeable about your specialty.

You can work to achieve this goal by scheduling regular educational office meetings, support staff continuing education and encourage advanced achievements such as certification programs. Remember that you create the image of your practice by externally communicating the specialized services you want to deliver. Get your staff involved in outreach programs within the community to help spread the word. Be consistent and repeatedly project your image through various outlets—newsletters, pamphlets, on-hold phone messages, websites,

social media networks, blogs and printed materials in your office.

If you and your staff continue to promote your specialty, industry representatives will soon visit your office and use your practice to market their products to other practitioners. This helps your practice evolve and further brands you as a specialist.

Partner with local schools and community programs to offer vision screenings and set up speaking engagements; these opportunities to promote your practice will encourage potential patients to seek your expertise. Advertise an open house specialty “how to” program in your local newspaper. This type of event will help publicize your expertise, increase your practice visibility and solidify your credibility as a specialist. Communication is the key in developing more of a local presence in your community.

Take advantage of information technology systems like Demand Force (www.demandforce.com) and Web Systems 3 (www.websystem3.com) that were developed to increase patient communication. These software options are an automated marketing and communications solution that helps you grow revenue, retain and engage your existing customers and track marketing results. They integrate directly into your management system and turn your customer base into a powerful social network.

The backbone of these systems communicate through cell phone texts, email and phone communication is the trifecta of integrating your practice into a patient’s daily routine. Features such as the ability to make appointments online, to download medical health forms instantaneously, automatic newsletters, facebook integration, surveys/reviews, marketing campaigns and an educational website all add to the perceived value of your practice

and further help in creating your desired image.

Technology

Technology will help you become a specialist. Incorporate the latest in diagnostic and therapeutic instruments into your practice and you will stand out.

In the past, it would take years of clinical experience to develop the skills needed to identify subtle changes in ocular structures associated with the early phases of eye disease. Even then, many experts would disagree on the diagnosis. Today, with the advent of technologies such as anterior and posterior segment OCT, we can observe tissue changes that were previously impossible to visualize.

Refractive anomalies are now evaluated with wavefront and point spread function devices that can identify changes in the optical properties of the visual system never before realized. Similarly, tear osmolarity and lipid layer analysis are new technologies in dry eye specialty practices. Electro-diagnostic procedures, such as visual evoked potentials and electro-retinograms, can provide an in-depth analysis of objective functions of the retina, optic nerve and visual cortex.

With these new technologies come improved lines of communication. We are now seeing an increase in cross referrals. Optometrists can specialize in niche areas like diabetic management by utilizing advanced retinal imaging to work hand-in-hand with endocrinologists. The key is early diagnosis and specialized therapeutic options—an effective combination that can be credited to the advanced technology available in specialty practices.

Literature and Research

Lecture and write in professional publications to establish yourself

as a credible specialty eye care provider. Once published, other practitioners will learn of your expertise through the literature. You will likely see an increase in referrals, another step toward branding your practice. As you make the circuit as a speaker and a writer, others will perceive you as a specialist. This, in turn, will lead to new consulting opportunities and advance your status within the specialty. Get started by volunteering to speak at local optometric society meetings. Contact your partnering laboratories, contact lens manufacturers or pharmaceutical companies and ask to present new information to your peers.

A key element of any true specialty practice is research and development. Your involvement in clinical trials not only gives you access to cutting edge technology, but including your patients as subjects in your study will serve as a continuous reminder that they are part of an advanced eye care environment working to promote better eye health and vision for everyone. As an added bonus, your involvement in research and development will give you new material for writing, lecturing and consulting.

The best way to join a research and development team is to let your lab, manufacturing and pharmaceutical representatives know about your area of specialization and interest in participating in clinical studies. Once you get started, you'll likely find yourself being invited to participate in many such events over time.

Marketing


Once you have the experience and qualifications to be considered a true specialist, marketing will help increase the flow of patients to your practice. The most effective and cost efficient tool you have is internal marketing. Leverage your patient loyalty to spread the word. Another



Photo: Carl Zeiss Meditec Inc.

Specialty practices should incorporate the latest technology.

option, albeit far more costly and less efficient, is external marketing; public relations efforts are the most effective use of marketing dollars. If you can get the word out about your specialty services without appearing to advertise, patients will seek out your care. Focus on newspaper write-ups and interviews on radio and television to develop a credible and knowledgeable public persona. Consider hiring a public relations consultant with contacts in the industry to help spread your story to the media and initiate in-service media training to prepare you for an external marketing campaign. Internet campaigns on YouTube or Internet blogs are also effective strategies.

The hallmark of a successful practice is your ability to stand out. Once you decide on how to differentiate your practice, implement your efforts with integrity, creativity and ingenuity. We recommend differentiating yourself by specializing your practice. We have used the above outlined principles to develop our own successful specialty practice—EyeVis Eye and Vision Research. Remember that your continued success as a specialty practice hinges on your ability to evolve and stay abreast of new developments. 

Toric Soft Lenses and Astigmatism

Proceedings from a live interactive webinar event, attended by several of the industry's most renowned contact lens practitioners.

Moderated by Ernie Bowling, O.D.

CONTROVERSIES IN CARE POLL

On occasion, even when a patient would benefit from a soft toric, I sometimes may not fit one because:

Poll Results:

It takes too much time.	13%
Patients will balk at the price.	0%
I won't fix what ain't broken.	13%
I feel bad charging more for a lens that's so easy to fit.	13%
I'm not guilty of this. I'd fit the patient.	63%



CONTROVERSIES IN CARE

On The Web >> To register for our next event, go to www.reviewofcontactlenses.com/controversies-in-care.

Correction of astigmatism with toric contact lenses allows for minimal image distortion and improved peripheral vision. Simply put, they offer better quality of vision to your patients. However, toric soft contact lenses are not used as heavily as one might expect. A whopping 45% of potential contact lens wearers have astigmatism of 0.75 diopters or more.¹ Yet, the percentage of toric contact lens fittings is significantly lower. Data from the Contact Lens Council found that, in 2004, only 13% of the contact lenses fit in the United States were toric soft contact lenses.²


We have a tremendous opportunity here to expand our toric contact lens use—and, it appears that attendees of the “Controversies in Care” event are seizing this opportunity, while the more broad ECP population reflected in the literature is

not. For example, when polled during the event, 56% of the “Controversies in Care” audience said that over 20% of their practices consists of toric lens patients. Another poll question asked about the initial amount of astigmatism present before the practitioner would recommend a toric contact lens. Here again, my thinking was the practitioners would perhaps reach for a spherical equivalent lens in low astigmatic correction. But, the respondents again showed amazing acumen: 90% of the “Controversies in Care” attendees choose a toric lens in as low as 0.75D astigmatism.

So, what is the biggest reason more patients are not fit in toric contact lenses? Cost. Most of the “Controversies in Care” audience agreed that it was important for the practitioner to charge for the additional visit time and the increased level

of service required to fit these lenses. Several practitioners said they like to give the patient the benefit of seeing what better optics can do for them, and then allow the patient to make an educated decision. While many doctors use a tiered fee structure, others believe it makes better business sense to inform the patient of the costs up front to eliminate problems afterward.

Overall, there was no shortage of debate in this inaugural “Controversies in Care” event. Stay tuned next month for a lively discussion about kids and contact lenses.

We also welcome you to join the discussion live. You can register for upcoming online events at www.reviewofcontactlenses.com. 

1. For whom to fit toric contact lenses? About Vision. Available at: www.about-vision.com/contact-lenses/toric/128-fit (accessed February 2012).

2. Contact Lens Council. Statistics on Contact Lens Wear in the U.S. 2004 Nov. Available at: www.contactlenscouncil.com/pcon-stats.htm (accessed February 2012).

TOPICS

- Allergy
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- Solutions and Lens Care
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LIVE POLL

How often do you recommend nutritional supplementation to your patients?

- Always—a little omega-3 never hurt anyone.
- Never! I consider all supplements a waste of money.
- Only in certain cases.
- On a regular basis to patients with various conditions.



Which Oral Meds Cause Dry Eye?

As dry eye remains a persistent problem, practitioners need to review the medications that may cause dry eye symptoms.



Trend-Setting: Global Lens Distribution

The worldwide use of contact lenses as a form of vision correction gives us a glimpse into the prescribing trends of other countries.



Should Patients Pick Their Wear Schedule?

Because many already do, we must keep patients on track with consistent education, reminder services and an emphasis on behaviors that affect corneal health.



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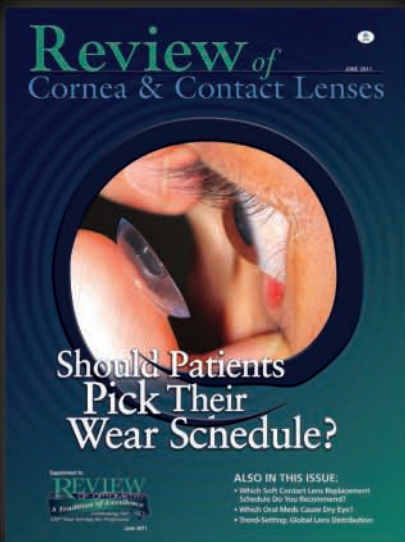


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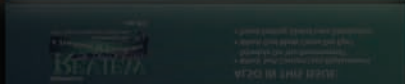
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A graphic for the New Technology & Treatments in Vision Care West Coast meeting featuring a blue and white abstract background with light rays and a grid pattern. The text "New Technology & Treatments" is in a large, white, sans-serif font, with "IN VISION CARE" and "WEST COAST" in smaller, white, sans-serif fonts below it.

**New Technology
& Treatments
IN VISION CARE
WEST COAST**

SEPTEMBER 21-23, 2012

Hilton Torrey Pines, La Jolla, California

A graphic for the Puerto Rico 2012 meeting featuring a tropical resort scene with palm trees and a swimming pool. The text "Puerto Rico 2012" is written in a large, white, cursive font, with the tagline "...a meeting of clinical excellence" in a smaller, white, sans-serif font below it.

**Puerto Rico 2012
... a meeting of clinical excellence**

JULY 19-22, 2012

Ritz-Carlton San Juan, Puerto Rico

A graphic for the New Technology & Treatments in Vision Care East Coast meeting featuring a close-up of a human eye with green light rays emanating from it. The text "NEW TECHNOLOGY & TREATMENTS" is in a large, white, sans-serif font, with "IN VISION CARE" and "EAST COAST" in smaller, white, sans-serif fonts below it.

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& TREATMENTS
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EAST COAST**

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For more information and to register: www.revoptom.com/Meetings

Please contact Lois DiDomenico with questions at ReviewMeetings@Jobson.com or 1-866-658-1772.

The logo for Review of Optometry, featuring a small globe icon above the word "REVIEW" in a large, bold, serif font, with "OF OPTOMETRY" in a smaller, sans-serif font below it.

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The logo for Cope, featuring the word "cope" in a lowercase, sans-serif font with a checkmark above the letter "o", and a registered trademark symbol (®) to the right.

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