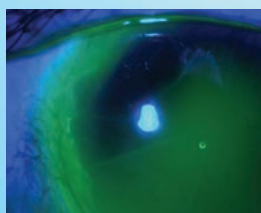
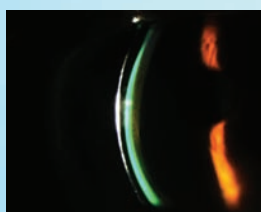
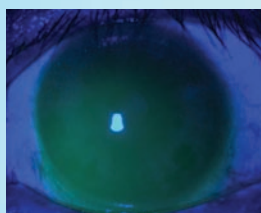


# Review *of* Cornea & Contact Lenses



JAN/FEB 2012

## Solutions & Rewetting Drops



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### **ALSO IN THIS ISSUE:**

Finding the Balance for Contact Lens-Associated Dry Eye

The Case for Bandage Soft Contact Lenses

Alternatives to Silicone Hydrogel Contact Lenses

Know the Irregular Cornea Terrain

Supplement to

**REVIEW**  
OF OPTOMETRY

January 2012



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**Reference: 1.** Ciba Vision data on file, 2011.

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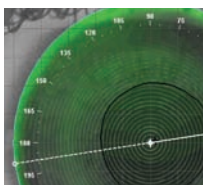
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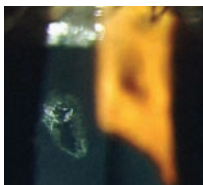
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## In The News

- **Optovue's RTVue** has received FDA 510(k) clearance for OCT measurements of central corneal power, curvature and thickness in human corneas, both pre- and post-cataract surgery. It can also calculate total cornea power in eyes that have undergone corneal refractive surgery. For more information, visit [www.optovue.com](http://www.optovue.com).

- According to a recent study in *Optometry and Vision Science*, protein and **lipid deposits** on contact lenses may contribute to clinical complications. It examined the effect of phospholipids on the adhesion of bacteria to contact lenses. Results showed that while phospholipids adsorb/absorb to contact lenses during wear, the major types of phospholipids adsorbed to lenses do not alter bacterial adhesion or growth.

- **Bausch + Lomb** has added a new product to its signature loteprednol etabonate line: Lotemax Ointment — indicated to treat postoperative inflammation and pain following ocular surgery. Lotemax Ointment is the first preservative-free topical ophthalmic steroid formulation in the U.S. For more information, visit [www.bausch.com](http://www.bausch.com).

- **ABB CONCISe** and **Compulink Business Systems, Inc.**, have announced a partnership to integrate Compulink's leadership Electronic Health Records (EHR) and Practice Management software with ABB CONCISe's distribution centers. As part of this partnership, users of Compulink's Eyecare Advantage software will now be able to order lenses directly from ABB CONCISe's catalog of products. For more information, visit [www.abbconciSe.com](http://www.abbconciSe.com).

# Steroids Could Help Heal Corneal Ulcers

A recent study gives hope to those suffering from severe cases of bacterial corneal ulcers, which can lead to blindness if left untreated. The use of topical corticosteroids in a randomized controlled trial was found to be neither beneficial nor harmful in the overall patient population in the study. However, it helped patients who had more serious forms of bacterial corneal ulcers, according to University of California, San Francisco researchers.

In a paper published in *Archives of Ophthalmology*, researchers found significant vision improvement—one and a half to two lines of improvement—by using steroid

therapy on patients with severe ulcers.

The use of topical corticosteroids is somewhat controversial, with no specific evidence pointing one way or the other. But in this study—the Steroids for Corneal Ulcers Trial (SCUT)—co-author Nisha Acharya, MD, MS, says “There was no increase in cornea perforations.”

Dr. Acharya and his colleagues looked at 500 participants from the United States and India between September 2006 and February 2010. “It makes us feel like we’re moving towards an evidence-based paradigm of care for corneal ulcers rather than a trial-and-error sort of approach,” Dr. Acharya said.

## Cause of Increased Infections in Contact Lens Wearers

While it is well documented that contact lens wearers have a much higher incidence of corneal infections compared to those who do not wear contact lenses, the exact cause of this increased susceptibility has not been identified. A recent study—published in *Investigative Ophthalmology & Visual Science*—was performed to determine if multipurpose contact lens solutions (MPCLSs) can cause increased infections in the cornea by destroying the protective cell-bound mucin layer.

An immortalized human corneal-limbal epithelial cell line (HCLE) was treated in the presence of four commonly used MPCLSs and the expression and release of MUC-16 was assessed. Cells were also cultured with *Pseudomonas aeruginosa* following MPCLS treatment and internalization of bacteria was assessed by quantitative genomic PCR. Loss of MUC-16 was then correlated with infection rates.

Each of the four commonly used MPCLSs examined in this study differentially affected mucin release. The relative effect was correlated with an increase in infection of corneal epithelial cells by *P. aeruginosa*. Study results are consistent with the hypothesis that MPCLSs cause increased infections in the cornea by destroying the protective cell-bound mucin layer.

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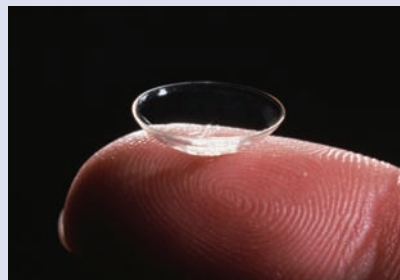
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## Contamination Risk of Reusing Daily Disposable Contact Lenses

A new study in the November issue of *Optometry and Vision Science* investigated contamination of saline and daily disposable contact lens (DDCL) stored overnight after use in the original blister pack and studied the practices of a group of DDCL users. Twenty DDCL wearers placed their lenses back into the blister pack saline (BPS) after one day's use and left them overnight before transferring both lenses and BPS to a new CL case.

The lens and BPS were cultured the following day, and total number of organisms, *Staphylococci* and gram-negative organisms enumerated. Each subject submitted five pairs of lenses over a one-month period. Ninety-five percent of subjects had at least one pair of contaminated lenses, and the BPS yielded similar results to the contaminated lenses, with staphylococcal contamination being predominant. Three subjects admitted to not washing their hands before handling their lenses and six to habitual reuse of their lenses with storage in the BPS.



## Mercy Ships Celebrates World Sight Day

Approximately 80% of all visual impairment can be prevented or cured, according to the World Health Organization (WHO). On World Sight Day, Mercy Ships honored those patients who had received eye surgeries onboard the state-of-the-art hospital ship, the Africa Mercy.

In 2011, Mercy Ships eye surgeons gave the gift of sight to more than 1,300 individuals in Sierra Leone, one of the poorest countries in the world. The Mercy Vision Eye Care Team also performed more than 7,500 eye evaluations and distributed 2,400 pairs of reading glasses.

With approximately 90% of all visually impaired people living in developing nations, the medical services provided by Mercy Ships in West Africa are focused on the areas of greatest need. The Africa Mercy has six operating theaters, a CT scan, a laboratory, and an X-ray machine. For more information, visit [www.mercy-ships.org](http://www.mercy-ships.org).

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## The Art of Delivering Bad News

As we all know, bad news is unavoidable. How you handle the task of bearing such news can have long-lasting effects.

**D**elivering eye care is appealing to most of us because it is science, and diagnoses are often “black or white”. Either a patient has a problem, or he doesn’t. But what happens when we are faced with telling a patient some bad news? Suddenly, the familiar *science* turns into the *art* of communicating, and we are on shaky ground.

Without question, this is a deal breaker in terms of patient–doctor relations. Deliver the news well, with compassion, and you’ve earned a fan for life. But deliver it in a methodical, impersonal manner, and you’ve not only alienated a good patient, but you’ve done harm to him as well.

In this impersonal, digital, fast-paced world, taking the time to deliver unfortunate news carefully is more important than ever. So, how do we practice the “art” of delivering bad news?

The news we have for patients may range from “You’re not a good candidate for wearing lenses overnight” to “You have a suspicious pigmented spot in the back of your eye that could be a problem.” My personal experience—and the advice of experts<sup>1,2</sup>—has led me to derive a protocol for delivering bad news.

1. **Take your time.** There’s no better way of communicating concern for your patients than this. Talk slowly. Relax your posture. Sit down with your patient at eye level.<sup>1</sup> This gesture says, “You are important to me”. A patient who feels valued is a loyal patient.

2. **Get to the point.** Provide details and reasons *after* you deliver the bad news. The patient is waiting for the verdict, and it is frustrating for him to have to wait.

3. **Allow the patient time to process the news.** After hearing bad news, a patient’s head is reeling. He needs time for it to sink in. Don’t be afraid of silence during this time. It may take a few minutes before the patient responds, particularly if it is exceptionally bad news.

4. **Be prepared for an emotional response.** Tears and anger are to be expected. Reflective listening, or empathetically stating what you see, is an effective technique when dealing with emotions. Offer tissues when needed.

4. **Give the explanation.** Provide answers as you are best able without using a defensive tone of voice. The bad news you are delivering may be a result of your patient not achieving the comfort or vision with

contact lenses that he expects. Reframing the situation may help.<sup>1</sup> Understand that although a patient’s anger may appear to be directed toward you, he most likely is actually mad at the situation.<sup>2</sup>

5. **Allow the patient to ask questions.** Encourage communication by asking, “Do you have any questions?” Reassure your patient that questions may occur to him later and that he should feel free to call for clarification should he need it.

6. **Offer hope.** Is there any good news you can give? If so, be sure to end your patient’s appointment on this note. Sometimes just sincerely saying, “I’ll be here to help you however I can” is sufficient. Make suggestions for support services, talking books, magnifying lenses, driving services and counseling. These resources can be a great help for someone adapting to a big life change.

7. **Think of how you would like to be treated.** The golden rule does work! When in doubt as to what to do, ask yourself, “What would I want someone to do if the roles were reversed?” Although it sounds simple, this is sometimes a difficult exercise. The terminology, equipment and diagnoses have a certain familiarity to us that a patient doesn’t share. This is a new experience for your patient; try to understand it from his perspective. Doing so can provide an extra dose of patience for a busy practitioner who has other patients waiting.

There are as many suggestions on how to handle the delivery of bad news as there are eye care practitioners, and the ones I have listed here may not be right for you and your temperament. But take the time to evaluate your own techniques. Ask yourself, “Can I be doing better?” Make time to chat with other practitioners and share ideas.

Few tasks are as challenging or as rewarding as developing an expertise in the “art” of delivering bad news. I look forward to hearing what works best for you. RCCL

1. <http://www.techrepublic.com/blog/10things-tips-for-delivering-bad-news/2396>

2. [http://www.cbsnews.com/8301-505125\\_162-28246628/how-to-deliver-bad-news/](http://www.cbsnews.com/8301-505125_162-28246628/how-to-deliver-bad-news/)



# Get Creative with Scleral Lenses: Part 1

Notching a lens to improve scleral contour is one way to customize a scleral lens for your already unique patient.

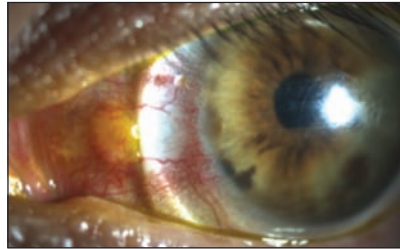
Scleral lenses are a hot topic. Because scleral lenses are designed to fit the sclera and completely vault the cornea, it takes the irregular corneal surface out of the picture. Even on a patient with keratometry readings over 70D, you'll have a contact lens that is stable and fits comfortably. But what happens when the sclera is not regular?

Eye care practitioners see scleral and conjunctival anomalies during primary care evaluations every day. A pinguecula is the most common irregularity encountered during a scleral lens fit. Patients typically report that their eyes get very red in the sector of the pinguecula after several hours of lens wear. The compression of the vasculature under the lens during wear causes congestion of the surrounding blood vessels. The eye stays injected after removing the lens until the congestion of blood has regulated itself.

## Case Report

A 52-year-old Hispanic male was diagnosed with pellucid marginal degeneration two years prior and was unable to achieve a satisfactory corneal gas permeable contact lens fit. His GP lens was an intralimbal design, but lacked sufficient movement. He was very comfortable in his soft toric contact lenses, but his vision was unsatisfactory. He was referred for a scleral GP lens fitting.

The scleral lenses provided great comfort and vision, but he complained of chronic redness in the nasal conjunctiva of both eyes. Upon examination, it was evident that the redness was caused by vascular



**1. Mechanical irritation on a pinguecula induced by a scleral contact lens.**

congestion from the scleral lens on his nasal pingueculae.

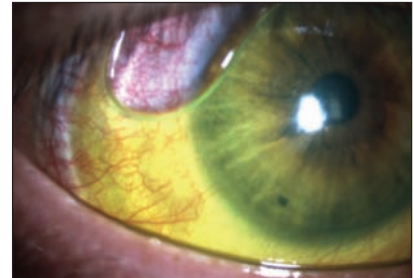
We first attempted some minor changes to relieve the irritation. We ordered the scleral lenses in a smaller overall diameter in an effort to land the scleral lens inside the pinguecula. While this eliminated some of the vascular congestion, the lens was now mechanically irritating the pinguecula (*figure 1*).

Next, we attempted to vault over the pinguecula with the scleral lens, which relieved some of the irritation, but the lens was difficult for the patient to insert and remove correctly (*figure 2*).

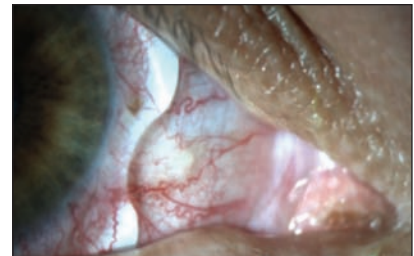
After failing to resolve the redness, my lab consultant suggested notching around the heaped tissue. A notch in a scleral lens can be effective in eliminating conjunctival irritation from the overlying contact lens by contouring around scleral irregularities.

There are several ways to measure and order a notch in a scleral contact lens. One way to begin is to simply dot the lens with a marker around the scleral irregularity while the patient is wearing the lens. After the lens is removed, measure the height and width of the dotted area.

Another way is to use a parallel-



**2. Incorrect application of a scleral lens leading to a bubble within the corneal chamber.**



**3. A notched scleral contact lens with improved fit and appearance.**

pipel light beam in the slit lamp and measure the height and width of the pinguecula under the contact lens.

For insertion, instruct the patient to apply the lens with the notch in the corresponding quadrant, and it will settle into place. Patients will notice improved comfort and cosmesis, leading to a longer wearing time. Our patient immediately noticed improved comfort and cosmesis (*figure 3*).

With all of the customizable options available for scleral lenses, patients with specialized vision needs no longer have to settle for a lens that just “gets them through the day.” Notching a lens to improve scleral contour is one way to customize a scleral lens for your already unique patient. RCL





## Down on the Pharm

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

# A New Pharmaceutical Tool

Looking for monotherapy in a steroid ointment for postoperative inflammation? Look no further.

**P**ostoperative anterior chamber inflammation is an expected and usually benign consequence of ocular surgery. A routine course of topical corticosteroids normally suffices to quell the likely cells and flare. However, situations do exist in which a patient is a known steroid responder or is sensitive to preserved solutions, and is consequently in need of an alternative treatment. The solution, until now, was to have a compounding pharmacy specially formulate a preservative-free steroid drop or ointment, which could be cost-prohibitive for many patients.

### Introducing Lotemax

Lotemax ointment (loteprednol etabonate 0.5%, Bausch + Lomb) is indicated to treat inflammation and pain following ocular surgery. It is the first preservative-free topical ophthalmic steroid preparation in the United States and is the first monotherapy steroid ointment brought to the U.S. market in 20 years.

Lotemax ointment is available in a 3.5mg tube and is indicated for usage q.i.d., beginning 24 hours after ocular surgery and lasting for up to two weeks. Patients should be advised not to wear contact lenses during this time. It is contraindicated in children following ocular surgery, as it may interfere

with amblyopia treatment.

Loteprednol etabonate (LE) ophthalmic suspension has been in common use for many years and is indicated for the treatment of steroid-responsive conditions of the palpebral bulbar conjunctiva, cornea and anterior segment of the globe, as well as inflammation following ocular surgery.<sup>1</sup> Compared to dexamethasone

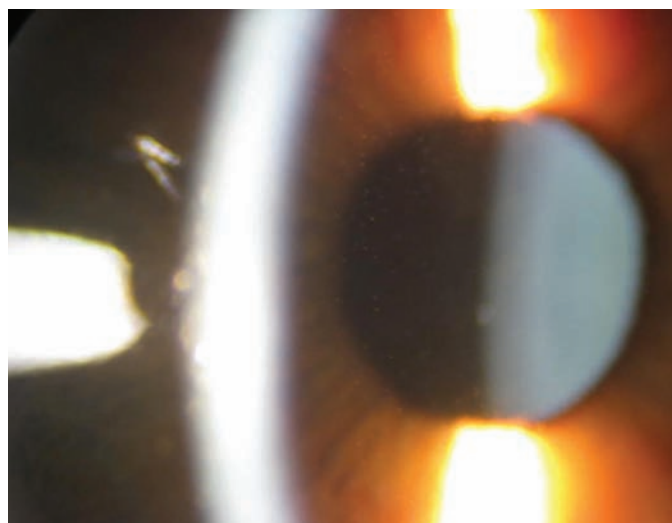
3, randomized, double-masked, parallel group vehicle-controlled studies at 33 centers in the United States.<sup>4</sup> The 805 patients were randomized: 404 received LE ointment and 401 received vehicle (mineral oil and white petroleum) treatments. Only patients over the age of 18 with negative pregnancy tests and an anterior chamber inflammation score of less than

three on the first postoperative day were eligible.

The study period lasted approximately four weeks and required seven total visits. Cataract surgery was performed on the second visit, which was scheduled within 14 days of the initial visit. All eligible patients received either the LE ointment or vehicle, to be used four times a day by instilling a half-inch ribbon of drug into the inferior cul-de-sac

for 14 days. They were seen on postoperative days one, three, eight, 15 and 18.

The primary efficacy endpoints of this study were the proportion of patients with complete resolution of anterior chamber inflammation and no pain (Grade 0) on the fifth visit, postoperative day eight. Safety endpoints included incidence of adverse events, change in baseline IOP and visual acuity, abnormal slit lamp findings or subjective symptoms.



Anterior segment inflammation.

or prednisolone acetate, it has a lower propensity for increased intraocular pressure (IOP).<sup>2,3</sup>

Having an ointment preparation will provide practitioners with a choice of dosage forms when treating postoperative inflammation.

### Safety Trials

The safety and efficacy of LE 0.5% ointment to treat inflammation and pain following cataract surgery was assessed in two Phase



Only 12 patients (1.5%) discontinued the study—four LE ointment patients for failure to follow procedure, to follow up or “other” reasons, and eight vehicle patients due to patient withdrawal, adverse events and investigator decision.

The findings included:

- Complete resolution of anterior chamber inflammation was observed in 27.7% of LE ointment patients, as compared to 12.5% of vehicle patients ( $p < 0.0001$ ).
- The LE ointment patients also had a statistically significantly greater rate of Grade 0 pain (75.5%) vs. the vehicle patients (43.1%).

- Mean baseline IOP was similar between the groups on the first postoperative visit and was constantly lower than the baseline for both groups at subsequent visits.
- Three patients in the LE ointment group and one patient in the vehicle group experienced an increased IOP ( $> 10$  mm Hg from baseline) throughout the study.
- Fewer adverse events were reported in the LE ointment group (47.2%) vs. the vehicle group (78.0%), which was also statistically significant. These included anterior chamber inflammation, photophobia, corneal edema, conjunctival hyper-

emia and pain. However, these reactions can also be attributed to the surgical procedure itself.

Lotemax ointment provides eye care practitioners with a medication that has a proven track record that we can be confident in using on our post-surgical patients. For these reasons, it is an important addition to our pharmaceutical toolbox. [RCCL](#)

1. Bausch + Lomb. Lotemax package insert.
2. Holland EJ, Bartlett JD, Paterno MR, et al. Effects of loteprednol/tobramycin versus dexamethasone/tobramycin on intraocular pressure in healthy volunteers. *Cornea*. 2008 Jan;27(1):50-5.
3. Bartlett JD, Horwitz B, Laibovitz R, Howes JF. Intraocular pressure response to loteprednol etabonate in known steroid responders. *J Ocul Pharmacol*. 1993 Summer;9(2):157-65.
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## Derail Dropouts

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

# The Comfortable Side of Keratoconus

Understanding new contact lens options will help those who may have comfort issues with RGPs or those interested in other contact lens options.

**K**eratoconus causes a steepening of the cornea, creating an irregular surface and an accompanying irregular refractive error. As the condition progresses, it becomes more difficult to correct the resultant refractive error with spectacles, and contact lenses often are the preferred method of correction. Most practitioners consider rigid gas permeable lenses the standard of care for the keratoconic cornea. While they work well at masking corneal irregularities, they often times require a significant adaptation period for patients to get “used to” the feel of them.

For keratoconic patients who appreciate the beneficial visual outcomes, but have difficulties in adjusting to lens awareness, lens dropout may be inevitable. Certainly for patients with significant comfort issues, large-diameter RGPs and hybrid lenses have allowed many with moderate to advanced keratoconus stay in lens wear. Additionally, new soft lens designs may challenge our current thinking on correcting the keratoconic patient. Here, we will review soft lens options along with two new keratoconic designs.

### Mild Keratoconus

Those patients with mild corneal steepening will often times not necessarily require a specialty lens design. For those patients wearing soft contact lenses who show mild areas of steepening, transitioning them into a soft toric lens or increasing the power of the astigmatic correction if already wearing a toric lens typically will result in an improved visual experience. These usually are

patients who will still have 20/20 visual acuity which is attainable with glasses but show early corneal steepening. For those patients who have a decrease in best-corrected visual acuity with traditional soft toric contact lens options, a specialty soft lens for keratoconus may be warranted.

### NovaKone

The NovaKone is a unique design by Alden Optical that was introduced toward the end of 2011. It is a soft lens for keratoconus and is made of hioxifilcon D which is 54% water. It comes in a standard diameter of 15.0mm, but the diameter can be made larger or smaller, as needed. The sphere power availability is from +30.00D to -30.00D in 0.25D steps. Cylinder power availability is up to -10.00D in 0.25D steps from 1° to 180°. Additionally, the lens features five “It Factors” that define center thickness in order to neutralize irregularities.

Diagnostic fitting of the lens requires a four-step process. Initially, a base curve is selected on the average keratometry readings between the two meridians. (The base curve is the curve that is located on the center portion of the posterior surface of the lens.) The curve that is located more peripherally will be flatter than the central portion so that it aligns with the peripheral cornea and conjunctiva. This is termed the fitting curve. This curve can be altered independently of the central base curve. Diagnostic lenses feature a remarkably stable design to aid in over-refraction.

The thickness of the lens can be

manipulated for the more irregular cornea, making it a thicker lens to mask the irregularities. After the initial parameters are selected, the lens is placed on the eye. The base curve can be adjusted to provide an optimal optical surface and ensuring a light touch, while the fitting curve can be manipulated to optimize the fitting relationship of the lens on the eye. An over-refraction is performed, vertexed, and then the final lens is ordered. Alden Optical recommends the NovaKone be dispensed for quarterly replacement.<sup>1</sup>

### Kerasoft IC

The Kerasoft IC is a unique new soft lens design for keratoconus and other corneal irregularities that is marketed by the Bausch + Lomb Boston Group and manufactured/distributed by selected laboratories throughout the world. This lens is made of the Definitive material, which is a new custom latheable silicone hydrogel material that has a water content of 74%.

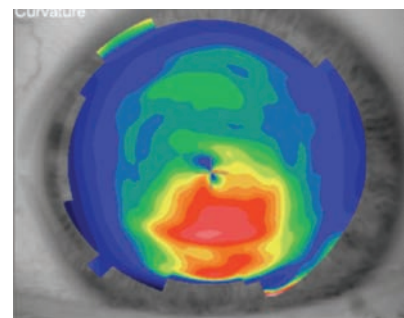
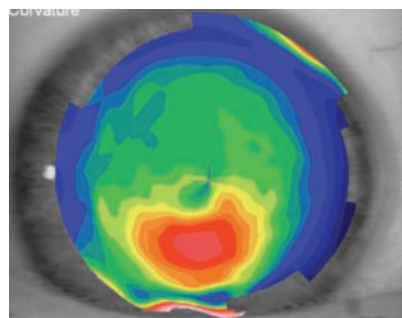
The standard diameter is 14.5mm and its back surface is comprised of a large central curve and peripheral curve. The optic zone is 8mm in diameter and is located on the anterior surface of the contact lens. A unique characteristic of the design is the ability to make the whole peripheral area either steeper or flatter to achieve a better fitting relationship or to even make these changes in different sectors, if indicated.

The initial lens selection is based on the corneal shape, rather than simply curvature. As an example, there are different base curve guidelines for centrally located nipple

cones than for inferiorly located cones. Thus, the initial base curve selected is not based just on corneal measurements, but is combined with the type, severity and location of the corneal irregularity.

Once the diagnostic lens is selected and placed on the eye, an assessment of the fit is performed within five minutes. It is advised to use the MoRoCCo VA guidelines developed to simplify the fitting process. It stands for assessing movement, rotation, centration comfort and vision. The ideal fit shows between 1mm to 2mm of movement with the blink, which is much more than we are accustomed to seeing with most soft lenses. Rotation is then assessed with stable 10° or less of rotation with the blink being the fitting goal.

The lens should center well, be comfortable while the vision attained with an over refraction is



1. Topography scans of a patient who was fit with Kerasoft IC lenses (O.D. left, O.S. right).

stable after the blink and close to best-corrected VA. If any of these fitting characteristics are not being met, it usually necessitates altering the base curve, while in some cases making the peripheral curve steeper or flatter will result in achieving an optimal fitting.<sup>2</sup>

Understanding new soft contact lens options for your keratoconic patients will help those who may have comfort issues with RGPs or

those interested in other contact lens options. By embracing these new technologies, you offer your patients the opportunity to experience soft lenses to help correct their keratoconus and allow them the opportunity to continue wearing contact lenses. <sup>RCCL</sup>

*Special thanks to Craig Norman, Bill Shelly and Tom Shone for their assistance with this article.*

1. [www.aldenoptical.com](http://www.aldenoptical.com)

2. Kerasoft IC Fitting Manual

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# Treating the Problem: Fungal Keratitis

Stay up-to-date on the current treatment regimens and future therapies for fungal keratitis infection.

**A**s we follow up on last month's column, "Fungal Keratitis: The Lessons Learned," (November/December 2011, *Review of Cornea & Contact Lenses*), we realize that it is important to practice what we preach. Fungal keratitis is a condition that cannot and should not be taken lightly—left untreated, the infection may lead to permanent vision loss. Because the infection is so fast acting, even in cases that are accurately diagnosed and treated, many patients may even need a therapeutic penetrating keratoplasty. This column will present an overview of the current treatment regimens and highlight possible future therapies for the infectious disease.

### Awareness is Key

Although optometrists may not necessarily be the primary eye care provider *treating* the fungal infection, how to prevent the disease from occurring by being aware of a patient's lifestyle, especially in more tropical or humid climates, can play an eye-saving role in the case against fungal keratitis. Fungal keratitis is often treated by cornea specialists at tertiary care centers and eye institutes that have the ability to perform cultures and employ other diagnostic tools to test for fungal keratitis, such as confocal microscopy. However, many patients in rural areas or in lower income populations may not have access to a cornea specialist; therefore, an optom-



**An eye infected with fungal keratitis before treatment. Notice the extensive neovascularization within the corneal tissue.**

etrists' knowledge and suspicion of the disease is of crucial importance, as they may be the first to diagnose the condition. Given that fungal keratitis cases usually occur within the contact lens-wearing population, the optometrist plays a significant role as more than 80 percent of contact lens wearers go to an optometrist for their eye care.<sup>1</sup> Clinicians evaluating contact lens users with signs of fungal keratitis should look for a cornea that appears dull-gray; a heaping of the epithelium; a dry, rough texture; and a feathery, branching pattern. If an optometrist suspects fungal keratitis, they should advise their patient to discontinue contact lens wear immediately, and refer the patient to an ophthalmologist if appropriate. Knowing when to refer a patient to an ophthalmologist or corneal specialist is an important weapon in an optometrist's arsenal, as well as an awareness of the scope of

available treatments.

Ordinarily, it is quite rare for fungi to invade and damage a healthy eye. But when fungal eye infections do occur, it can be sight threatening. Early diagnosis is essential for the successful treatment of fungal keratitis. The importance of early identification must be stressed; treatment has proven to be most effective if aggressively administered in the early stages of infection.

### Current Treatment

Suspicion is one, if not the most, important aspect of treatment and prevention. All clinicians should be especially observant in contact lens wearers. Being slow to identify and treat the disease can drastically worsen the patient's condition. For fungal keratitis cases, systemic and topical steroids should be avoided until it is absolute that the pathogen has receded. In today's market, natamycin 5% is the only commercially available topical agent indicated for the treatment of fungal keratitis, and has been popularly used for filamentous fungi infections. However, there are other therapeutic treatments that include both topical and oral anti-fungal medications. The two most commonly prescribed antifungal treatments are amphotericin B, which is usually used primarily to treat *Candida* pathogens. In addition, flucytosine can be an alternate treatment, used in conjunction with amphotericin B or miconazole.

More recently, however, studies have shown that triazoles—and more specifically voriconazole, a broad-spectrum antifungal agent effective against yeasts and molds—may be more effective than natamycin and amphotericin B against fungi. A recent study<sup>2</sup> combining injected and topical voriconazole showed effectiveness in combating infection in patients with *Fusarium* keratitis. The case series involved three patients who presented with recalcitrant *Fusarium* fungal keratitis, and a voriconazole solution was administered to each patient via intrastromal injection as well as 5% topical natamycin hourly and oral ketoconazole twice per day. A significant reduction in the size of the *Fusarium* infiltration was noted in two of the patients.

## The Future of Treatment

Antifungal drugs may often have

poor corneal penetration, as they are routinely administered on an hourly basis for weeks at a time, day and night. This can vastly increase non-compliance, a factor that, as mentioned above, is crucial in the steps to fight fungal infection. However, emerging new therapies aim to change that aspect: one new technology is a contact lens that elutes econazole, an antifungal medication of the imidazole class.<sup>3</sup> The lens is designed to treat and prevent fungal ocular infections and results showed that the release of 16mg of econazole killed 100% of fungi for 21 days. An antifungal contact lens provides a one-two punch by reducing the treatment burden in addition to increasing patient compliance. An econazole-eluting contact lens would expand an ophthalmologist's toolbox for treating fungal keratitis, and would follow suit

with the new wave of combination contact lens and drug treatment, such as the K-lens, a ketotifen-eluting contact lens, though, like the anti-fungal lenses, are yet to be FDA-approved.

Having a wealth of knowledge concerning disease prevention, identification, and consecutive treatment is of invaluable importance to an eye care practitioner. Optometrists should periodically educate themselves on various diseases, no matter how rare. Furthermore, cases of *Fusarium* keratitis should be reported to state and local health departments or directly to the Centers for Disease Control and Prevention at 800-893-0485. [ACCL](#)

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# Understanding Biofilm Removal

Biofilms are part of everyday life and are a significant factor in the development of microbial keratitis events.

**B**iofilms are everywhere in everyday life, such as in the plaque on your teeth, the build up in pipes, the slime on rock and inside contact lens cases. A biofilm is a group of microorganisms growing on a solid surface (living or non-living) and are generally embedded within a self-produced matrix of extracellular polymeric substance (EPS). The EPS consists of extracellular DNA, proteins, and polysaccharides. The EPS protects the cells within it and facilitates communication between the microorganisms through biochemical signals.

Formation of a biofilm begins with the attachment of free-floating (planktonic) microorganisms to a surface. These first colonies adhere to the surface initially through weak, reversible bonds. Other planktonic cells can then attach to the adhered bacteria. This process of continued adhesion eventually leads to many layers of microorganisms and EPS on the surface. If the colonies are not immediately separated from the surface, they can anchor themselves more permanently. Once colonization has begun, the biofilm grows through a combination of cell division and recruitment. A biofilm can be formed by a single microorganism species, but more often biofilms consist of many species of bacteria, as well as fungi, algae, and protozoa.

Microorganisms living in a biofilm can have significantly different properties from planktonic microorganisms.<sup>1</sup> Biofilms have

increased resistance to detergents and antibiotics, since the EPS and the outer layer of cells protect the interior of the community. A biofilm also produces high levels of antibiotic degrading enzymes. Repeated use of antimicrobial agents on biofilms can cause bacteria within the biofilm to develop an increased resistance to biocides. The bacteria within the biofilm remain healthy, and the biofilm can regrow.

## Steps for lens case care and biofilm reduction:

- 1) Discard the old solution from the wells of the case.
- 2) Rub the case with clean fingers for at least five seconds, rinse with contact lens disinfection solution.
- 3) Wipe dry with a clean cloth.<sup>5</sup>
- 4) Store cases dry with the lids off.

Bacteria that is attached to a surface (sessile) turns on stress-response genes and renders the biofilm more resistant when exposed to environmental stresses, making it a significantly different organism to deal with compared to planktonic organisms. Biofilm associated infections may be more virulent and aggressive and require different clinical approaches to treatment.<sup>1-3</sup> Data suggests that microbial keratitis events involve biofilm forming organisms.<sup>2</sup>

Studies have shown the bacterial contamination of contact lens cases may be as high as 81% and may be responsible

for transferring organisms from the case to the lens to the eye.<sup>4</sup> Removing the biofilm from the contact lens case is an important step in lens care compliance.

Numerous studies have now shown that mechanically wiping the contact lens case dry after lens removal will mechanically disrupt the biofilm and will reduce the lens case bioburden significantly.<sup>5-7</sup> Silver impregnated lens cases have less biofilm formation than polypropylene lens cases.<sup>8</sup>

Biofilms are part of everyday life and are a significant factor in the development of microbial keratitis events. Biofilms can form daily in contact lens cases. Mechanical disruption and drying of the lens case is the best way to protect lens wearers from lens case biofilm associated infections. RCC

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# The World is Your Pizza

Looking to expand the contact lens side of your practice? The path to success may look different than you'd expect.

Even *I* can make frozen pizza at home. Sure, it's not that good, but I can do it. So I'd like to think that a restaurant — any restaurant — could serve pizza if they chose to. As one of the most popular food choices in the United States, why doesn't *every* restaurant offer pizza? Surely your favorite elegant restaurant, Taco Bell, McDonalds or Wendy's could all serve up pizza if they chose to. But why don't they and what does any of this have to do with your contact lens practice?

Simply put, these restaurants don't serve pizza because that's not what they do! They do what they do best — be it steaks, tacos or burgers — and they stay the course with those central food offerings.

If you're like most practitioners, you have a general practice. You perform examinations, dispense glasses and contact lenses and you practice medical eyecare. You probably even fit some specialty contact lenses and you might even take on tougher cases such as an occasional postoperative penetrating keratoplasty or refractive surgery failure. Corneal reshaping might be something you dabble in as well. That's common.

Few of us, however, have a practice *solely* devoted to contact lenses. And there are many reasons why this might not be a good idea (time commitment, too small a market and start up expenses, to name a few). However, if you'd like to step up your contact lens fitting game, here's a strategy to help you do so.

## Separate Locations, Separate Successes

A good friend of mine is a successful restaurateur in Southern California. He has a chain of several restaurants that can probably best be described as a sports bar with a beach cantina atmosphere. Recently, he opened a new restaurant literally steps away, and clearly visible from one of his existing locations. This restaurant, however, offers upscale Mexican cuisine in a contemporary setting.

*"If you're genuinely interested in ramping up your contact lens practice, it might make sense to consider a totally separate location that offers only those services."*

Two restaurants, same owner, same market, but with two very different themes and potential pools of dining customers from which to draw. Can we do the same thing, or are we trying offer pizza in our practices?

If you're genuinely interested in ramping up your contact lens practice, it might make sense to consider a totally separate location that offers *only* those services. This would give you the benefit of positioning this new entity as a genuine specialty practice. There would be no eyeglasses visible and no medical procedures performed here. You would have the luxury (and necessity) of a large diagnostic


inventory and the requisite equipment to take on virtually any case.

The benefits here are a clear distinction to patients that this location is *the* place for specialty lenses and it avoids the confusion of trying to be all things to all patients within the same location.

## The Sky's the Limit with a CL-Centered Practice

Marketing opportunities abound with this model, as you can now venture out to other practitioners who are still practicing generalized care. If your "clinical chops" are finely tuned, you can market your practice to those fellow practitioners who have no desire to take on "impossible" cases and you can instill in them the confidence that there will be no "patient-nabbing" because this is only a specialty lens practice. You can invite them down to visit the practice to see for themselves what you do *not* do.

Of course, the skeptics might think you could take a referred patient and self refer to your main office, but that would of course be self-defeating for everyone. Additionally, with this arrangement, once a patient is successfully fit, a co-management arrangement might apply. The referring doctor could be responsible for follow-up care and lens replacements, if they are comfortable doing so.

As in "thinking outside the box," it might be a good idea to "think outside your practice." 



## What's The Solution

By Steve Lowinger, O.D.

# OPTI-FREE® Puremoist® MPDS: Comfort from Lens Insertion to Removal

Growing our contact lens patient base in the era of the hyper-informed and hyper-critical patient means that we, as practitioners, need to deliver better products and better solutions in response to our patients' demand for good vision and comfort throughout their day—from insertion to removal of their contact lenses, as long as they wear them.

Keep in mind that expanding our patient base is as much about keeping our current patients in contact lenses as it is about attracting new contact lens wearers. When polled, patients around the world named comfort as their primary reason for dropping out of contact lens wear.<sup>1</sup>

Silicone hydrogel contact lenses have been at the forefront of this issue; the increase in their use over the past decade shows that practitioners have noticed the advantages of the material.<sup>2</sup> However, in that same time, we have continued to see the same number of dropouts from contact lenses, so the material itself does not seem to be the solution to the comfort problem.<sup>1</sup>

### The Solution

Over time, we have all seen symptomatic patients who come back looking for better

comfort—they are vocal and easy to spot. Many contact lens solutions make claims about the symptomatic patient, and we, as practitioners, are wired to the “problem-based” eye exam. Having a solution that can make that

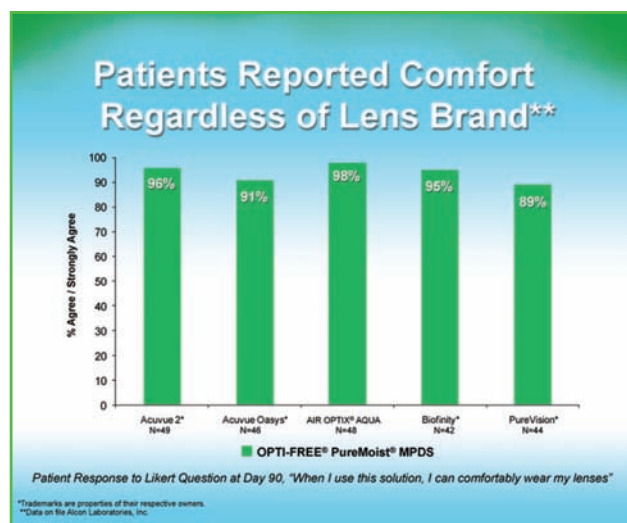
that start out with hydrophilic sites on their lens surface. With some silicone hydrogel materials the tear film breaks up, and the hydrophilic groups can migrate into the lens producing a more hydrophobic, less-wettable surface.<sup>3</sup> Maintaining lens wettability is a challenge with all contact lenses, but especially with silicone hydrogels.

To help us with this battle for comfort, Alcon has introduced OPTI-FREE® Pure-Moist® multipurpose disinfecting solution. A novel block copolymer, HydraGlyde® Moisture Matrix improves the wettability of silicone hydrogels by impacting both the lens surface and bulk hydrating properties. With its affinity

for both internal and external siloxan groups, HydraGlyde® Moisture Matrix decreases the hydrophobic nature of silicone hydrogel lenses.<sup>4</sup> This can lead to better comfort experience for your patients.<sup>4</sup>

### The Research

Alcon has conducted many studies to assess solution's performance in the symptomatic patient. However, the non-complaining patient is the one who may benefit from doctors being proactive in recommending solutions that may enhance comfort. Alcon conducted a study of asymptomatic



patient that is not complaining more comfortable is tantamount to curtailing the contact lens dropout issue that our practices face, as well as creating value for those in our practice who have good comfort but could see enhanced comfort from a better solution or product.

Silicone hydrogel materials are by nature hydrophobic. The manufacturing processes in transforming these hydrophobic materials into something that is compatible with the ocular surface differ between the companies. These soft lenses will have a hydrophobic backbone

patients with OPTI-FREE® Pure-Moist® MPDS which showed statistically significant improvements over the comparator in the patient's perceptions of all day comfort and the ability to wear lenses that feel moist from lens insertion to removal. Patients also reported outstanding comfort across all contact lens brands tested, silicone hydrogel or traditional hydrogel.<sup>5</sup>

Having a solution that provides patient comfort, regardless of lens type, allows the practitioner to make strong solution recommendations for their patients. Patients have a lot of solution choices when they go shopping. Giving patients a compelling reason to use a particular solution is tantamount to keeping them comfortable and happy in their lens wear. A product that does this in the asymptomatic patient is even more of a practice enhancer. Recommending a product that provides comfort, while utilizing the exceptional dual disinfection that the OPTI-FREE® brand is known for, will help keep your patients happy and successful in their lenses.

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# Finding the Balance for Contact Lens-Associated Dry Eye

Learn how to combine OTC tear agents to manage dry eye symptoms in your contact lens patients.

By Shana Brafman O.D., and S. Barry Eiden, O.D.



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**D**ry eye syndrome is a common condition found in most optometric eye care practices, and can often make the difference between success and failure in a contact lens patient. It can affect patients in both soft and gas-permeable lenses. Recent studies have found that 52.7% of contact lens wearers suffer from dry eye—a much higher percentage than found in the general population, which is estimated to range between 14% and 33%.<sup>1</sup>

## Dry Eyes in the CL Wearer

Dry eye disease yields symptomatic and objective findings that are all related to an insufficiency of the tear film—whether caused by an overall decrease in tear volume or an increase in tear evaporation.<sup>2</sup> Some common patient complaints associated with dry eye may include burning, grittiness, foreign body sensation or blurred vision.

For a patient to be successful with

contact lens wear, he or she needs to have a stable tear film. The tear film is what keeps the lenses hydrated, ensures adequate oxygen transmission, and reduces the chances of bacterial contamination of the contact lenses. Contact lens wear can reduce corneal sensitivity and alter the normal tear secretion needed to maintain a healthy ocular surface.<sup>3</sup>

Patients find the easiest and greatest relief of contact lens-induced dryness following lens removal. Unresolved dryness issues can cause a patient to discontinue contact lens wear permanently,<sup>4,5</sup> which can lead to an increase in contact lens wearer drop out rates.<sup>5</sup>

The use of artificial tears can increase a patient's comfort, performance and contact lens tolerance. A stable tear film is ideal for a successful contact lens fit.<sup>3</sup> A combination of tears that works on unique portions of the tear film may be ideal for optimal therapy.<sup>6</sup> Studies have shown that more than



50% of contact lens wearers have tried artificial tears to relieve their discomfort; yet, more than 50% of that population reported no relief.<sup>1</sup>

In an ideal situation, the tear film should surround a contact lens on both sides.<sup>7</sup> If tears evaporate or break up too quickly, they are not able to constantly surround a contact lens, leading to discomfort. It has been shown that tear film break-up time, volume and stability are all lower in intolerant contact lens wearers.<sup>7</sup> Studies have also shown that a decrease in contrast sensitivity and visual acuity in contact lens wearers can be attributed to a change in their tear layer. Low-viscosity artificial tears helped improve the patient's visual acuity, while artificial tears with higher viscosity did not improve visual performance.<sup>8</sup>

The tear film is comprised of three distinct layers, each with

its own purpose. The *lipid layer* is the most anterior layer and is made up mostly of meibomian oil and helps maintain the tear film stability, decrease evaporation and thicken the aqueous layer in order to create a smooth ocular surface. The middle layer—known as the *aqueous layer*—is produced by the lacrimal gland and makes up the majority of the tear film. It chiefly consists of water and proteins. The most posterior layer, the *mucous layer*, is made up of mucins and coats the cornea, attaching to the aqueous layer to create an even, stable tear film.<sup>6</sup> Without this layer, the tears would not be anchored to the cornea.

Tear film deficiencies can be found at any of these layers and can cause symptoms of dryness with or without contact lens wear. Any of these tear film problems can occur simultaneously or independently.

## OTC Options for Contact Lens-Associated Dry Eye

Over-the-counter (OTC) agents can be used to help patients manage their contact lens-related dry eye and prevent further complications.<sup>9</sup> There are both on- and off-label options for these patients to increase their comfort and chances for successful contact lens wear. It is important to remember that preservatives are needed in all ophthalmic drops to prevent bacterial growth. Unfortunately, these preservatives can have a cytotoxic side effect to the eye with long-term use.<sup>10</sup> For patients using drops as part of a frequent regimen, preservative-free drops or drops with fewer toxic preservatives may be a better option.

Not all artificial tears are created equally or are intended to affect the same layer of the tear film. It is very important that practitioners determine which

What Are Your Options?			
	Manufacturer	Key Factor	Contact Lens Approval
<b>Blink Contacts</b>	Abbott Medical Optics	Mucin	Yes
<b>Blink Tears</b>		Sodium Hyaluronate	Off label
<b>Oasis Tears</b>	Oasis Medical	Sodium Hyaluronate	Off label
<b>Optive</b>	Allergan	Mucin, Osmoprotection	Yes
<b>Systane Ultra</b>	Alcon	Mucin	Off label
<b>Systane Balance</b>		Lipid and Mucin	

layer of the tear film is causing the dry eye symptoms and contact lens discomfort before prescribing an artificial tear. A strong case history is also crucial, because symptoms may not always match objective findings.<sup>11</sup> By using the correct artificial tear with contact lens wear, you can increase successful treatment and continuation of contact lens wear.

Studies have shown that tears that merely increase tear volume can cause symptoms to worsen in patients with a lipid deficiency.<sup>6</sup> Advances in research and production have created several options with unique mechanisms of action and formulation. Recent reports have focused on decreased lipid layer thickness in patients with dry eye symptoms.<sup>12</sup> Unfortunately, there are no commercially available systems on the market to measure a patient's lipid thickness for objective dry eye findings. Manufacturers are also taking a newer approach of using artificial tears for osmoprotection.<sup>9</sup>

## Review of Available Agents

- *Systane Balance (Alcon)* was developed to help with meibomian gland dysfunction (MGD). Patients with MGD experience changes in the lipid layer of their tears. Systane Balance is the only artificial tear on the market that is able to work on the lipid and

mucin layer simultaneously. It has two mechanisms of action to increase comfort and decrease dryness. Like Soothe XP, it is a lipid emulsion drop that permits restoration of the lipid layer (LipiTech System), thereby thickening the aqueous layer. By thickening the lipid layer, evaporation decreases.

Systane Balance also contains the unique hydroxypropyl guar (HP-guar) system that strengthens the attachment of the aqueous layer to the glycocalyx-mucin interface. This further allows the aqueous layer to increase.<sup>13</sup> Systane Balance has not been approved for use with contact lenses, but has been used off-label by many practitioners without any issues. Sorbitan tristearate is used to preserve Systane Balance drops, which are currently unavailable in a preservative-free option.

Systane and Systane Ultra also contain the guar system to increase the mucin aqueous interface, but do not contain a system to increase the lipid layer of the tears. Systane Ultra will cause less blur than the original Systane due to its lower viscosity upon instillation, which is made possible by the addition of sorbitol to the formulation.<sup>13</sup> Both Systane and Systane Ultra are available in preservative-free forms.

- *Oasis Tear products (Oasis Medical)* are available in two for-

mulations: Oasis Tears and Oasis Tears Plus. The active ingredient in both formulations is glycerin. Oasis Tears also contain sodium hyaluronate, which has been shown to improve subjective and objective findings of dry eye. This is a naturally occurring polymer that is seen at ocular damage sites. It is believed to have anti-inflammatory properties as well. Many patients with dry eye symptoms will experience changes in their corneal epithelium that can cause erosions.<sup>15</sup>

Some studies have shown that sodium hyaluronate is actually able to help protect and promote healing of a dry eye patient's corneal epithelium.<sup>15</sup> Sodium hyaluronate has the ability to retain water, allowing for increased surface wettability. It can change viscosity upon blinking and is more viscous while the eye is open, which improves tear film break-up time and helps spread the agent more evenly across the ocular surface.<sup>16</sup>

Oasis Tears are most commonly prescribed in a non-preserved form, but have recently been released in a bottled preserved formulation. None of the Oasis Tear formulations have been approved for contact lens use. Off-label use of these products for contact lens wearers has been highly successful in our practice. Application before, during and after contact lens wear has allowed many of our patients to significantly increase their comfortable contact lens wearing time. Oasis Tears can be purchased only directly at a doctor's office or online from Oasis Medical.

- *Blink Tears (Abbott Medical Optics)* Lubricating Eye Drops are designed to mimic the mucin layer of the tear film, and



### Soothe XP (Bausch + Lomb, not currently available)

This was the first oil-in-water lipid emulsion eye drop to contain the proprietary mineral combination Restoryl. It was developed to thicken and increase the performance of the lipid layer of the tear film. When the lipid layer is increased, tear evaporation decreases and overall aqueous volume escalates. Studies have suggested that symptomatic dry eye patients can have a thin or deficient lipid layer. Soothe XP has been shown to more than double the lipid layer thickness, a more significant change in lipid layer than seen by other artificial tears.<sup>12</sup>

Soothe XP is not approved for use with contact lenses, but has been used by many practitioners as an off-label option. Soothe XP has been discontinued, but the company indicates that production may resume at a future date.



are able to bind to 1,000x their value of water. By improving the mucin layer of the tears, the tears become more stable and adhere better to the ocular surface. The improved adhesion increases the aqueous volume. These drops also contain sodium hyaluronate, but at a lower percentage and molecular weight than Oasis Tears.

The preservative stabilized oxychloro complex (SOC), found in all versions of Blink Tears, causes less damage to the ocular surface because it can convert into components that are naturally found in the eye. This decreases the chances of cytotoxic effects from continued use of artificial tears for dry eye symptoms.<sup>10</sup> A recent study found that instilling a drop of Blink Contacts on the lens before insertion decreased objective and symptomatic findings of dry eye.<sup>17</sup> Blink Contacts are approved for use with contact lenses, but Blink Tears may be used in an off-label application.

- *Optive Eye Drops (Allergan)* are designed to provide increased osmoprotection. Compromised tear films create a hypertonic state, while a healthy eye's tear film is isotonic. A hypertonic tear film will cause osmotic stress because more water will leave the epithelial cells in an attempt

to balance the osmotic state. As more tears leave the epithelial cells, the cornea becomes dehydrated and compromised, increasing dry eye symptoms.

Optive promotes epithelial cell stability under dry eye-induced hypotonic stress. These drops contain the active ingredient sodium carboxymethylcellulose (which acts as a lubricant) and glycerol (which acts as a moisturizer). The glycerol helps water bind to the cells. This combination aims to create osmoprotection by binding to the corneal cell surface to reduce water loss.<sup>18</sup> Optive utilizes Purite as its preservative. Purite, which is similar to the SOC found in Blink Tears, disappears immediately as it converts into common tear components once it interacts with the ocular surface.<sup>10</sup> Due to this mechanism, there is less concern about cytotoxic results from long-term use. Optive Eye Drops have been approved for use with contact lenses and is also available in preservative-free vials.

Identifying dry eye patients before and during contact lens wear is beneficial to both the patient and practitioner. By recognizing these patients and treating them accurately, we as

practitioners can improve their contact lens comfort and chances of successful contact lens wear, as well as minimize contact lens drop out rates. By understanding the differences among OTC choices, we can educate our patients about the ideal choice for them. Currently, there is no cure for dry eye conditions, so we must do our best to control the symptoms and improve our patients' experiences with contact lens wear. [BCCL](#)

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# Taking Charge of Patients' Solution Selections

Are you helping your patients select the right solution to improve their contact lens wear and compliance?

**John L. Schachet, O.D.**



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In today's contact lens and solution environment, a majority of patients feel there is no observable difference in contact lens products. When patients leave your office for the pharmacy or grocery store, they're often overwhelmed by the quantity of products claiming to do exactly the same thing. In addition, the lens solution you recommend is often in the same color box as many of the others—others that may appear to be significantly less expensive.

A savvy comparative shopper may read the product labels for similar ingredients, only to find out that many are identical. Moreover, each product claims to address dry eye problems, maintain lens moisture throughout a normal contact lens-wearing day, and enhance lens comfort.

A strong product recommendation from you weighs heavily in the patient's selection, and could potentially eliminate this grueling process. However, more often than

not, the recommended product is one of the more expensive products—if you don't stress the importance of using that specific product, your patients will simply choose an alternative solution. After all, they are all the same, aren't they?

## Practicing What You Preach

The practitioner's views lie at the heart of this issue: If you don't believe there's any difference in products, then why would your patients think otherwise? If you don't spend some quality time with them explaining your recommendation, how are they supposed to make an intelligent and informed decision at the point of purchase? It's your job—in fact, your obligation—to let your patients know why you're recommending a specific product.

If your selection is best for the ultimate health of their eyes, tell them that. If you believe one product is superior at disinfecting or

has a lower potential complication rate than another, share this with your patient. If you think one product will clean better than another or ultimately be more comfortable, giving the patient longer, more enjoyable wearing time, such information will only reinforce the patient's confidence in your selection. If, however, you don't care, then your patient will have to deal with the solution confusion at the store shelves.

### The Generics Issue

Every time you go to a pharmacy or give your patients a drug prescription, you're faced with the decision of whether to get that prescription filled in the legend or generic form. You know the generic will be cheaper, but are you certain the prescription is *exactly* the same?

Although the active ingredients are identical, the inactive ingredients, most times, are not. There are times when these inactive ingredients will not agree with the patient's system and they will experience some form of hypersensitivity reaction, leading them to believe they're allergic to the drug in general. While, in fact, this may be true, it may also be that the inactive ingredients could have triggered the unwanted reaction and all they need to do is use the legend form of the drug. The point is that, while generics are generally the same as the legend drugs, they don't always work the same.

Private-label generic contact lens solutions operate slightly different than their drug counterparts. Most of these products use older disinfectants and preservatives than what the newer contact lens solutions offer. When the manufacturers of these "generics" bring them to market, they

cannot make any false claims or new claims on the box or in the package inserts. Instead, what they do is market the color of the boxes to look similar to the newer "legend" marketed products. This only adds to the consumer's confusion at the shelf since so many products look similar or, in some cases, identical.

Unless your patient is armed with knowledge about the difference between these products,



**If you don't recommend a specific solution, chances are patients will reach for lower-cost generics.**

they may buy the older products simply because of the cost differential. In fact, statistics show a significant penetration from private label generic products into the current branded solution market.

In a study of nearly 600 contact lens wearers, UCLA researchers found the highest rate of

complications were among users of private label and store brand solutions.<sup>1</sup> Complications can and often do lead to contact lens dropouts. In fact, studies suggest the most common reason for discontinuation is lens discomfort, which accounts for between 43% and 72% of contact lens wear dropout.<sup>2</sup> A 2005 survey revealed that 52% of contact lens wearers were most likely to self-report dry eye symptoms.<sup>3</sup>

In a 2010 issue of *Review of Optometry*, John Rumpakis, O.D., reported survey results that found 50% of contact lens wear dropout is due to comfort/fit issues, which translates to about \$275.00 loss in annual revenue from each contact lens patient.<sup>4</sup> Furthermore, it suggested the average dropout rate is about 16% in the United States, which results in about \$45,000 of lost annual revenue.

### Opinions In Sync

Addressing contact lens compliance is an ongoing battle. In a 2011 *Review of Optometry* article, Gina Wesley, O.D., M.S., suggested that confusion may occur if doctors' recommendations don't match up with those of the manufacturers.<sup>5</sup> She noted that patients are savvy researchers and, if your recommendations contradict prevailing opinion or the manufacturer, they have no incentive to follow the remainder of your instructions.

Be cognizant of what is written on labeling or in the package inserts of the products you prescribe. If your instruction to the patient differs from what's generally recommended, you can explain the reasons why you've chosen it. Surveys have shown that a significant percentage of patients are not aware of the



ingredients in contact lens products. This gives you an opportunity to tell the patient why it's important to pay more attention and listen to your recommendations. You can reinforce this by citing personal experiences or clinical studies. Either way, it's an opportunity to get your patients back on the right track.

Let your patients know that you care about the health and comfort of their eyes and express concern about non-compliant behavior. While you don't want to offend anyone, it's important to let your patients know how strongly you feel about compliance. Dr. Wesley doesn't recommend asking patients if they're using the solution you prescribed because it's too easy for them to simply reply "yes." She suggests that you either have a variety of solution bottles in the office or, at the very least, pictures of the various branded and non-branded solutions so they can point out which one they use. If your patient doesn't even know which product they are currently using, then that lets you know where you need to start with the education process. Education is definitely the key to success in this arena.

Many studies have been conducted over the years on contact lens compliance, addressing lens wearing and replacement schedules, lens case hygiene and the use of fresh solution, and not topping off the contact lens case—habits that patients often pick up. Many of these studies have concluded that compliance is a multifactorial problem that requires a multifaceted solution. Urging the proper selection and use of contact lens solutions and related products is a good place to start.

## Implementing a Plan

So, how does this relate to the issue of private-label generics or store-brand generics? After all, these products have been FDA approved for their main ingredients, haven't they? Of course they have. But are they the best possible lens care alternatives for our contact lens patients today? If you feel that prior reported contact lens research makes a case for prescribing the newest and best available products for our patients, then it's time to take a proactive role in educating your patients. It will not only ensure a greater percentage of successful contact lens wearers but will increase the bottom line in your practice as well.

What can you do in your office to implement a "good practices" approach? One solution is to not just recommend—but actually prescribe—a particular brand that you believe will be compatible with the contact lens you're fitting. When you give the patient the prescription, let them know why you chose it.

Take advantage of industry resources. The three major manufacturers of contact lens solutions, Alcon, Bausch + Lomb and Abbott, have done extensive research in both manufacturing and marketing these products. Speak to their representatives, look over their literature and read their studies. Finally, to be absolutely certain about how these products will perform, try them with successful contact lens patients in your practice and get their feedback. All of this will help you formulate an educated opinion on the value of each of these products.

Learn as much as you can about today's products so your patients will benefit and improve their

chances of contact lens success. It is incumbent upon you to know what you're recommending and the reasons why. Along with this, know why they are uniquely better than the store brand or private label generics.

Our goal is always to keep our patients healthy and happy, while at the same time keeping them coming to our practices. Our recommendations and prescriptions for our contact lens patients will help do just that. Let's not forget the power of our influence over our patients. Don't let lens care non-compliance be the exit ramp for contact lens patients who were once loyal and satisfied. Speak to them at each office visit about what they're using, and reinforce your reasons for staying with a branded product that you recommend for the health of their eyes and, ultimately, for the success of their contact lens wearing experience.

As the prescribing doctor, you can contribute significantly to the success or failure of your contact lens patients. Compliance ultimately depends upon the patient following our instructions—so make sure you give your patients a reason to trust your advice. If not, we will see not only more contact lens dropouts, but also the loss of patient revenue at a time when we should all be more attentive to each and every patient we're privileged to treat. RCCL

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# Know the Irregular Cornea Terrain

Here's how to evaluate the perfect contact lens fit on a surgically altered cornea.

By John M. Rinehart, O.D.

Contact lens fitters need to design lenses that provide the best possible comfort for the wearer, allow the patient to attain his best acuity, and keep the eyes healthy. We need to design a clean, wet, moving lens and put it on a clean, wet eye. The tools available to us make this relatively easy for most "normal" corneas. With corneal topography, new highly permeable and wetttable materials, and many great lens designs, we can satisfy virtually all of our patients who are legitimate candidates for contact lenses.

The fitting criteria for surgically altered corneas are the same as for the normal cornea. Ideally, the lens will have slight apical clearance with areas of light touch in the mid-periphery at 3- and 9-o'clock, and will have unobstructed vertical movement with each blink. Generally, this is easy to achieve on a standard, with-the-rule cornea; however, there is a significant challenge to achieve these fitting characteristics on surgically altered corneas. The goal is the same, but

safe compromise frequently will be necessary. As a general rule, it is best to begin with the simplest lens design that you believe will satisfy the needs of the patient.

For the purposes of this article, we will concentrate on fitting gas-permeable (GP) lens options, including moderately large corneal lenses and scleral lenses.

## A Demographic Apart

According to the American Academy of Ophthalmology, there were approximately 41,000 corneal transplants and 700,000 refractive surgeries performed in 2008.<sup>1</sup> In my experience, almost all corneal transplant patients have irregular corneas and require specially designed GP lenses. If you include the high number of radial keratometry (RK) patients, we could have hundreds of thousands of people who need specialized fitting to achieve their best possible acuity.

The examination procedure should consist of the same steps as any other contact lens patient, including corneal topography



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(CT). CT provides information that leads the contact lens fitter to the initial diagnostic lens and provides valuable information to estimate the degree of success presented by each contact lens fitting option. At the completion of this initial exam, the patient should be educated about the benefits and limitations of each contact lens option, or even if spectacles might be a more suitable option to provide clear vision.

Lenses available to treat these irregular corneas include (but may not be limited to):

- Standard soft lenses.
- Standard spherical GP lenses.
- Large-diameter GP lenses (10.5mm to 13.0mm; average 11.2mm to 11.5mm).
- Aspheric GP lenses.
- GP lenses with either steep or flat peripheral curves.
- Reverse-geometry GP lenses.
- Toric lenses.
- Piggyback systems.
- Scleral GP lenses.
- Hybrid lenses (combination of GP and soft materials).

## Multiple Sets of Lenses

The best available tools for fitting these patients are multiple sets of diagnostic lenses and the best topographer is the diagnostic lens. Post-surgical corneas that are relatively normal frequently can be fit from topography. A post-surgical cornea that is prolate (e.g., steepest in the center and flattest toward the periphery) is the easiest on which to achieve the apical clearance with light 3- to 9-o'clock touch and vertical movement. At times, a toric or aspheric lens may be necessary to attain this ideal fit. Virtually every other cornea requires diagnostic lens fitting.

The basic diagnostic GP lenses that a fitter of irregular corneas

should have available include:

- Large-diameter, large optic zone lenses for post-penetrating keratoplasty patients and other abnormal corneas.
- Reverse-geometry lenses in two diameters, ranging from 10.0mm to 11.0mm.
- Back or bitoric set. Sphere power effect set works well.
- Aspheric lenses, prolate and possibly oblate lenses.
- Scleral lenses in two diameters, ranging from 15.0mm to 19.0mm.
- Lenses designed specifically for keratoconus (useful for corneal ectasia post-LASIK). Include two different diameters, ranging from 8.6mm to 9.8mm.

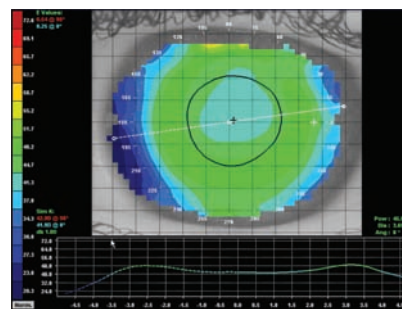
It is unnecessary to have all of the above diagnostic sets at your immediate disposal, as many labs have "loaner" sets available.

You can select your initial diagnostic lens a number of ways. Many topographers allow you to select from a number of lens designs and parameters to create a simulated fluorescein pattern. Manipulate the parameters until this simulated pattern looks the way you like, and then place a diagnostic lens that closely approximates the lens in the topographer on the eye. Evaluate the fluorescein pattern, and, if it is similar to the topographer's version, over-refract to determine the exact powers and order the lens. If the topographer's simulated fluorescein pattern is not similar to the actual pattern, make changes to your diagnostic lenses until you have the desired fit, again over-refract, and order your lens.

If you do not have access to a corneal topographer or your topographer does not allow you to "design" lenses, you will need to do everything with diagnostic lenses only. In cases where the

topography is so irregular that you cannot determine a good starting point, just put a lens on the eye, evaluate the fluorescein pattern and make lens changes until you have the best initial fit.

Frequently, more than one lens design will provide the necessary fitting characteristics to ensure the patient sees well, is comfortable and maintains a healthy cornea. As a reminder, start with the least complicated lens design that you believe will meet the needs of the patient. Large-diameter lenses, as well as scleral lenses, tend to center well and provide a stable fit and stable acuity because the lenses do not move excessively on the eye.



**1. This topography image of a post-LASIK patient's cornea shows minimal flattening from center to mid-periphery nasally, but a significant difference center to temporal side.**

When topography shows a large amount of steepening in the mid-peripheral cornea, a reverse-geometry lens may be the best starting point. If the mid-peripheral cornea is similar to the central cornea, then a traditional lens may function well. The goal of a large-diameter lens fit is to have the flattest base curve that does not bear heavily on the cornea.

Figure 1 is a topography image of a post-LASIK patient whose cornea could be fit with either



a spherical lens or a reverse-geometry lens. Notice that there is not a large amount of flattening from center to mid-periphery on the nasal side, but there is a significant difference center to temporal side. Curvature at apex is 41.80D, 3.5mm nasal curvature is 40.80D, and 3.5mm to the temporal side the curvature is 47.5D. It would be logical to expect a conventional GP lens to decenter to the temporal side, as that is the steepest portion of the cornea. To minimize this, either a large-diameter spherical lens or a reverse-geometry lens would be a good first choice.

When selecting a reverse-geometry lens for your patient, the base curve will approximate the flat keratometer reading and the “alignment” curve will approximate the average of the nasal and temporal cornea 3.5mm to 4.0mm from the corneal apex. The diagnostic lenses that are used for orthokeratology work well when fitting postoperative corneas with an oblate shape.

## To Each Their Zone

As previously noted, scleral lenses provide good centration and stable vision due to their near lack of movement and large optical zone. Scleral lenses are less likely to “pop-off” the eye. The downside is that they are significantly more expensive and initially more difficult to handle. They can work well for most irregular corneas, regardless of the cause of the irregularity. A well-fit scleral lens should always vault the central cornea and clear the limbus.

The initial lens selection typically will be a base curve that is 1.00D steeper than the steepest K-reading. A well-fit lens will center; vault the corneal apex;

complete clearance of the limbal region; avoid blanching of conjunctival vessels, which would indicate the periphery is too tight; and involve minimal or no lens movement. Also, after several hours of wear, the lens can be easily removed; there is no “suction.”

The three zones of the lens should be evaluated beginning with the corneal zone and moving out:

- *Corneal zone.* Use an optic section to evaluate the depth of the tear layer near the corneal apex. The tear layer should be one-fourth to three-fourths the thickness of the cornea, or 150µm to 375µm. This will vary with each lens design, but as an

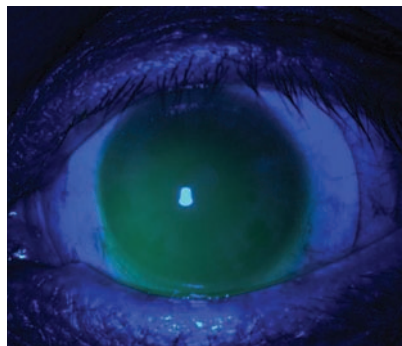


Photo: Brett Larson, O.D.

**2. A corneal touch zone on a post-surgical cornea that has a “feathery” edge, as in the one above (look at the superior temporal quadrant), can be acceptable.**

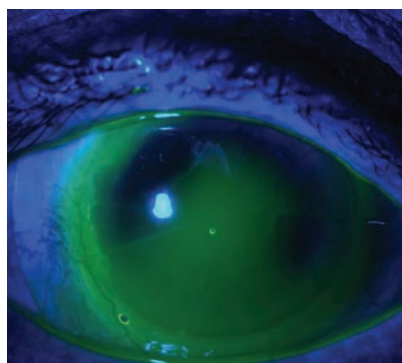


Photo: Brett Larson, O.D.

**3. Excessively hard touch in the superior temporal quadrant of a corneal touch zone.**

estimate, 1.00D of base curve change will result in 100µm of sagittal depth change when the base curve and first peripheral curve are changed the same amount.

Post-surgical corneas can be quite irregular and it is not always possible to vault the entire cornea. At times, it may be necessary to accept some corneal touch. This can be acceptable if the touch zone has a “feathery” edge (see figure 2) as opposed to a very sharp edge (see figure 3).

- *Limbal zone.* There should be adequate clearance of this area, which is evidenced by diffusion of fluorescein over the entire limbal area. If additional clearance is needed in this region, consider widening the optical zone or the first peripheral curve.

- *Scleral zone.* There should be no blanching of blood vessels or restriction of blood flow. Also, there should be no excessive edge lift. Let the lens settle on the eye for at least 30 minutes before you evaluate the fit. Further, it is wise to evaluate the lens again after three to four hours of wear before ordering the initial lens. At the three- to four-hour evaluation, assess tear flow beneath the lens and determine if the lens is “sucked on.”

Because each lab manufactures and designs their lenses differently, the information provided here serves as a general guide. When first fitting any scleral lens or any lens design that is new to you, don’t be shy about asking questions of the lab’s consultants. They are a valuable source of information and will be a great aid to your success. RCLL

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# The Case for Bandage Soft Contact Lenses

A primer on the use of these therapeutic lenses to serve and protect the corneas of our patients.

By **Susan Gromacki, O.D., M.S., F.A.A.O.**



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The concept of a protective eye bandage originated in the first century A.D., when Celsus reportedly applied a honey-soaked linen to the site of a pterygium removal to prevent symblepharon development.<sup>1,2</sup> Bandage soft contact lenses were first used in the 1970s following the development of hydroxyethyl methacrylate (HEMA) by Otto Wichterle.<sup>2</sup> With the recent advances in material technology, today's bandage contact lenses provide the same benefits as their predecessors—but with enhanced convenience, improved healing and increased corneal health.

## Bandage Lens Basics

By definition, a bandage contact lens protects the cornea. Many different lens types can be utilized to

accomplish this goal (*see tables 1 and 2*); however, because of their high oxygen permeability and FDA approval for extended wear, silicone hydrogel soft contact lenses are currently most practitioners' first choice.

Bandage lenses protect the cornea not only from potential exterior sources of injury, but also from a patient's own eyelids. The shearing effect created by the lids during the blink can inhibit re-epithelialization

**Table 1. Therapeutic Lens Options**

- Hydrogels
- Silicone Hydrogels
- Collagen Shields
- Gas Permeable Scleral Lenses

**Table 2. FDA-Approved Soft Lenses for Therapeutic Use<sup>8,9</sup>**

Lens	Manufacturer	Material	Powers	Maximum Wear Schedule
Air Optix Night & Day Aqua	Alcon	lotrafilcon A	+6D to -10D	30 days
PureVision	Bausch + Lomb	balafilcon A	+6D to -12D	30 days
Acuvue Oasys	Vistakon	senofilcon A	+8D to -12D	7 days
Sof-Form 55 EW	Unilens Corp.	methafilcon A	+9.75D to -10D	7 days

and cause pain. Use of a bandage lens facilitates corneal healing in a pain-free environment.

Depending on the patient's ocular condition, he or she may wear their therapeutic lenses for a period of days to years. They may be utilized for daily or extended wear (*see table 2*). Because there is generally an underlying disease process precipitating the need for a therapeutic lens, extra caution must be taken to clean and disinfect the lens after wear, keeping in mind that silicone hydrogel lenses tend to deposit lipids more readily than HEMA lenses (*see image 1*). That said, the addition of a digital rubbing step is necessary for lenses that are used more than once.

It is critical to perform frequent follow-ups for bandage contact lens patients. One reason is that a bandage lens fit, by design, demonstrates less movement than a traditional soft lens fit. The theory is to provide increased patient comfort while preventing the heal-

ing epithelial cells from sloughing off due to any mechanical trauma of the lens itself.<sup>3</sup> In addition, it is important for the practitioner to be vigilant regarding the detection of signs of microbial keratitis. The compromised cornea—especially when wearing lenses in an extended wear modality—is at particular risk for infection.<sup>4</sup>

### Indications

Bandage contact lenses are indicated for many different reasons, including: protecting the eyes, increasing comfort, facilitating healing and sealing wound leaks. We'll explore these indications, and others, in more detail in the following paragraphs.

- **Protection.** Corneal protection is needed in the case of several conditions, including: entropion, trichiasis, tarsal scars, recurrent corneal erosion, post-surgical ptosis and surgical sutures or exposed suture knots.

Recurrent erosions are a typical sequella of epithelial basement membrane (basal lamina) trauma or are secondary to anterior basement membrane dystrophy, anterior basement membrane degeneration or stromal dystrophy. A bandage contact lens is the second line of treatment, after hyperosmotic drops and/or ointment fail.<sup>2,5</sup> An added benefit is

the enhanced vision provided by the smooth refracting surface of the contact lens, as opposed to an irregular anterior corneal surface.<sup>5</sup> Hypertonic saline drops should continue to be utilized concurrently with the lenses.

- **Pain relief.** The mitigation of corneal pain is another important indication for therapeutic contact lenses. The conditions most in need of this therapy include bullous keratopathy; epithelial erosion and abrasion; filamentary keratitis; and postoperative penetrating keratoplasty.

In bullous keratopathy, endothelial failure results in corneal edema, which in turn creates epithelial blisters that rupture, causing pain, foreign body sensation, and photophobia. A bandage contact lens reinforces the damaged tissues and protects the nerve endings from the abrasive actions of the eyelids. Patients who are awaiting a conjunctival flap or cornea transplant may be fitted with therapeutic lenses for up to 30 days at a time.<sup>2</sup>

Until recently, pressure patching was the standard of care for treating large epithelial abrasions (*see figure 2*). With this treatment, the caveat was to refrain from patching contact lens wearers or injuries caused by presumed vegetative matter or false finger-

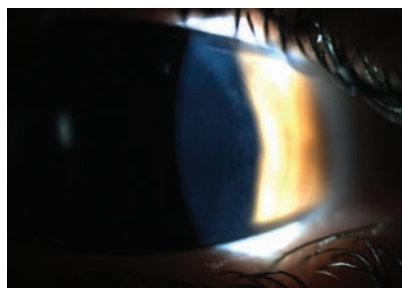


Photo: Dr. John Herman  
**1. Therapeutic soft contact lens with 2+ surface coating.**



nails. The utilization of a bandage contact lens provides protection and healing for all three of these conditions, and it has now supplanted patching as the standard of care. The authors of the Wills Eye Manual caution, however, that prophylactic topical antibiotics should be used concurrently and that daily follow-up care is mandatory.<sup>6</sup>

The other advantage of bandage contact lenses over patching is the ability to continue to install topical ophthalmic medications. This is particularly important after a corneal abrasion, erosion, or corneal refractive surgery, which necessitate the frequent installation of antibiotics and/or artificial tears. Some reports caution against the installation of cycloplegic agents (which reduce the pain associated with a corneal abrasion/erosion or after corneal refractive surgery) in bandage CL wearers. The dilating drops can cause the bandage lenses to dry out and become less comfortable, especially overnight, with the end result a potentially decreased healing response.<sup>7</sup> On the other hand, bandage contact lenses can be utilized—by design—as vehicles for drug delivery, but the exact way to ensure a consistent dosage is still under investigation.



**3. The cornea, one day following PRK.**

- **Healing.** The use of bandage contact lenses to facilitate healing is particularly necessary for the following conditions: chronic epithelial defects, corneal ulcer, neurotrophic keratitis, neuroparalytic keratitis, chemical burns and basement membrane disease.

They also enhance healing following corneal surgery, particularly refractive surgery. They protect the cornea from exposure or from the irritation caused by rubbing the eye as the corneal wounds are healing. Therapeutic bandage contact lenses are a mainstay after photorefractive keratectomy (PRK) procedures, in which the removal of the epithelium leaves an open wound that takes about one week to heal (see figure 3). They are also valuable for the following procedures: laser-assisted in situ keratomileusis (LASIK), laser-assisted subepithelial keratomileusis (LASEK), Epi-LASIK, penetrating keratoplasty (PK) and phototherapeutic keratectomy (PTK), lamellar grafts and corneal flaps.

- **Sealing.** The lenses also may aid in sealing leaky wounds. Serving as a splint or sealant, the lenses can be beneficial after cataract, penetrating keratoplasty or glaucoma filtering surgery.

- **Maintenance of corneal hydration.** The role of bandage contact lenses in dry eye is controversial. For patients who need to continually instill lubricating drops into their eyes, particularly

after refractive surgery, the benefits of using a bandage lens can be great. Other patients who benefit are those who have significant lagophthalmos and subsequent corneal exposure. However, contact lenses are generally contraindicated for dry eye.<sup>7</sup>

- **Structural stability and protection in piggyback lens fitting.** Many patients benefit from the utilization of a soft and rigid lens concurrently. The rigid lens provides crisp vision, particularly for irregular corneas, and the soft bandage lens protects the cornea, preventing irritation and abrasions. Examples include elevation differences in the host/graft junction, keratoconus and in the presence of scar tissue.

## Contraindications

Each clinician must assess his patient's condition carefully to determine whether a bandage contact lens is warranted. Interestingly, many of the conditions that require bandage contact lenses (dry eye, infection, inflammation, etc.) contraindicate lens wear in general. In addition, therapeutic contact lenses should not be used in patients who are unwilling or unable to comply with the necessary treatment and follow-up. RCCL

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**2. The use of therapeutic contact lenses has replaced pressure patching as the standard of care for epithelial abrasions such as the one in the image above.**

# Alternatives to Silicone Hydrogel Contact Lenses

While silicone hydrogel lenses serve many patients well, ponder these five reasons to consider other options.

By Jason R. Miller, O.D., M.B.A., F.A.A.O. and Gina Wesley, O.D., M.S., F.A.A.O.

Advances in contact lens technology over the past 20 years have been tremendous in terms of ocular health, visual performance and ease of prescribing by the eye care professional. Despite these advances, many factors influence our patients' comfort with contact lens wear. Fortunately, significant improvements include the advent of new materials designed to improve vision and hydration and increase oxygen permeability—all to allow lasting comfort. So, is the newest and most advanced always “best” for our patients?

Silicone hydrogel contact lenses were a major technological advance. The improvement in oxygen permeability was much needed, but many other factors affect successful contact lens wear, such as deposition likelihood, movement and wettability. Oxygen flow is important,

but may not tip the scale in ultimate favor for fitting silicone hydrogel lenses 100% of the time. This article will analyze a few reasons why you might not consider a silicone hydrogel contact lens as your primary choice in all cases.

## 1. Comfort is King

For contact lens wearers, the goal is to maximize comfort. Practitioners must sort through a range of options to determine the optimal treatment protocol that will improve their patient's comfort level.

As practitioners, we must understand that comfort is a very subjective term. If you were to ask patients to rank their comfort on a 10-point scale, those wearing silicone hydrogels may have lower scores. This may be a result of the fact that many silicone hydrogels have a much higher modulus than conventional

hydrogel contact lenses. In addition to a possible foreign body sensation due to a stiffer material, this characteristic may result in minor edge lift issues if the material is too loose.

For patients with these types of complaints, it is important to create a strategic approach to better achieve comfort. Here's how:

- *Treat any underlying condition.* An underlying ocular health issue may be the root cause of the discomfort. Dry eyes can have a huge impact on the contact lens wearer and the contact lens practice. According to the National Eye Institute's Impact of Dry Eye on Everyday Life (IDEEL) ques-

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**Goal Statement:** Silicone hydrogel contact lenses are a major technological advance, but many other factors affect successful contact lens wear. This article will analyze a few reasons why you might not consider a silicone hydrogel contact lens as your primary choice in all cases.

**Faculty/Editorial Board:** Jason Miller, O.D., Gina Wesley, O.D.

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tionnaire, approximately 34% of contact lens wearers discontinue use at least once, most frequently as a result of dry eye symptoms.<sup>1,2</sup> This can slowly erode a contact lens practice. A thorough history is the first step in identifying the dry eye patient.

- *Focus on contact lens care.* It is important to look for ways to modify the care system regimen to optimize comfort. This entails getting a true account of the patient's care routine and making sure that he or she is using the solutions that will most likely improve the wearing experience. If your patient has strayed from prescribed wear and care patterns, take the time to go over proper care techniques.<sup>3</sup>

- *Evaluate the material.* A number of contact lens materials and designs can improve the comfort level that a patient is experiencing. Silicone hydrogel lenses, in particular, have been designed to maximize oxygen permeability, but not always maximize comfort. However, recently, there have been significant technological advancements in surface chemistry designed to improve the hydration of second and third generation silicone hydrogels.

- *Evaluate the modality.* Always prescribe patients' preferred wearing schedule, while considering their ocular health and compliance. From single-use daily disposable contact lenses to two-week, one-month and the less common, quarterly/yearly replacement schedules, today's contact lens wearers have many options to consider when choosing a lens modality. But ultimately, as the eye care practitioner, you are responsible for selecting a proper contact lens modality and material to ensure lens wear success. All things considered, the lens and lens care system that minimizes patients' chances for an infectious or infiltrative event is the one you should choose. For many

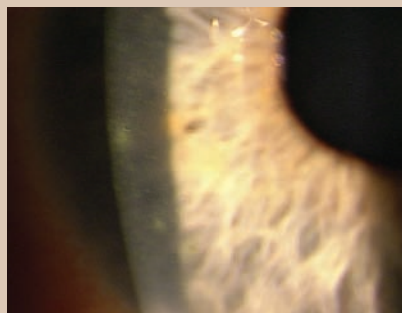


**1. Contact Lens Acute Red Eye due to overwear with a higher modulus silicone hydrogel lens.**

patients—particularly those who are non-complaint—daily disposable lenses may be the wisest option (see sidebar). Likewise, astigmatic patients often will be best served with alternative lens options. A significant portion of these patients wear spherical equivalent contact lenses to mask the uncorrected cylinder, but this technique often does not provide optimal vision correction. New introductions of daily disposable options in toric designs will give us yet another opportunity to engage current and potential lens wearers with this convenient modality.

## 2. History of “Corneal Event”

A thorough contact lens fit and the process of individualizing the contact lens wearing experience starts with a thorough history, which



**2. This patient was treated with an anti-biotic/steroid combination eye drop and it cleared within 5 days. Consider refitting this type of patient into a daily disposable soft contact lens to prevent recurrences.**

includes asking about previous red eyes, corneal ulcers, infectious reactions and inflammatory events. Superior epithelial arcuate lesions (SEALs) are multifactorial, but may be a direct result of mechanical irritation from a stiffer silicone hydrogel material.<sup>4</sup> The incidence is increased with silicone hydrogels.<sup>5</sup> Patients may not specifically know what happened, but can often describe the situation and how it was treated—so, don't forget to ask!

The increased stiffness of silicone hydrogel lenses may also result in higher numbers of mucin balls. These coalesced mucins are also a result of a mechanical complication of silicone hydrogels, can affect vision and may be transient.<sup>6</sup> Patients may complain of visual fluctuations, but upon examination, you may or may not see the mucin balls. Although most patients adapt and the number of mucin balls decreases over time, it can possibly be a long-standing issue.

In addition, an unexpected finding with silicone hydrogel lenses has been an increase in infiltrative events. Much research is ongoing in this area, but corneal hypoxia may not play as large a role as previously thought with regard to these events. Dr. Szczotka-Flynn has speculated that the improved physiological profile of the cornea beneath a silicone hydrogel lens may allow for more rapid activation of the immune response against bacterial ligands frequently present on all lens surfaces.<sup>7</sup> Patients with a past history of infiltrative events while wearing silicone hydrogel lenses is another reason to consider other contact lens options.

## 3. Heavy Depositor

Some patients are heavy depositors and have difficulty keeping silicone hydrogel lenses clean due to the increased likelihood of lipid-

## The Many Benefits of Disposability

It is important to actively discuss the new materials and modalities available, along with their improved health benefits. In many instances, hydrogel daily disposable contact lenses may be the best choice. The one-day modality offers patients the convenience of a fresh lens each time, without the hassle of cleaning and keeping track of a replacement schedule. Also, one-day contact lenses are very useful for patients who have had a history of non-compliance, solution or material sensitivity or toxicity. This lens modality may be the best choice for our pediatric and teen population—our often not-so-responsible patient population. Statistically, daily disposable lens wearers have the lowest rate of complications, which opens up the potential to add a significant number of contact lens wearers to your office. These lenses offer many advantages, of which convenience is by far the biggest. In the end, the best lens to use is the one that maximizes their comfort.<sup>12-14</sup>

based deposits. Unlike traditional hydrogel challenges with protein-based deposition, lipid-based deposits are more transient and may actually slide around on the lens surface, affecting vision and comfort in a dynamic manner.<sup>8,9</sup>

Traditional enzymatic cleaners may not eliminate these deposits. Although more frequent replacement modalities help to minimize this situation, you will still have some patients who are truly at a disadvantage with their silicone hydrogel lenses after only a few days of wear due to lipid deposits. Additionally, the lipid deposits create more risk of biofilm formation, which may prove very hard to eradicate, and create a higher chance of microbial contamination of lenses and cases.<sup>10</sup>

What to do? Oftentimes, protein deposition is better managed, or a heavy lipid-depositor may not be as deposit-prone, if fit in a traditional hydrogel lens.

## 4. Material - Solution Incompatibility Issues

This is not always a reason to walk away from silicone hydrogel contact lenses, but if this becomes a recurrent issue, it may be a reason to change materials and solutions to solve the situation. There is substantial debate surrounding recent studies that implicate solutions and material incompatibility and resultant corneal staining. Despite the ongoing controversy over the details, however, one cannot deny there are possible complications. The more porous nature of silicone hydrogel materials has created an issue of possible solution uptake into the lens matrix. This solution, which was never meant to “wash” the eye during wear time, has been shown to possibly cause loss of corneal integrity, presenting as corneal staining. Research indicates that this staining often does resolve after several hours, and patients may not be at any increased clinical risk of adverse events.<sup>11</sup> However, we must consider the possible comfort and visual fluctuation issues that arise from even short-term staining and irritation. Even if a “clinical” finding does not manifest itself, this point is irrelevant to the wearer of said lens and incompatible solution, who experiences a short period of discomfort and non-ideal lens wear every day. Finding these patients is as easy as asking about wear time and comfort/vision throughout the day. Consider lens/solution combinations, and ask yourself whether silicone hydrogel lenses are truly the best option for these patients.

## 5. “Tinted” Lenses

This is an easy discussion, as there are no current options for silicone hydrogel tinted, or colored, contact lenses. This may change in the future, but as of now, these patients need to be fit in hydrogel technology. Don’t forget to present this option to your patients, as they might not know it’s a possibility. Part-time colored lens wear may be something your silicone hydrogel lens wearer may be interested in. Letting them know the technology is somewhat different will set expectations appropriately.

We are fortunate to practice in a time of great innovation within the contact lens arena. However, it’s also important to keep in mind the variety of lenses available to us. With the plethora of options out there, mixing some traditional technology with the newest lens options will help keep your contact lens practice healthy and growing. **RCCL**

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## CE TEST FOR ALTERNATIVES TO SILICONE HYDROGEL CONTACT LENSES

- Why might patients wearing silicone hydrogels rate their comfort levels lower than some other lens wearers?
  - they may have a foreign body sensation
  - they may have astigmatism
  - the lenses may be masking dry eye
  - they may be sleeping in their lenses
- Mucin balls...
  - may be caused by the increased stiffness of silicone hydrogel lenses.
  - may be a result of a mechanical complication of silicone hydrogels.
  - can be transient
  - all of the above
- Which of the following statements is false?
  - silicone hydrogels have a lower modulus than conventional hydrogel contact lenses.
  - SiHy wearers may experience minor edge lift issues if the material is too loose.
  - approximately 34% of contact lens wearers discontinue use at least once.
  - Silicone hydrogel lenses have been designed to maximize oxygen permeability.
- Significant technological advancements in \_\_\_\_\_ have been designed to improve the hydration of silicone hydrogels.
  - material composition
  - surface chemistry
  - physiological profile
  - none of the above
- In what instances might you want to consider a lens other than a silicone hydrogel?
  - patients with dry eyes
  - pediatric and teen patients
  - both a and b
  - none of the above
- One-day contact lenses may be a best option for what type of patient?
  - those with a history of non-compliance
  - those with solution or material sensitivity or toxicity
  - both a and b
  - none of the above
- \_\_\_\_\_ are often utilized to mask the uncorrected cylinder in astigmatic patients.
  - reverse geometry lenses
  - spherical equivalent lenses
  - gas permeable lenses
  - orthokeratology lenses
- To better achieve comfort for silicone hydrogel lens wearers with foreign body sensation and low comfort scores:
  - evaluate the material
  - recommend a different lens care solution
  - prescribe rewetting drops
  - change their wearing schedule
- While superior epithelial arcuate lesions are multifactorial, they be a direct result of:
  - the porous nature of silicone hydrogel lenses
  - protein-based deposits
  - lipid-based deposits
  - mechanical irritation from a stiffer silicone hydrogel material
- Controversies exist surrounding recent studies that implicate:
  - solutions and material incompatibility and resultant complications
  - the impact of lipid deposits on biofilm formation
  - solutions and material incompatibility and resultant corneal staining
  - an increase in infiltrative events in silicone hydrogel lenses

## Examination Answer Sheet

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This exam can be taken online at [www.reviewofcontactlenses.com](http://www.reviewofcontactlenses.com). Upon passing the exam, you can view your results immediately. You can also view your test history at any time from the website.

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| 2. (A) (B) (C) (D)  |  |
| 3. (A) (B) (C) (D)  |  |
| 4. (A) (B) (C) (D)  |  |
| 5. (A) (B) (C) (D)  |  |
| 6. (A) (B) (C) (D)  |  |
| 7. (A) (B) (C) (D)  |  |
| 8. (A) (B) (C) (D)  |  |
| 9. (A) (B) (C) (D)  |  |
| 10. (A) (B) (C) (D) |  |

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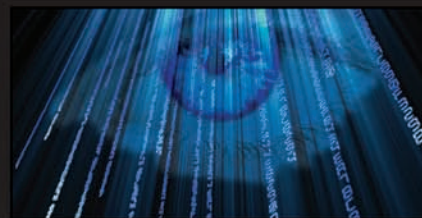
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