Review of Cornea & Contact Lenses

SEPTEMBER 2013

FOCUS ON PRESBYOPIA

- DON'T LET THESE SCENARIOS PREVENT SUCCESS WITH MULTIFOCALS
- SPECIALTY MULTIFOCAL LENSES: THE CASE FOR CUSTOMIZED FITS
- CE COURSE: WHEN IS SURGERY THE BEST OPTION?

Also:
- International Trends in Contact Lens Practice
- 10 Lessons Learned at BCLA 2013

Supplement to
REVIEW OF OPTOMETRY
SEPTEMBER 2013

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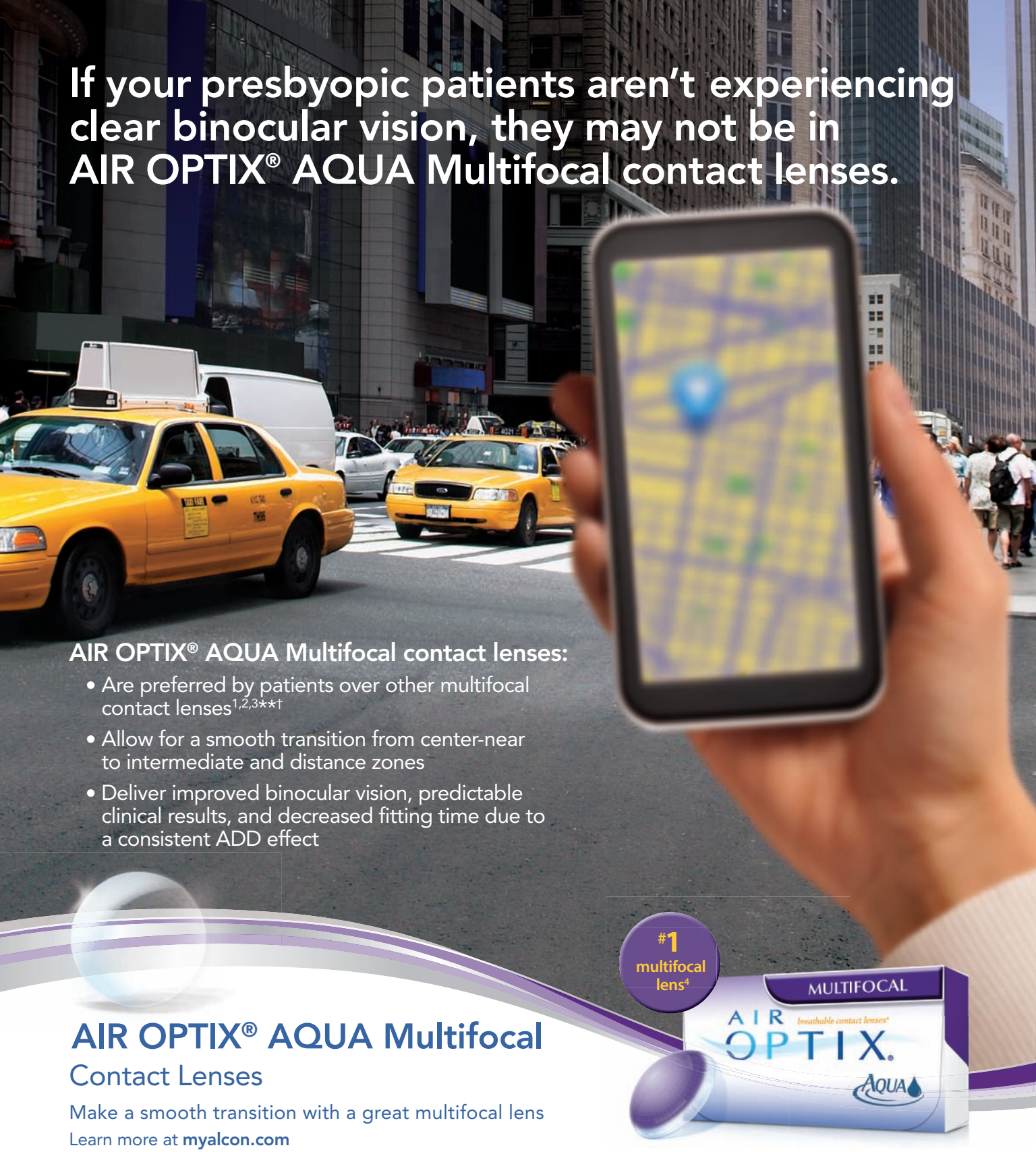

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References: 1. In a randomized, subject-masked clinical study at 20 sites with 252 patients; significance demonstrated at the 0.05 level; Alcon data on file, 2009. **2.** Rappon J. Center-near multifocal innovation: optical and material enhancements lead to more satisfied presbyopic patients. *Optom Vis Sci.* 2009;86:E-abstract 095557. **3.** In a randomized, subject-masked clinical trial at 6 sites with 47 patients; significance demonstrated at the 0.05 level; Alcon data on file, 2008. **4.** Based on a third-party industry report, 12 months ending October 2012; Alcon data on file.

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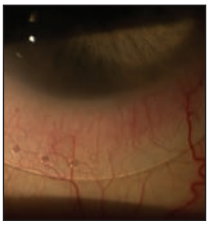

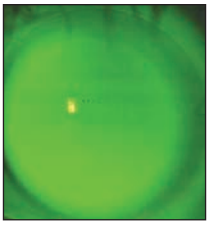

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In The News

• Patients who undergo **Descemet stripping automated endothelial keratoplasty** (DSAEK) experience better postoperative corneal sensation and less tissue damage than their penetrating keratoplasty (PKP) counterparts, according to a study published in the journal *Cornea*. Researchers in Japan used fluorescein staining to determine corneal epithelial integrity in 31 eyes of 28 DSAEK patients and 15 disease-matched eyes of 15 PKP patients.

The results: Corneal sensation was preserved and epithelial damage was less severe in the DSAEK group. "The preservation of corneal sensation seems to contribute to the early recovery of visual function and long-term maintenance of ocular surface health after DSAEK," researchers concluded.

• Hot on the heels of the long-awaited AREDS 2 data, published in May, comes an updated version of **PreserVision AREDS 2 Formula** vitamin and mineral supplement from Bausch + Lomb. Initially released in 2010, the supplement was recently reformulated to contain the same levels of nutrients recommended by the newest clinical findings of the second phase of this landmark clinical study.

The newly updated supplement contains 500mg of vitamin C, 400 IU of vitamin E, 10mg of lutein, 2mg of zeaxanthin, 80mg of zinc and 2mg of copper. B+L says that this combination of nutrients has been found to assist in the prevention of AMD and improve overall ocular health.

• Alden Optical expanded the "on demand" educational resources available on its website to include streaming video of a **NovaKone** workshop that explored the real-world performance of this custom soft lens for keratoconus. Visit www.aldenoptical.com/products/soft-specialty/novakone to view.

New Surveys Help to Assess Dry Eye's Impact

Two dry eye questionnaires designed to help practitioners better document their findings and understand the impact of the condition on everyday life have proven their worthiness for clinical practice in new peer-reviewed research.

• ***The need for SPEED.*** The first, called the standard patient evaluation of eye dryness (SPEED) questionnaire, was compared to four existing dry eye questionnaires: the Ocular Surface Disease Index (OSDI), Dry Eye Questionnaire, MacMonnies Dry Eye Questionnaire and Subjective Evaluation of Symptom of Dryness.

Fifty test subjects—30 symptomatic and 20 asymptomatic—were enrolled in the study, published in the September 2013 issue of the journal *Cornea*. Over the course of two visits, the subjects completed all five of the aforementioned dry eye questionnaires.

The study demonstrated the validity and repeatability of the SPEED questionnaire in clinical settings. Researchers closely examined the correlation between SPEED and the OSDI questionnaire—the profession's current "gold standard."

The SPEED questionnaire accurately segregated the symptomatic and asymptomatic subjects, similar to the OSDI questionnaire, with the added benefit of offering practitioners a more simplified scoring system. The four subsets of the SPEED questionnaire (See *"What the Questionnaires Record"*) require patients to fill out a numerical scoring system ranging from 0-4 to describe the severity and frequency of symptoms. This helps to expedite the survey experience for patients, while still maintaining accuracy when reporting symptoms.

• ***Use DEQS for success.*** Another dry eye patient questionnaire was recently developed and tested by researchers in Japan. Dubbed the Dry Eye-Related Quality-of-Life Score Questionnaire (DEQS), it seeks to assess the impact dry eye disease has on patients' quality of life.

DEQS, much like SPEED, is a concise and simplified dry eye symptom questionnaire. The questionnaire originally was designed to include 35 items, but after multiple rounds of research this number was reduced to 15 items. The survey is broken up into an Overall Summary scale and two multi-item

What the Questionnaires Record

The SPEED questionnaire is broken up into four subsets: (1) symptoms, (2) frequency of symptoms, (3) severity of symptoms and (4) a brief yes or no question that asks if patients are currently using eye drops for lubrication. By using a numerical scale, the survey makes reporting symptoms easy for patients, and analysis a breeze for clinicians.

The DEQS questionnaire's 15-item list makes it more extensive than SPEED, but with a different emphasis. While SPEED focuses solely on the frequency and severity of symptoms, the DEQS questionnaire contains an additional section on the impact dry eye has on patients' daily life, which gives the survey the added benefit of "real world" relevance.

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subscales: Impact on Daily Life and Bothersome Ocular Symptoms.

The DEQS study, published in the August 2013 issue of *JAMA Ophthalmology*, examined the experience of 224 subjects: 203 symptomatic and 21 unaffected. Participants in the study were asked to fill out DEQS in addition to the Short-form-8 and National Eye Institute Visual Function Questionnaire-25.

Analysis of the results of DEQS demonstrated a strong correlation to the mental component of the Short-form-8, as well as a correlation with four of the National Eye Institute Visual Function Questionnaire-25's subscales.

With these two new examples of dry eye questionnaires, practitioners have access to easier methods for assessing the impact that dry eye has on patients' comfort and quality of life.

The SPEED questionnaire can be downloaded at www.hines-sight.com/pdfs/dryEyeQuestionnaire.pdf.

Myopia More Common in Asians

Asian children in the US exhibited higher rates of myopia than non-Hispanic white (NHW) children, according to a study conducted by Ge Wen, MSc, from the Department of Preventative Medicine, University of South California, Los Angeles.

The research group conducted a cross-sectional, population-based study of 1,501 NHW children and 1,507 Asian children between the ages of six and 72 months in Los Angeles and Riverside counties.

The study, published in the August 14th online edition of *Ophthalmology*, found that the myopia rate in NHW children was just 1.20%, compared to 3.98% in Asian children. Astigmatism was also more prevalent in Asian children, with a rate of 8.29% vs. 6.33% in the NHW group. NHW children experienced a higher rate of hyperopia, though, at 25.7% compared to 13.5% in Asian children. The study confirmed what many researchers had previously believed, but demonstrated the difference in myopia rates was actually lower than expected.

The cause of the disparity in myopia rates is related to both genetic and environmental factors. Most children with myopia have parents who are also myopic. Another factor leading to increased myopia rates in Asian children is the comparatively higher amount of near work and activity such as reading that is encouraged in Asian cultures.

Studies such as this are useful in providing clinicians relevant background information on prospective patients, which helps to set practice guidelines for tailoring care to each individual patient.

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Editorial

By Joseph P. Shovlin, OD

The Eagle Has Landed—or Has It?

When pondering the unknown, the "far side of the moon" is often used as a metaphor. Just as that mysterious region has not been fully explored or its significance understood, two recent cornea-related publications highlight unknowns in the ophthalmic arena that warrant further attention. Oftentimes when we read something new in the literature, we wonder whether it will ever have relevance or clinical significance. Corneal structure and a unique response to a topical agent are two recent publications of interest examined this month.[1-3]

The Sixth Layer of the Cornea

The cornea remains a truly remarkable structure that typically functions efficiently by "eating aqueous and breathing air." Recently a "new" component of the cornea has been identified and described histologically by Dr. H. S. Dua and his lab associates at the University of Nottingham in the UK.[1,2] It's called Dua's layer—named for the man who identified it. The acellular "layer" that Dua describes lies between the stroma and Descemet's membrane, and appears to be quite strong.

Of particular note, the layer has a distinctly different set of physical and mechanical properties than the anterior stroma.[3] Dua's layer might have significance by providing a better understanding of posterior corneal disease and surgical biomechanics in lamellar procedures.[2]

The report is an interesting read, but not without controversy. In fact, Dua's layer may not actually be a new, sixth layer to the cornea, but simply a region of the posterior stroma described adequately by Binder et al. over two decades ago. Its overall relevance may also be debated, since we have known for quite some time that the posterior area of the stroma differs from the anterior region.

A literature review finds that Binder and coworkers described an attachment of the posterior stroma to Descemet's membrane by fibers that run perpendicular to the membrane. The attachment was associated with a dense, amorphous mass at the interface between Descemet's and the posterior stroma, and was found to be about 22 microns in diameter.[4] It appears that this description has an uncanny similarity to Dua's recent description.

ROCK Inhibitors for Fuchs' Dystrophy

Looking a bit deeper into the cornea, a prodigious research group in Japan (Koizumi N, Okumura N, Ueno M, et al.) has reported a case of Fuchs' corneal dystrophy that was successfully treated by Rho-associated kinase inhibitor (ROCK) topical medication. The investigators revealed relatively small endothelial cells on confocal microscopy present at high cell density in the central cornea where endothelial cells had been removed by transcorneal freezing techniques.[5] ROCK inhibitors are protein serine/threonine kinases best characterized as downstream effectors.[5] The pathway is involved in regulating the cytoskeleton and influences cell migration, apoptosis and cell proliferation.[6]

A potential option for medical management has broad clinical implications. The case report highlights the possibility of topical therapy as a viable alternative to surgery. The ROCK inhibitor Y-27632 promotes the proliferation of primate corneal endothelial cells in vitro, and healing of cells in vivo.[5] A pharmacological approach to endothelial recovery is certainly an attractive alternative to lamellar surgery.

It will require some time to determine the real significance of the two recent publications described above. Is Dua's layer different than what Binder described a few decades ago, and will it provide unique benefits in the treatment of our patients with posterior corneal disease, or who might require deep lamellar surgery? And what are the actual benefits of topical Rho-associated kinase inhibitors for endothelial corneal disease? Will it alter the way we manage patients with Fuchs' dystrophy?

The scientific community welcomes new observations and innovations to help clinicians practice better and to generate new ideas for researchers. What is unknown is the significance of Dua's layer and ROCK inhibitors. Stay tuned, for these two topic areas may have potential significance within our own orbit. RCCL

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By Elyse L. Chaglasian, OD, and Tammy P. Than, OD, MS

Drug Upgrades Improve Compliance

Improvements in anti-inflammatory ophthalmic medications are enhancing patient tolerability.

Over the past year, several new anti-inflammatory ophthalmic medications have been approved. While none of the active ingredients are novel, each of these new medications has made tremendous improvements in patient comfort, dosing consistency and tolerability. These enhancements have resulted in increased patient compliance. Understanding how these medications have improved is imperative when prescribing patients anti-inflammatory drugs.

This month's column will review several new drugs, focusing on the numerous changes from their previous generations. It is worth noting that none of the medications discussed in this article should be administered while wearing contact lenses. Typically, lens wear can be resumed 10 minutes after a drop has been instilled.

Corticosteroids

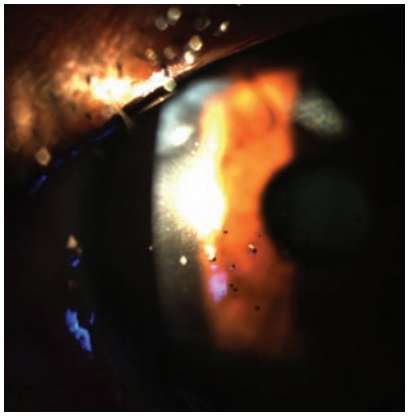
Lotemax ophthalmic gel (loteprednol etabonate 0.5%, Bausch + Lomb) was approved in October 2012 to treat postoperative inflammation and reduce pain following ocular surgery. Although it has the same active ingredient and concentration as the suspension and ointment forms, several enhancements to the gel formulation improve both patient comfort and tolerability.

The gel's pH level has been reformulated to more closely mimic that of the human physiological tear film (6.5 pH for the gel, 5.5 for the suspension). The concentration of BAK has been significantly reduced in the gel, from 0.01% to 0.003%, to minimize BAK-related adverse effects of stinging and ocular surface disease. The inclusion of boric acid and EDTA has allowed this reduction of BAK while at the same time bolstering its effectiveness.[1] To improve the mucoadhesive properties of the gel and help prevent sedimentation, povidone was replaced with polycarbophil. Propylene glycol was also added to the LE gel to provide additional ocular lubrication.

In addition to the new LE gel, Lotemax is also available in suspension and ointment forms. While both are appropriate in certain clinical circumstances, they do have a few qualities that limit patient comfort and compliance when compared to the gel formulation.

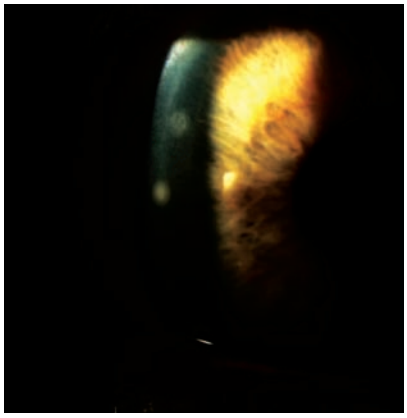
According to the package insert for Lotemax suspension—as well as most other suspensions—the patient is to "shake vigorously before using." Suspensions must be properly shaken to achieve equilibrium and ensure each drop contains a consistent dose of medication. Unfortunately, as we are aware, patients often fail to shake, and certainly not always vigorously, limiting clinical efficacy. While Lotemax ointment does obviate the need to be shaken, a sustained visual blur is commonly associated with ointment use. There is also a high potential for imprecise dosing, as patients have difficulty squeezing exactly a half-inch ribbon of ointment for each dose.[1]

A study conducted by Apt et al. showed that less than one-third of patients shake topical ophthalmic suspensions before instillation.[3] Other studies have shown that even with shaking, dose uniformity of suspension drops exhibits great variability.[4,5] This is where the use of the LE gel proves advantageous over both the Lotemax suspension and ointment. According to a poster presentation at ARVO 2012, the LE gel does not form sediment over 16 months, while Lotemax suspension does almost immediately.[6]



A patient with multiple metallic foreign bodies who benefited from a topical NSAID after removal.

When in the bottle, LE gel behaves as a semisolid gel. Upon dispensing from the dropper bottle, shear forces convert it to a liquid. It mixes readily with tears in this liquid form, minimizing visual disturbance yet remaining viscous enough to maintain ocular surface retention.[1,2] These improvements make the LE gel a more convenient and patient-friendly option vs. the suspension and ointment forms.



A patient with inflammatory lesions that would benefit from a steroid such as Lotemax.

Two multicenter studies were conducted comparing LE gel to vehicle in patients undergoing cataract surgery. As expected, LE gel was more effective at eliminating anterior chamber cells and pain than the vehicle.[7,8] More than 85% of the patients in both test groups reported no discomfort following instillation, confirming the improved ocular tolerability of the new formulation of LE.[2,7] There are currently no studies comparing LE gel to other formulations of loteprednol or other steroids.

In summary, LE gel is a new formulation of an ophthalmic corticosteroid with uniform dosing, which has eliminated the need for shaking, ensuring patients will achieve the proper dosage. LE gel has been shown to be both efficacious and comfortable upon instillation. It is available in one size, as 5 grams (contained within a 10 mL bottle).

Because blur with the LE gel has been minimal, there really is no compelling reason to select the suspension. The gel has much more consistent dosing than the suspension and should be more comfortable.

NSAIDs

Two new once-a-day topical ophthalmic NSAIDs have emerged within the past several months, Ilevro (Alcon) and Prolensa (Bausch + Lomb). Both are approved to treat postoperative inflammation and reduce ocular pain following cataract surgery.

Ilevro was approved in October 2012 and launched in January 2013. Ilevro is a more potent variation of Nevanac, containing a 0.3% concentration of nepafenac vs. the 0.1% found in Nevanac. Nepafenac, a prodrug, is converted by intraocular hydrolases to amfenac once it penetrates the cornea.

There is a slight change in pH with Ilevro, measuring 6.8 compared to 7.4 for Nevanac. Both Ilevro and Nevanac are preserved with 0.005% BAK and are formulated as suspensions, requiring the patient to shake before instillation. The inclusion of guar gum in the new formulation of nepafenac gives Ilevro the advantage of increased ocular surface retention time when compared to Nevanac. This reformulation permits Ilevro to be dosed just once a day vs. Nevanac's three times a day dosing. By increasing ocular surface retention time and decreasing the daily dosage requirements, Ilevro is a more convenient option for patients than Nevanac, which ensures an improvement in patient compliance.

The efficacy of Ilevro was evaluated in an Alcon-sponsored, double-masked, Phase 3 study of 2,000 subjects. Patients were randomized to receive nepafenac 0.3% once daily, nepafenac 0.1% three times a day, the vehicle of nepafenac 0.3% once daily or the nepafenac 0.1% vehicle three times a day. Each group used their study medications the day before cataract surgery and continued use for 14 days postoperatively. The

Table 1. Profiles of Nepafenac Cure Rates by Concentration and Dosing

	Nepafenac 0.3%	Nepafenac 0.1%	Nepafenac 0.3% Vehicle	Nepafenac 0.1% Vehicle
Cure Rate	68.4%	70.1%	34.0%	35.6%
Patients Pain Free at Day 14	91.0%	90.9%	49.7%	56.1%

primary outcome measure was the percent of patients "cured" at day 14, with cure being defined as no cells and no flare.

According to the data found in Table 1, the results of the study demonstrate that a once-daily dosing of nepafenac appears to be equally efficacious to a three times daily dosing of a lower concentration of the same agent.[9]

Another non-steroidal anti-inflammatory drug, Prolensa, was approved in April 2013. Its active ingredient, bromfenac 0.07%, is a lower concentration of the same agent found in Bromday (0.09%). Prolensa is preserved with the same concentration of BAK as Bromday, at a BAK concentration of 0.005%. Prolensa is also slightly closer to tear pH than Bromday—7.8 for the former, 8.3 for the latter.

Polysorbate 80, found in Bromday, has been replaced in the Prolensa formulation with tyloxapol, a substitution that has been thought to enhance contact time. Like Bromday, sodium sulfite is an added excipient and, therefore, this medication should not be prescribed to patients with a known sulfite allergy. Currently, there is no head-to-head study comparing Prolensa to Bromday. Prolensa is available in two sizes, 1.6 mL and 3 mL, both priced the same.

A study to compare Prolensa to Ilevro for the treatment of ocular inflammation after cataract surgery, sponsored by Discover Vision Centers with Bausch + Lomb as a collaborator, is currently enrolling 50 patients. Each drug will be used once daily beginning three days before cataract surgery and continuing for 21 days after surgery. The primary outcome measure will be resolution of intraocular inflammation (cells and flare). The anticipated completion date is February 2014.[10]

Each of these three new anti-inflammatory drugs offers distinct improvements over earlier formulations, including dosing consistency, improved comfort and less frequent dosing with comparable efficacy. Comparative studies that are underway will help provide additional evidence-based data to guide future clinical practice patterns of usage. RCCL

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By Mile Brujic, OD, and Jason Miller, OD, MBA

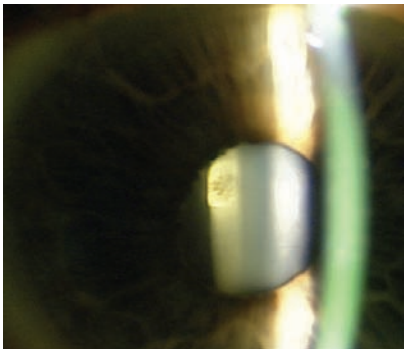
Every Pot Has a Lid

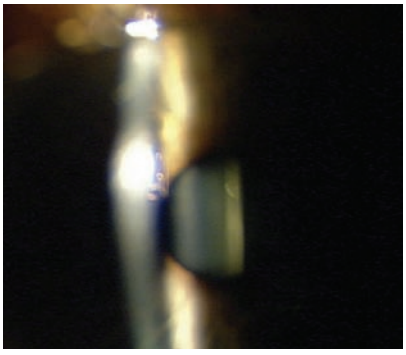
Keep current on the wide array of multifocal lens options and you'll find the right fit for each of your presbyopes.

When considering the reasons for contact lens dropout, we can no longer blame a dearth of options. Significant improvements in contact lens technology—specifically, the advent of new materials designed to improve hydration—increase oxygen permeability and allow patients long-lasting comfort. Additionally, recent improvements in multifocal contact lens designs have created an opportunity to retain patients with presbyopia by correcting this frustrating visual deficit with contact lenses.

Lens materials have never been better and the visual performance of multifocal contact lens options has continued to improve, creating an opportunity for practice growth. And yet, presbyopia is precisely the point at which dropout becomes epidemic. Are you actively embracing all contact lens options to improve your presbyopic patients' experience with contact lens wear?

Aside from such practice benefits, it is simply very rewarding to fit baby boomers with contact lenses. But to better manage presbyopic patients, eye care practitioners need to be more robust in their approach. In a survey of 500 patients with presbyopia, just 8% of current contact lens wearers reported being told about multifocal contact lenses when first complaining about their near vision.[1] In addition, 33% of respondents indicated that they would likely seek the services of another practitioner if their current practitioner did not inform them of multifocal options.[1]





1, 2. The exam revealed bilateral posterior subcapsular cataracts (OD left, OS right).

As an eye care professional, it is important to keep current on presbyopic contact lens choices to present patients' options in a positive manner, while at the same time setting realistic vision expectations. For example, it's critical to try to communicate presbyopic fitting in such a way as to avoid words with a negative connotation like "compromise" or "loss of vision." Instead, describe multifocal lenses as "customized" or "balanced" according to each patient's visual system.

If the patient needs readers to see the phone book or medicine bottles, let him or her know that this is normal and may be necessary. If you can eliminate a patient's need for reading glasses 90% of the time, it is still a victory.

Case Report

DS, a 54-year-old white female, presented with complaints of blurred vision at both distance and near with her current contact lenses. Specifically, vision in her right eye tended to fluctuate more throughout the day than in her left. She considered discontinuing contact lens wear due to her loss of clear, crisp vision. At the time, she wore soft toric monovision contact lenses, with an average wear time of 8-10 hours.

Due to her growing visual and comfort symptoms, wear time had been steadily decreasing. DS, a teacher who used a computer for approximately 2-3 hours a day, complained of dry eye, discomfort and ocular fatigue with her current contact lenses. She also mentioned that her night driving had become increasingly difficult.

The patient's medical history was positive for rheumatoid arthritis and osteopenia. She was being treated with an as-needed steroid shot, as well as calcium additives. Ocular history was positive for small posterior subcapsular cataracts (PSC), both OD and OS. She complained about these symptoms, reporting that she noticed that there was a further loss of crispness in her vision, specifically regarding night driving.

Her manifest refraction was:
OD: -4.50 -1.00 x 030 20/20
OS: -4.50 -1.50 x 005 20/20
Add +2.25 20/20 OU

DS had been wearing her current contact lenses for the past three

years and enjoyed the freedom that contact lenses provided her vs. wearing spectacles. Her contact lens Rx at presentation was:

OD: -4.25 -0.75 x 030
Distance = 20/25-2
Near = 20/50-
OS: -3.00 -1.25 x 180
Distance = 20/50
Near = 20/30

The patient's keratometry readings were:

OD: 44.50 / 45.75 @ 097
OS: 44.75 / 46.75 @ 094

Slit-lamp exam revealed a small "off-center" PSC OU (see figures 1 and 2).

There are a plethora of viable contact lens modalities that might suit her needs, including: single vision soft toric (monovision or distance with over-readers), single vision RGP, single vision hybrid, multifocal soft toric, multifocal RGP and multifocal hybrid contact lenses. There are many varieties in each of these categories.

Doctor-Patient Decision

After reviewing her various contact lens options, DS was successfully fitted with hybrid multifocal contact lenses. Appropriate visual expectations were discussed thoroughly (i.e., that these lenses would allow her to have clear distance, intermediate and near vision for most visual tasks), as were the fees involved and the importance of follow-up care with her ahead of time. Other important aspects to convey to the patient were the basic principles of a simultaneous lens design and, as this was a custom-made lens, the expected time it would take for the fitting, fabrication, shipping and subsequent progress visits.

Simultaneous Vision Designs

Make sure to touch on the technology and explain to your patients that simultaneous vision designs deliver near, intermediate and distance correction simultaneously. These lenses offer a more gradual change between viewing zones vs. the "jump" between zones that comes with translating designs.

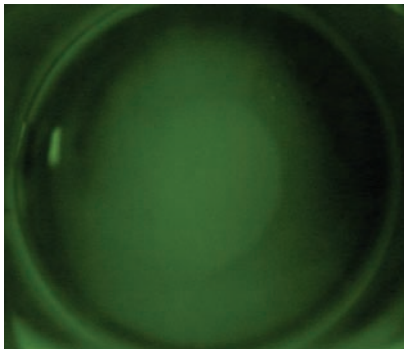
When beginning to fit a patient, err on the side of better distance vision, and inform the patient that the near vision performance will improve as the fitting process continues. This policy goes along with the golden rule of multifocal contact lens fitting: "If patients experience good distance vision initially, they will wear their lenses into their follow-up exam. If they don't, they will carry them."

The patient's initial experience is critical step. Consider conducting a practical test at the dispensing visit (other than a visual acuity measurement) to determine a difference in functionality with the lenses. For example, ask patients to look at their cell phones, specifically directing them to let you know if they can see the numbers clearly. For smartphone users, ask if they can read an email. This demonstrates the "real-life" improvement in vision multifocal contact lenses can provide.

Conclusions

Both patients and practitioners have quite an array of available multifocal lens options (in soft, hybrid and gas permeable) to choose from. If we provide an individualized approach and take full advantage of current technologies, we have the ability to improve our presbyopic patients' wearing experience while at the same time curtailing dropout.

This case demonstrates the importance of understanding the various multifocal designs and how to best "set the stage" with proper education and strategies for this demanding patient population. Keeping current on contact lens options for our presbyopic patients will help eye care professionals' present multifocals in a positive light, while setting realistic vision expectations for patients. The time spent discussing contact lens options is a critical aspect in successfully fitting multifocals. Understanding patients' hobbies, visual needs and real-world goals for their contact lenses will help best guide your fitting process. RCCL



3. The patient's contact lens on-eye performance, showing proper centration and fit.

1. Studebaker J. Soft multifocals: practice growth opportunity. Available at: www.clspectrum.com/article.aspx?article=103013 (Accessed July 2013).

By Jason Jedlicka, OD, FAAO

Hybrids for Irregular Scleral Shapes

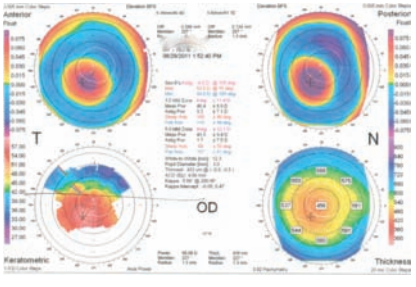
Vaulting hybrid lens designs offer an alternative to scleral lenses when dealing with irregularly shaped scleras and corneas.

Gas permeable lenses and keratoconus have traditionally gone hand in hand. Many keratoconic patients suffer from visual deterioration that only a GP lens can improve. Unfortunately, in some instances, many of these patients are unable to wear GP lenses comfortably, which creates a constant struggle for these individuals. The GP lens bearing on the cornea can cause a dry, irritated sensation in the eyes, and in some instances, recurrent epithelial erosions.

The recent availability of scleral GPs has allowed many individuals to experience significant improvement in lens comfort and tolerance, due to their fit characteristics of apical clearance and a maintained pre-corneal fluid chamber.

There are also some situations in which individuals can have highly irregular scleral shape. An asymmetric, irregular sclera—whether it is naturally occurring or the result of an ocular trauma or surgery—can present a challenge for eye care professionals when attempting to get an optimal fitting scleral lens.

A vaulting hybrid lens design, such as the SynergEyes ClearKone or UltraHealth, offers an alternative to scleral lenses when central corneal clearance is necessary. The advantage of a hybrid design is that the soft skirt will drape over highly irregular scleral shape and allow for a successful lens fit. Consider the following case, which demonstrates this very situation.



1. Topography of the right eye demonstrating keratoconus.

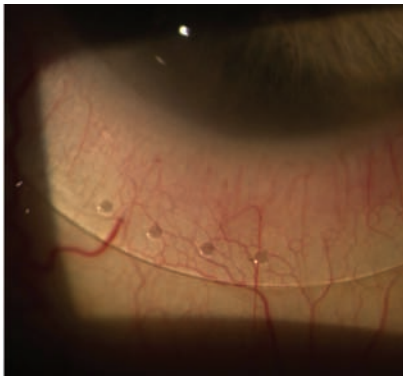
A Case Study

ND, a 34-year-old white male, presented with a history of Marfan's syndrome. This condition led to dislocated crystalline lenses in each eye, lens extraction and aphakia. Some years later, he suffered a retinal detachment in his right eye, which was repaired successfully with a scleral buckle. He had worn GP lenses for his high hyperopia for several years with no issues; however, approximately three years prior to his initial visit with me, he noticed significant changes to his right eye due to the development of keratoconus (figure 1). His primary care optometrist had him refitted in new corneal GP lenses, but he was struggling with lens comfort, and was being referred for refitting of the keratoconic, aphakic right eye.

Following much testing and discussion, ND was eventually fitted into a 17.5mm scleral lens in his right eye. While the scleral lens did improve his lens comfort, it also led to significant 3-9 conjunctival redness and irritation. It was revealed at follow-up that the sclera was not spherical, so a lens with a toric landing zone was ordered to improve the fit. While the toric landing zone did in fact improve the fit, ND reported frequent issues with bubbles getting under the lens just moments after insertion.

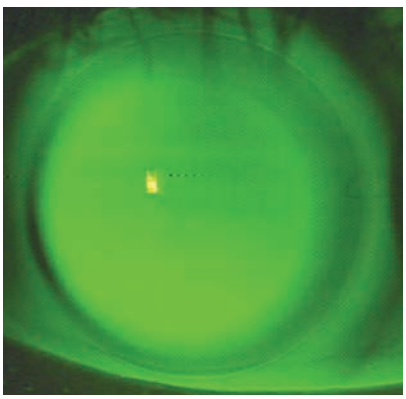
After reviewing the proper insertion technique with a toric lens, it was clear that the bubbles had originated from the inferior landing zone area, as the steep meridians superiorly and inferiorly were not opposing each other. This caused the lens to alternately rotate and led to intermittent inferior edge lift, which allowed bubbles to get under the edge when the lens shifted counterclockwise (figure 2).

After reassessing his options, we attempted a fit in a SynergEyes ClearKone, with the hopes of letting the soft skirt drape the sclera and avoid edge life, while still vaulting the very centrally located nipple cone. A lens was successfully fit, with a vault of 300 and a medium skirt. However, due to his aphakia, the power needed was +11.50, which is not an available parameter. After consulting with the lab about this case, they agreed to make a special order lens with the necessary +11.50 power.



2. A toric scleral lens on the right eye, with blanching adjacent to a well-aligned landing zone in the same quadrant.

ND returned four weeks later to pick up the special order ClearKone



3. A SynergEyes ClearKone lens on the right eye.

lens. He was pleased with both the fit and vision. After wearing the lenses for a few weeks, the 300 vault was eventually exchanged in favor of a 350 vault (figure 3). He was able to use the new ClearKone without the issues he had with the scleral lens. Earlier this year, he was refitted into the new UltraHealth design to allow enhanced breathability with the high prescription.

Conclusion

Scleral lenses are amazing tools to help patients get the vision they need when an irregular cornea exists. However, in certain cases, scleral irregularities may exist due to prior trauma, surgery or natural changes to the scleral surface. When this occurs, it can be difficult to get an even, aligned fit of the lens to the sclera. Quadrant-specific designs do exist for scleral lenses, and can often be employed in complex sclera situations. However, in cases where a hybrid lens is appropriate—such as in centrally located keratoconus—these lenses can be just as successful and potentially less complex. RCCL

By Christopher W. Lievens, OD, MS, and Crystal Brimer, OD

Our Motto: To Protect and Serve

Like other professionals who support the public interest, we in the eye care community have an obligation "to protect and serve." Our success is measured by our patients' safety and satisfaction. Any effort that helps in advancing that goal must be pursued vigorously.

Clinicians are still abuzz over the data revealed in the recent FDA-sponsored in vitro research into the disinfection efficacy of contact lens solutions in the presence of a lens. The research found that the uptake of the polyhexamethylene biguanide (PHMB) solution (0.0001%, six-hour soak) caused a reduction in the PHMB concentration and reduced disinfection efficacy against both *Staphylococcus aureus*[1] and *Fusarium solani*.[2] When disinfectant is released from the lens, it may have a negative effect on human corneal epithelial viability and barrier function.[3,4]

A study of a solution with POLYQUAD®/ALDOX® preservatives, by contrast, found that in the presence of a lens, the residual concentration of POLYQUAD®/ALDOX® preservative was reduced only slightly over time, and storage with the lenses did not adversely affect biocidal efficacy.[5] Only one solution containing PHMB was tested, and it is important to not generalize the results of the FDA-sponsored studies. But currently 50% of patients are using PHMB-based solutions, many of which are generic or store-branded products[6] and this research shows one of the potential differences in solution products.

Doctor/Patient Disconnect

Although 56% of doctors say they routinely make lens care recommendations, only 31% of patients reported receiving a recommendation for a specific product.[7]

The recent research should compel us to give more attention to the solutions we choose, and to make more deliberate recommendations to our patients—a much-needed move considering that 51% of patients said they would forego a free sample in exchange for education on which solution to use and why.[8]

Although we frequently give out samples, we do not always explain why we recommend specific products for our patients. Of the patients who received a specific recommendation, 77% purchased accordingly.[7] If we take the time to fully understand the recent FDA-sponsored research, we can use it to help shape what lens care products we recommend to our patients.

Educating Patients

It's important to educate patients on lens care compliance.

Ask each patient to bring in everything they use for their contact lenses at *every* visit. Too often we focus on education for new wearers, assuming that our established wearers are behaving as we taught them. In reality, they may be the most apathetic of all, having developed bad habits for which they perceive no untoward consequences. Over time, experienced wearers were less likely to follow their eye care professional's recommendation.[7]

It is worthwhile to display information on proper cleaning and disinfecting techniques for the contact lens and lens case, and require that even established wearers review it yearly with their doctor. Another way to promote compliance is to send email reminders of lens care recommendations and proper technique following their exam, or perhaps midway through the year when they may have relaxed their regimen. Also discourage "topping-off" or re-use of solutions, which can add risk, especially considering the potential reduction in biocidal efficacy following PHMB uptake[1,2,9] shown in the FDA-sponsored in vitro testing.

Discomfort remains the number one reason contact lens wearers drop out of the modality.[10] If we commit to purposefully choosing and recommending lens care regimens, we have the potential to improve not only their success and comfort, but also our retention rate.

Ultimately, our patients listen to us. We are entrusted with responsibility for their eye care, but the benefits of patient safety and satisfaction stretch far beyond the fulfilling of an obligation.

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Additional references available at www.reviewofcontactlenses.com.

By Christine W. Sindt, OD

Are We Condoning Non-compliance?

Our challenge: promote healthy contact lens use among daily disposable wearers without giving these patients a pass for bad behavior.

I will admit that during a certain portion of my exam routine, I turn on the autopilot and simply go through the motions. Be honest, how many times have you been lost in thought, maybe about your plans after work, or started putting together your grocery list while your attention should be focused on refracting? With that said, it should have come as no surprise to me when—without any thought at all—I handed my nine-year-old daily disposable contact lens patient a contact lens case to remove her lenses before dilation.

"What's that?" she innocently asked. "Well," I started, "it's a case to store contact lenses in when they are not being used." At this point her face instantly crinkled up as she blurted out, "Why would anyone ever want to do that? Yuck! Just throw them away."

Kids Say the Darndest Things

It was at this point that I realized she was looking for ways to achieve compliance. This young lady was still pure and untainted by the everyday non-compliance drivers of the world: money, time and laziness. Here I was—the protector of her eyes—telling her that it was OK to put the lenses back in after they had been removed. No fresh pair, no lens disinfection, no hand cleaning. I had offered her a pass for non-compliance.

This led me to ask myself the question: how many times have I done this in the past? And is this really as bad as I'm making it out to be? Should I be prepared with two sets of lenses for every exam—one for the fitting and one for after the dilation? Do the contact lens manufacturers consider these factors when calculating the number of diagnostic lenses they give us?

Also, what should I tell patients when they ask me, "Is it OK to take my lenses out when swimming and then put them back in again?" Should I dispense solutions to daily disposable wearers, knowing it will increase the risk of extended wear, which would encourage non-compliance? When I ask these questions to most practitioners, this is exactly what they instruct their patients to do. Yet they also believe that wearing a daily disposable contact lens more than once is a non-compliant behavior, one that puts their patients' eye health at risk.

The question of length of wear in lens care also requires some attention. Is wearing and cleaning a daily disposable lens for two to four days and then throwing it away any worse than wearing and cleaning a traditional disposable lens for two to four weeks, or sometimes even longer? Which system generates more deposits? Which modality poses an increased risk of infection?

Give them an Inch…

Is the real problem that we generally don't offer our daily disposable patients cleaning products, which leads them to disregard cleaning or disinfecting their lenses? Despite the benefit daily disposables provide in obviating the need for lens care, patients sometimes do still wear them for several days. Are we worried that if we give them cleaning products, the patient will then take the next step and wear their single-use lenses for upwards of two to four weeks? Is it best, as some practitioners have told me, to wait until the patient brings up cleaning/storing to have the conversation with them about disinfecting and proper lens care?

In general, I educate my patients on what I believe are the safest ways to wear their contact lenses. I tell my daily disposable wearers that the lens is always most comfortable and cleanest right out of the packaging, and to avoid wearing them beyond their recommended replacement frequency. If the patient needs to take the lens out for any reason, it is best to simply put a new lens on. If that is not an option, as sometimes is the case, then the lens must be disinfected before it can be reinserted into the eye, but it most likely won't feel as comfortable as the first wear. I tell all my patients that there is no shortcut to safety—one way or another, the lens must be clean when it is reinserted in the eye.

In general, I don't worry much about the number of times a patient wears a lens. Daily disposable patients want to be comfortable, and as a result, are generally more compliant than traditional disposable lens wearers. I don't pretend to have all the answers, but this reminds me—I need to stop at the grocery store after work today. RCCL

Presbyopia: When is Surgery the Best Option?

A look at the advantages and disadvantages of interventions for this perennial problem.

By David A. Shiple, MD, and James V. Aquavella, MD

The need to address presbyopia is one that eye care practitioners face on a daily basis. This age-related change, in which accommodative ability is insufficient for near vision tasks, usually starts to manifest clinically around the ages of 40 to 45. As of 2005, presbyopia had impacted the lives of an estimated 1.04 billion people worldwide.[1] The global burden will continue to increase commensurate with the aging of the population.

While the onset of presbyopia is an inevitable part of aging, its effects can be treated through a variety of surgical and nonsurgical techniques. Successful management of presbyopia can substantially improve health-related quality of life. Corrective lenses have of course been the mainstay option for centuries, but the advent of surgical interventions—most developed within the last decade—have radically altered the playing field. Surgical solutions offer a durability of effect that patients may find justifies the expense and risk.

Any surgical option will necessarily be compared against the various passive optical methods available to treat presbyopia—e.g., monovision, multifocality and bifocal or progressive addition lenses—where the risk of injury is nil and the clinical performance is well established. Such solutions can provide patients both functional near and distance vision to treat the symptoms of presbyopia in a noninvasive manner. While the concept of spectacle-free aging

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Dr. Aquavella established the cornea research lab at the University of Rochester and directed cornea research and fellowship training programs for 25 years. He is professor of ophthalmology at the University of Rochester Flaum Eye Institute, where he coordinates dry eye research.

via contact lens wear is attractive, those options do have inherent limitations and may not be appropriate for every patient.

In response, several surgical technologies have been explored and developed to correct presbyopia: monovision laser in situ keratomileusis (LASIK), photorefractive keratectomy (PRK), conductive keratoplasty (CK), presbyopic LASIK (presbyLASIK), corneal inlays, and monovision or multifocal intraocular lens (IOL) placement. Each of these procedures has their advantages and disadvantages, and no single method has emerged as the ultimate solution for presbyopia correction.

It is important that clinicians have an understanding of the various trade-offs associated with each procedure to better educate their patients. It is important for practitioners to recognize that while present emphasis involves the exploration of perhaps more glamorous surgical options, a significant amount of research is being conducted into improving the contact lens as well as the monovision-related options. This is clearly an arena in which basic optics, visual physiology and technological innovation converge.

Monovision LASIK

One of the numerous surgical techniques available to treat presbyopia is LASIK, targeted for monovision refractive status postopereratively. Success rates from monovision can range anywhere from 72% to 92.6%.[2,3] The technique does not come without flaws, as various drawbacks are associated with monovision. The procedure can potentially induce anisometropia and reduce binocular acuity and stereopsis.[2] The exact level of anisometropia that should be targeted remains controversial. Factors correlated with better results include good intraocular blur suppression, post-op treatment of anisometropia of less than 2.50 diopters, successful distance correction of the dominant eye, good stereoacuity, lack of esophoric shift, and the patient's willingness and motivation to adapt to monovision.[3-7]

In addition to proper patient selection and understanding of monovision, individuals must be informed of both the risks and benefits of LASIK as a whole. Postoperative complications such as haze, ocular pain, flap issues, ectasia and dry eye must be discussed with the individual prior to the procedure, in conjunction with a thorough examination of the eye and assessment of corneal biomechanical properties.

PresbyLASIK

An alternative to monovision LASIK is to create a corneal flap and apply a variably ablative treatment pattern to the stroma, creating a multifocal cornea. Different algorithms to create a multifocal cornea have been investigated, all falling under the rubric *presbyLASIK*.[8-10]

In the peripheral presbyLASIK procedure, the central cornea is treated for distance acuity, while more peripheral corneal tissue is removed as a means to create a negative asphericity to increase depth of field. Because the relative amount of corneal tissue ablated to create the peripheral asphericity is higher in myopic eyes, this technique has been practiced more in hyperopic presbyopes. Safe peripheral presbyLASIK may be limited to emmetropes, hyperopes and low myopes.

Another technique in this family of options—central presbyLASIK—creates a hyperpositive area in the central cornea for near acuity, while reserving the peripheral cornea for distance. Central presbyLASIK is pupil dependent and targets a similar purpose as diffractive multifocal lenses, leaving the central cornea clear for near vision. This technique is advantageous because it requires less excision of tissue in both myopic and hyperopic corneas.[8]

PresbyLASIK has broad potential application in both phakic and pseudophakic presbyopes. However, at this time, both methods of presbyLASIK require further study and scientific evaluation prior to more widespread use. Potential disadvantages to this procedure may include unwanted diffractive effects, improper centration and alignment, and progression or loss of effect due to the biomechanical properties of the cornea. A study by Alio et al. reported reduced contrast sensitivity in these patients, and questioned whether higher aberrations and changes in the retinal point-spread function were the root cause.[9]

As with other forms of LASIK, complications such as postoperative haze, ocular pain, flap issues, ectasia and dry eye must be discussed with the individual before performing the operation. Exclusion criteria for this method will likely include patients with keratoconus, corneal ectasia or any corneal opacity.

Conductive Keratoplasty

Conductive keratoplasty (CK) has been used to treat low hyperopia and presbyopia in the past, but has fallen out of favor in recent years. CK is advantageous because it is a nonablative, noninincisional procedure that uses radiofrequency energy to steepen the cornea. This energy is delivered by inserting a fine tip into the peripheral cornea stroma in a ring-like

pattern. CK lessens the trade-off inherent in monovision correction that provides near-vision correction at the expense of distance correction; CK generally achieves more gain at near than detriment at distance.

Although short-term results are promising, CK has been shown to regress significantly over time. In a smaller six-year follow up period, Ehrlich found the mean manifest refraction spherical equivalent (MRSE) to be +0.295D at 23 months, +1.00D at 48 months, and +1.394D at a mean final follow up of 73 months. Uncorrected distance visual acuity deteriorated along with this trend.[11] An additional shortcoming is the potential for induced astigmatism if either a treatment pattern is not centered or from circumstances that may change the uptake of radiofrequency energy between treatment spots.

Because of this significant regression of refractive effects, patients should be counseled that this refractive procedure is not a permanent solution.[12] Individuals with a history of corneal surgery, keratoconus, pellucid marginal degeneration, epithelial disease or endothelial dysfunction may not be good candidates for this procedure.

Intracor

A less invasive application of laser ablative surgery has also been developed for the correction of presbyopia. In this procedure—known as Intracor—a femtosecond laser ablates only intrastromal corneal tissue, sparing the epithelium. The femtosecond laser energy is delivered in a series of concentric disruptive cylindrical rings within the posterior cornea stroma that extend out to mid stroma. Intraocular pressure then induces central steepening of the anterior corneal surface.

The entire pattern of applied laser depends specifically on an individual's refractive error; the procedure improves both uncorrected near and distance visual acuity. Because this technique is entirely intrastromal, the epithelium remains intact, pain and inflammation from exposed ocular surface is avoided, recovery time is shortened and anterior stromal corneal fibers are preserved.[13]

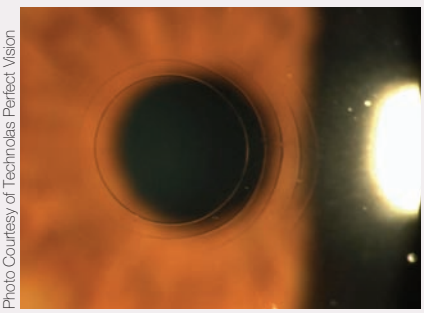

Photo Courtesy of Technolas Perfect Vision

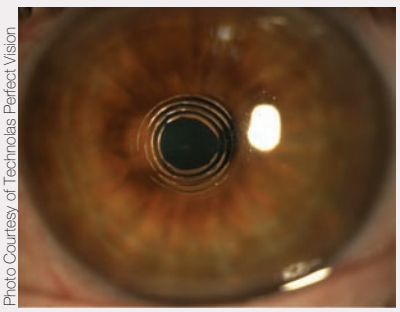

Photo Courtesy of Technolas Perfect Vision

Three hours (left) and one day (right) post-Intracor treatment.

So far, initial results are promising, but patient selection criteria have not been correlated with refractive outcomes.[13] Similar to many other new surgical presbyopic therapies, further investigation is required prior to widespread adoption. Because recent studies have only looked at a small number of eyes, further research is necessary. Larger studies with longer follow up are recommended to provide a better understanding of outcomes and help characterize possible effects on corneal biomechanical properties.[13,14]

Corneal Inlays

LASIK monovision, presby-LASIK and Intracor are all ablative therapies; corneal inlays for presbyopic correction offer an additive solution in which no corneal tissue is removed. Three style design types currently exist to improve presbyopia: refractive optic inlays, corneal reshaping inlays and small-aperture inlays. In each design, a corneal flap is created and the inlay is implanted entirely intrastromally. Refractive optic inlays act as a small lens inserted into the central cornea to improve near vision. Corneal reshaping inlays aim to reshape the anterior curvature of the cornea. Small-aperture inlays, like the Kamra from Acufocus, are designed to increase the depth of field by using the principle of small-aperture optics to restore both near and intermediate visual acuity.[15,16]

Each design type is in various stages of the FDA approval process. As a whole, corneal inlays are advantageous because they offer potential reversibility as well as the possible application to a wider array of corneas. Corneal inlays have been safely performed in both hyperopic and myopic presby-LASIK patients, further extending their usability.[17] The Kamra small-aperture inlay has also had successful longer-term follow in both natural and post-LASIK emmetropes.[16,18]

Intraocular Lenses

The options described above are examples of extraocular solutions to refractive and presbyopic visual needs. Phakic individuals who have visually significant cataracts with symptomatic presbyopia may instead elect for intraocular surgical correction by cataract removal and intraocular lens placement. To correct for presbyopia, there are

a few options: IOL placement targeted for monovision, accommodative IOLs and multifocal IOLs. Monovision has been previously reviewed, and one must discuss anisometropia and reduction of both binocular acuity and stereopsis to ensure appropriate patient selection before recommending such a solution. Pseudophakic monovision can be very effective, as it has received overall high patient satisfaction.[19]

There are currently two types of intraocular lens designs to correct for presbyopia. Lenses that are marketed as accommodating operate under the assumption that the lens can undergo axial shift under ciliary muscle contraction. However, current accommodative IOLs have come under some critical review, as distance-corrected near visual acuity has not been statistically correlated with axial shift in these lenses.[20]

Multifocal IOLs are another design option used to correct presbyopia. These lenses use either a refractive or diffractive technology to create simultaneous images on the retina. This technique is used to broaden the range of vision and facilitate independence from spectacles. In well-selected patients, these lenses have been used successfully. However, patients may experience some complications, such as loss of contrast sensitivity, glare, halos and the need for IOL exchange.[21]

Given these potential complications, IOLs should not be recommended to patients who have a significant requirement for night driving, or professional drivers or pilots.[22] Both multifocal IOLs and monovision strategies can successfully correct presbyopia and refractive error in many patients.[21] The risks and benefits of intraocular surgery should always be discussed with the patient.

While there are various surgical and nonsurgical options available, a perfect solution to correct presbyopia does not yet exist. Thorough history, review of ocular systems

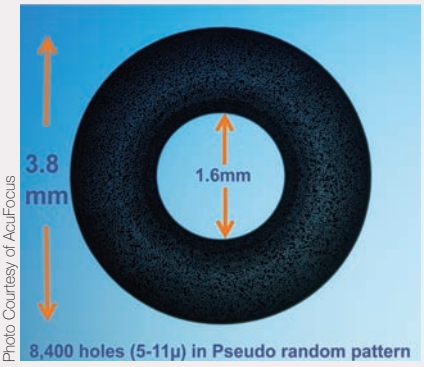

Photo Courtesy of AcuFocus

The Kamra inlay has a total diameter of 3.8mm, with a center aperture of 1.6mm.

and examination is necessary to better advise and help patients make an educated decision that best suits their needs. Each option has its own advantages and disadvantages and it is imperative to ensure that patients have realistic expectations and goals when correcting presbyopia, as there will always be tradeoffs with any of the aforementioned techniques. Ultimately, it is up to the clinician and patient to decide which alternative will work best to reach the patient's goals for spectacle-free vision. RCCL

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CE TEST

1. Which of the following is not a corneal surgical remedy for presbyopia?
A. conductive keratoplasty
B. presbyopic LASIK
C. multifocal intraocular lens
D. corneal inlays

2. The success rate for monovision is approximately:
A. 80%
B. 10%
C. 55%
D. 45%

3. Which of the following are possible complications of LASIK?
A. corneal haze
B. flap slippage
C. postoperative ectasia
D. all of the above are possible complications of LASIK

4. PresbyLASIK works best for:
A. moderate myopia
B. emmetropia
C. high hyperopia
D. none of the above

5. Conductive keratoplasy has all of the following concerns, except:
A. regression is common
B. the scars are placed over the visual axis
C. induced astigmatism
D. has minimal refractive effect

6. Which of the following is a complication or disadvantage of multifocal intraocular lenses?
A. carries higher risk of CME than a monofocal lens
B. generally requires a larger corneal incision for insertion
C. some patients experience glare
D. will always require some plus lens addition to read

7. Intracor describes the following procedure/device for presbyopia:
A. an artificial cornea
B. laser ablation of the stroma with femtosecond lasers
C. a diffractive intraocular lens
D. monovision LASIK

8. Which presbyopic surgery does not remove corneal tissue?
A. Kamra corneal inlay
B. presbyLASIK
C. Intracor
D. LASIK monovision

9. Central presbyLASIK has all of the following characteristics/traits, except:
A. creates a hyper-negative area in the center of the cornea
B. the peripheral cornea is used for distance acuity
C. is pupil dependent
D. central cornea is clear for near acuity

10. Which of the following is not a viable option to treat presbyopia using an intraocular lens?
A. monovision with a 2.00D add effect
B. multifocal IOL
C. accommodative IOL
D. an aspheric IOL to correct spherical aberration

Examination Answer Sheet

Valid for credit through September 1, 2016

This exam can be taken online at www.reviewofcontactlenses.com.
Upon passing the exam, you can view your results immediately.
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Directions: Select one answer for each question in the exam and completely darken the appropriate circle. A minimum score of 70% is required to earn credit.

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1 = Excellent 2 = Very Good 3 = Good 4 = Fair 5 = Poor

Rate the effectiveness of how well the activity:

11. Met the goal statement: ① ② ③ ④ ⑤
12. Related to your practice needs: ① ② ③ ④ ⑤
13. Will help you improve patient care: ① ② ③ ④ ⑤
14. Avoided commercial bias/influence: ① ② ③ ④ ⑤
15. How would you rate the overall quality of the material presented? ① ② ③ ④ ⑤
16. Your knowledge of the subject was increased:
◯ Greatly ◯ Somewhat ◯ Little
17. The difficulty of the course was:
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① SS # ___ - ___ - ___

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Signature _____ Date _____

Lesson 109349 RO-RCCL-0913

Advertorial

Meeting the visual challenges of a digital world

Selecting daily disposable contact lenses that provide comfort and visual clarity

By David I. Geffen, OD

Evidence of the explosion in digital devices is all around us, but less obvious perhaps are the ways in which to help our patients respond to the unique visual challenges this revolution poses. Recent statistics document that many of our contact lens patients spend much of their workday using a computer and a significant amount of time outside work on a computer or other electronic device – often amounting to 10 or more hours a day.[1] Indeed, such increasing amounts of screen time are consistent with the reported high rates of electronic device ownership among American adults, with 88% now owning a cell phone, 61% a laptop computer, 18% a tablet computer, and 18% an e-reader.[2] Among younger patients this trend is in full swing.

In my own practice we routinely ask patients about their use of computers and other similar devices both on the intake form as well as verbally. And, as a sign of the times, I have taken to having patients use their smart phone in place of a near point card to test that aspect of their vision. But are there other clinical considerations that might possibly increase the chances of success in selecting daily disposable lenses for our patients? We know, for example, that the blink reflex decreases during computer use,[3] increasing the likelihood of dryness. This in turn can have significant effects on both comfort and clarity of vision. I'd like to share with you some data as well as personal experience on the use of Biotrue® ONEday, a lens whose properties specifically address the issue of dehydration and provide excellent optical performance in a daily disposable modality.

The Biotrue® ONEday lens is made from HyperGel™, a new contact lens material designed to imitate physiologic properties of the human eye. These include a level of oxygen transmission sufficient to maintain white, healthy eyes and water content that matches the 78% water content of the cornea.[4,5] Perhaps the most important breakthrough of the HyperGel™ material, however, is that it has an outer surface designed to mimic the lipid layer of the tear film to minimize dehydration of the lens and therefore maintain consistent optics.[6] This is important because contact lenses can dehydrate throughout the day, which can lead to discomfort and blurred vision.

My own practice is located in a high-tech area, where it is not unusual to have patients who spend an entire 8-9 hour workday on a computer, and then another few hours at home on the computer or other digital device for recreation. What I have found is that with the Biotrue® ONEday lens, even patients who work long hours at their computers or using other digital devices experience comfortable vision. By keeping maximum moisture, the lens maintains its optics so that patients have a level of vision that is crisp and clear throughout the day, which is really important if you are staring at a computer monitor all day.

The bottom line from a practice point of view is that many more of my daily disposable patients not only remain loyal and keep coming back, but they refer their friends and family as well. It's very gratifying to demonstrate for patients that evolutions in digital technology can also be matched by improvements in lens technology so that we are able to recommend eye care that keeps pace with other aspects of their lives. ■

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HL6563

Don't Let These Clinical Scenarios Prevent Success with Presbyopes

Fitting presbyopic patients with contact lenses often poses a challenge, but none of these problems are insurmountable with the proper plan.

By Douglas P. Benoit, OD, FAAO

Dr. Benoit is senior optometrist with The Eye Center of Concord, a multisubspecialty ophthalmology group located in Concord, NH. He is a Diplomate of the Section on Cornea, Contact Lenses and Refractive Technologies of the American Academy of Optometry.

Much has been written about how to succeed in multifocal contact lens correction of presbyopia. The emphasis, understandably, is usually on the lens design parameters and how to customize them for your patients. Knowing which lens to use in a particular case is extremely important, which is why we need to make sure we ask the right questions and conduct a thorough preliminary examination.

We are all familiar with the attributes of a desirable multifocal contact lens candidate: a healthy and wet ocular surface, normal pupil size, a refractive error within certain parameters, proper motivation and realistic expectations.[1]

What about patients who do not meet some, or any, of these criteria? Should we simply abandon these patients and consider them lost causes? That would certainly be a mistake. In this article we will explore these issues and ways to make sucscesses out of what we would typically consider questionable prospects.

Ocular Health Screening

First, let's discuss ocular health status. Generally speaking, a compromised eye is not a good environment in which to insert any contact lens, let alone one that must correct a multitude of refractive errors. There are certain exceptions to this, though. In our initial examination, we must assess the patient's lids and lashes, tear film, cornea and conjunctiva. If blepharitis is present, it must first be cleared up, otherwise there could be problems with debris

under the lens, or even *Staphylococcus*-related inflammation or infection.[2] Similarly, if Demodex proliferates, this overpopulation needs to be eradicated before the contact lens fitting. Left untreated, this ectoparasite can cause inflammation and pustules. Medications such as oral ivermectin[3] and localized treatments like tea tree oil have been used for treatment.

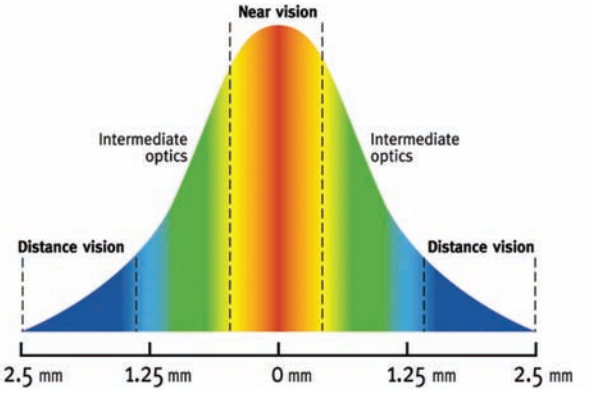
Pay special attention to the meibomian glands, lid wiper and tear film quality. Meibomian gland obstruction needs to be treated via warm compresses and/or expression. The importance of the lid wiper in external ocular health cannot be forgotten.[4] Lid wiper epitheliopathy (LWE) needs to be addressed and remedies found. LWE can manifest as ocular dryness and may be accompanied by keratitis, although some patients are asymptomatic. If an incomplete blink is involved, behavior modification can help, as can lubricants.[5]

Also, the tear film integrity is vitally important, as in all contact lens wearers. If there is debris in the tear meniscus, or if the meniscus is scant, we must find a remedy. Do not forget to check the tear film break-up time to ensure the ocular surface is sufficently lubricated to withstand the introduction of a contact lens into its environment. Lubricants and the other standard measures used for meibomian gland dysfunction can help return the system to normal.

Check the cornea for signs of epithelial basement membrane dystrophy, vascularization, superficial punctate keratopathy and frank keratitis. The cause of any epithelial disruption needs to found and treated.

Finally, it is also important to examine the conjunctiva. Both the bulbar conjunctiva and tarsal conjunctiva need to be evaluated—yes, you must evert the upper lid. The cause of any injection of the bulbar conjunctiva, or papillary/follicular reaction of the tarsus, should be found and appropriate measures taken.[6]

Suffice to say that any prospective multifocal wearer deserves at least as much screening and pre-fitting care as a wearer of spherical or toric lenses, if not more. Dry eye often develops independently but concurrently as these patients reach their 40s.



Representative center-near simultaneous image multifocal lens design.

Refractive & Lifestyle Factors

Once we are satisfied that the status of the ocular surface is suitable for contact lens wear, we can begin to consider the other aspects of presbyopic contact lens fitting. The list of possible "problem" patients includes those individuals with minimal distance refractive error but high add powers, younger patients with high adds, post-refractive surgery presbyopes, those with high astigmatism, older patients and patients with unrealistic expectations. Let's begin with the latter patient type.

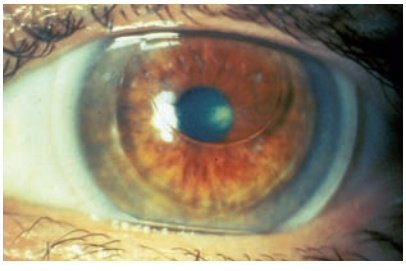
Any discussion of presbyopic correction strategies, either spectacle or contact lens approaches, needs to cover what these applications both can and cannot do. There are always trade-offs with any form of vision correction. Patients who expect their vision to be perfect at all distances will be disappointed. Simultaneous-image contact lenses use merged optics, which means that in order to get distance, intermediate and near vision in one lens there will necessarily be some compromise. Usually, either distance or near vision ends up slightly suffering, but still remains viable for most activities. Translating bifocals generally require the forgoing of intermediate vision, in exchange providing good distance and near acuity. So, it is important to first discuss the patients' needs and priorities, both for their work and leisure activities, and then pick the lens design most suited to the task.

Older patients can pose a challenge for a number of reasons. Many older individuals have relatively small pupils in ambient light. This type of patient may have difficulty getting the most out of simultaneous image designs. The same is true of patients with very large pupils. Thankfully for these patients, there are translating designs available. Older patients also tend to have decreased tear film volume and stability. Lubricants can supplement the warm compress regimen, and can be used before, during and after lens wear. Often, older patients can have flaccid lids, which might affect lens movement and translation. In these patients lens design choice is important—a simultaneous image lens may be the better option.

There is also the option of using an oculoplastics surgeon to improve lid performance prior to attemping contact lens fitting.

Very often, the older patient has higher add power needs as well. Patients with high adds, whether older or younger, can be a challenge. Those with a long history of spectacle wear are accustomed to their glasses providing crisp near vision, and they expect the same from the contact lens. A soft lens may not work well in such patients. Gas permeable lenses to the rescue! GP bifocals, particularly translating designs, allow for the correction of higher adds without degrading distance vision. In the case of the older patient, corneal sensitivity is often lower, so comfort may be less of a concern with GP wear than in younger patients.

For a younger patient who is attempting GP lens wear, the generally improved clarity will usually help them through the adaptation phase, and good comfort is eventually achieved through acclimation to lens wear. Gas permeable lenses also work very well for the patient who has very low myopia but needs a bifocal/multifocal.



Representative translating design bifocal contact lens.

There are certainly soft multifocal lenses that are appropriate for these patients as well, particularly early presbyopes, whose visual demands are not too taxing, or those patients who may not be willing to tolerate the lens awareness that comes with GP wear. It all comes down to patient needs and practitioner experience as to which design to fit first.

Say "No" to Mono?

Many studies have shown that vision and stereopsis is far superior with bifocal/multifocal corrections than in monovision correction.[7] Since both eyes have nearly equal acuity with multifocals, overall vision is clearer and depth perception is more normal. Monovision limits depth perception to such an extent that the FAA will not allow pilots to fly wearing monovision corrections. And as presbyopia advances, monovision eventually become less and less viable and must be abandoned. Rather than start the patient on a path that only offers a short-term solution—and one that comes saddled with visual compromises at that—it seems prudent to take a long-term perspective and have patients accept that adaptation to multifocal optics is the better way forward.

That said, there is a place for modified, or enhanced, monovsion in presbyopic contact lens correction. Most designs take into account the role of eye dominance in vision. For this reason, the end visual result can be improved by biasing our power selections in the lenses.

We must not forget that, for some individuals, single vision contact lenses with reading glasses might be the best option. It is even possible to use single vision lenses for near and put on glasses over them to enhance distance vision. However, most presbyopes presenting for contact lens evaluation desire to be spectacle-free and that should remain our goal.

Another area where GP lenses shine is in fitting a presbyopic post-refractive surgery patient. These folks often have unusual corneal profiles. Some also have ectasia, which can complicate the fit. The gas permeable lens designs offer great flexibility in instances such as these. One can find a posterior lens design to align the corneal curvature and correct the distance vision, and then add a bifocal or multifocal on the front surface to correct the near and intermediate vision.

This same approach also works well for those patients with high corneal astigmatism. A toric, or more often bitoric, back surface can provide both a good fit and vision, while the front surface can contain the necessary presbyopic correction. For those practitioners (or patients) who are uncomfortable with a GP lens, there are some very good soft lens designs that will correct the astigmatic and presbyopic refractive errors quite well.

None of the patients mentioned above present an insurmountable problem to fitting contact lenses, even multifocal lenses. The preliminary evaluation will point out the areas that require attention before the lens is placed on the eye and should indicate which design is best suited for that patient. It is simply a matter of the practitioner being aware of all the options that exist and presenting them honestly to the patient. It also helps if the eye care professional has experience with a number of different lens designs so that they feel confident in fitting them. These challenging patients can make the day interesting, to say the least, but the successes are all the sweeter because of it. RCCL

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Strategies for Success with Specialty Multifocal Contact Lenses

Go beyond the rack to customize lenses to meet the needs of your presbyopic patients.

By Charissa Young, David L. Kading, OD, and Mile Brujic, OD

Ms. Young is an optometry student at Pacific University with an interest in dry eye management and contact lenses.

Dr. Kading is in practice in Seattle and is an adjunct faculty member at Pacific University.

Dr. Brujic is a partner of Premier Vision Group, a four-location optometric practice in northwest Ohio.

For patients who are unsatisfied with the visual performance or comfort offered by "off-the-rack" contact lens options, exploring the world of specialty contact lenses opens up a brand new market of possibilities. Ordering custom lenses from the array of potential multifocal options gives ODs another weapon in our arsenal in the ongoing battle to keep patients in contact lenses as they begin to experience the frustrating effects of presbyopia.

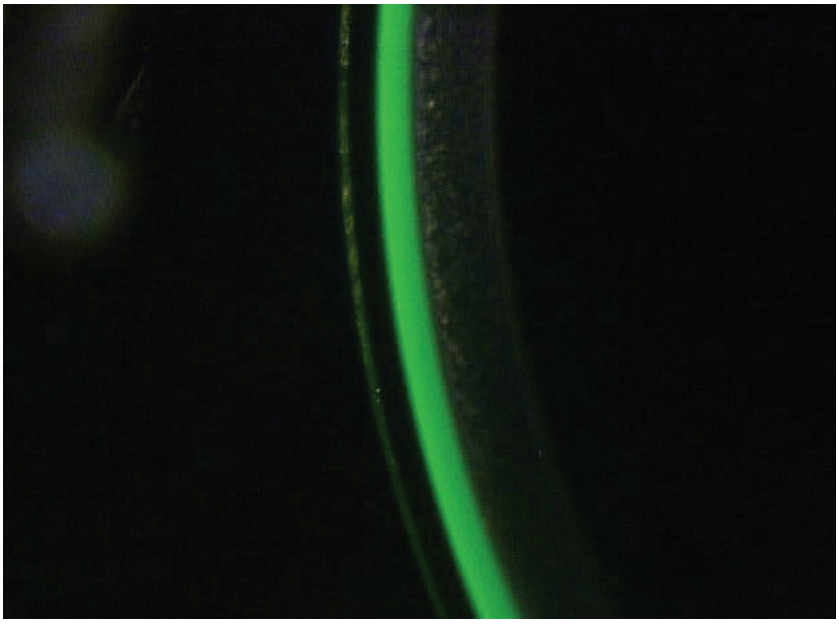
Custom lenses are advantageous because they offer a larger parameter profile than standard lenses, encompassing a variety of optical zone sizes, add powers, high sphere and cylinder powers and diameters for patients with larger or smaller corneal than is normal. It's an exciting time in the specialty contact lens world, as the materials and customizability of specialty lenses only continue to improve as the industry advances forward.

Cylinder Options

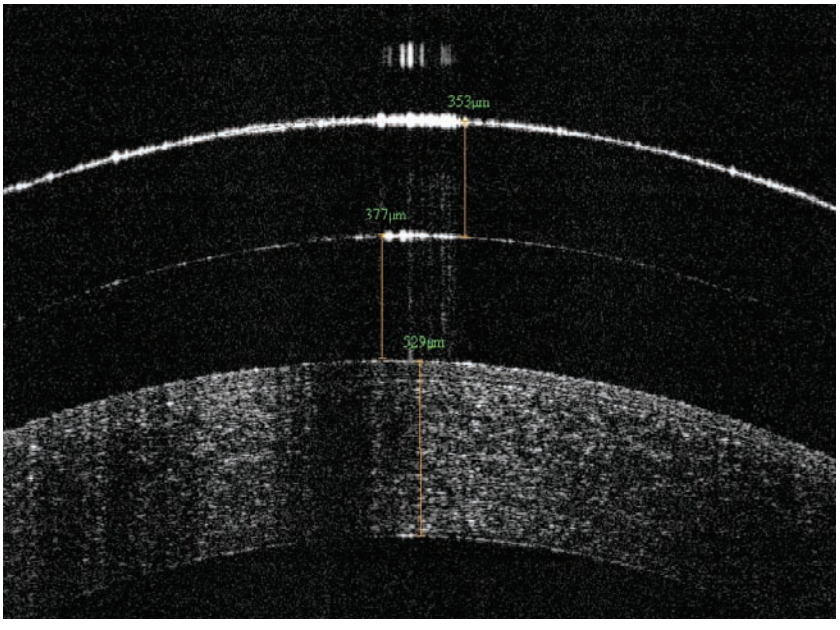
One of the most difficult obstacles you will face when fitting presbyopic patients—aside from the substantial matter of achieving adequate near vision correction—is the additional presence of astigmatism. As visually symptomatic astigmatism is an inevitability in very many patients, we are tasked with overcoming the triple threat: looking for lens options that correct not only the patient's sphere and add power, but cylinder as well. Fitting difficulties also may arise with both the availability and design of lenses.

Currently, only CooperVision sells a stock multifocal toric soft lens in the US: the Proclear Multifocal Toric. This lens is available in two base curves and one diameter, with power ranging from +20.00 to -20.00, cylinder power up to -5.75 and add powers ranging from +1.00 to +4.00 in the manufacturer's D and N designs. Otherwise, no other mass-produced soft lens design options exist from the leading manufacturers for presbyopic/cylindrical correction.

Instead, a host of custom lens designs—ranging from soft, hybrid, GP and scleral modalities—are available to correct both cylinder and presbyopia simultaneously. Aspects of normal GP lenses will not be discussed in this article, aside from the recognition that they are readily available in many modalities for both the spherical and cylindrical patient in a multitude of designs. Instead, the focus of this article will be on specialty soft, hybrid and scleral designs. Let's look at the parameters that influence the lens design and fitting



Slit-lamp and OCT images showing proper corneal clearance for a scleral lens fit. The contact lens must clear the central cornea sufficiently to take into account eventual lens settling during the day.



process for these challenging, but rewarding, patients.

Corneal Diameter

The latest custom soft lenses stand apart from available off-the-rack lens options in their increased prism and thickness profiles, base curve and diameter availabilities. While the average corneal diameter measures 11.8mm, researchers found that approximately 10% of patients fall outside of the bell curve and are likely not best served by the standard 14.0-14.5mm lens diameter options.[1] Patients who have much smaller or larger corneal diameters can wear a lens customized specifically to fit their cornea. This helps to guarantee that the lens is stable, which is critical if the patient has any cylinder present.

Determining a patient's corneal diameter also helps to ensure that the lens is properly centered on the eye, which is crucial when fitting multifocal optics. Although corneal diameter is most critical for patients wearing soft lenses, it is also important for patients with hybrid and scleral lens modalities, as it affects the sagittal depth of these lenses. Large-diameter lenses do help to reduce the influence of corneal diameter on the fitting process, however.

To specify corneal diameter for a patient's custom soft lens order, it is necessary to measure the patient's horizontal visible iris diameter (HVID). Some slit lamps come equipped with ocular reticules for on-sight measurements, but a standard PD ruler in close proximity to the eye behind the slit lamp can be used to measure limbus-to-limbus. Another potential method is to use calipers from the topographer to measure white-to-white. If all else fails, you can estimate using a contact lens of known size, manually centering it with a known diameter soft lens, and then estimate the amount of overlap nasally and temporally.

The Power is in the Add

Custom multifocal lenses have the ability to not only specify add powers to the 0.1D, but also in powers outside of the add ranges typically offered by off-the-rack options. Emerging presbyopes who spend a considerable amount of time doing near work may benefit from the availability of lenses with +0.25D to +0.75D add powers. On the other end of the spectrum, patients who have advanced presbyopia or shorter working distances may benefit from add powers over +3.00D.

Zone Sizes

For patients with very large or very small pupils, or dynamic pupil changes, the ability to alter the asphericity or zone size may allow these patients, who typically struggle in traditional multifocal lenses, to achieve visual clarity and stability in custom lens designs. Standard multifocal lens designs in the center near or center distance modality typically have a 2mm center zone size, which may not be a viable option for patients with larger pupils. For patients with small, pinhole-like pupils, a slightly smaller zone size may make the transition between the near and distance portions of the lenses an easier process.

While most people work in normal room illumination conditions, patients who don't (e.g., bartenders and waiters) may experience a mismatch between their pupil size and the zone size. To compensate for this, measure the patient's pupil size in three separate illuminations: bright light, dim illumination (using the cobalt blue filter on either the slit lamp's dimmest setting or a topographer) and normal room illumination. Ask the patient what lighting situation they're in most frequently, and then select the size of the center zone accordingly. For example, a patient with a larger pupil than average during the day may exhibit increased visual problems due to their pupil size increasing when doing night driving or activities.

Currently, only two zone sizes are available in hybrid multifocals, but these can be customized in nearly any size for scleral designs and custom soft lenses. One such design from Valley Contax takes into account the patient's dominant eye. The near zone in the dominant eye is made slightly smaller than the non-dominant eye and then, depending on the patient's outcome, can further be customized with increased add power or altered zone diameters. It is important to remember that as the sagittal depth of a scleral lens changes, the zone size will be affected as it moves either further away from or closer to the patient's pupil.

Alternative Materials

Many of your custom lens needs will be best served with the availability of the latest latheable silicone hydrogel materials, which offer higher Dks than previous incarnations, in conjunction with a lowered risk of hypoxia and peripheral neovascularization. For presbyopes with irregularly shaped anterior surfaces, such as those with keratoconus, high cylinder powers and irregular astigmatism, scleral or hybrid multifocal alternatives offer even more options to increase vision stability.

Hybrid multifocals offer the best of the hard and soft lens worlds: optimum clarity through gas-permeable optics combined with the comfort of soft lenses in the lens periphery. Similarly, scleral lenses can provide wearers increased comfort because the weight of the lens is distributed over the sclera, which contributes to less lid movement and lens-lid interaction.

In fitting scleral lenses, it's critical to clear the entire central cornea with enough extra vault to compensate for the natural settling effects on the lens over the day. According to a 2012 study conducted by Caroline and Andre, the average scleral lens settles 127µm, so order the sagittal height 300 to 400 microns steeper to compensate for this effect and increase patient wear time.[2] Keratoconic corneas on average need an additional 300 microns of clearance.

The Final Order

As with off-the-rack stock lens brands, no two custom lens labs are alike. Remember to work closely with your lab of choice regarding custom lens fitting, as their design features can alter the fit significantly from one lens to another. The devil truly is in the details when trying to achieve patient satisfaction in custom lens fits for presbyopes, particularly those with significant astigmatism.

While fit is important with any contact lens offering, centration of the multifocal lens is absolutely crucial, and the ability to tailor the lens based on each patient's specific needs helps to guarantee success. By specifying your patient's unique power, axis, corneal diameter, zone size, base curve and add power, you create not only a customized lens, but also an expanded practice scope and dedicated patient following. RCCL

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Think Globally, Practice Locally

These days, the "Old World" gets most of the new advances first. Here's a look at international trends that could profoundly impact your practice.

By Frank Auletto, Associate Editor

Most trends in the worldwide contact lens market are universal. The four major manufacturers—Alcon, CooperVision, Vistakon and Bausch+Lomb—operate in numerous countries that span the globe. Despite this worldwide reach and coordination of strategy, some notable disparities between the US and international markets exist. From fitting patterns to available products to consumer attitudes toward lens wear preferences, some of these differences can be staggering.

Being aware of successful prescribing trends and new products available worldwide can help to improve not only patient care, but also your practice's profitability—offering a winning situation for both you and your patients.

Product Availability

While there are many similarities across the various contact lens markets around the globe, it is the disparities between them that are most interesting—and the most bewildering. One such point of interest is the difference in products available overseas vs. products available in the United States. Numerous countries outside of the US generally tend to see contact lenses, solutions and surgical treatments hit the market long before they reach US shores.

A recent example of a product that debuted abroad before receiving the green light from the FDA is Alcon's Dailies Total1 lens. The manufacturer's "water gradient" daily disposable lens released initially in late 2011, but only in Nordic countries.[1] The product didn't reach US shores until June 2013, a lengthy gap in release dates that doctors in the US find frustrating but now commonplace. But US doctors can benefit from the insights gleaned in such early product rollouts.

Bo Lauenborg, an optometrist in Denmark where the first Dailies Total1 launch took place, considers the product "a revolution" in achieving all-day comfortable lens wear. "When I first apply the lens, I have patients telling me they think something is wrong, because they cannot feel anything in their eye." Dr. Lauenborg also says the lens "opens a whole new world" to patients concerning improved lens comfort at the end of the day.

While the Dailies Total1 lenses are an example of a product approved for patient use internationally before gaining US approval, there are many other products that are already available and being used overseas still awaiting the go ahead from the FDA. For example, recently Novaliq's NovaTears OTC was marked for approval in Europe in July 2013.[2] As of now, NovaTears is awaiting FDA approval in the US.[3]

Myopia control lenses have become increasingly popular in several Asian countries, according to Mark Willcox, PhD, professor of optometry and vision science at the University of New South Wales. He says Singapore, Malaysia and Hong Kong—areas typically associated with high myopia rates—have all more readily adopted contact lenses that assist in correcting myopia physiologically.[4] CooperVision's MiSight line, an orthokeratology lens option designed for myopia correction prevalent in these regions, has yet to obtain FDA approval for distribution in the US.

While the health ministries of every nation obviously have the best interests of their citizens at heart, the FDA can be notoriously stringent. Why do so many products hit the international market before reaching the United States? What makes getting a product passed in

the US such a difficult task? FDA regulations often pose a difficult hurdle for emergent pharmaceuticals and medical devices to surmount, but what is it that makes FDA approval so difficult?

Nathan Efron, PhD, professor of optometry and vision science at Queensland University of Technology in Australia, believes that fear of potential litigation may be the culprit. "The notion of wanting to protect the health of citizens in a nation is a universal, but this is perhaps stronger in the USA than elsewhere," Dr. Efron says. "This may relate to the greater propensity for US citizens to exercise their rights in terms of litigation if anything goes wrong."

Perhaps past lawsuits over previously released products have caused the FDA to be more conservative in its approval of new drugs and devices.

Whatever the reason, an extensive amount of new products for sale outside of the US are still seeking FDA approval. The differences in the available drugs, contact lenses and other treatments may also be the cause for differences in prescribing patterns between various nations.

International Prescribing Patterns

The differences between contact lens markets worldwide only begin with products. One of the largest and most perplexing differences between US and foreign markets is the greater prevalence of daily disposable (DD) lenses internationally vs. the relatively low adoption rate in the US.

What makes DD lenses more popular in markets outside of the US? Why isn't the demand in the US for this modality as strong as it is internationally?

There are numerous benefits when using DD lenses vs. reusable lenses—they are more convenient, more sanitary (when proper compliance and replacement frequency are followed) and more comfortable than lenses with a longer recommended replacement frequency. With the added convenience and health benefits when compared to two-week or monthly replacement options, DD lenses would appear to be the obvious choice for contact lens wearers. In Europe and other international markets, this is increasingly becoming the case, but the US is significantly lagging behind in the DD market.

According to Dr. Willcox, the percentage of new daily disposable fits in the US is only 13%, a number that pales in comparison to the 38% of new soft lens fits in the UK. Denmark is far and away the leader of the DD market, Dr. Willcox says, with 58% of their new soft lens fits being daily replacement lenses.

What is causing this notable discrepancy between new DD fits? It's perplexing that the US—one of the world's leaders in health care and generally a culture that adopts new technological advances wth gusto—lags so far behind other nations in new DD fits. While DD lenses are generally more expensive on average than two-week or one-month options, Dr. Efron doesn't believe economics have much effect on the inability of the US to gain ground on the DD lens market.

"We know that nations with a higher gross domestic product (indicating the 'average wealth' of citizens) have a higher rate of daily disposable lens prescribing," he says. "However, this cannot explain the lower uptake in the USA, which is an affluent country with a relatively high gross domestic product."

While financial issues may not be the main cause of lukewarm

DD prescribing in the US, compliance among patients deserves some investigation. A 2010 study by Dumbleton et al. examined the compliance of contact lens replacement in the US and Canada. The study found that 18% of Americans—not an insignificant number by any means—reported that they wear their DD lenses beyond the recommended replacement frequency.[5] More research needs to be done on the relationship between compliance and prescribing trends in the US vs. trends abroad, but perhaps due to poor replacement frequency compliance rates, ODs in the US aren't as forceful in prescribing DD lenses to patients as a result.

Nicole Carnt, PhD, BOptom, of Moorfields Eye Hospital in London, believes that lifestyle differences may also play a role in daily disposable lens prescribing. "It makes sense to me that in Australia the market share is high, because of the outdoor lifestyle. Practitioners will often prescribe a supply of daily dispoables for holidays, etc., for biweekly or monthly replacement wearers."

Geography—something that not many ODs would consider a factor in prescribing trends—could potentially play a more significant role in the relatively slow adoption of DD lenses in the US than you may think. Dr. Efron believes that the wide dispersion of practitioners created as a result the vast landscape of the contact lens market may have a significant impact on prescribing trends in the US.

"The UK is a small island nation with short lines of communication and a large, coherent body of contact lens practitioners who regularly attend, and are influenced by, opinion leaders at the annual British Contact Lens Association meeting," he says. "If a product or category is deemed to be superior, such ideas are quickly and universally adopted."

The BCLA meetings give practitioners in the UK the opportunity to become educated and more familiar with new trends in the contact lens market, and to share their expertise more readily with each other. Without directly comparable meetings in the US, it is more difficult for ODs to communicate with one another which products and treatment options are more successful than others. Perhaps the shared knowledge exchanged at the BCLA meetings help practitioners in the UK gain more confidence in prescribing certain products.

Such confidence and enthusiasm even trickles down to the optician level. "In the UK, Morgan et al. found that daily disposables were slightly more likely to be recommended by dispensing opticians—maybe they are more retail savvy and are able to communicate the benefits of DD and justify the increased cost more comfortably?" adds Dr. Carnt.

Impact on Your Practice

What effects—if any—will these global trends and distinctions have on your practice? The application of the shared knowledge of ODs from around the world to your practice can help to improve patient care and bring in more revenue for your practice.

One of the first things you can do now is educate yourself on the various products available outside the US. When these products obtain FDA approval, you'll be better prepared to quickly recommend newly released products to your patients with authority. For example, if you start learning the features of a product now such as the MiSight lens, when it hits the US market you won't need to spend additional time learning its various features. This will enable you to quickly suggest and prescribe it as another option for your patients with myopia, while at the same time increase your practice's profitability.

Another important area to address is that of patient compliance. Discuss with your patients the importance of following recommended contact lens replacement schedules. You can use this conversation as a framework for suggesting DD lenses to your patients. Explain the convenience of DD lenses with your patients, while also outlining their added health benefits. This should help to reduce patient dropout, which will guarantee you more repeat customers.

Lastly, see if the European experience offers any lessons about patient engagement that might shed light on missed opportunities here. The move to daily disposable lenses has been embraced elsewhere. Americans are no less open to the benefits of this modality when presented in a way that demonstrates the health and convenience benefits.

You have a unique position as an OD—with the dual obligations to protect the health of your patients while also offering them a full suite of contact lens products from which to choose. Educating yourself on what's successful internationally as well as domestically will improve both the patient care and profitability of your practice. RCCL

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10 Lessons Learned at BCLA 2013

Get up to speed with groundbreaking findings from the UK's 37th annual meeting that will help you in your practice. **By Frank Auletto, Associate Editor**

A plethora of invaluable research was presented at this year's British Contact Lens Association (BCLA) Clinical Conference & Exhibition, covering everything from corneal infection risk factors to ortho-K techniques to contact lens care. In case you missed this year's meeting, here are our picks for some of the more stand-out abstracts presented at the UK's premier contact lens event, and how the research presented may soon affect your practice.

Long term ortho-K treatments could stabilize refractive errors in myopes. A study by Yee et al. demonstrated that patients with a median age of 10 who wore ortho-K (OK) lenses for five years showed signs of refractive error and corneal curvatures stabilizing approximately six weeks after ceasing OK lens wear. While these results may be patient dependent, no sudden changes in each patient's myopia were observed.[1]

Monitoring OK wearers over time is essential to ensure the success of the treatment. The study demonstrates how critical the six-week time period is for stabilization following OK treatment. "Prior to six weeks, the cornea for some patients can still continue to change." says Clinical Editor Joseph Shovlin, OD. "This is an important time reference, especially when considering final correction in prescribing alternative corrective options such as conventional lenses or even refractive surgery."

Hand washing time is important when dealing with silicone hydrogel lenses. Etty Bitton, OD, and Samantha Kronish conducted a two-arm pilot study using silicone hydrogel contact lenses and two different liquid hand soaps to determine the effects of hand washing on contact lens parameters. Unsurprisingly, the study demonstrated that when using liquid hand soaps, shortened hand washing times have the potential to leave behind soap residue on the lenses. This causes a visible smear or smudge on the lens surface that reduces the clarity of vision in contact lens wearers.[2]

The study points out the importance of educating patients on proper compliance when wearing contact lenses. "The consequences can be evident with an impact on vision, overall comfort, wettability and, somewhat surprisingly, the lens fit," Dr. Shovlin adds.

Use this finding as a lesson to reiterate to your patients the importance of spending enough time washing their hands before handling contact lenses. Not only will it have the effect of reducing potential residue on the lenses, it will also help to lower the risk of infection as a result of improper hygiene.

Multifocals offer presbyopes better binocular vision than monovision lenses. While there are many options available to help presbyopes, multifocal (MF) contact lenses may provide your patients with greater focus than monovision (MV) lenses.

A study by Pete Kollbaum, OD, PhD, et al. compared the binocular summation ratio (BSR) of monocular dominant eye performance to binocular performance using three different contact lenses: MV lenses with adds of +0.75 and +2.00D, lotrafilcon B low and high add MF lenses and omafilcon A MF lenses.

The results showed that both MF lenses had very similar median BSRs—1.12 for omafilcon and 1.19 vs. lotrafilcon B high lens and 1.15 for lotrafilcon B low lens—which were significantly higher than the median BSRs for either of the MV lenses—1.00 for the MV+0.75D

and 1.02 for the MV+2.00D.[3]

While binocular summation varies between presbyopic correction options, MF correction provides better binocular summation for patients when compared to MV options. "Binocular summation in presbyopes wearing various forms of contact lens correction will vary depending on the type of correction used," Dr. Shovlin explains. "Of interest, monocular defocus (i.e. monovision high add correction, +2.00D) did not show inhibition (BSR < 1)."

Gas permeable lenses can be used to flatten the corneas of keratoconus patients. Various surgical options for correcting keratoconus exist, but researchers are examining the possibility of correcting the condition with the use of contact lenses. Romero-Jimenez et al. conducted a study that evaluated the effect 14 days of GP lens wear had on the anterior corneal surface of patients with keratoconus.

Thirty-one keratoconic patients with no history of lens wear were fitted with either flat or three-point-touch lenses. The changes made on each subject's mean central keratometries (MCK), corneal asphericity, maximum corneal curvature (MK), thinnest corneal thickness and anterior corneal surface aberrations were examined for each group. The study found that the GP lenses in both groups significantly flattened the MCK and MK, reduced their corneal asphericity, corneal aberrations and also increased their corneal thickness.[4]

While further research is still necessary, GP lenses can be used to flatten the corneas of patients with keratoconus, providing additional support for non-surgical approaches to long-term management of irregular corneas.

Bandage contact lens material is more important in the healing process than once believed. The use of conventional hydrogel and silicone hydrogel contacts as bandage contact lenses (BCLs) may be causing more damage to eyes than good. Manpreet Kaur Cooner, BSc Chemistry, et al. examined the connection between contact lens material, vitronectin removal, plasmin upregulation and wound healing using hydrogel lenses. Vitronectin, an adhesive protein, has been shown to influence the generation of plasmin in tears, which is disadvantageous in the process of ocular healing. Because vitronectin has a high affinity for hydrogel surfaces, the use of hydrogels for BCLs needs to be reevaluated.[5]

While hydrogel and silicone hydrogel lenses offer convenience, their specific healing capabilities are limited. This new information will prove useful to researchers in the future production of BCLs that are more conducive to the ocular healing process.

The presence of PQ1-ALX in contact lens solutions may help to eradicate biofilm created by Staphylococcus aureus. The formation of microbial keratitis and corneal infiltrates has long been associated with the development of biofilms found inside of contact lens cases. A study conducted by David McCanna, PhD, and Lyndon Jones, PhD examined the antimicrobial efficacy of the contents of various contact lens solutions against *Staph aureus*. The antimicrobials polyquaternium-1 (PQ1) and alexidine (ALX) were shown to be the most effective in damaging the cell membranes of the bacteria present.[6] The presence of PQ1-ALX was shown to cause the most damage to microbial cell membranes, and this information will prove useful in the development of future contact lens solutions. Understanding which ingredients are most effective against various bacterial cell membranes can help you when recommending solutions to your patients. Still, though, disposing of lens cases regularly in favor of a new case remains the best way to prevent bacterial infection.

Stenotrophomonas maltophilia and Pseudomonas aeruginosa pose a risk of forming a biofilm and adhering to contact lenses. High levels of gram-negative bacteria can colonize contact lens cases and transfer into the eye, increasing the likelihood of infection or corneal infiltrates.

Mark Willcox, BSc, PhD, and Ajay Vijay, BOptom, PhD, examined the capabilities of *Stenotrophomonas maltophilia* and *Pseudomonas aeruginosa* to form biofilms and adhere to contact lenses. Both showed the ability to adhere to contact lenses, with *S. maltophilia* having a higher affinity for low Dk lenses, and *P. aeruginosa* adhering in higher numbers to lenses with a higher Dk. This ability of pathogens to adhere may be related to the production of diffuse corneal infiltrates in patients susceptible to *Stenotrophomonas* when lens disinfection is compromised, says Dr. Shovlin. "Exposure to significant lens surface bioburden exists, especially with repeated inoculation."

Neither bacteria were affected significantly by lens wear during the study. Though further research is required, it is believed that their ability may be related to the production of corneal infiltrates.[7] Ensuring that lens care provides

broad-spectrum efficacy against all known pathogens will reduce risk of adverse events. These findings could aid in the development of future products designed to disinfect contact lens cases, ensuring lower rates of infection in contact lens wearers.

Mucin balls can cause microstructural abnormalities in the cornea. While believed to be harmless, mucin balls can cause small changes in the cornea. Over the course of four months, 10 patients were examined after using continuous wear SiHy lenses approved for monthly wear. The study found that by the third and fourth weeks of continuous wear, mucin balls had formed around the cornea. Once the lenses were kept out of the eyes following continuous wear—one day for one-week wear, and three days for three- to four-week wear—the cornea was restored to its original state.[8]

"Mucin ball formation remains an interesting phenomenon whose significance clinically is still being investigated," Dr. Shovlin says. "Debate continues on whether their presence has a detrimental or protective effect for other corneal events." Though they don't pose a great risk, it still remains important to communicate with your patients the importance of removing their contact lenses for a few days following continuous wear. Preventing the formation of mucin balls is just one reason among many.

Friction between the eyelids and lenses can cause inflammation and discomfort. Discomfort is commonplace for many lens wearers and a motivator for dropout. Clinicians have tried to understand its underlying causes for years, but questions still remain.

A small study by Morgan et al. revealed that interaction between the lid margin and the lens surface might create friction, which then possibly leads to inflammation and discomfort. Ten non-CL wearers and 10 lens wearers broken into two groups—five in low-friction contacts, and five in high-friction lenses—were examined throughout the course of a day to measure any increase in inflammatory cells. The results showed that there was in fact an increase, with the greatest elevation occurring in the high-friction contact lens group.[9]

"Poor comfort may be related to the frictional interaction between the lens and lid anatomy," Dr. Shovlin says. "Inflammatory lid margin changes are unavoidable, but strategies to lessen the mechanical influence may be a benefit to lens wearers." Suggesting low-friction contact lenses could prove to be an effective way to decrease discomfort in patients.

Hyperosmolarity could lead to discomfort in lens wearers. The need to understand the factors that cause end-of-day discomfort in contact lens wearers has led researchers to examine the impact of osmolarity. Tawnya Wilson, OD, and Kristy Canavan, OD, examined 12 subjects—six with CLIDE and six unaffected patients—to measure the difference in osmolarity with and without lens wear. The results showed that CLIDE subjects were more likely to experience hyperosmolarity than normal patients.

Three osmolarity readings were conducted at four different points—before lens wear, 30 minutes after lens insertion, eight hours after insertion and 15 minutes after the lenses were removed—using the TearLab Osmolarity system. CLIDE subjects reported higher osmolarity readings vs. normal subjects in every test.[10]

A Contact Lens User Experience (CLUE) questionnaire was given to each subject to determine subjective comfort levels following the tests. The differences were staggering—during the initial visit, normal subjects scored 99.69 vs. 73.07 for CLIDE subjects; following lens wear, normal subjects scored 90.86 vs. 71.18 for CLIDE subjects.

While the osmolarity bare-eye measures were repeatable, the measures may not be as predictive for evaluating CLIDE. "Osmolarity measures with a lens on the eye did not show repeatability, nor was there correlation between comfort and osmolarity," adds Dr. Shovlin.

The BCLA is to be commended for its efforts to promote research that improves patient care and product development. Look for next year's meeting in Birmingham, June 6-9, 2014. RCCL

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2. Bitton E, Kronish S. The impact of hand washing time and soap on the surface of silicone hydrogel contact lenses: a pilot study. Poster session presented at BCLA 2013.
3. Kollbaum P, McGiffen R, Rickert M, Tarrant J, Chamberlain P. Binocular summation of presbyopic contact lens corrections. Poster session presented at BCLA 2013.
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By Gary Gerber, OD

Cutting Ties to Attain Practice Happiness

Dismissing problematic staff and patients can enhance happiness in your practice.

The optometry field constantly changes, and lately more so than ever. Obamacare, EHR, Internet-capable glasses, ICD-10, vision plan contract changes… stop this treadmill, I want to get off!

Despite the flurry of changes, there is one thing that has remained constant for practice owners—you have the ability to determine the level of happiness that exists within your own business. You can ensure a high level of enjoyment in your practice by handpicking a quality staff and selecting the type of patients you want to visit your office.

Cultivating a Better Clientele

What does it mean to pick patients who are the right fit for you? Let's use the Ritz-Carlton's business model as an example. Its motto reads, "We are ladies and gentlemen serving ladies and gentlemen."

In only serving ladies and gentlemen, the Ritz creates exceptional service and memories for not only their guests but their employees as well. By excluding uncouth behavior, it has deliberately chosen the clientele it wants to attract. When achieved, both the guests and the Ritz employees are happier. This is a business model you should follow as a practice owner.

ODs can mimic the Ritz model by putting a stake in the ground and saying, for example, "We want to cater to patients who really value our services and aren't choosing us solely based on our being in their insurance plans. So, we will offer special concierge-like services to those patients who show up on time, refer others, spend more than $X per year, are compliant and are a sheer joy to work with."

Those concierge services would be things like preferential parking, appointment times, expedited eyeglass delivery, notification of new frame styles the patient has previously shown a predilection for, early notice to trunk shows and new contact lens offerings.

Assessing the Problem

On a daily basis, you regularly encounter two groups of people: your staff and your patients. Because you spend so much time dealing with these parties, it's important that your interactions with them are enjoyable, not just tolerable.

For example, if an employee's behavior is starting to drive you crazy, it is important that you deal with it the instant this becomes evident. Don't dwell on your staff's shortcomings if you're not willing to take the time to assist in fixing them. If there are no alternatives, it may be in your best interest to fire the offending staffer; don't let the problem linger. Dismiss the staff member sooner rather than later. Once you've successfully dealt with this problem, you and your staff will be much happier.

Take this same approach with your less desirable patients—the abusive, abrasive and chronically non-compliant ones. What possible benefit is there to you, your staff or even the patient to continually engage in this lose-lose scenario?

Repeatedly dealing with this type of patient will quickly wear you down emotionally. In fact, without even realizing it, one difficult patient can impact your interactions with non-problematic patients. When you see the offending patient's name on the schedule for 2:15 p.m., that interaction will be the only thing on your mind during every exam leading up to that dreaded appointment. Afterwards, you'll spend the rest of the day mentally dissecting the interaction, negatively affecting your afternoon appointments as well. Is this extra level of stress worth it? It may be best from a common sense standpoint, as well as a financial one, to just cut the cord and dismiss the patient altogether.

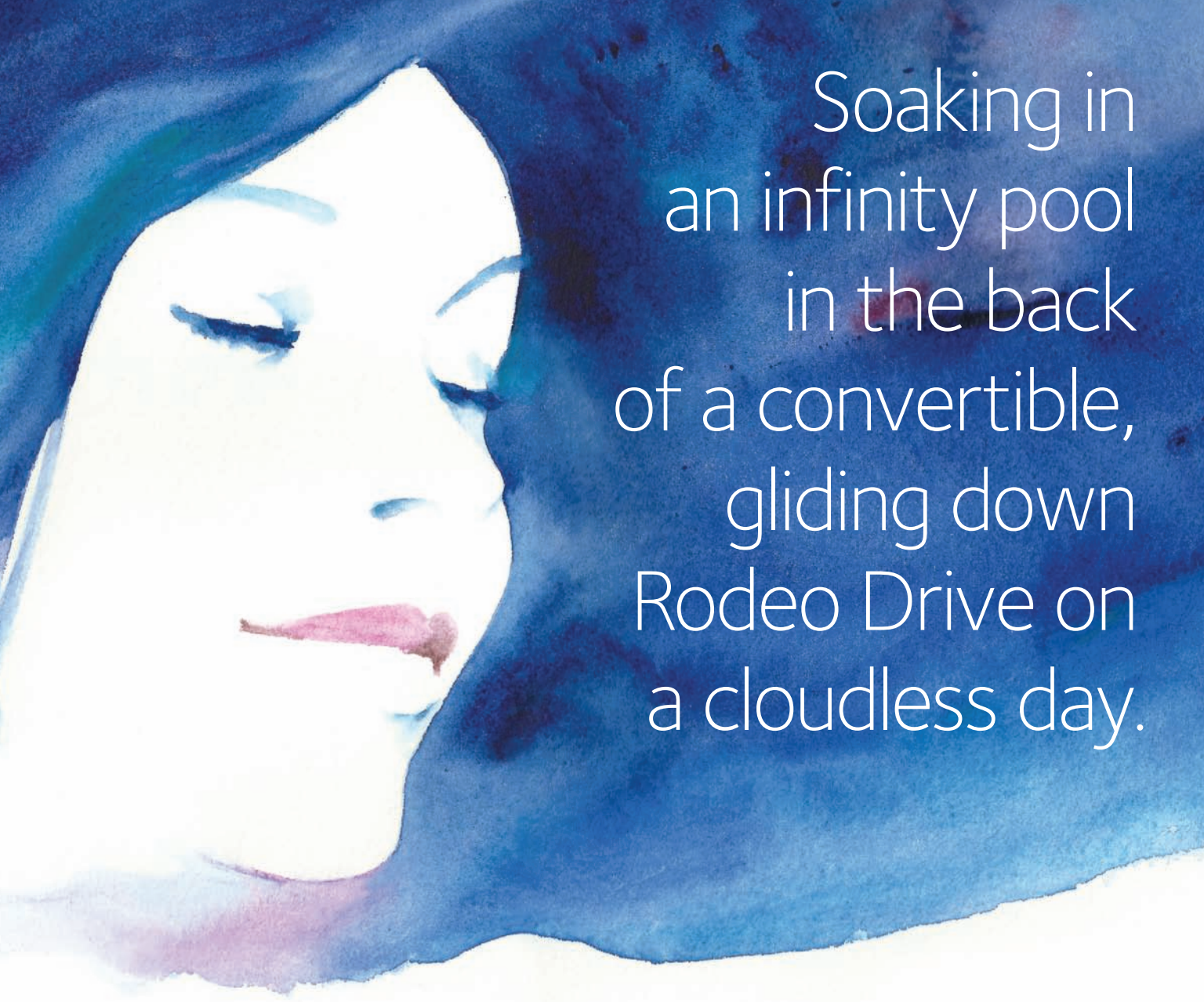
Yes, there is a financial gain from firing a patient—your energies and focus are not drained and drawn from the rest of your day. Also, your staff will be more supportive of other efforts to grow your practice if they see you supporting them by firing patients like this.

Does Fire = Fail?

Most people reflect on successes as personal accomplishments, but view failures as the work of others—e.g., "I successfully fit that very tough keratoconic" but "the reason we had a poor revenue generating week was because we saw a lot of patients from XYZ Plan."

Highly successful practitioners define both successes and failures from their own vantage point. They don't view firing as a failure because the patient is crazy, but rather as *their* failure to properly cull the right mix of patients in the first place. The ensuing success comes when the doctor steps up and takes responsibility for dismissing the patient. The same thoughts go for firing staff members who aren't a good fit.

These über-successful doctors use personal failures as learning experiences, and turn them into later success stories—one fired staff member and patient at a time. RCCL



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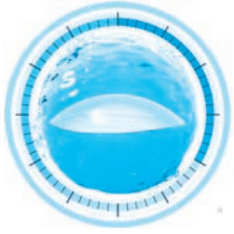
that reduces lipid deposition
and removes protein deposits[1-3]

PROVIDING MOISTURE
from morning till night[1,2,4]



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