Is it DRY EYE, ALLERGY or BOTH?

ALSO INSIDE THIS ISSUE:

- Controversies in Care—Steroids: Too Hot to Handle?
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Extreme measures shouldn’t be necessary for all-day lens comfort
When Should You Consider Multifocal IOLs?

These lenses may be the best option for your patient, even if they have previously been unsuccessful with multifocal contact lenses.

Eric Polk, O.D.
In The News

• The Cornea Society has named Donald Tan, F.R.C.S., as its new president. Dr. Tan is the medical director of the Singapore National Eye Centre, chairman of the Singapore Eye Research Institute, professor of ophthalmology at the National University of Singapore and medical director of the Singapore Eye Bank. Currently, he is the president of the Asia Cornea Society and the Association of Eye Banks of Asia. For more information, visit www.corneasociety.org.

• The Centers for Medicare & Medicaid Services announced that the American Board of Optometry is one of nine boards to qualify for the 2012 Physician Quality Reporting System (PQRS) Maintenance of Certification (MOC) program incentive. This year, physicians will again have the opportunity to earn PQRS incentives, as well as an additional 0.5% by participating in qualified MOC program activities, including a practice assessment module and patient experience care survey. For more information, visit www.cms.gov.

• The 52nd Annual Heart of America Contact Lens Society Contact Lens and Primary Care Congress will be held February 15-17, 2013 in Kansas City, Mo. For more information, visit www.hoals.org.

• Optometry Giving Sight has announced its annual World Sight Day Company Challenge, inviting the optical industry to raise funds through October 11 to aid blind or vision-impaired patients who cannot afford eye exams and glasses. For more information, visit www.givingsight.org.

• Alden Optical will license NovaKone to David Thomas Contact Lenses, a subsidiary of Menicon Holdings. The lenses will be offered to specialty fitters in the United Kingdom, Europe, Middle East, Africa and India by September 2012. For more information, visit www.aldenoptical.com.

ASCRS Seeks United Collaboration

The American Society of Cataract and Refractive Surgery (ASCRS) has formed an Integrated Ophthalmic-Managed Eye Care Delivery (IOMED) task force to investigate and recommend ways in which the organization and its membership can advance an eye care delivery model based on a synergistic collaboration between optometry and ophthalmology. The IOMED task force also will consider creating an entirely separate society—as well as new educational tracks at the ASCRS Annual Symposium—to meet the educational needs of integrated eye care practitioners.

According to Stephen S. Lane, M.D., ASCRS Governing Board member and IOMED task force chair, the goal is to find the best ways to facilitate cooperation between ophthalmologists and optometrists to meet the needs of the aging baby boomers. In other news, the 300-member Contact Lens Association of Ophthalmologists will now be managed under the administrative umbrella of ASCRS. For more information, visit www.ascrs.org.

New iPad App Explains Cataracts

Eyemaginations has launched a new iPad application, the Luma IOL Simulator, to help eye care practitioners better explain cataracts and cataract surgery to their patients. The app has on-screen drawing functionality, allowing the physician to illustrate the visual benefits and limitations of a broad selection of IOL options. Users of the app will also be able to share the iPad screen images wirelessly to a television using Apple TV. The app is available for free download in the Apple iTunes store for all Luma customers. For more information, email info@eyemaginations.com or call 877.321.5481.

Bio-Inspired Daily Disposable

Bausch + Lomb’s Biotrue OneDay, a new daily disposable contact lens, has received FDA clearance. The company says the lenses are made with a proprietary bio-inspired material called HyperGel, which is designed to retain moisture and mimic the lipid layer of the tear film to prevent dehydration and maintain consistent optics after 16 hours of wear. The silicone-free material offers 78% water content (the same as the cornea) and delivers more oxygen than a traditional hydrogel, the company says. The lenses also offer UV protection from UV-A and UV-B rays. For more information, visit www.bausch.com.
Barometer of Global Eye Health Results Released

Bausch + Lomb released the results of a new public opinion global survey of 11,000 consumers across 26 countries. According to the data, less than one-third of those polled take basic steps to preserve eyesight and just 21% have had regular eye exams in the past five years. Of those who do not have regular exams, 65% said they did not visit an eye doctor because they did not have any symptoms and 60% said they already had clear vision.

In a survey of eye care practitioners, 97% believe consumers do not have sufficient eye care knowledge. Women were more likely to take better care of their eyes than men, and married people were more likely to have had a comprehensive eye exam in the past year than single individuals.

The test results seemed to be easily reproduced when repeated in the short-term.

A complete summary of the study is available in the August 2012 issue of *Ophthalmology*.

FDA Approves Glaucoma Implant

The iStent Trabecular Micro-Bypass (Glaukos) is the first *ab interno* glaucoma implant to receive FDA approval. The 1mm device, made of non-ferromagnetic titanium, will be used in conjunction with cataract surgery to lower IOP in adult patients with mild to moderate open-angle glaucoma currently treated with ocular hypotensive medication. It is to be placed into Schlemm’s canal using an inserter and intraoperative gonioscopy. For more information, visit www.glaukos.com.

Contact Lens Sensor to Measure IOP

A recent study at the Hamilton Glaucoma Center at the University of California San Diego found that contact lens sensors provided safe and tolerable 24-hour monitoring of intraocular pressure in glaucoma patients.

Kaweh Mansouri, M.D., M.P.H., and colleagues conducted a study of 40 patients suspected of having or previously diagnosed with glaucoma. Over two separate 24-hour sessions, the researchers found that adverse reactions included blurred vision (82%), conjunctival hyperemia (80%) and superficial punctate keratitis (15%).

The test results seemed to be easily reproduced when repeated in the short-term.

A complete summary of the study is available in the August 2012 issue of *Ophthalmology*.

Adviser Index

Alcon Laboratories................................................................. Cover 2
The annual British Contact Lens Association meeting gave attendees a look at breakthrough contact lens research.

The 36th British Contact Lens Association (BCLA) clinical conference and exhibition was held in Birmingham, UK this past May 24-27. With about half of its 1,203 delegates from the United Kingdom and the remainder from another 44 countries, the four-day conference included multiple sessions with lectures from prominent experts Lyndon Jones, B.Sc., Ph.D., and Stuart Richer, O.D., Ph.D., as well as workshops, posters and competitions.

Given the meeting’s heavy emphasis on contact lens care, I thought it might be appropriate to review its highlights and abstracts this month. This research certainly will impact our everyday clinical practices, and perhaps even trigger new ideas in research. This year’s presentations dealt with a broad array of topics, ranging from novel drug delivery systems and controlled molecule release to the impact of cosmetics on the physical dimensions and optical performance of silicone hydrogel lenses.

The following summaries are based on abstracts from the printed material provided by the BCLA. Take note, the materials were submitted in advance of the meeting and may not entirely represent the final conclusions of the authors.

- **Characteristics of the ocular surface in normal and marginally dry eyes, including sensitivity, tear osmolarity and ocular symptoms.**

  There often is a disconnect between symptoms and clinical signs when a patient complains of ocular discomfort. Practitioners tend to focus on the cornea, but research shows that lids and conjunctiva are important—especially regarding contact lens-related discomfort, meibomian gland dysfunction and sensations associated with ocular dryness.

  Fiona Stapleton, B.Sc., M.Sc., Ph.D., of the University of South Wales in Australia, examined 76 subjects (of whom 37 were contact lens wearers) to investigate the relationship between clinical indications of dry eye, symptoms of discomfort and ocular surface sensation during a single visit. Conjunctival staining was associated with higher tear osmolarity, lower tear volume, reduced tear film quality, more corneal staining and an increased incidence of lid wiper epitheliopathy. The latter condition was associated with increased tear osmolarity, corneal staining and conjunctival staining. Ocular surface sensitivity was associated with higher levels of conjunctival staining and lid wiper epitheliopathy.

  Contact lens wear was associated with more reporting of symptoms, lower tear volume and tear film break-up time and more staining of cornea, conjunctiva and lid wiper. No difference was found between contact lens wearers and non-lens wearers with respect to sensitivity.

  The take-home message: when evaluating ocular health and symptoms, the conjunctiva and lids are just as important as the cornea.

- **Controlled release of comfort molecules from silicone hydrogel contact lenses through the use of molecular im printing.**

  Conventional eye drops have limitations in relieving ocular discomfort associated with contact lens wear: they are inconvenient to apply, have a low residence time on the eye and produce some side effects from inactive ingredients. Using molecular imprinting, graduate student Charles White, of Auburn University, described lenses that were designed to incorporate and elute a “comfort agent” from within the polymer network of the lens during wear.

  Using rabbit eyes in an in vivo study, researchers found that the imprinted lens released a comfort agent in a slow, controlled manner for up to 26 hours. The non-imprinted lenses were depleted after 10 hours; conventional eye drops washed out of the eye in just six to 30 minutes.

  The research team was able to incorporate comfort molecules into a commercial extended wear silicone hydrogel lens, achieving a tailored release of 50 to 52 days. Release rates are adjustable, as well as the size of the reservoir of comfort agent within the lens.

  The lab also created a microfluidic device able to mimic natural tear flow; lenses were able to release a comfort agent for 60 days. These lenses had a 90% degree of optical clarity at the conclusion of the 60-day period.

  Better contact lens comfort may be achieved with this new technology, which may make its way to market in the future. Comfort molecules are delivered before symptoms of discomfort occur. Further developmental work is ongoing.

- **Dry eye in contact lens wear: a perennial problem?**

  Estimated contact lens dropout rates range from 15% to 30% in multiple countries. Dropout and discomfort are two closely related themes that have remained constant despite improvements in lens material and design. In 2012, are we any closer to addressing concerns of dry eye symptoms associated with
contact lens wear? Alan Tomlinson, M.Sc., Ph.D., D.Sc., D.C.L.P., D.Orth., of Caledonian University in Scotland, reviewed the research and provided an overview of factors contributing to this problem.

Once a contact lens (comprised of any material) is placed in the eye, a cascade of events follows, often ending in symptoms of discomfort. These events result in loss of conformity between the lid and globe, which changes the blink pattern and tear distribution. In addition, the tear film splits into post- and pre-lens components. Dr. Tomlinson noted that if the average tear film volume is 0.728 mm³ and the volume of a lens is 34.603 mm³, the tear film now has to cover double the original surface area.

Interference with the lipid layer, resulting in an up to 50% increase in evaporation and rapid drying of the tear film and contact lens, adds to the problem. This increased evaporation is one of the main causes of contact lens-associated dryness.

Lens dehydration can be characterized in two stages: onset lateness (first tear break-up) and drying duration (at which point the lens has already dried out). Both stages are important in learning about contact lens-related dryness and attempting resolution. Remember that there are different drying patterns for each lens. For example, a hydrogel lens begins drying in one spot and extends over time, and a silicone hydrogel dries out in scattered areas that extend and coalesce over time. Wetting characteristics also vary, depending on the lens material and solution used.

Contact lens discomfort actually may be a symptom of vision changes communicated by means of a feedback loop. The eye has only a limited number of responses to stress, and they do not necessarily relate to their physical cause. One must not assume a contact lens wearer has dry eye simply because he or she reports symptoms of dryness. Don’t diagnose dry eye or contact lens dryness based on symptoms alone. Consider recommending different lens materials, care solutions, emulsion eye drops and breaks from contact lens wear.

**The impact of cosmetics on the physical dimension and optical performance of silicone hydrogel contact lenses.**

Cosmetics are safe for periocular use, but what is their impact on contact lenses? An in vitro experiment conducted by Doerte Luensmann, Ph.D., Dip. Ing., of the University of Waterloo assessed the effect of common cosmetics (liquid make up remover, make up remover wipes, hand cream, waterproof mascara and water-soluble mascara) on contact lens shape, power and optical performance of seven hydrogel lenses. Recovery of the changes was measured after cleaning the lenses with a hydrogen peroxide regimen.

Some cosmetics can change the shape of contact lenses as well as the quality of vision they provide. Overall, balafilcon A, enfilcon A and galyfilcon A lenses demonstrated a stronger change in parameters; plasma surface lotrafilcon A and lotrafilcon B were impacted the least by cosmetics. Liquid make-up remover and both waterproof and water-soluble mascara had a strong impact on image quality. Cleaning with peroxide provided minor recovery of different lens parameters, although its efficacy varied with different cosmetics.

Practitioners should advise patients to insert contact lenses prior to applying make up and remove their lenses prior to removing eye make up. Contact lens wearers who exhibit problems that appear to be related to cosmetics may need to be switched to a different lens type.

**Predicted reduction in high myopia for various degrees of myopia control.**

In this study, Noel Brennan, Ph.D., of Johnson & Johnson Vision Care in Jacksonville, Fla., calculated the proportion of people who may avoid becoming high myopes with varying degrees of myopia control.

Refractive error frequency distribution samples were studied to identity the proportion of individuals with various levels of myopia, especially those frequencies of different degrees of myopia greater than -5.00D. Refractive errors were multiplied by a correction factor, depending on the degree of myopia control under consideration. The change in the proportion of the population with greater than -5.00D of myopia was then calculated.

Results showed that reducing the rate of myopia progression by 33% would lead to a 73% reduction in the frequency of high myopia. Reducing the rate of progression by 50% would lead to a 90% reduction in frequency of high myopia.

Myopia control that leads to a modest reduction in progression rates could have a major impact on the risk of sight-threatening complications. Development and adoption of methods for reducing myopia progression by as little as 33% are justified from a public health perspective. Novel contact lens designs, such as multifocals, may aid in reducing the rate of myopia progression.

**Cytotoxic and inflammatory effects of contact lens multipurpose solutions on human corneal epithelial cells.**

Multipurpose solutions may cause damage to the ocular surface. In this study, researchers at Hadassah University Hospital in Jerusalem examined the cytotoxic and inflammatory effects of multipurpose solutions (MPS)
Edited by Janet F. Thomas, B.Sc., M.B.A., Editor, and Christine Purslow, B.Sc., Ph.D., Assistant Editor.

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and hydrogen peroxide disinfection systems on cultured human corneal epithelial (HCE) cells.

HCE cells were exposed to eight commercially available MPS products (MPS A to H) at concentrations of 30% v/v and 50% v/v for 12 hours. Cytotoxic effects and protein contents of pro-inflammatory cytokines were examined using numerous lab tests.

Incubation of HCE cells showed that all MPS examined did induce some levels of pro-inflammatory cytokines compared to the negative control. MFB immunoassay demonstrated that five MPS stimulated the highest levels of pro-inflammatory cytokines in HCE cells. In contrast, insignificant differences were noted between the hydrogen peroxide systems and the negative control.

Taken together, these data suggest hydrogen peroxide is a preferable disinfecting and sterilizing system for contact lenses compared to most commercially available MPS.

Do people really care for contact lens cases in the correct way?

The purpose of the study, conducted by Katharine Evans, B.Sc., Ph.D., Magdalene James, B.Sc., and Christine Purslow, B.Sc., Ph.D., was to investigate contact lens case hygiene among contact lens wearers in a university population. All university staff and students were emailed an online contact lens case hygiene questionnaire investigating demographics, wearing history, last aftercare and practitioner lens case hygiene questions. Compliance scores were calculated from responses about daily case emptying, rinsing, drying, no use of water and frequent case replacement.

Of the 745 contact lens wearers who completed the questionnaire, 683 wore soft lenses and wore 62 gas-permeables (GP). Less than 6% of respondents were fully compliant. Compliance scores were similar in the two gender groups. GP wearers reported significantly poorer case hygiene than soft lens wearers, with mean compliance scores of 2.19 and 2.76, respectively. Superior hygiene was observed in those wearing lenses for less than 12 months. Compliance scores were better where the practitioner questioned lens case hygiene during aftercare. Wearers with more recent aftercare, or where the practitioner went on to explain the consequences of poor lens case hygiene, had better compliance (although differences did not reach statistical significance). In soft lens wearers, compliance tended to be worse in those wearing internet-purchased lenses (2.49) compared to practitioner-purchased lenses (2.78).

This study highlights poor case hygiene in contact lens wearers; like other aspects of lens wear, compliance decreases with increasing wearing history. These results reinforce the importance of regular aftercare and the influence of the practitioner on lens case hygiene.

Evaluation of change in comfort and vision from two to four weeks of monthly replacement silicone hydrogel contact lenses.

This study by Peter Bergenke, O.D., of Alcon and Barry Eiden, O.D., and Robert Davis, O.D., M.B.A., of EyeVis examined changes in comfort and vision between two weeks and one month for wearers of lotrafilcon B lenses. One hundred twenty current wearers of lotrafilcon B lenses each wore a new pair of lenses for one month, using their habitual lens case system, and were evaluated after two weeks and at one month. In addition to clinical ratings, subjects responded to agreement statements regarding perceived differences in comfort or vision over the month of wear.

No differences were noted in biomicroscopy scores between two weeks and one month. Comfort and vision ratings were evaluated for non-inferiority of the one month compared to the two week rating, using a margin of 0.50 on a 1-10 scale. Non-inferiority was established for ratings of visual clarity and ocular redness. The four agreement statements using a Likert scale comparing comfort between the two-week visit and the four-week visit were all found to be significant.

Subjective comfort ratings showed a small decrease between two weeks and one month; however, subjects expressed strong agreement with statements regarding comfort and vision throughout the month of wear. Wearers of lotrafilcon B lenses do not perceive substantial drops in comfort or vision over the recommended wearing interval. The small decrease in comfort supports compliance with monthly replacement of these lenses.

The annual BCLA conference is almost entirely dedicated to contact lens-related practice and research, and this year was no exception. The meeting provided valuable data and clinical insights that help all of us provide better care to our contact lens wearers. Due to space constraints, it is impossible to cover all the posters and abstracts, but I do urge our readers to visit www.bcla.org/uk for more information.
The Life and Times of Hydrogen Peroxide
From disinfection to wound healing and anti-aging, hydrogen peroxide is a multifaceted and vitally important substance.

We think of hydrogen peroxide as an active disinfectant against a wide range of microorganisms (bacteria, yeasts, fungi, viruses and spores), yet it is also integral to a variety of other endogenous and exogenous activities. Hydrogen peroxide constantly surrounds us in this world, and as such, seemingly takes on a world of its own.

What Is It?
Hydrogen peroxide (H₂O₂) is in the air we breathe, the water we drink and products we use regularly. Even our own bodies constantly produce it. Hydrogen peroxide is biologically created from the breakdown of superoxide anions (O₂⁻) following exposure of cells to physical, chemical or biological agents. H₂O₂ is important in normal wound healing, initiating necessary inflammation and pathogen destruction.

We harness the good properties (teeth whitening, contact lens disinfection, hair bleaching), and by eating blueberries, monitoring our vitamin C and using sunscreen, we ward off the ill effects (aging, inflammation, DNA damage, tumor induction). The toxicity and disinfectant properties of peroxides, however, are directly related to the concentration and the body’s ability to detoxify itself. A 3% to 6% concentration of hydrogen peroxide is commonly sold over the counter and is used in contact lens disinfecting solutions. Concentrations from 6% to 25% show promise as chemical sterilants.

Microorganisms have built-in defense mechanisms against hydrogen peroxide, including the encystment of amoebo and increasing levels of enzymatic degradation. Catalase, among others, is an antioxidant enzyme that protects cells from metabolically-produced hydrogen peroxide by degrading H₂O₂ to water and oxygen. This defense is overwhelmed by increasing the concentrations used for disinfection. Therefore, the disinfection efficacy of a contact lens solution against highly resistant organisms depends on the contact time and concentration of the peroxide over that entire period of time.

How Does It Work?
Hydrogen peroxide disinfects by producing hydroxyl free radicals (OH⁻) that can attack membrane lipids, DNA, mitochondria and other essential cell components. Hydroxyl radicals are highly reactive, short-lived and remarkably destructive. H₂O₂ is lipid soluble; therefore, when cells come into contact with hydrogen peroxide, the cell is easily penetrated and releases a variety of signaling molecules that play a key role in immune cell activation (inflammation), healing and tumor genesis.

Wound healing has several stages mediated by hydrogen peroxide signaling, including inflammation and new tissue formation. Hydrogen peroxide attracts leukocytes to the wound site, which produce more pro-inflammatory mediators. H₂O₂ also stimulates angiogenesis, fibroblasts to create new connective tissue and keratinocytes to close the epidermal layer. In addition, H₂O₂ increases heparin binding epidermal growth factor, released by the keratinocytes, and encourages closure of the epidermal layer.

The levels of H₂O₂, however, must be kept in check. When available, antioxidants—produced by our body—are insufficient to maintain reasonable levels, DNA and mitochondrial damage results, increasing the likelihood of cancer development. High levels of oxidative species also have been linked to neurodegenerative diseases (e.g., Parkinson’s, Alzheimer’s, Huntington’s), cardiovascular disease and chronic fatigue syndrome.

Hydrogen peroxide is a potent metabolic regulator in our bodies; it can be either friend or foe. Although our initial reaction is to think of H₂O₂ as a benign disinfectant because of its ability to be broken down to water and oxygen, its mechanisms are powerful and complex and should command respect.


A Preemptive Strike
Open communication with your patients can help to alleviate complications surrounding dry eye and contact lenses, such as dropouts.

Astonishingly, there are at least 34 million Americans that currently wear contact lenses regardless of their ocular condition. From presbyopia to astigmatism, lens technology has evolved to address the needs of a wide range of patients with varying ocular issues. However, the contact lens dropout rate remains a persistent concern for practices, especially with patients suffering from dry eye.

A recent study found that 32.7% of contact lens wearers, compared to an estimated 14% to 33% of the general population, suffer from dry eye. In a 2010 global survey conducted by John Rumpakis, O.D., M.B.A., the primary reason patients discontinue use of their lenses is discomfort associated with dry eye (50%), followed by a preference for glasses (15.9%) and finally, expense (12.3%). As eye care practitioners, we struggle to work with financial constraints and our patients’ personal preferences. However, we can take steps to prevent a contact lens user from discontinuing use solely due to dry eye.

In this column, we’ll look at the patient profile of a contact lens user with dry eye, describe ways to screen for the disease and examine the many treatment options currently available.

The Dry Eye Dilemma
Dry eye is both a medical concern as well as a refractive issue, and should be treated before the initial prescription and/or continuation of lenses. By treating the eye first, you can then focus on equipping your patient with the most appropriate lens choice.

Ocular dryness and the use of contact lenses presents a considerable challenge: Contact lenses may exacerbate pre-existing dry eye, and can also induce dry eye in patients who may have previously never had any symptoms. This type of dry eye is a condition known as contact lens-induced dry eye (CLIDE). When a contact lens is placed on the pre-corneal tear film, the normal tear film is disrupted, which leads to more rapid tear film break-up and evaporation. Contact lens wear also can decrease corneal sensitivity and disrupt the normal tear secretion that is needed to preserve the ocular surface.

Keep in mind that losing contact lens patients can significantly impact your practice’s income. In fact, each contact lens dropout costs an optometric practice an average of $21,695 over the lifetime value of that patient. These losses can be avoided if a patient’s dry eye is appropriately managed first.

Recognize Patient Behavior
It should be noted that a comprehensive dry eye exam is different from a regular check-up of a patient’s overall ocular health.

Before fitting your patient in contact lenses, conduct a thorough eye exam. Ask basic questions, such as whether your patient is experiencing any common signs of dry eye, including burning, stinging or grittiness. Upon clinical presentation, it is important to clearly differentiate between symptoms related to lid disease (blepharitis or meibomian gland dysfunction) and symptoms of allergy. For example, an allergic eye itches, while a dry eye burns and produces a gritty sensation.

Next, follow up with more detailed questions to gain some insight into your patient’s daily habits. Note non-compliant tendencies among your patients, such as sleeping in lenses or skipping cleaning regimens. Learn about your patient’s individual lens needs, such as how many hours of continuous lens wear is expected, to establish the most customized approach to their lens care. Consider switching your patient to a daily disposable lens, which may help alleviate many symptoms and improve compliance.

While collecting a personal history, find out about your patient’s home and work environments. Symptoms of ocular discomfort are higher among contact lens users who spend significant time in areas controlled by air conditioners and/or heating units, and those who are exposed to windborne and airborne pollutants.

Visually taxing activities, such as reading, watching television or using a computer, can exacerbate dry eye symptoms. Suggest that your patients avoid these stressors for an extended period of time. These subtle changes in
lifestyle can often have a significant impact on dry eye patients’ quality of life.

Finally, find out at what time of the day the symptoms are at their worst. Studies have shown that subjects with dry eye display impaired visual function in the evening rather than in the morning.6

Clinical Examination

There are several techniques used to diagnose dry eye.

• **Fluorescein and lissamine green staining.** These tests are used to evaluate the cornea, conjunctiva and tear film to get a clear picture of the extent of dry eye damage.

• **Standard slit lamp.** A physical examination is also needed to look for classic signs of the disease such as redness.

• **Tear film break-up time (TF-BUT).** TF-BUT can also illuminate a dry eye issue; the cut-off for dry eye diagnosis is less than five seconds.7

• **Ocular protection index (OPI).** The OPI was developed to quantify the interaction between blinking and the tear film—thus providing a framework to assess the effects of tear film instability associated with dry eye.8

• **Interblink interval visual acuity decay (IVAD).** Because the severity of dry eye signs and symptoms may relate to a patient’s interblink visual acuity, a disruption in visual function and tear film stability can be measured by clinical technologies such as the IVAD test.

The Treatment Options

Advances in contact lens technology have broken the barrier between dry eye sufferers and contact lenses. Soft contact lens materials, including omafilcon A and etafilcon A, have higher oxygen permeability than previous-generation lenses, allowing the eye to “breathe” easily and the tear film to replenish more readily. One study showed that senofilcon A (Acuvue Oasys, Johnson & Johnson) is particularly effective in improving comfort over time in habitual lens wearers who are exposed to adverse environmental conditions.3 These lenses were also shown to enhance wettability and improve comfort, which can eventually lead to fewer dropouts.

Rewetting drops can also be used. Proactively selecting the optimal care products for your patient’s particular lenses can enhance performance and the overall wear experience, which ultimately can reduce dropouts.

Despite the number of treatment options available today, nothing is as successful as establishing a management strategy with your patients that works best for their individual needs. Emphasize frequent check-ups and maintain a clear line of communication for long-term contact lens-wearing success. Pre-emptively treat dry eye first and then follow with a contact lens prescription that works best for a patient’s condition. This will help minimize dropouts at your practice and make your patients much more comfortable in their lenses.9

Diagnostic tests like staining reveal a dry eye patient’s symptoms such as increased tear film break-up. Being fully aware of your patient’s dry eye is crucial before outfitting them in lenses.

A Material Match for Overnight Wearers

Finding the right contact lens material to match each patient’s individual needs can increase comfort and, ultimately, improve compliance.

Over the years, we have explored a number of ways to derail contact lens dropouts. We credit the recent advances in technology for providing nearly limitless options to keep our patients in their contact lenses. One significant technological advancement is the improvement in oxygen permeability. Increased Dk/t values directly impact daily wear, as we know, but perhaps the significance is even more important to our extended wear patients.

Contemporary contact lens materials, designs, solutions and wearing schedules have fortunately reduced the number of serious contact lens complications we see today. It is important to remember how inconvenient and potentially damaging these complications can be, should they occur.

In this column, we will primarily focus on how extended wear lenses are prescribed and which contact lens materials are appropriate to use.

HEMA vs. SiHy

Dk/t values have long been considered an important factor when evaluating a contact lens material, especially when you consider that some of your patients may be sleeping in their lenses. Overnight wearers need to be closely evaluated; collect important information such as how long the lenses are worn overnight, the replacement schedule and the material of the prescribed lenses.

Some of your extended wear patients may be using older hydrogel material lenses. Research suggests that the much healthier silicone hydrogel (SiHy) lenses, with their higher oxygen permeability levels, produce less corneal edema and neovascularization.

Even though some traditional soft contacts have extended wear or flexible wear approval, they may not be the best choice for patients seeking overnight lenses. Traditional soft lenses are made from hydroxyethylmethacrylate (HEMA), which relies on the polymer to regulate the amount of oxygen that permeates the lens. With the advent of SiHy contact lenses, the Dk/t increases as the silicone increases.

But remember that the Dk/t varies from the center of the lens out to the periphery. The peripheral cornea may be negatively affected by the lower Dk/t levels in the thicker, peripheral aspect of the contact lens material.

The limbus is the only source of epithelial stem cells, which help the cornea heal quickly and maintain normal function. If lower Dk/t values in the peripheral contact lens material cause hypoxic inflammation in the limbus, there is the potential for serious complications such as chronic keratitis, vascularization and recurrent erosions.

Increased oxygen limits the amount of chronic limbal inflammation, so practitioners should continue to use contact lenses with the highest Dk/t values possible. This is especially important for patients who never remove lenses for any period of time.

In addition, the severity of microbial keratitis is lower in the

A Case Study

Tony, a 16-year-old white male, has worn daily disposable lenses in the past, but has recently developed a bad habit of not taking them out every night. This was not mentioned during the routine history taken by the staff, but it came out during the exam.

The patient’s father admitted that he was aware of his son’s bad habit and asked if there were any better options for his son to wear contact lenses in a healthy way. The risks of extended wear were discussed, and it was recommended that he should be fit into a high Dk/t silicone hydrogel monthly disposable that he could wear overnight. Note: Talk to your patients about how your role as their doctor is to minimize any risk of a negative event, thus prolonging their contact lens wearing life.

After performing the refit and subsequent follow-up two weeks later, the patient admitted loving these new lenses. His vision was excellent, the lenses fit well and his anterior ocular health was clear and quiet. He transitioned well, but will be monitored every six months.
SiHy group when compared to HEMA wearers who sleep in their lenses. For these reasons, SiHy lenses should be the lens of choice for continuous wear patients.

The Overnight Wear Scale

Do you proactively recommend overnight lenses or do you prefer to wait until the patient admits to continuously wearing their lenses without a break? It is each practitioner’s professional decision when and how to introduce this modality, but keep in mind that many patients already internally rationalize overnight wear without your consultation. Can we find these patients before they start overnight use? Perhaps by pre-advising our patients and putting high-risk offenders in SiHy material, we can minimize the risk of marginal keratitis.

Remember to ask the right questions. Instead of asking if they sleep overnight in their lenses, ask how often they sleep overnight in their lenses. This question carries more weight if you ask it while performing the slit lamp exam. Either way, this inquiry needs to be discussed and repeated at each contact lens evaluation.

Non-compliance is already a serious issue, and the problem can worsen if you are not diligent. Several factors contribute to the issue, including age, education, wear schedule, when your patient was first fit in lenses and why they chose that particular modality.

Non-compliance in the medical care field is as high as 44%; yet non-compliance in contact lens care ranges between 50% and 99%. This is why we, as an eye care community, need to be consistent in how we educate and prescribe specific lenses.

Steroids: Too Hot to Handle?

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

Panelists: Joseph Shovlin, O.D., and William Potter, O.D.

If ever a topic could instantly generate debate, and perhaps a little fear in the hearts of optometrists, it is steroids. In a recent “Controversies in Care” online webinar, panelists Joseph Shovlin, O.D., and William Potter, O.D., with additional contributions from Paul Karpecki, O.D., tackled this thorny issue—delving into the pros and cons of steroid use in patients with corneal compromise (e.g., inflammation or marginal keratitis), the effectiveness of steroid-antibiotic regimens and the impact of the SCUT trial.

To kick off the night, audience members were asked how often they prescribe topical steroids. The results showed that a good percentage regularly do: 7% said never, 30% fewer than five times a month, 47% more than five times but less than 20 times a month, and 17% said more than 20 times a month.

“Heck, there’s a woman at the eye center who uses them every day,” said Dr. Potter. “From a medical standpoint, I’ve never seen anyone get faulted for not using a steroid, only for using a steroid inappropriately,” said Dr. Shovlin.

**Corneal Inflammatory Events**

Dr. Shovlin started the night’s conversation by mentioning the increasingly frequent occurrence of corneal inflammatory events (CIEs). “With silicone hydrogel lenses, dryness seems to be a pretty common issue,” added Dr. Potter. “When dryness is involved, you certainly get a sequestering of dirt and germs and toxins, and that makes these events a little bit more likely.”

He then mentioned that confocal microscopy can show an up-regulated immune system in the corneas of silicone hydrogel wearers. While its clinical impact is yet to be determined, this does show that immune systems react to the silicone hydrogel modality, he said.

Dr. Shovlin noted that the relative risk is tenfold if using an MPDS vs. a peroxide-based system. More interesting, he said, is what’s growing in the lens case; work by his group found two gram-negative bugs—*Stenotrophomonas* and *Achromobacter*. Dr. Shovlin and colleagues then took those isolates and exposed them to Opti-Free Replenish (Alcon), Revitalens (AMO) and Biotrue (Bausch + Lomb).1 They recorded a significant log reduction in those organisms initially, but after six hours the bugs regrew in Opti-Free Replenish. Therefore, the ideal procedure is to follow lens care basics of rubbing and rinsing, and adhering to a lens case replacement schedule.

In response to an audience question on whether practitioners are seeing the same results with Opti-Free PureMoist (Alcon), Dr. Shovlin said reports are mixed but the re-addition of EDTA (previously in Opti-Free Express), may “soften” the cell membrane in gram-negative bugs and allow the disinfectants to be more robust.

How best to treat CIEs? Dr. Potter said he uses a short course of topical ciprofloxacin, and a soft steroid q.i.d. for the first week and b.i.d. for the second week, because the duration of the infection—if it is an infection at all—is much shorter than the inflammatory process. Dr. Shovlin’s go-to treatment is a combination of tobramycin and dexamethasone q.i.d., and he successfully gets patients back in lenses within seven to 10 days.

**The SCUT Trial**

Steroids are not as clinically effective in bacterial keratitis as initially thought, but also not as bad as once considered—that’s the takeaway from the SCUT trial, said Dr. Shovlin. Therefore, there may be a role for steroids in certain cases (i.e., a central corneal ulcer) but not as a matter of routine. The study also found that steroids should not
be used in *Nocardia* infections, and that MIC values do correlate with clinical results. He stressed that this guidance has limitations, and there are always outliers and exceptions.

“The questions it raises is in the subgroup analysis, since different strains of *Pseudomonas* might respond differently,” added Dr. Potter. “Next time around, the authors are going to look harder at the subgroups, especially the bacterial strains, which might give a better guide as to whether it is worthwhile to use steroids or not.”

Audience members were then asked when they are inclined to add steroids to a bacterial corneal ulcer. Only 3% would do so at the onset of the diagnosis, 30% at the 24-hour point with some initial improvement (as recommended by the SCUT trial), 35% only after 72 hours and the culture and sensitivity results are in, and 32% would not if the patient is showing improvement without steroids.

Interestingly, following the release of SCUT, 47% of those polled said the results had no impact on their prescribing patterns for bacterial corneal ulcers, while 27% would be more likely and 26% would be less likely to do so.

**EKC Management**

Because these patients often present while actively using steroids, the decision can be out of the clinician’s hands. Dr. Potter is more reluctant to start steroids in EKC unless he sees the three indicators: central infiltrate interfering with vision, intractable pain and the presence of a pseudomembrane. In the absence of those, he treats without steroids, but follow-up is vital; infiltrates develop seven days after the onset of initial symptoms and supportive care is not really going to address the discomfort. Dr. Shovlin stressed that although you cannot be punished for not using steroids, if you see any of the three indicators, steroids are the most effective way to alleviate the patient’s symptoms.

The audience agreed. A majority (47%) would use topical steroids only for pain, central infiltrates and/or pseudomembranes and 26% would wait to see how the disease progresses, while 18% said they would always use topical steroids for EKC and 8% said they would never prescribe steroids as it prolongs the clinical course.

Which steroid should you use? Dr. Potter would usually opt for soft steroids—fluorometholone or loteprednol—but for more severe cases or in the presence of a pseudomembrane, he would put patients on Pred Forte (prednisolone acetate, Allergan). He said he would remove the pseudomembrane if possible.

**Intraocular Pressure**

Dr. Potter brought up the classic 1963 study by Armaly that found that a third of normal patients and 90% of glaucoma patients respond to steroid use with a greater than 6mm Hg rise in intraocular pressure. The takeaway here, he said, is that prednisone has better penetration and may be more potent in raising intraocular pressure. In uveitis, for example, the regimen would not be q.i.d., but rather q2h or qh.

“Identifying a steroid response is not the most terrible thing that can happen,” he added. “You have really done your patient a favor by identifying them as a potential glaucoma patient in future years.”

In response to an audience question on treatment of steroid responders, Dr. Shovlin said he typically uses a steroid like Durezol (difluprednate, Alcon) initially, so there is potential for some impressive pressure spikes. He usually adds a topical aqueous suppressant when not contraindicated. However, he did warn that it is sometimes quite frustrating to get insurance coverage for some of these treatments.

**Allergy**

Last but not least, Dr. Potter gave three factors that would prompt him to use steroids in an allergic conjunctivitis patient: (1) work or school performance being disrupted significantly, (2) a high Rx contact lens such as a keratoconus patient, and (3) when making a clinical distinction between a histamine-mediated process vs. an eosinophil-type process. “We have to make sure we are dealing with allergy. It works on a higher order cascade effect—it is the echelon of therapy,” said Dr. Shovlin.

Dr. Potter added a cautionary note: Steroids should improve allergies almost immediately, so if you do not see a change, reconsider the diagnosis.

*A special thank you to our active audience who participated throughout the evening. We welcome you to join us for future conversations.*

A Second Degeneration

Piggybacking GP lenses is not the only way to treat nodular corneal degeneration. Try vaulting the cornea instead.

As I wrote in my last column, nodular corneal degenerations can often be difficult to manage. The symptoms of discomfort and decreased vision can vary greatly, and also can be associated with other conditions, such as chronic ocular surface inflammation and irritation. Patients with nodular degenerations often will seek surgical treatment if their symptoms are persistent.

In the June 2012 column, I discussed the case of a 33-year-old white female who presented with severe corneal nodular degeneration leading to significant vision loss but who only suffered minor discomfort from the symptoms. The patient has been managed successfully for many years now by piggybacking a gas-permeable (GP) lens over a bandage soft lens. However, if symptoms of discomfort, photophobia and irritation become predominant, sometimes another approach can work better.

A Case Study

EH, a 43-year-old white female, was recently referred for a possible contact lens fitting for Salzmann’s nodular corneal degeneration. She had been diagnosed with this condition 20 years ago, and had undergone multiple attempts to treat it with bandage lenses, corneal scrapings and phototherapeutic keratectomy (PTK).

The most recent PTK was done bilaterally less than six months prior to this evaluation. Her chief complaints were light sensitivity, blurry vision and a chronic scratchy sensation.

Her entering acuity without correction was 20/60 OD and 20/70 OS. The slit lamp exam revealed an ocular surface mostly free of nodules, though there was ocular surface inflammation (figure 1), as well as areas of fragile, irregular epithelium (figure 2).

At this stage, because so many procedures had already been done on her corneal surface with only fair results, both she and her corneal specialist were determined to forgo any further surgical intervention. After reviewing her past history and discussing her options, I agreed that scleral lenses might be of benefit. This option could significantly improve her vision, and hopefully reduce her symptoms by covering the sensitive corneal epithelium. EH consented and we fitted her with a pair of msd Mini-Scleral Design lenses (Blanchard Labs). To bring her right eye to 20/20 vision, I fitted a 4.40 Sag, 18.0mm, increased profile lens with a power of +1.25D (figures 3 and 4). To achieve 20/20 vision in her left eye, I fitted a 4.60 Sag, 18.0mm, standard profile lens with a power of +0.50D.

After the lenses were ordered and dispensed, I made slight adjustments to the refraction and edge profile over the next few visits.
In the end, EH was able to wear her scleral lenses for more than 10 hours a day with good vision. Her symptoms were not fully resolved, but she did notice a difference. Her vision improved and she was satisfied to continue wearing the lenses as her primary mode of vision correction.

**Discussion**

Fitting Salzmann’s corneal nodular degeneration in scleral lenses can be an excellent way of correcting vision and providing the best possible comfort in many cases. In fact, scleral lenses have proven effective for a vast array of corneal degenerations and ocular surface diseases.2,3

One difficulty in fitting Salzmann’s corneal degeneration patients with scleral lenses is that the nodules are focal elevations on the ocular surface. Scleral lenses often settle by 100µm or more.4 Ensuring sufficient vault at the time of fitting will allow for that settling to occur without the lens bearing down on these fragile nodules, which would likely lead to a worsening of the symptoms. The nodules are often in the peripheral cornea, making it all the more complex to get sufficient vault to avoid contact with the elevated nodules either at fitting or after lens settling has occurred. In general, larger-diameter sclerals are preferred to allow for a larger corneal chamber and one with sufficient vault all the way to and beyond the limbus.

Nodular corneal degenerations can be difficult to manage. As demonstrated in these last two columns, GP lenses have a significant role in managing these conditions by restoring vision and—to a certain extent—improving symptoms. Whether you choose to go the direction of a larger, vaulting GP lens or something that rides on the cornea (with or without piggybacking) will depend on your patients’ individual presentations.4

Down on the Pharm
By Jill Autry, R.Ph., O.D., and Elyse Chaglasian, O.D.

Flomax for Females?
Here’s what you need to know about the off-label use of tamsulosin.

I

If you see a lot of older male patients, it’s likely that you’ve often had a conversation about the ocular effects of Flomax (tamsulosin, Boehringer Ingelheim/Astellas Pharma), an oral medication for men who suffer from benign prostatic hypertrophy (BPH). Flomax, an alpha-1a blocker, decreases symptoms of BPH such as frequency, urgency, weak urine stream, difficulty in starting urine flow, dysuria and nocturia.

The decrease in BPH symptomatology observed with tamsulosin is directly related to the drug’s ability to preferentially antagonize alpha-1a receptors and, therefore, relax smooth muscle in the prostate and bladder neck. Although other non-subtype alpha-1 blockers exist, tamsulosin’s affinity and selectivity for the alpha-1a receptor subtype results in superior efficacy in treating BPH without the hypotensive side effects common with less selective agents. Unfortunately, it also relaxes the iris dilator muscle, leading to miosis.

In recent years, the use of tamsulosin has expanded to off-label indications in both men and women. Here is an overview.

Off-Label Uses
The most common off-label use of tamsulosin is to assist in the passage of kidney stones by increasing urinary fluid volume and pressure as well as relaxing smooth muscle in the ureters. Studies have verified that tamsulosin increases the expulsion rate of kidney stones while decreasing the time to expulsion and the need for adjunctive pain management, hospitalization and surgical intervention. Tamulosin is also prescribed off-label to men and women to treat overactive bladder, to facilitate voiding in patients with and without multiple sclerosis (MS) and to treat patients with urinary retention. Like its mechanism of action in BPH, tamsulosin is effective by antagonizing alpha-1a receptors with subsequent relaxation of urinary tract smooth muscle.

The expanded use of tamsulosin is important to optometrists because of its well-established association with intraoperative floppy iris syndrome (IFIS). The condition, with its associated perioperative cataract surgery concerns, was first reported in 2005 by David F. Chang, M.D., and John R. Campbell, M.D.

IFIS is precipitated by the drug’s effect on the iris dilator smooth muscle and is characterized by poor pupillary dilation before surgery, progressive miosis during the procedure, iris movement and undulation hindering phacoemulsification, iris prolapse through the cataract incision site and posterior capsule rupture.

Most recently, an increased risk of postoperative complications has also surfaced regarding the use of Flomax. Patients who currently use the drug, and even patients who have used an alpha-1a blocker in the past, are more at risk for postoperative complications including retinal detachment, lost lens fragments and severe inflammation or infection.

Beyond Flomax
With the FDA’s approval of a generic tamsulosin formulation in 2010, more patients have greater access to the medication. Practitioners should also be aware of the FDA-approved branded combination product called Jalyn (dutasteride and tamsulosin hydrochloride, GlaxoSmithKline), which combines tamsulosin with the 5α-reductase inhibitor dutasteride to reduce symptoms associated with BPH.

Another alpha-1a selective blocker, Rapaflo (silodosin, Watson), received FDA approval in 2008 and, as suspected, has had reports of IFIS. Non-subtype specific alpha blockers such as Hytrin (terazosin hydrochloride, Abbott Labs), Cardura (doxazosin mesylate, Pfizer), and Uroxatral (alfuzosin hydrochloride, Sanofi-Aventis) have had reports of IFIS but are rare compared with the alpha-1a selective products.

Be Prepared
In order to decrease the surgical ophthalmic risks associated with alpha-1a blockers, eye care practitioners must take heed of the Boy Scout motto “be prepared.” Unfortunately, stopping the medication before surgery has not proven to lessen or halt IFIS and is generally not recommended. Knowledge of the patient’s previous or current use of an alpha-1a blocker, however, will allow the surgeon to take preoperative and intraoperative precautions, which will allow for fewer IFIS complications. Here are some recommendations for the management of IFIS.
Most ophthalmologists agree the biggest threat with a Flomax patient involves the inability to maintain good pupillary dilation during the surgery. In a survey of high-volume ophthalmologists skilled in managing IFIS, there are various recommendations for achieving and maintaining an adequate pupil size. The use of atropine 1% has been described three to seven days pre-op as well as the use of an intracameral epinephrine/lidocaine mixture. Both of these techniques increase pupillary dilation and decrease progressive miosis. Surgeons also recommend having iris hooks and/or capsular tension rings available in case their pharmacological approach fails.

Healon 5 (Abbott Medical Optics), as both a cohesive and dispersive viscoelastic agent, is the referential viscoelastic for patients who exhibit IFIS. Its unique properties help to promote pupillary dilation and keep the iris from billowing and prolapsing into the incision sites.

Finally, some surgeons alter their phacoemulsification settings at various stages of the procedure in patients who exhibit IFIS. This often will result in a longer surgical case but a less complicated one.

With the increased and expanded use of tamsulosin and other alpha-1a antagonists for males and females alike, eye care practitioners should be diligent in reviewing each patient’s medication history and informing the surgeon when referring for cataract surgery. Asking your patient about current or previous urinary tract or prostate issues is an easy way to determine potential problems. This information is especially important for cataract surgeons, optometrists in surgical centers who provide pre- and postoperative care and primary care optometrists who are referring patients for surgery.


Optometric practitioners are overwhelmed by an array of practice modalities and methods. Technologic expansion is subject to the law of diminishing returns, especially as insurance reimbursements are increasingly challenged. Our knowledge base and techniques are expanding so rapidly that it causes us to pause and consider what really matters. This led me to the concept of the “1% Rule.”

**Examples of the 1% Rule**

If a clinical technique can add 1% to the growth of my practice with no investment in technology or personnel, then it is worth considering and pursuing. For example, I am personally interested in systemic and ocular inflammatory disease. Developing this specialty focus would involve attending top CE lectures, scouring the literature and eventually, lecturing on the topic myself. In return, patients recognize my expertise on this topic as a distinguishing feature of my practice.

Use the 1% rule for contact lens care and solutions. As eye care practitioners, we believe that proper use of lens care solutions is tremendously important and linked to our broader mission of promoting contact lens compliance. We therefore take the time to review techniques and procedures at each appointment. Patients are appreciative of the practitioner’s extra time and attention, and will often remark on our positive approach at a subsequent visit.

The practice-building effect is quite apparent. We miss an important teaching moment if we take the stance that “solutions don’t matter.” Science indicates otherwise, and the lackadaisical dispensing of solution samples does not inspire compliance.1-4 Keep in mind that the teaching itself shouldn’t involve a scare tactic. Most patients don’t respond well to a recitation of grave consequences.

Instead, at my practice, we have adopted the practice suggestion of Mile Brujic, O.D., of Bowling Green, Ohio, who emphasizes comfort as the benefit of compliance. OPTI-FREE® PureMoist® MPDS with HydraGlyde® Moisture Matrix fits perfectly with this approach. Its advanced features yield comfort and safety, while enabling us to present a new, forward-looking technology.

Aren’t you on the edge of your seat when you hear about a new product that may enhance your health, safety or convenience? Isn’t that what our patients look for at their annual exam? For contact lens practitioners, the direction here might be obvious: Technologic investment, loan servicing and equipment failure are zero when the stake is a targeted, one-minute discussion with the patient, followed by instruction and dispensing by our contact lens staff.

It isn’t the sale of solution that gives the 1% effect—it’s the caring and empathy that can set a practice apart from its competitors. Increased wettability and excellent disinfection are the reasons we recommend OPTI-FREE® PureMoist® MPDS and better contact lens comfort is our motivation. This approach has surely contributed 1% (or more!) to our bottom line, and it can do the same for yours as well.

Is it Dry Eye, Allergy or Both?

The symptoms are similar, yet the treatments are very different. How do we distinguish between the two?

By Ernie L. Bowling, O.D., M.S.

Dry eye and ocular allergy, both very common clinical presentations, are responsible for a large number of patient visits. Research and surveys over the past 20 years have estimated that the prevalence of dry eye disease (DED) is between 5% and 30% across various age groups. Several large studies have estimated that just fewer than five million Americans, 50 years and older, have moderate to severe DED.

About 15% to 20% of the U.S. population have atopy—a genetic predisposition toward developing certain allergic hypersensitivity to environmental substances, such as pollens, molds and dust mites. More recent, studies indicate that up to 40% of the U.S. population may have ocular symptoms related to allergy.

Clinical experience suggests that both dry eye and ocular allergy present very frequently in our clinics. To make the diagnosis more complicated, both conditions have very similar symptoms. Our job is to distinguish between the two and prescribe the appropriate therapy.

Etiology and Pathophysiology

Fifty million Americans are affected by allergy each year, and 30 million of these individuals suffer from seasonal allergies. Meanwhile, ocular surface disease (OSD) affects approximately 20.7 million people in the U.S. every year. Nearly 4.25 million of these individuals have chronic ocular surface disease.

Dry Eye

Ocular burning is the primary symptom of dry eye; the ocular signs and symptoms include corneal and conjunctival staining, a reduced tear meniscus, sandy and gritty foreign body sensation, keratitis and, albeit rarely, photophobia.

One of the most significant and compelling outcomes from the Dry Eye WorkShop (DEWS) was a new definition of dry eye disease that, for the first time, included terms like “hyperosmolarity” and “inflammation.” Dry eye is now defined as “a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tear film instability with potential damage to the ocular surface.”

The core mechanisms of dry eye are driven by tear hyperosmolarity, which activates a cascade of inflammatory events that cause epithelial damage. Meibomian gland dysfunction (MGD) is one of the major causes of evaporative dry eye and tear hyperosmolarity.

The International Workshop on
Meibomian Gland Dysfunction (MGDW) describes MGD as: “A chronic, diffuse abnormality of the meibomian glands, commonly characterized by terminal duct obstruction and/or qualitative and quantitative changes in glandular secretion. It may result in alteration of the tear film, eye irritation, clinically apparent inflammation, and ocular surface disease.”

Note that, as with dry eye, this new definition of MGD also includes the term “inflammation.”

### Allergic Conjunctivitis

The key symptoms of allergic conjunctivitis include itching, tearing, burning, foreign-body sensation and ocular dryness. Itching is the hallmark symptom. If it is absent, the diagnosis of allergic conjunctivitis should be questioned. It is important to inform patients that vigorous eye rubbing will lead to mast cell degranulation and exacerbation of itch. The key clinical signs of allergic conjunctivitis are hyperemia of the conjunctiva and the eyelids, conjunctival chemosis and papillae, eyelid edema and a clear, watery discharge.

Ocular surface inflammation plays a key role in the pathogenesis and symptomatology of allergic conjunctivitis. Both seasonal and perennial allergic conjunctivitis are type I hypersensitivity reactions that involve sensitization of the immune system upon first exposure of the antigen. After repeated exposure, the antigen-specific IgE binds to mast cells in the conjunctiva, triggering their degranulation.

### Treatment Algorithm for MGD

<table>
<thead>
<tr>
<th>Stage</th>
<th>Clinical Description</th>
<th>Treatment</th>
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</table>
| 1     | • No symptoms of ocular discomfort, itching or photophobia.  
     | • Clinical signs of MGD based on gland expression.  
     | • Minimally altered secretions: grade 2-4.  
     | • Expressibility: 1.  
     | • No ocular surface staining. | • Inform patient about MGD, the potential impact of diet, and the effect of work/home environments on tear evaporation, and the possible drying effect of certain systemic medications.  
     | • Consider eyelid hygiene including warming/expression. |
| 2     | • Minimal to mild symptoms of ocular discomfort, itching or photophobia.  
     | • Minimal to mild MGD clinical signs.  
     | • Scattered lid margin features.  
     | • Mildly altered secretions: grade 4-8.  
     | • Expressibility: 1.  
     | • None to limited ocular surface staining: DEWS grade 0-7; Oxford grade 0-3. | • Advise patient on improving ambient humidity; optimizing workstations and increasing dietary omega-3 fatty acid intake (+/-).  
     | • Institute eyelid hygiene with eyelid warming (a minimum of four minutes, once or twice daily) followed by moderate to firm massage and expression of MG secretions (+).  
     | • All the above, plus (+/-)  
     | • Artificial lubricants (for frequent use, nonpreserved preferred)  
     | • Topical azithromycin  
     | • Topical emollient lubricant or liposomal spray  
     | • Consider oral tetracycline derivatives. |
| 3     | • Moderate symptoms of ocular discomfort, itching or photophobia with limitations of activities.  
     | • Moderate MGD clinical signs.  
     | • Lid margin features: plugging, vascularity.  
     | • Moderately altered secretions: grade >8 to <13.  
     | • Expressibility: 2.  
     | • Mild to moderate conjunctival and peripheral corneal staining, often inferior: DEWS grade 8-23; Oxford grade 4-10. | • All the above, plus  
     | • Oral tetracycline derivatives (+).  
     | • Lubricant ointment at bedtime (+/-).  
     | • Anti-inflammatory therapy for dry eye as indicated (+/-). |
| 4     | • Marked symptoms of ocular discomfort, itching or photophobia with definite limitation of activities.  
     | • Severe MGD clinical signs  
     | • Lid margin features: dropout, displacement.  
     | • Severely altered secretions: grade 13 or greater.  
     | • Expressibility: 3.  
     | • Increased conjunctival and corneal staining, including central staining: DEWS grade 24-33; Oxford grade 11-15.  
     | • Increased signs of inflammation: >moderate conjunctival hyperemia, phlyctenules. | All the above, plus  
     | • Anti-inflammatory therapy for dry eye (+). |
This, in turn, releases intracellular-stored mediators including histamine, tryptase, chymase, heparin, chondroitin sulfate, prostaglandins, thromboxanes and leukotrienes; this cascade represents the acute phase of the allergic response.10

Depending on the geographic area, the signs and symptoms of allergic conjunctivitis often overlap with other forms of OSD, including aqueous deficient dry eye and MGD. Seasonal allergic conjunctivitis is most often triggered by pollen and typically spikes during the spring and summer months. Perennial allergic conjunctivitis is often caused by dust mites, pet dander and mold, and these symptoms can last throughout the year.

The lack of an adequate tear film and the presence of ocular surface inflammation aggravate the irritation caused by allergens and mast cell products such as histamine. The tear film serves as a barrier to allergens and dilutes them, as well as washes away inflammatory mediators. If eyes are dry, more allergens reach the conjunctiva and mast cells. In addition, inflammatory mediators have an increased residence time and enhanced concentration in the tear film.

Making the Diagnosis

Reviewing past and present medical history can be an important step in the diagnostic process (see “Itching vs. Burning,” page 24). Once a complete history is obtained, a thorough eye examination is necessary to confirm the diagnosis. Carefully examine the eye for evidence of eyelid involvement, including blepharitis, dermatitis, swelling, discoloration, pustis or blepharo-spasms. Conjunctival involvement may present with chemosis, hyperemia, cicatrization, or papillae formation on the palpebral and bulbar membranes. Patients will reveal the characteristic signs of ocular allergies, such as diffuse injection of the bulbar conjunctiva and papillary hypertrophy of the palpebral conjunctiva. The presence of Dennie’s lines (crease-like wrinkles that form below the lower eyelid margin), allergic shiners (dark circles under the eye due to swelling and discoloration from congestion of small blood vessels beneath the skin) or increased or abnormal secretions, also should be noted.11

In moderate to severe cases, dry eye disease can be diagnosed based on subjective symptoms and slit-lamp findings. Tear film break-up time is the time interval measured between the last blink and the appearance of the first dry spot.12 Fluorescein break-up time is a widely used method for determining the stability of precorneal tear film and identifying patients with evaporative dry eye. Tear meniscus characteristics (meniscus height, depth and radius of curvature) have been reported to be useful in identifying patients with aqueous-deficient dry eye.13

The Schirmer tear test is the most commonly used and easily performed test for the evaluation of dry eye. Vital staining is a widely used method for studying the integrity and viability of corneal and conjunctival epithelial cells. Fluorescein staining has been the standard clinical means of diagnosing the presence of corneal epithelial surface defects.

Historically, rose bengal (a derivative of fluorescein) has been the vital dye used for ocular testing as it provides an excellent staining of the ocular surface. It differs significantly from fluorescein because it does not stain the precorneal tear film, but rather the dead and degenerating (not denuded) epithelium of the conjunctiva and cornea. Rose bengal also stains mucous particles, strands, filaments and plaques more vividly than fluorescein, making it a better diagnostic aid in the evaluation of the conjunctiva and tear film. However, rose bengal rarely is used today due to stinging.

Another dye, lissamine green, has the advantage over rose bengal in that it fades relatively quickly and is less irritating. For that reason, it has become more widely used both clinically and in drug studies.

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<tr>
<th>Severity</th>
<th>Signs and Symptoms</th>
<th>Recommended Treatment</th>
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<tr>
<td>1</td>
<td>Mild to moderate symptoms, no signs, mild to moderate conjunctivitis</td>
<td>Patient counseling, preserved tears, environmental management, use of hypoallergenic products, water.</td>
</tr>
<tr>
<td>2</td>
<td>Moderate to severe symptoms, tear film signs, mild corneal punctate staining, corneal staining, visual signs.</td>
<td>Unpreserved tears, gels, ointments, cyclosporine A, secretagogues, topical steroids, nutritional support (flaxseed oil).</td>
</tr>
<tr>
<td>3</td>
<td>Severe symptoms, marked cornea punctate staining, central corneal staining.</td>
<td>Tetracyclines, punctal plugs.</td>
</tr>
<tr>
<td>4</td>
<td>Severe symptoms, severe corneal staining, erosions, conjunctival scarring.</td>
<td>PO anti-inflammatory therapy, PO cyclosporine, moisture gels, acetylcysteine, punctal cautery, surgery.</td>
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**A Treatment Plan**

Many individuals with multiple ocular surface disorders require polytherapy to address a host of ocular issues. Inflammation is a key etiologic factor in the pathogenesis of OSD. Thus, anti-inflammatory medications are crucial to successful treatment. In all forms of dry eye, primary tear supplementation is recommended by differently acting artificial tears and ophthalmic ointments.

Each patient must be treated individually based on subjective complaints and clinical signs along with systemic diseases. Long-lasting application of drugs with preservatives may cause disruption of the epithelial cell-to-cell contacts, allergic reaction, decreased goblet cell density or inflammation. Benzalkonium chloride, chlorobutanol and cetrimide are the most common preservatives in artificial tears that can induce toxic epitheliopathy after prolonged usage. Therefore, in moderate stage 2 dry eye (see “DEWS Dry Eye Severity Grading Scheme” above), changing to preservative-free artificial tears is reasonable and recommended. Most preservative-free tear drops may be used together with contact lenses.

The following medications currently are used for treating OSD (both on and off label):

- **Topical cyclosporine.** The only anti-inflammatory agent approved by the FDA for treating dry eye. The Delphi panel recommends its use at stage 2 dry eye.
- **Topical corticosteroids.** This is an additional therapy to be used in stage 2 dry eye.
- **Oral or topical antibiotics with anti-inflammatory activity.** These include tetracyclines, such as doxycycline and minocycline, and macrolides, such as azithromycin. The Delphi panel recommends their use in stage 3 dry eye, and the MGDW recommends their incorporation for the treatment of stage 3 MGD.

- **Omega-3 fatty acids.** Nutritional supplementation is an early recommendation of the Delphi panel, the DEWS report and the MGDW. This treatment has been advocated as an oral therapy to reduce inflammation.

A key take-away message from the DEWS treatment grid is that topical anti-inflammatory medications are recommended at stage 2 severities.

Several potent eye drops are available for treating allergic conjunctivitis. Convenience is one factor that may influence whether or not a medication produces the desired result, and can often drive a patient’s adherence to a regimen. Combination antihistamine/mast-cell stabilizer drops approved for once-a-day dosing are helpful here. All of the available allergy drops are generally safe and patients may

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**DEWS Dry Eye Severity Grading Scheme**

<table>
<thead>
<tr>
<th>Dry Eye Severity Level</th>
<th>1</th>
<th>2</th>
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<tr>
<td>Discomfort, severity and frequency</td>
<td>Mild and/or episodic</td>
<td>Moderate episodic or chronic stress or no stress</td>
<td>Severe frequent or constant without stress</td>
<td>Severe and/or disabling and constant</td>
</tr>
<tr>
<td>Visual symptoms</td>
<td>None or episodic mild fatigue</td>
<td>Annoying and/or activity limiting episodic</td>
<td>Annoying, chronic and/or limiting activity</td>
<td>Constant and/or possibly disabling</td>
</tr>
<tr>
<td>Conjunctival injection</td>
<td>None to mild</td>
<td>None to mild</td>
<td>+/-</td>
<td>+/++</td>
</tr>
<tr>
<td>Corneal staining</td>
<td>None to mild</td>
<td>Variable</td>
<td>Moderate to marked</td>
<td>Marked</td>
</tr>
<tr>
<td>Corneal staining (severity/location)</td>
<td>None to mild</td>
<td>Variable</td>
<td>Marked/central</td>
<td>Severe punctate erosions</td>
</tr>
<tr>
<td>Corneal/tear signs</td>
<td>None to mild</td>
<td>Mild debris, meniscus</td>
<td>Filamentary keratitis, mucus clumping, tear debris</td>
<td>Filamentary keratitis, mucus clumping, tear debris, ulceration</td>
</tr>
<tr>
<td>Lid/meibomian glands</td>
<td>Meibomian gland dys-function (MGD) variably present</td>
<td>MGD variably present</td>
<td>Frequent</td>
<td>Trichiasis, keratinization, symblepharon</td>
</tr>
<tr>
<td>Fluorescein tear break-up time</td>
<td>Variable</td>
<td>≤ 10 seconds</td>
<td>≤ 5 seconds</td>
<td>Immediate</td>
</tr>
<tr>
<td>Schirmer score</td>
<td>Variable</td>
<td>≤ 10mm/5 min</td>
<td>≤ 5mm/5 min</td>
<td>≤ 2mm/5 min</td>
</tr>
</tbody>
</table>

*Must have signs and symptoms.*
Itching vs. Burning

Before the physical examination, ask your patient if it itches more than it burns or if it burns more than it itches. Patients who complain of itching without other symptoms of ocular irritation, such as burning or gritty sensation, generally have a primary ocular allergy with an adequate tear film. However, patients who include itching among other ocular irritation symptoms often have a dry eye-induced ocular allergy.

By recognizing and treating concurrent components of ocular surface dysfunction and educating patients about their conditions, you can aid in their relief. 

CE TEST

1. What percentage of the U.S. population has ocular symptoms related to allergy?
   a. 20%.
   b. 30%.
   c. 40%.
   d. 60%.

2. What is the primary symptom of dry eye?
   a. Ocular burning.
   b. Hyperosmolarity.
   c. Gritty foreign body sensation.
   d. Eye irritation.

3. What is the hallmark symptom of allergic conjunctivitis?
   a. Itching.
   b. Burning.
   c. Conjunctival staining.
   d. Dryness.

4. What is the key etiologic factor in the pathogenesis of ocular surface disease?
   a. Inflammation.
   b. Tear film disruption.
   c. Antigens on the ocular surface.
   d. Hyperosmolarity.

5. What is the most commonly used and easily performed test to evaluate dry eye?
   a. Tear film break-up time.
   b. Fluorescein break-up time.
   c. Schirmer tear test.
   d. Rose bengal.

6. What is a consequence of long-lasting application of drugs with preservatives?
   a. Disruption of the epithelial cell-cell contacts.
   b. Allergic reactions.
   c. Decreased goblet cell density.
   d. All of the above.

7. Which agent is NOT a common preservative found in artificial tears?
   a. Benzalkonium chloride.
   b. Polysorbate.
   c. Chlorobutanol.
   d. Cetrimide.

8. Which medications currently are used for treating OSD?
   a. Topical cyclosporine.
   c. Omega-3 fatty acids.
   d. All of the above.

9. What is a recommended treatment option for patients with ocular allergy?
   a. Lid scrubbing.
   b. Punctal occlusion.
   c. Placing wet compresses directly on the skin.
   d. Topical combination mast-cell stabilizers/antihistamines.

10. What is one therapy for patients with blepharitis?
    a. Prescribe a tetracycline derivative, such as doxycycline or minocycline.
    b. Punctal occlusion.
    c. Apply wet compresses on the affected skin.
    d. All of the above.

Please retain a copy for your records. Please print clearly.

You must choose and complete one of the following three identifier types:

1  SS #  - -
   Last 4 digits of your SS # and date of birth
   State Code and License #: (Example: NY12345678)

2  - 3
   First Name
   Last Name
   Email

The following is your:    Home Address   Business Address

Business Name
Address
City    State
ZIP
Telephone #
Fax #

By submitting this answer sheet, I certify that I have read the lesson in its entirety and completed the self-assessment exam personally based on the material presented. I have not obtained the answers to this exam by any fraudulent or improper means.

Signature ___________________________ Date __________

Lesson 108499 RO-RCCL-0912

Examination Answer Sheet
Valid for credit through September 1, 2015
This exam can be taken online at www.reviewofcontactlenses.com.
Upon passing the exam, you can view your results immediately.
You can also view your test history at any time from the website.

Is It Dry Eye, Allergy or Both?

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.

Mail to: Jobson - Optometric CE, PO Box 488, Canal Street Station, New York, NY 10013
Payment: Remit $20 with this exam. Make check payable to Jobson Medical Information LLC.
This course is joint-sponsored by the Pennsylvania College of Optometry
There is an eight-to-10 week processing time for this exam.

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Eye care professionals often mistakenly believe that a multifocal contact lens trial can indicate whether a cataract patient is a good candidate for a multifocal intraocular lens. For many reasons, this is simply not true. For example, if a patient has a cataract, their vision is going to be blurred no matter how well the contact lens is fit. Also, elderly patients are more likely to have ocular surface disease, which can cause fluctuations in vision with multifocal contact lens use.1,2 This also occurs with IOLs, but to a lesser extent.

Keep in mind that multifocal IOLs have different optics than the multifocal contact lenses we have available today. Also, multifocal contact lens wearers can be plagued by other fitting problems. Multifocal contact lenses, for example, can decenter and flex while on the eye affecting visual acuity.

In this article, I will outline the various multifocal IOL options and how to pick the right candidate for implantation.

The Multifocal IOL Market
There are currently three multifocal IOLs available in the United States, and each has a different design.

• ReStor. The ReStor IOL (Alcon) uses an apodized diffractive design on the front surface. It is a single piece, aspheric lens that comes in two add powers. The 4.0 version gives a +3.20D add power in the spectacle plane, while the 3.0 version gives a +3.00D add power. These lenses may be the best option for your patient, even if they have previously been unsuccessful with multifocal contact lenses.

By Eric Polk, O.D.
+2.50D add at the spectacle plane. This lens works well with patients who require a stronger reading add and have a pupil that still constricts with light and accommodation.

• Tecnis. The Tecnis (Abbott Medical Optics) IOL uses a full-aperture diffractive design on the posterior surface that splits light and distributes it among the near and distance foci.

The full-aperture diffractive design works well with patients who have a larger pupil size and who do near work in a dimmer lighting environment. The anterior surface has an aspheric design to compensate for the spherical aberration of the cornea to improve night vision.

• ReZoom. The ReZoom (Abbott Medical Optics) IOL uses concentric refractive zones to produce near and distance images. The ReZoom IOL is most similar to today’s multifocal contact lenses that have concentric rings of power. However, the ReZoom lens is used less frequently then the diffractive IOL because of increased nighttime visual side effects such as halos around headlights.3,4

One could argue that fitting a multifocal contact lens is a good psychological indicator for the success of clear lens exchange surgery. Although today’s multifocal contact lenses provide good vision, they still compromise the distance and night vision to a small degree. If a patient found this compromise intolerable, it may be an indication that they are going to have a tough time with the multifocal IOL.

Ideally, we would be able to do a test to determine if a patient is going to adapt to a multifocal IOL before they have surgery. Unfortunately, there is currently no preoperative test that demonstrates what the vision would be like with a diffractive IOL.

If a patient is concerned about the compromised night vision with a multifocal IOL, but would still like less dependence on reading glasses, you can try implanting an accommodating IOL such as CrystaLens (Bausch + Lomb). I find that while accommodating IOLs give better night vision, multifocal IOLs offer better near vision. The Synchrony IOL (Abbott Medical Optics), an accommodating IOL that may have stronger near results, is currently awaiting FDA approval.

Selecting the Right Candidate

How do we determine who is a good candidate for multifocal IOLs?

Eye care practitioners agree that the key is to carefully select your patients and to take the time to educate them about outcomes and side effects before surgery.

A good candidate for multifocal IOLs is someone who has an easy-going, laid back personality, is not particular about their vision and is motivated to see at near without glasses. In contrast, a poor candidate is someone who is never satisfied with his or her vision correction, is overly demanding and/or frequently drives at night. I recommend taking extra care with patients who are obsessive-compulsive and/or have high astigmatism. There is also a reported case of a patient with Meniere’s disease who experienced problems adapting to a multifocal IOL.5

Astigmatism is not an absolute contraindication, since it can be treated with limbal relaxing incisions (LRI) or corneal refractive surgery. I prefer corneal refractive surgery over LRIs at my office because of its greater predictability.6,7 A toric design for ReStor multifocal IOL is currently available internationally but has not been FDA approved in the United States at this time.

A patient’s perception of a good visual result depends largely on their preoperative condition. For example, a 70-year-old +4.00 hyperope who has dense cataracts will be thrilled with the results of multifocal IOL implantation. However, a 55-year-old -2.00 myope with mild nuclear sclerosis is going to be a lot more particular about the end result of the surgery.

Patients should be educated about what to expect from their vision after surgery. We tell patients they will have glare and halo immediately following the
procedure, but it will get better with time. The vision with multifocal IOLs requires some neuroadaptation. It may take six to 12 months before the brain fully adapts to the multifocal image the eye receives with a diffractive IOL. This may be why patients with peripheral vestibular disorders, such as Meniere’s disease, do not do well with multifocal IOL implantation. Retinocortical processing of visual information is impaired in these patients, which may make it more difficult for them to adapt.7

If the patient is unable to adapt to the optics of a multifocal IOL, and no other treatments can improve the vision, your patient may require an explantation of the lens.

One final word of advice: Do not over-promise the quality of near vision post-operatively. Although near vision is generally adequate for the majority of patients, some must still wear reading glasses in certain situations.

Addressing the Dissatisfied Patient

Most patients report that they are happy with their vision in multifocal IOLs.8-11 However, some patients do express dissatisfaction and require further treatment to relieve their symptoms.12-15

A recent study evaluated symptoms, etiology of complaints and treatments for 76 eyes of 47 patients dissatisfied with their surgery.12 In this study, 69 eyes (90.8%) were treated with the 4.0 ReStor IOL, four eyes (5.3%) were fitted the 3.0 ReStor IOL, two eyes (2.6%) with the Tecnis IOL and one eye (1.3%) with the ReZoom IOL.

Of the 76 eyes, 94.7% (72 eyes) reported unsatisfactory vision and 38.2% (29 eyes) reported dysphotopsia. Patients were treated with refractive surgery, glasses, miotic eye drops, capsulotomy and other surgical procedures. Of the patients who reported problems, only 4% were unable to have their problem resolved and requested explantation of the IOL.12

If your patient experiences blurred vision from a residual refractive error, I recommend part-time spectacle wear or corneal refractive surgery. We find that patients experience good results with LASIK or PRK surgery after cataract surgery.

Elderly patients and patients with epithelial basement membrane dystrophy (EBMD) are at higher risk for developing loose epithelium during flap creation.16 For that reason, we often recommend PRK surgery instead of LASIK for our post-cataract patients.

Doctors are quicker to treat posterior capsular opacification in a multifocal IOL patient than in those with a monofocal IOL.17,18 Posterior capsular opacification increases unwanted symptoms of blurred vision and increased glare and halos after surgery.

It is important to make sure the patient understands that, once the posterior capsulotomy procedure is performed, we typically do not recommend lens explantation. If a patient reports that he did well with the lens at first and later experienced blurred vision, I know it is from capsular opacification, assuming no new ocular anomaly is present. However, if the patient has never been happy, I discuss the option of lens explantation before we perform a capsulotomy. Once the capsulotomy has been performed, the risk of surgical complications with explantation increases.

Even though nighttime vision problems can be caused by the optics of the multifocal IOL, other causes should be ruled out. A decentered IOL can increase glare and halos.19 It has been shown that as little as 0.3mm
decentration of the multifocal IOL can cause symptoms.15

There are a number of pre-operative selection criteria that should be used in determining if a patient is a good candidate for multifocal IOL, an accommodating IOL or a monofocal IOL. The doctor should consider the patient’s distance and near visual needs, occupation, history (including any previous refractive surgery), pupil size in dim and bright light, and the overall ocular health. These pre-operative factors will guide the doctor in his recommendation of what type of IOL should be recommended.

There is no diagnostic test that determines who is a good candidate for multifocal IOLs at this time. However, you can still have all the information regarding the lenses prior to surgery and referring back to your surgeon for any enhancements that may improve their vision.16

A Case Study

A 68-year-old white male was recently referred to our center for cataract surgery by a comanaging practitioner. Prior to the patient’s arrival, the practitioner sent a referral letter that went into great detail about the progression of the cataract. The patient experienced a slow myopic shift in refraction and then progressively noted a loss of contrast sensitivity and displeasure with the vision in his glasses. Despite the detailed case outline, the doctor forgot one important detail. The doctor did not give a recommendation for the type of IOL.

During my initial exam, the patient was concerned about needing reading glasses after surgery. He is retired and spends a lot of time reading and working on his computer. The patient had tried multifocal and monovision contact lenses in the past, and did not like the vision with either modality. Monovision lenses created too great a disparity between the eyes. The vision with the multifocal lenses was variable: At times he saw well, but found that he had to frequently remove the lenses and clean them to get good comfort and vision.

The pre-operative examination showed a pupil size of 5.5mm O.D. and a 5.5mm O.S. in dim light, and a 3.5mm O.D. and 3.5mm O.S. in bright light. His best-corrected visual acuity measured 20/40- O.D. with a +3.50-0.50x175 manifest refraction, and 20/40- O.S. with a +3.75-0.25x165 manifest refraction, with a +2.50 add. Slit lamp was normal except +2 nuclear sclerosis in each eye. The dilated fundus exam and intraocular pressure was normal.

I discussed his options: a standard IOL, monovision, a pseudo-accommodating IOL and a multifocal IOL. The patient quickly decided he did not want monovision, nor did he want a standard IOL with both eyes focused for distance. An accommodating IOL would give him good distance vision, but he would most likely still need readers for his near vision.

It was important to the patient to see well at near without eyeglasses, so I recommended going with a multifocal IOL. We discussed that the side effects of decreased night vision and halos around headlights. We also discussed his distance vision might be better if he went with an accommodating IOL or monofocal IOL.

The referring optometrist thought it would be a mistake to implant a multifocal IOL because the patient had already been unsuccessful with multifocal contact lenses. I explained that problems with multifocal contact lenses were, in fact, not an indication that the patient would have similar issues with multifocal IOLs.

In the end, we agreed to follow my recommended treatment plan, and the patient reported good vision at his follow up appointment. His distance vision was 20/25 in each eye, and near vision was J3. The patient did continue to notice halos around headlights at nighttime, however, he said that his night vision was tolerable.

11. Javitt JC, Steinert RF. Cataract extraction with multifocal IOL because the patient had already been unsuccessful with multifocal contact lenses. I explained that problems with multifocal contact lenses were, in fact, not an indication that the patient would have similar issues with multifocal IOLs.
Few conditions are as much of a “sure thing” as presbyopia—we see it all day long in our clinical practice. Unfortunately, although the condition is pervasive, enthusiasm for contact lens correction of it is not. Patients are generally unaware of the concept, and practitioners often consider it too much hassle except in ideal circumstances. Too often, both parties opt for the path of least resistance—spectacle lenses. Why bother with tricky contact lens fittings when there are cheaper, easier alternatives? Because we shouldn’t have to ask patients to compromise their goals, and we practitioners shouldn’t “take a dive” when we know we have the skills to truly achieve those goals.

In this article, I will provide an overview of the modalities available today to better serve our presbyopic patients’ visual demands.

Early Pioneers
Benjamin Franklin, frustrated with the effects of presbyopia, created the first spectacle bifocal lens in 1784. But the desire and concept to correct vision via alternative means, aside from the spectacle lens, first began in 1508 with Leonardo da Vinci; he suggested using water in direct contact with the eye to alter the optics of the visual system for correction of refractive error. In 1887, a German glassblower named F.A. Muller crafted and successfully fit a glass contact lens using a mold of a person’s eye to ensure proper curvature, a technique developed by Sir John Herschel. The first soft contact lens bifocal lens was introduced in 1982.

From spectacle bifocal lenses to contact lenses, art and science continue to work together to achieve refractive correction that doesn’t compromise near vision.

The Challenge
Many of our patients who are now showing signs of presbyopia have worn contact lenses successfully in the past, and wish to continue to...
do so without having to switch to spectacles to correct for their near demands. Our patients want clear, crisp optics at all focal lengths, without having to sacrifice a specific distance in one eye to allow another to be brought into focus. In addition, it is important to factor in the visual demands of today’s patients, which are becoming increasingly more complex and are placing greater strain on the eye due to the increased use of mobile devices that require good near vision—laptops, tablet computers, smart phones and GPS systems, to name a few. Practitioners have to correct for this growing incidence of refractive error.

Industry continues to provide today’s practitioners with multiple tools to help meet these demands. The first step is to listen and take inventory of your patient’s lifestyle and corresponding visual demands. Details about occupations, hobbies and leisure-time activities will allow you to determine which contact lens modality is the best fit for your patient.

Along with accounting for the patient’s refractive error, we must address any ocular anomalies that may be present. Some of the challenges in fitting a multifocal contact lens include lid anatomy, irregular cornea shape, corneal ectasia, ocular surface disease or previous ocular surgeries.

**Our Approaches**

With the visual demands of our patients escalating, it is increasingly important to be able to provide the whole visual range without compromise. Here is an overview of the different approaches:

- **Monovision.** The monovision fitting approach has been used by many practitioners, and done so very successfully. However, because a stronger add is needed for close demands, the intermediate distance will become more of a challenge, or vice versa.

- **Bifocals.** One approach is to modify the monovision setup by using a pure distance correction in the individual’s stronger distance eye, and then fit a bifocal contact lens in the fellow eye. In the stronger near eye, set the distance portion of the bifocal lens for intermediate range, coupled with a lower add to allow for near demands (e.g., cell phone use or reading printed materials). This fitting approach can be applied to soft and gas-permeable (GP) lenses.

- **Toric multifocals.** Compound or mixed astigmatism, combined with presbyopic changes, can be a challenge when fitting a contact lens patient. Advances in lens stabilization, materials and lathing techniques have allowed manufacturers to offer toric multifocal soft contact lenses.

  For example, SpecialEyes offers its 54 Multifocal Toric lens with a base curve of 6.9mm to 9.5mm, a diameter range of 12.5mm to 16.0mm, plano powers to +/−25.00D, add up to +3.00 in 0.10D increments and cylinder power of -0.50D to -8.00D in full circle axis. Additional options for soft toric multifocal contact lenses would include: Proclear Multifocal Toric DW (CooperVision), Synergy Translating Bifocal (Gelflex USA), Satureyes Multifocal Toric (Metro Optics), Metrofocal Toric (Metro Optics), C-Vue Advanced Toric Multifocal (Unilens Corporation), C-Vue 55 Toric Multifocal (Unilens Corporation), MVT (Unilens Corporation) and UCL Sonic View Toric (United Contact Lens).11

- **Hybrid multifocals.** Another option to address astigmatism, myopia or hyperopia along with a
Scleral Multifocal Lenses

<table>
<thead>
<tr>
<th>Company</th>
<th>Lens</th>
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<tbody>
<tr>
<td>Acculens</td>
<td>Maxim</td>
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<tr>
<td>Acculens</td>
<td>Comfort</td>
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<tr>
<td>Art Optical</td>
<td>SoClear</td>
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<td>Advanced Vision Technologies</td>
<td>AVT</td>
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<td>DigiForm</td>
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<tr>
<td>Truform</td>
<td>Tru-Scleral</td>
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<tr>
<td>Valley Contax</td>
<td>Valley 15, 16, 18</td>
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1. The manufacturer claims that up to 6.00D of corneal astigmatism can be addressed with its hybrid lens for spherical power ranges of +5.00D to -15.00D and effective range of add power in the near zone is from +0.0D to +2.25D.

2. The manufacturer states that the duo of two lenses has a central aspheric add on the anterior surface of the lens and is available in a diameter range of 15.7mm to 20.5mm, power +/- 20.00D, cylinder to -6.00D, and adds from +1.00D to +3.50D. This lens is manufactured using Boston XO₂ material with 140 Dk.

### Helpful Hints

- Never hesitate to make use of the consultative services of contact lens manufacturers; they can help problem solve and give you options that you may not previously have considered.
- Put your patient first. If needed, refer patients who require specialty care to an optometrist who offers the consultative services of contact lens manufacturers; they can help problem solve and give you options that you may not previously have considered.
- Even the best technology will fail if the patient is not receptive to it. Managing patient expectations is a critical part of the process.
- Finally, take the time to learn about all the new technology, materials and tools at your disposal.

### Reference:

7. Sindt C. Basic scleral lens fitting and design. Scleral contact lenses are an important tool when fitting challenging patients. Contact Lens Spectrum, 2008 Oct.
It may come as a surprise to most of you that orthokeratology (ortho-k) officially turns 50 on October 13, 2012—the date in 1962 when George Jessen, O.D., gave his controversial lecture, “Orthofocus Techniques,” at the meeting of the International Society of Contact Lens Specialists in Chicago.1 At the same conference, Newton Wesley, O.D., M.D., Sc.D., suggested the alternative word “orthokeratology” be used to describe the technique, which Ronald Kerns, O.D., later defined as “the reduction, modification or elimination of a refractive error by the programmed application of contact lenses.”2 Because the early techniques were unsuccessful, interest in ortho-k waned by the mid-1980s, when conventional contact lenses started to really come into their own.

Science has markedly evolved since the early 1990s with the development of CNC lathes, advanced reverse-geometry lenses, high-Dk rigid gas-permeable (RGP) materials that allow for overnight wear of the lenses, and most importantly, highly accurate and repeatable corneal topography instruments.

Modern ortho-k is a scientifically validated, FDA-approved method of correcting low to moderate myopic refractive errors—up to -4.00D, and in some instances, up to -8.00D. The design of ortho-k lenses has evolved to include treatment for astigmatism and low degrees of hypermetropia and presbyopia. We are also seeing strong indicators that ortho-k can play an important role in myopia control.3-5

Jerome Legerton O.D., M.S., M.B.A., has published a comprehensive review of the current options for myopia control.6 There are no published studies on the optimal time to introduce myopia control treatment, or the time (years) that the treatment needs to
be maintained to have a positive long-term effect. The common rule is that the practitioner, with the clinical knowledge of family history and refractive progression, will consult the parents and child to decide when to fit.

The current practice brings up questions of safety and efficacy, as well as the importance of total compliance in order to minimize the risks of corneal infection. However, in the area of myopia control, ortho-k could conceivably become “optometry’s fluoride,” my terminology for the chance to do something positive for our myopic patients. Why, then, is this procedure not more prevalent in the optometric community?

Several external factors, such as the apprehension of taking on a new procedure, lack of formal instruction, the risk of adverse outcomes, learning new and challenging concepts (such as sag fitting) and the accurate interpretation of corneal topography maps may hinder the eye care professional. From personal conversations with fellow optometrists who are thinking about starting ortho-k, the main stumbling block appears to be a misconception as to how the procedure actually works.

In this article, I will sort through some of the myths surrounding modern orthokeratology.

**Myth Busting**

**Myth #1: Ortho-k works by compression on the central cornea.**

Dr. Jessen’s original concept was to fit lenses very flat with respect to the flat –K reading and, by applying apical bearing and pressure to the cornea, induce corneal flattening. Many optometrists find it somewhat unethical to fit a lens with this in mind. However, this is not how modern ortho-k lenses work. The base curve is definitely much flatter than the flat-K; however, the incorporation of the reverse curve allows the designer to lift the lens so that it does not come into contact with the apical corneal surface.

The reasons for this are simple. In 1977, Tommy Hayashi O.D., Ph.D., proved that if there was no apical clearance present in a contact lens fit, the “tear layer squeeze film” forces, combined with lid forces, would drag the lens off center (usually superiorly) until some form of apical clearance was re-established. This would lead to equilibrium between the post-lens tear layer squeeze film forces, lid forces and the surface tension around the lens edge.

Similarly, if a reverse-geometry lens exhibits apical touch, then the lens will de-center and cause central corneal staining due to lens abrasion of the epithelium and distortion of the post-wear corneal topography.

The ideal ortho-k lens is always well-centered and must be fitted with at least 5µm to 10µm of apical clearance (figure 1).

So, if it’s not causing apical pressure, how does the process actually work?

The old adage that “flat lenses cause corneal flattening, steep lenses cause steepening” is loosely applicable to ortho-k lenses because elements of both fitting philosophies are inherent in the lens design. The flat base curve centrally applies a minimal degree of central compression, but due mainly to the effects of
the lens thickness on lid tension. The steep reverse curve at the edge of the back optic zone creates an annulus of tension, or negative pressure, that draws fluid from the central epithelium into the mid-peripheral cornea, thereby causing central flattening and mid-peripheral steepening (figure 2). The combination of these two effects causes the change in anterior corneal curvature and the refractive change (figure 3).

Myth #2: Ortho-k lenses are difficult and time consuming to fit.
This is certainly true if you believe you can fit ortho-k lenses using a keratometer. Essentially, the keratometer is now an obsolete instrument for measuring corneal shape. Our entire history of lens design and fitting was based on the false assumption that the cornea was somehow spherical in shape centrally, and then flattened off in the periphery. Corneal topography has challenged this notion; now we understand the true aspheric nature of the corneal shape.

Keratometry readings give an indication of the sagittal radius of curvature of the cornea at a chord of 3.00mm, but give no indication as to the rate of corneal flattening (eccentricity, or e), which determines the sag height of the cornea. So, instead of having a fitting rule that says to “fit the lens X diopters flatter than K,” the new rule for fitting ortho-k lenses is: lens sag = corneal sag + apical clearance (over the common chord of contact). The ideal patient

For a novice ortho-k practitioner, an ideal patient would have the following traits:
• Mild myopia (< -2.50D).
• Less than 1.00D with-the-rule astigmatism.
• Corneal astigmatism equal to the spectacle Rx.
• Central astigmatism only.
• Patients who complain of dryness with soft lenses.
• Active sports people.
• Mid-teens to young adult; don’t fit younger patients until you gain experience.
• Progressive myopes.
• Normal, well-centered corneal topography.
optimal or accurate information if both the pre-fit and post-wear maps have variable quality.

Myth #4: Some lenses are inherently better than others.
Unlike corneal topographers, most ortho-k lenses were created equal. The only difference between the different lens designs is the actual fitting philosophy used by the manufacturer.

Studies have shown that the clinical outcomes are equal irrespective of the design used, so the most important thing to consider when starting with ortho-k is which design you think will work best for you; then stick with it until you master it. 

Of great advantage is the technical help offered by all the manufacturers during the critical learning curve (the first 20 cases). Also critically important are your clinical skills, including patient suitability, interpretation of the lens fit and the ability to accurately interpret the topography maps.

Myth #5: All you need to get started is the FDA certification course.
The completion of a certification course simply means you have the right to start learning how to fit ortho-k lenses; it does not confer clinical expertise. The best way of gaining the required knowledge is to join a professional organization that provides the training and support that is required to really get you started with confidence.

The Orthokeratology Academy of America (OAA) provides great scientific content, and its annual conference always incorporates a “boot camp” for beginners. The OAA is in the process of becoming an international body, which bodes well for the future of ortho-k.

Modern marketing has a tendency to oversimplify things in order to increase market penetration and usage. We see this with the misconception that ortho-k is another cookie-cutter approach to fitting a contact lenses. While in some instances, such as when dealing with an ideal corneal shape and a simple refractive error, this may be true, but it is certainly not the case in more complex fittings. When practitioners say that they have tried ortho-k and it didn’t work for them, they usually mean that they have tried the simple approach and it didn’t work, but they didn’t take the time to properly learn how to fit the lenses.

To successfully incorporate ortho-k into your practice, initially ignore the marketing, and instead concentrate on the basics. Understand the science, go to the experts for training, get good gear (trial lens sets and topographer) and, most importantly, start off with the simple, low myopia cases.

Learn a Lesson from a Landscaper

Optometric practices should look to other industries for tips to improve their business model.

Most industries put more emphasis on the hiring and training of a prospect than the average practitioner. Personality profiling, orientation and extensive training—not just technical, but cultural immersion—are the hallmarks of great customer service organizations.

For example, a bank teller spends more time with the customer than the president. The teller is literally the face of the bank. Similarly, the staff often spends more time with the patient than the doctor. How do those interactions compare?

2. How can you credibly and affordably market your customer service message to separate yourself from the pack, and thereby gain more referrals and new patients?

Let’s look at how other businesses market themselves. A tutoring center, for example, advertises its convenient hours as much as its ability to produce scholastic achievement. A five-star restaurant is known for its impeccable service and inviting décor, in addition to its menu. Consider whether your advertising focuses solely on your “menu.” Do you simply deliver the standard line that you accept most insurance plans and fit all types of contact lenses? Instead, build your credibility around superior customer service.

3. How do you make patients focus on the value they receive rather than the absolute price?

While it’s a huge topic in and of itself, keep in mind that “value” is a function of price and quality. And quality should include the patient experience—not just the features and benefits of a particular lens.

4. How do you make patients feel like you have absolutely gone above and beyond?

Once again, let’s look to other businesses. A car dealer, for example, may offer you free oil changes and tire rotations with your new car. When you bring in your car for service, they offer you a free loaner car or give you a ride home. When the car is done, it’s washed and returned to your house. Similarly, consider what you can deliver as your “above and beyond.” Ask your staff for the corollary to the car dealer with regard to you delivering a patients yearly supply of contact lenses. Have some fun and see what you come up with!

5. What systems and procedures do you have in place, ready to be deployed when customer service mistakes happen?

The truth is that every business makes customer service mistakes. It is the way you deal with the issue, and the time frame in which you resolve the problem, that determines whether your customers stay loyal or stay away from your practice.

Imagine that a patient calls your office complaining that she has been waiting six weeks for her contact lenses. Do you already know how you would respond?

The aforementioned scenarios are the reality of practice management. You can learn a lot when you look outside of the optometry field and understand how other businesses run. Start by talking to your patients about their work experience. You just may learn something new.
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