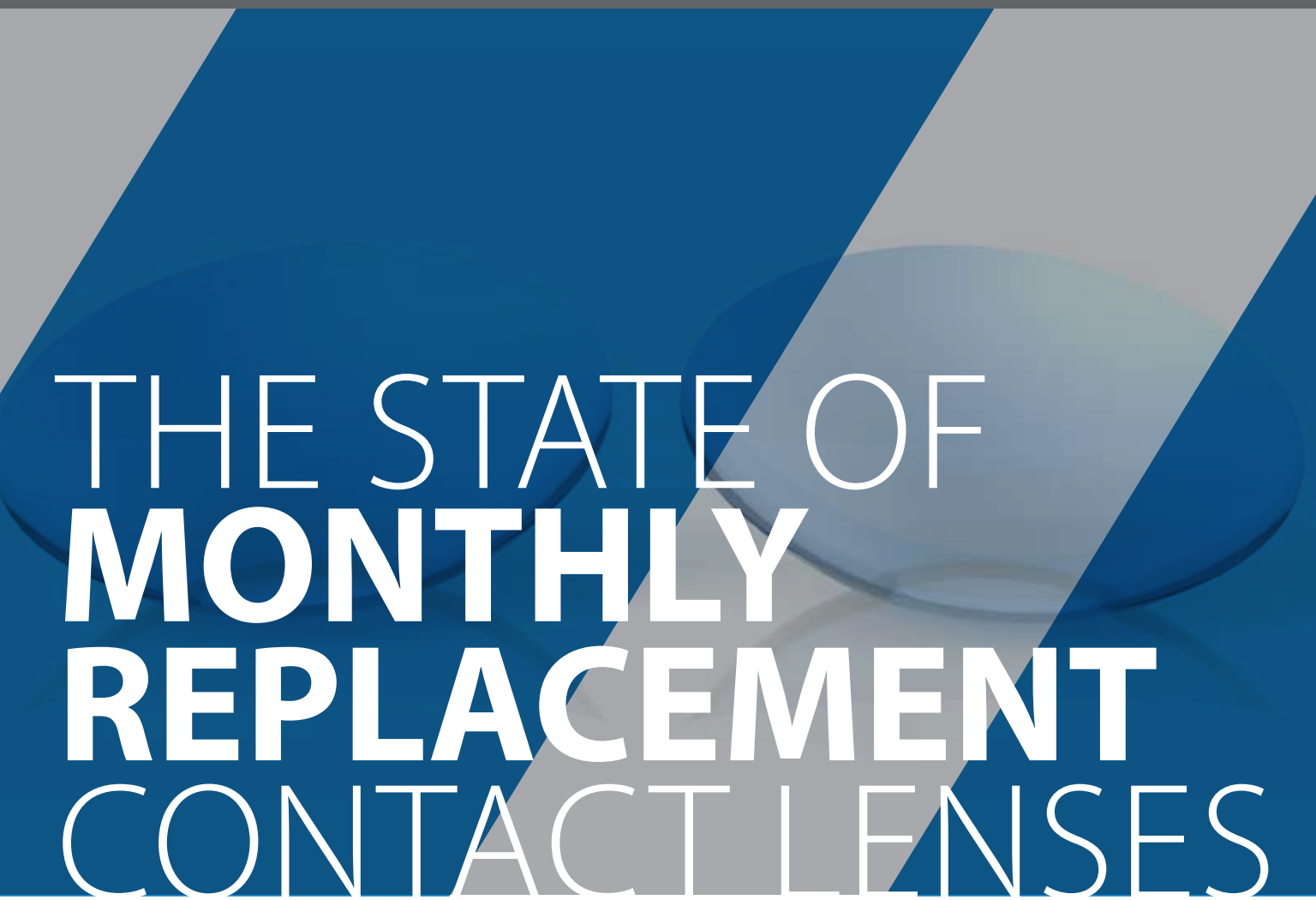
June 2014



THE STATE OF **MONTHLY REPLACEMENT** CONTACT LENSES

Five leading eye care practitioners discuss the role of the monthly modality in today's contact lens landscape.

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Roundtable Participants

Moderator

William Townsend, OD, FAAO
Dr. Townsend practices in Canyon, TX, and is an adjunct professor at the University of Houston College of Optometry. He is president of the Ocular Surface Society of Optometry and conducts research in ocular surface disease, lens care solutions and medications. He is an advisor to Alcon, Bausch + Lomb, CooperVision, TearLab and Vistakon.

Panelists

Jennifer E. Davis, OD
A 2001 graduate of the University of Houston's College of Optometry, Dr. Davis is in private practice at Vision Tech Optometry Center in Waynesboro, VA. She lectures nationally on topics related to contact lenses and anterior segment disease. She has received honoraria from Alcon.

Melanie J. Denton, OD
After graduating from the Michigan College of Optometry in 2009, Dr. Denton completed a one-year residency in Ocular Disease at the prestigious Bascom Palmer Eye Institute at the University of Miami Miller School of Medicine. She is a fellow of the American Academy of Optometry and a member of the American Optometric Association.

Randall Fuerst, OD
Dr. Fuerst is a 1983 graduate of Pacific University College of Optometry. He is a partner in a three-office, eight-doctor practice in Sacramento, CA. Dr. Fuerst is passionate about vision, contact lenses, ocular surface disease and wavefront aberrometry. He is the immediate past Chair, AOA Contact Lens and Cornea Section, and serves on advisory boards of several ophthalmic companies.

Gina Wesley, OD
Dr. Wesley practices in Medina, MN, where she focuses on primary care, contact lenses and pediatric vision. She was the 2006 Graduate of the Year from The Ohio State University College of Optometry and was recently awarded the 2013 inaugural Early Professional Achievement award from her Alma Matter.

THE STATE OF **MONTHLY REPLACEMENT** CONTACT LENSES

Introduction

Today's contact lens practitioners have choices—an almost overwhelming number of choices. When it comes to lens replacement cycles, there are daily disposable, 2-week replacement, monthly replacement, and quarterly replacement lenses. There are lenses that are made to order, including specialty soft lenses, rigid gas permeable lenses, hybrid lenses, and scleral lenses. And within each category there are multiple options: doctors can select from various lens materials, surface treatments, packaging solutions, designs, and parameter sets. With all these choices, the opportunities for contact lens success have never been greater. Despite these advances, some patients still present us with challenges!

In particular, we are confronted with not only finding viable options, but the *best* option for each individual patient. In addition to the basics required of every lens—biocompatibility with the ocular surface, good vision, and comfort—each lens we select must meet the patient's specific lifestyle, budget, and convenience needs.

Because we know how important it is for patients to care for and replace their lenses as directed, we are motivated to select lenses that make lens care and replacement as convenient as possible. In this regard, two modalities stand out: daily disposable and monthly replacement lenses.

While daily disposability is convenient and growing in popularity, monthly replacement has its own set of advantages: The replacement interval is easy to remember; the selection of lens designs, materials and parameters is vast; the lenses tend to be cost effective; and some superb, high technology lenses are available in the monthly replacement modality. For these reasons, many practitioners find the monthly modality an appealing go-to choice for most of their contact lens patients.

With this in mind, a virtual roundtable of some of the country's leading eye care practitioners was recently convened to discuss the role of the monthly modality in today's contact lens landscape. In the following pages, you will see why these lenses remain the mainstay of leading-edge practices around the country.

Monthly Replacement Contact Lenses: A *De-facto* Standard?

Dr. Townsend: Monthly replacement contact lenses are the foundation of contact lens practice in so many offices. Have they become a de-facto standard for clinicians?

Dr. Davis: Monthly replacement contact lenses are so popular because they are both exciting and practical. While it is true that daily disposable lenses represent the fastest-growing segment of the contact lens market, monthly replacement lenses have not stood still. Advances in monthly replacement lens materials and designs continue to generate enthusiasm in this segment. In addition, monthly replacement lenses are critical for practice: the wide range of designs and parameters, and their reasonable cost, enable doctors to fit—and satisfy—the great majority of their patients with high-performing monthly-replacement lenses.

While these lenses are exciting for our patients and critical for our practices, they also help us sleep at night. Repeated studies have shown that patient adherence to our lens care and replacement recommendations is higher with monthly replacement than 2-week replacement lenses.[1-3] Compliant patients experience fewer complications than non-compliant patients.[3] In addition, the range of monthly replacement lenses available opens up options such as continuous wear, for up to 30 days and nights in appropriate patients.

Dr. Fuerst: Monthly replacement remains the leading modality in my practice because there is solid evidence that patients in these lenses comply with replacement instructions at a higher rate than patients in 2-week lenses.[1-3] This not only raises my comfort level—patients also perceive that monthly replacement can be more cost effective than 2-week replacement (though, of course, this depends on the specific lenses worn). The result in my practice has been growth in the number of patients in monthly lenses and a sharp decline in patients wearing lenses with a 2-week replacement schedule.

Strategies for Improving Compliance*

Dr. Townsend: Compliance* with contact lens wear and care recommendations is a real concern. We have all seen patients suffer from painful, and sometimes destructive effects, resulting from poor compliance. In our practice, we have found it very effective to use anterior segment photography to show patients the deposits visible on their contact lenses and the ocular surface issues that can result from overwear of lenses. Visual demonstration has a big impact, making them more aware of what is actually on their lenses and helping them appreciate the problems that can ensue from overwear. What other strategies have you found to be particularly effective for encouraging greater compliance with your recommendations?

Dr. Fuerst: In my practice, we place great importance on communication with our patients. We also show them slit-lamp photos of the contact lenses on their eyes and explain what tear film deposits can do the lens. If we have any inkling that they may be deviating from our instructions on lens care or replacement frequency, we say: "Let's take a moment to discuss how you are taking care of your contact lenses and why it's important." I firmly believe that having this dialog helps keep patients successful and comfortable in contact lenses.

Dr. Wesley: In a variety of studies, compliance with monthly replacement contact lenses has been shown to be far better than with two-week contact lenses.[2,3] I find that noncompliance is often unintentional: patients simply forget that it's time to replace their lenses, or they wonder, "Did I put my contact lenses in last week, or was it two weeks ago? Was it Tuesday or was it Thursday?"

Patients need to be educated about the problems that can ensue from overwearing their contact lenses. Inevitably, some patients will wear their contact lenses longer than they are supposed to; but the annual exam is an excellent opportunity to re-educate and remind patients why on-time replacement is important to their experience of contact lens wear.

Dr. Denton: I make sure to educate my patients from the very beginning. We have a long talk about the reasons why following our instructions for lens care and replacement will benefit them. I stress that contact lenses are medical devices; the replacement intervals have been established to promote safe, healthy use. Often, I will ask patients to take out their phones in my office so they can set a repeating calendar alert.

Dr. Davis: That's a great suggestion. I also tell patients to change their contact lenses when they change their calendar. It is always important to have a very kind but frank discussion with contact lens patients, who can be reluctant to admit when they have been noncompliant with lens care and/or replacement. They need to understand that we are not judging them, and that we have their best interests at heart. Pose open-ended questions to find out more about their contact lens-wearing habits, and to determine a contact lens modality that fits each patient's lifestyle. For some patients, this will mean daily disposable lenses, for others, monthly replacement is more appropriate—but both are easy to remember. ■

Dr. Wesley: Lens replacement at the scheduled interval can mean fewer deposits, which can, in turn, mean better comfort and vision. I try to find out how long my patients actually wear their contact lenses and find the option that fits best with their lifestyle. This often results in prescribing monthly-replacement contact lenses.

I choose contact lenses on the basis of their ability to provide patients with excellent comfort and vision, while focusing on their ocular health. But even with those bases covered, there are still options to meet different lifestyle needs. While some patients want the convenience of daily disposables, other patients choose monthly replacement for a variety of reasons, including cost, the comfort of a specific monthly replacement lens, or just because throwing contact lenses away every day feels wasteful to them.

Dr. Denton: Although I offer a range of lenses, the monthly modality is my first-line option for most patients. Patient satisfaction with the comfort, vision, and affordability of these lenses motivates me to keep prescribing them; and, as a doctor, the high level of patient compliance with a monthly replacement schedule—second only to daily disposable lenses—keeps me comfortable recommending them to any patient who can't, or would rather not, be fit with a daily disposable.[3]

Contact Lens Wear and the Ocular Environment

Dr. Townsend: I certainly agree that the benefits of monthly replacement contact lenses make them a great choice for many patients. And, like others, I find the data on patient compliance with the recommended replacement schedule compelling. But let us move on to another topic related to comfort: the ocular environment and its impact on contact lens wear.

Dr. Wesley: The ocular environment is enormously complex, involving many variables and significant patient-to-patient differences. Two patients can wear the same lens for the same amount of time and have an entirely different experience, because each person's ocular environment is unique.

Dr. Davis: The tear film is a far more complex system than we previously imagined; no longer do we envision it as a simple three-tiered structure, with a lipid layer poised on top of a sheet of aqueous fluid, and held on the eye by the presence of ocular surface mucins.[4] Instead, we now envision the tear film as a complex, self-repairing structure that, even if normally robust, is greatly impacted by the presence of a contact lens.[4,5]

Manufacturers attempt to defend their contact lenses in different ways

Taking a closer look at silicone hydrogel contact lens technology sheds light on different manufacturers' attempts to protect lenses from dryness and deposits by masking silicone molecules on the lens surface.

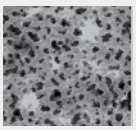
ACUVUE^ OASYS^ contact lenses are made of a material containing polyvinyl pyrrolidone (PVP). This binds to water, but does not completely mask the silicone which leads to increased lipid deposits. With substantial silicone mobility, silicon levels reach approximately 10% at the surface of a dry contact lens.[3,4]

Biofinity^ contact lenses are made of a material composed of modified silicone macromers, making the lenses more wettable. However, the lens still allows silicone to be exposed at the surface— attracting lipids that decrease wettability. Silicone remains mobile with large levels of silicon present at the surface (>10%) when the contact lens is exposed to air.[3,5]

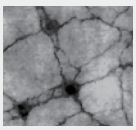
PureVision^ contact lenses undergo plasma oxidation, which converts surface silicone to silicate "glass". The surface cracks produce "glass-like" silicate islands. Exposed silicone in the cracks results in high lipid uptake.[3,6,7]

Lotrafilcon B contact lenses, such as **AIR OPTIX® brand contact lenses,** feature a unique, permanent plasma surface created by a fusion process. This permanent surface minimizes the mobility of the hydrophilic and hydrophobic sites during blinks by preventing the silicone in the lens material from being exposed to the air.[7] This smooth protective surface allows tears to spread evenly over it, promoting moisture retention and minimal deposit buildup. With surface integrity that lasts throughout the wearing period, less than 1% silicon is measured at the surface of a dry contact lens.[5]

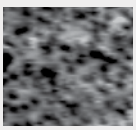
Figure 1 – Surface defends against daily deposits



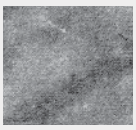
ACUVUE^ OASYS^ contact lenses
No permanent plasma treatment and an uneven surface[10]



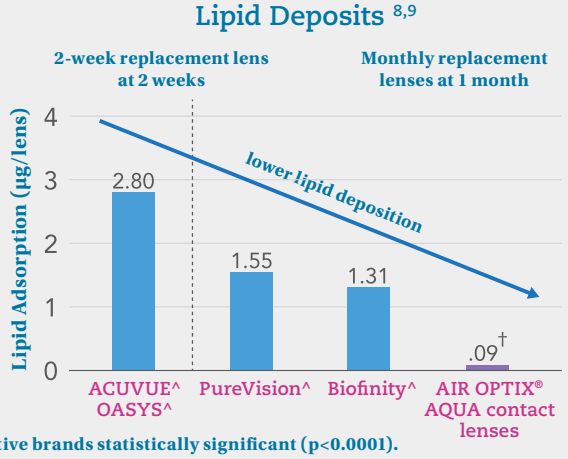
PureVision^ contact lenses
Surface made up of silicate islands that do not completely cover the surface[10]



Biofinity^ contact lenses
No permanent plasma treatment[11]



AIR OPTIX® AQUA contact lenses
A permanent, chemically-bonded plasma treatment for a smooth, continuous surface[10]



† All differences between AIR OPTIX AQUA® contact lenses and competitive brands statistically significant ($p<0.0001$).

A contact lens impacts the ocular environment in many ways, one of which is by causing a thinning of the pre-lens tear film and shortening of the tear film breakup time (TFBUT).[4-6] This situation is dynamic: the tear-lens environment changes throughout the day. For example, in many silicone hydrogel materials, rotation about chemical bonds can bring hydrophobic constituents of the lens polymer close to the surface, where they tend to stabilize due to their affinity for the hydrophobic environment of the air.[5] This is just one of many mechanisms that can lead to temporary surface dryness.

Dr. Wesley: And any prolonged, repeated disruption of the tear film may lead to contact lens discomfort. A shortened TFBUT and transient surface drying reduce contact lens lubricity and increase the chance of lipid deposition—both of which may be associated with reduced contact lens comfort.[5,7] It is vital that we do all we can to maintain the stability of the pre-lens tear film.

Dr. Fuerst: While contact lenses are enormously popular among teens and young adults, we all know that as our patients get into their thirties and forties, the proportion who wear contact lenses begins to decline. While the onset of presbyopia may have something to do with this, the decline in contact lens wear begins well before the age at which most people notice a significant loss of near vision.

The aging tear film is no doubt a contributing factor to early-midlife contact lens drop-out. And in recent years I have noticed that the age of onset of ocular surface disturbance seems to occur earlier. I attribute this to the greatly increased use of computers, tablets, and smartphones, all of which keep us engaged in intense visual activity for much of the day.

Fortunately, advances in contact lens and lens care technology have given us tools to fight back. With better, more biocompatible lens materials and designs, we can keep

The Impact of Contact Lens Care Solutions

Dr. Townsend: Unless the patient is wearing daily disposable lenses, the contact lens care system can be a critical factor in promoting comfortable, lens wear. Recommending the right contact lens solution can increase the surface wettability of the lens and improve wearing comfort. We talk with our patients about the science behind contact lens materials and solution design, and how the two interact. The message is pretty simple: from 1971 until 1999, almost all soft lenses were made with some type of hydrogel material, and care solutions were designed for that material. But when silicone hydrogels appeared, new solutions had to be developed for optimum compatibility with those materials.

Although lens manufacturers do their best to mitigate the effects of hydrophobic silicone in silicone hydrogel contact lenses, it may create dry spots on the lens surface. OPTI-FREE® PureMoist® Multi-Purpose Disinfecting Solution (MPDS) was designed to work with silicone hydrogel lens materials, increasing their surface wettability and facilitating comfortable wear from insertion to removal.[16] For individuals who react to the preservatives in multipurpose disinfecting solutions, I often recommend hydrogen peroxide systems. CLEAR CARE® Cleaning & Disinfecting Solution has an excellent disinfection profile and when it is neutralized, becomes a solution that has no harsh preservatives.

Which contact lens solutions do you recommend to your patients, and why?

Dr. Denton: My go-to solution is OPTI-FREE® PureMoist® MPDS, with the HydraGlyde® Moisture Matrix, which surrounds lenses with a cushion of moisture that lasts from morning to night.16 Patients report excellent all-day comfort, moisture, and clear vision when using this solution, and I feel very confident recommending it.[16] I go to CLEAR CARE® Solution when my patients show any signs of preservative sensitivity. The system's effective platinum-disc neutralization leaves only miniscule levels of residual peroxide at the end of the disinfecting cycle, offering patients good comfort on insertion.[17,18]

Dr. Davis: I have been involved with a number of clinical studies exploring the relationship between specific contact lenses and the solutions used in their daily care, and I agree that solution compatibility is key. Prescribing advanced technology contact lenses without recommending an appropriate care solution sets patients up to be less-than-satisfied with their contact lens experience. ■

patients—including many who were on the verge of dropping out—happily in lens wear. These advances allow more patients in the critical 35 to 45 age range to continue wearing contact lenses.

Dr. Townsend: Every year, approximately 16% of contact lens wearers drop out of lens wear, most often with complaints of discomfort.[8] We now have a much better understanding of what causes contact lens discomfort. A number of potential factors, related to the lens material, the patient, the external environment, and contact lens solutions can impact lens comfort.[9] Some patients fail in contact lenses due to a poorly wetting ocular surface, coated or contaminated contact lens surfaces, environmental conditions, and/or reduced or altered tear production. To prevent lens dropout, we must carefully consider many possible contributors.

The first step is evaluating a patient's ocular surface prior to prescribing contact lenses. This involves paying attention to the patient's lipid layer, which requires healthy, functioning meibomian glands. It may be valuable to help a patient achieve more normal meibomian gland function before entering into contact lens wear, because a normal lipid layer typically means fewer problems with contact lens related dryness.[5,9]

In addition to making sure the ocular surface is ready for contact lens wear and selecting an appropriate lens, it is essential to recommend a contact lens care solution that is biocompatible both with the ocular surface and with the lens material.

Advanced Contact Lens Surface Technology

Dr. Townsend: On cursory examination, soft contact lenses are very similar in appearance, but we recognize that there are actually tremendous differences in their material composition and surface characteristics. These differences can dramatically affect patient comfort and vision, and the extent of comfortable wearing time. In your opinion, what are the significant differences between currently available soft contact lens designs and materials?

Dr. Wesley: We know from clinical experience that the contact lens material can have a significant effect on the patient's wearing experience. In some cases, we can literally see the difference. Although a number of material properties likely play a role in determining comfort—including edge design, modulus, and oxygen permeability—it stands to reason that the wettability and lubricity of the lens surface influence the interactions between the lens and the ocular surface tissues, and thus influence wearing comfort.[5,9,10]

All other things being equal, a lens surface that can stay wettable throughout the wearing interval should be more comfortable than one that is either less wettable to begin with or loses its wettability in the course of the wearing period. Because they are manufactured with a uniformly hydrophilic plasma surface treatment, Alcon's AIR OPTIX® AQUA brand contact lenses maintain moisture and resist deposits, and are my go-to lenses for patients who need or prefer monthly replacement.[5,11]

Dr. Davis: I agree: the lens surface is critical. Even though the lens matrix determines such important characteristics as

oxygen flux and modulus, it's the surface of the lens that interacts with the ocular environment and contacts the tarsal conjunctiva with every blink. A surface with dry spots or deposits can increase friction for the eyelid and can produce discomfort.

Dr. Townsend: I think we all agree that the lens surface is an important key to patient comfort. Successful management of the related issues of surface wettability and deposit resistance are pillars of successful contact lens wear. But creating a wettable, deposit resistant surface is a complex and difficult task, especially in the case of silicone hydrogel materials.

The primary issue is silicone, which can be both beneficial and detrimental to contact lens wear! Although silicone is the key to these materials' high oxygen permeability, it is extremely hydrophobic. Exposed silicone on the lens surface can create hydrophobic regions on the lens that can both resist wetting and attract lipids. (Lipids, being hydrophobic themselves, are attracted to other hydrophobic substances.) To address these issues, every silicone hydrogel lens maker has searched for a means of reducing the impact of silicone on lens surfaces. Some technologies for masking the silicone have been more successful than others, and, thus, some silicone hydrogel lens surfaces are more wettable—and attract less lipid—than others.

Dr. Denton: The manner in which each lens manufacturer deals with the silicone component can result in critical differences between lens surfaces. Some widely used lenses, like ACUVUE^ OASYS^, don't hide the silicone so much as try to damp its effect by placing the wetting agent polyvinyl pyrrolidone (PVP) within the lens matrix. PVP binds water to the lens, but this cannot fully hide the silicone components, some of which are exposed at the surface.[12-14]

Other strategies have included plasma oxidation—the technology employed in PureVision^ lenses—which converts surface silicone into a glassy silicate. But micro-cracks in the lens surface (creating so-called "islands" of silicate) can expose underlying silicone.[11-13,15] Biofinity^ lenses employ a different strategy: attempting to modify the silicone macromers themselves to make them more wettable. This is somewhat effective, but, again, some silicone remains exposed at the surface.[12-14]

Dr. Fuerst: One of the most successful ways to avoid the problems of exposed silicone is the plasma surface coating developed for AIR OPTIX® contact lenses. This unique, permanent plasma coating significantly reduces the exposed silicone at the contact lens surface—and it does not diminish during the wearing period, resulting in consistent wettability and consistently low lipid deposition.[11]

Dr. Townsend: In my practice, I have found that the surface characteristics of AIR OPTIX® AQUA contact lenses translate to a positive lens wearing experience. Patients wearing these lenses typically report comfortable wear that lasts until the lenses are removed, and crisp, clear vision—an essential but often underappreciated benefit of good lens surface properties. ■

*** Compliance with manufacturer-recommended replacement frequency.**

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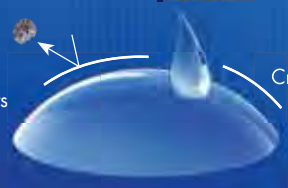

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*AIR OPTIX® AQUA (lotrafilcon B) and AIR OPTIX® AQUA Multifocal (lotrafilcon B) contact lenses: Dk/t = 138 @ -3.00D. AIR OPTIX® NIGHT & DAY® AQUA (lotrafilcon A) contact lenses: Dk/t = 175 @ -3.00D. AIR OPTIX® for Astigmatism (lotrafilcon B) contact lenses: Dk/t = 108 @ -3.00D -1.25 x 180.

Important information for AIR OPTIX® AQUA (lotrafilcon B), AIR OPTIX® AQUA Multifocal (lotrafilcon B) and AIR OPTIX® for Astigmatism (lotrafilcon B) contact lenses: For daily wear or extended wear up to 6 nights for near/far-sightedness, presbyopia and/or astigmatism. Risk of serious eye problems (i.e., corneal ulcer) is greater for extended wear. In rare cases, loss of vision may result. Side effects like discomfort, mild burning or stinging may occur.

Important information for AIR OPTIX® NIGHT & DAY® AQUA (lotrafilcon A) contact lenses: Indicated for vision correction for daily wear (worn only while awake) or extended wear (worn while awake and asleep) for up to 30 nights. **Relevant Warnings:** A corneal ulcer may develop rapidly and cause eye pain, redness or blurry vision as it progresses. If left untreated, a scar, and in rare cases loss of vision, may result. The risk of serious problems is greater for extended wear vs. daily wear and smoking increases this risk. A one-year post-market study found 0.18% (18 out of 10,000) of wearers developed a severe corneal infection, with 0.04% (4 out of 10,000) of wearers experiencing a permanent reduction in vision by two or more rows of letters on an eye chart. **Relevant Precautions:** Not everyone can wear for 30 nights. Approximately 80% of wearers can wear the lenses for extended wear. About two-thirds of wearers achieve the full 30 nights continuous wear. **Side Effects:** In clinical trials, approximately 3-5% of wearers experience at least one episode of infiltrative keratitis, a localized inflammation of the cornea which may be accompanied by mild to severe pain and may require the use of antibiotic eye drops for up to one week. Other less serious side effects were conjunctivitis, lid irritation or lens discomfort including dryness, mild burning or stinging. **Contraindications:** Contact lenses should not be worn if you have: eye infection or inflammation (redness and/or swelling); eye disease, injury or dryness that interferes with contact lens wear; systemic disease that may be affected by or impact lens wear; certain allergic conditions or using certain medications (ex. some eye medications). **Additional Information:** Lenses should be replaced every month. If removed before then, lenses should be cleaned and disinfected before wearing again. Always follow the eye care professional's recommended lens wear, care and replacement schedule. Consult package insert for complete information, available without charge by calling **(800) 241-5999** or go to **myalcon.com**.

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