Next-Generation Contact Lens Care:
Contemporary perspectives on comfort, disinfection, and safety for your patients

Faculty:
Thomas P. Kislan, O.D.
J. Bradley Flickinger, O.D., F.A.A.O.
Joseph P. Shovlin, O.D., F.A.A.O.
Scott Schatz, Ph.D., O.D., F.A.A.O.
Mark D.P. Willcox, Ph.D., F.B.C.L.A., M.A.S.M.
Marguerite B. McDonald, M.D., F.A.C.S.
Thomas P. Kislan, O.D.

In recent years, we have seen the efficacy of multi-purpose contact lens solutions falter as new contact lens materials have been introduced and contact lens-related infections have been traced to new or unusual pathogens. Ongoing studies have also confirmed that patient compliance with replacement schedules and contact lens care continues to be poor.

New-generation care systems must face all these challenges. First, they have to do a better job of killing pathogens like Pseudomonas, Acanthamoeba and Fusarium. Higher biocidal efficacy against these harmful microorganisms gives us greater confidence that the solutions will help prevent infection. The introduction of dual-disinfectants is one way that manufacturers are enhancing the efficacy of the latest generation of care products. We are also seeing the latest care systems go through more rigorous standards for approval. When contact lens solutions are tested prior to commercial approval, there are two testing criteria. The more stringent is known as the “stand-alone” criteria. The stand-alone test or inoculum challenge test measures the microbial kill of the solution during the manufacturer’s recommended soaking time. The solution is challenged with a representative range of inoculum level of a standard ISO/FDA panel of organisms, which must be reduced by at least 99.9% or 3-log for bacteria and at least 90% or 1-log for molds and yeasts. The solution’s ability to do this is measured independent of any contact lens material or specific rub/rinse regimen. Passing earns the solution the label of multi-purpose disinfecting solution (MPDS) rather than just multi-purpose solution, or MPS.

It is important to use solutions that not only meet the MPDS standards, but also to ensure that they are tested to demonstrate efficacy against some of the sight-threatening pathogens that aren’t in the standard testing panel, such as Acanthamoeba, especially in its cystic form.

Secondly, the new generation of care systems must be compatible with the lenses that patients are actually wearing. We have seen an unusually high incidence of inflammatory corneal infiltrates among patients wearing senofilcon A lenses in combination with a contact lens solution containing PQ-1 (0.0010%) and Aldox (0.0005%). The reasons for this are not well understood, but may be related to chemical interactions or a toxic inflammatory reaction to the “bioburden” of dead cells in the post-lens tear film. With the majority of new fits now in silicone hydrogel contact lenses, we should be looking for solutions that are compatible
Contact lens comfort is dependent on many factors, including the quality of the patient’s tear film and ocular surface; the lens modulus, oxygen transmission and wettability; and how the multi-purpose solution (MPS) interacts with the lens and the tear film.

The introduction of silicone hydrogel lenses has certainly improved oxygen permeability, but that hasn’t necessarily translated into gains in comfort. In fact, because silicone is hydrophobic—that is, it repels water—surface wetting of these lenses is actually quite challenging.

New multi-purpose solutions that are designed to be compatible with silicone hydrogel materials may help to improve comfort.

“In-eye surface wettability,” which describes how well the tear film spreads over the lens surface, is a critical parameter, but it isn’t easy to measure. One in-vitro model that scientists have developed to test surface wettability involves pre-soaking a lens in a given MPS, then cycling it through short soaks in

with these materials and that don’t contribute to high rates of staining or corneal infiltrates when paired with them.

Third, next-generation solutions must assume less-than-perfect compliance—and protect patients anyway. One area of particular concern is partial evaporation of solutions, which can result from under-filling contact lens case wells, leaving the caps off, or topping off solutions. With partial evaporation, solution ingredients become more concentrated, which has been shown to reduce the efficacy of active ingredi-

ents in certain MPDSs.\(^2\)

A renewed emphasis on rubbing lenses with solution may be one way to encourage patients to take the disinfection process more seriously. This step—which many of us have always instructed patients to do—mechanically removes proteins and lipids that affect comfort and visual acuity. Eliminating the no-rub labeling on care products better supports our clinical instructions.

Finally, we want new solutions to address all these challenges without causing adverse events or compromising the contact lens wearing experience. As we ask new MPDS products to do a better job with disinfection, it is important for that protection not to come at the cost of comfort. It’s a tall order.

In this supplement, you’ll read about how one next-generation solution, RevitaLens OcuTec\textsuperscript{®} MPDS (Abbott Medical Optics Inc.) has been designed to meet the needs of real patients who are wearing soft contact lenses including silicone hydrogel materials and desire a high degree of comfort during lens wear. Most importantly, it will help us offer our patients greater protection from contact lens-related problems.

RevitaLens OcuTec\textsuperscript{®} MPDS is labeled with a rub and rinse recommendation to support patients’ lens cleaning efficacy, because we know that rub and rinse removes four times more unwanted deposits from lenses compared to rinsing alone.

Today’s multi-purpose solutions are better than ever at meeting patient needs.

### Comfort and Wettability with New Contact Lens Care Systems

#### Thomas P. Kislan, O.D.

Contact lens comfort is dependent on many factors, including the quality of the patient’s tear film and ocular surface; the lens modulus, oxygen transmission and wettability; and how the multi-purpose solution (MPS) interacts with the lens and the tear film.

The introduction of silicone hydrogel lenses has certainly improved oxygen permeability, but that hasn’t necessarily translated into gains in comfort. In fact, because silicone is hydrophobic—that is, it repels water—surface wetting of these lenses is actually quite challenging.

New multi-purpose solutions that are designed to be compatible with silicone hydrogel materials may help to improve comfort.

“In-eye surface wettability,” which describes how well the tear film spreads over the lens surface, is a critical parameter, but it isn’t easy to measure. One in-vitro model that scientists have developed to test surface wettability involves pre-soaking a lens in a given MPS, then cycling it through short soaks in


### Table: Comparison of Contact Lens Care Systems

<table>
<thead>
<tr>
<th>CL Brand</th>
<th>ReNu MultiPlus MPS</th>
<th>Opti-Free\textsuperscript{®} RepleniSH\textsuperscript{®} MPS</th>
<th>Biotrue MPS</th>
<th>RevitaLens OcuTec\textsuperscript{®} MPDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PureVision</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>≥9</td>
</tr>
<tr>
<td>Acuvue Advance</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>AirOptix</td>
<td>5</td>
<td>≥9</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Acuvue Oasys</td>
<td>≥9</td>
<td>≥9</td>
<td>≥9</td>
<td>≥9</td>
</tr>
<tr>
<td>Biofinity</td>
<td>≥9</td>
<td>≥9</td>
<td>≥9</td>
<td>≥9</td>
</tr>
<tr>
<td>Total Wettable Cycles</td>
<td>&gt; 31</td>
<td>&gt; 36</td>
<td>&gt; 40</td>
<td>&gt; 42</td>
</tr>
</tbody>
</table>

Figure 1: Number of cycles at which the lenses remain wettable when cycled with ISO saline.
saline, alternating with short drying periods, to mimic tear washing and between-blink drying.

Using this model, Yu and colleagues found that two new solutions, Biotrue MPS (Bausch + Lomb) and Re-vitaLens OcuTec® MPDS (Abbott Medical Optics Inc.) demonstrated a longer-lasting wetting effect on the three silicone hydrogel materials that were most difficult to wet (galafilcon A, lotrafilcon B and balafilcon A; Figure 1). Lenses made of two other materials, senofilcon A and comfilcon A, remained wettable over 9 such cycles, regardless of which MPS was used to pre-soak the lenses.

Clinical Trial Patients Give High Marks for Comfort

In a clinical trial, patients ranked their comfort level with RevitaLens OcuTec® MPDS very highly at insertion, at 2 hours, and at the end of the day (Figure 2). Even among those patients who wore their contact lenses for 16 hours per day or longer, RevitaLens OcuTec® MPDS provided excellent end-of-day comfort (Figure 3). Over the long term, there was no difference in comfort between the test group and a control group using Opti-Free® RepleniSH® MPDS. The test and control groups rated their mean comfort at 8.7 and 8.6 (out of 10), respectively (p > 0.05). This parity in comfort held true across all types of soft contact lenses.

To be rated just as comfortable as an existing leading MPS was a pleasant surprise, given the highly effective dual-action disinfectant in RevitaLens OcuTec® MPDS and its ability to deliver very high pathogen kill rates. With a boost in disinfecting power, one might expect slightly less comfort, but that wasn’t the case in the initial comfort is a big plus.

Discouraging Deposits

Finally, in addition to comfort on insertion and throughout the day, we also want a multi-purpose solution to support comfortable lens wear throughout the replacement cycle. Patients often find that their lenses become less comfortable toward the end of the recommended wear cycle. To prevent this deterioration in comfort after days or weeks of wear, the multi-purpose solution needs to be able to help keep the lenses free of protein and deposits.

Several studies have compared deposits with RevitaLens OcuTec® MPDS and Opti-Free® RepleniSH® MPDS, with various lens materials. Tarantino and colleagues, for example, measured lens cleanliness by computer-measured light reflectance from the lens surface with dark field microscopy. Light reflectance increases with deposits and debris accumulated on the lens surface. There were no clinically significant differences in lens cleanliness...
between the two regimens with any lens group. There was also no statistically significant difference between the solutions regarding protein deposition on three silicone hydrogel lens types. Lotrafilcon B lenses exhibited a significantly lower level of protein deposition with RevitaLens OcuTec® MPDS compared to the control solution (p = 0.01).

With any MPS, one of the most important things patients can do to remove deposits is to rub the lens with solution for a few seconds before rinsing. A rub-and-rinse regimen is essential to debulk the lens of dirt and deposits that can lead to discomfort. In addition, good compliance with the replacement schedule, keeping the case clean, and good hygiene while handling lenses can all improve comfort.

Further research remains to be done on the necessary qualities for MPS products to maximize patients’ comfort with today’s silicone hydrogel materials. But we should be encouraged that the latest solutions promise high levels of comfort and compatibility, with particular attention to improving surface wettability.

Impressive Disinfection with the Comfort & Convenience Patients Want

New multi-purpose disinfecting solutions provides high biocidal activity against pathogens for contact lens wearers.

J. Bradley Flickinger, O.D., F.A.A.O., and Joseph P. Shovlin, O.D., F.A.A.O.

A very positive trend in the development of new multi-purpose disinfecting solutions (MPDS) is the incorporation of two disinfecting agents. With complementary agents, one can balance out any disadvantages of a single agent and potentially increase the biocidal efficacy and spectrum of activity. We are fortunate to now have three dual-disinfection options in the U.S. market.

We participated in clinical trials for one of these solutions, RevitaLens OcuTec® MPDS (Abbott Medical Optics Inc.). The dual disinfectants (alexidine dihydrochloride and polyquaterium-1) work in concert with the chelating agent EDTA and a buffering system that includes boric acid.

The clinical trial results showed impressive efficacy, a low rate of adverse events, and positive patient perceptions. In fact, it is one of the few clinical trials we have seen in which patients are actually upset about not being able to purchase the test solution after the conclusion of the trial. Now that it is available commercially, this MPDS continues to serve our patients well.

Real-World Pathogens

What makes RevitaLens OcuTec® MPDS unique is that it has broad-spectrum disinfecting capabilities that are very effective against a full range of pathogens—bacterial, viral, fungal, and protozoan. It achieves 99.99% biocidal efficacy against FDA/ISO standard panel microorganisms. But more importantly, it has been shown to be very effective against challenging protozoan and fungal pathogens like Acanthamoeba and Fusarium—areas we know to have been the Achilles heel for contact lens solutions in the past.

Acanthamoeba, for example, responds to adversity (such as disinfection) by transforming from the feeding and dividing trophozoite to a highly resistant cyst stage that is capable of withstanding extremes of temperature, desiccation and

---

Table 1: Efficacy of contact lens care solutions against Acanthamoeba.

<table>
<thead>
<tr>
<th></th>
<th>Trophozoites</th>
<th>Cysts</th>
</tr>
</thead>
<tbody>
<tr>
<td>RevitaLens OcuTec® MPDS</td>
<td>3.6</td>
<td>3.6</td>
</tr>
<tr>
<td>Biotone MPS</td>
<td>2.0</td>
<td>2.3</td>
</tr>
<tr>
<td>OPTI-FREE® ReplenSH® MPDS</td>
<td>2.2</td>
<td>2.4</td>
</tr>
<tr>
<td>OPTI-FREE® EverMoist® MPDS</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Clear Care® Peroxide</td>
<td>3.4</td>
<td>3.9</td>
</tr>
</tbody>
</table>


3. Data on file, #118, Abbott Medical Optics Inc.
disinfection. When several of the new-est MPS products were tested against *Acanthamoeba* in the laboratory, they all showed good activity against the trophozoite form, but only RevitaLens OcuTec® MPDS demonstrated significant (>3-log or >99.9% log kill) cysticidal potential (Table 1). Without that kind of log kill, we have to rely on full compliance and good hygiene practices to guard against *Acanthamoeba*.

Many contact lens-related infections have been traced back to the contact lens cases. Common contaminants include the Gram-negative bacteria *Stenotrophomonas* (*Pseudomonas*) and *Delftia* (*Co-mamonas*). Researchers at the University of Leices-ter recently looked at how well four of the latest multi-purpose solutions stood up to bacterial isolates taken from contact lens cases, including several *S. maltophilia* and *D. acidovorans* strains. RevitaLens OcuTec® MPDS demonstrated a 4- to 5-log reduction against all the common case isolates, while the other solutions tested showed a lower degree of efficacy against some or all of these “real-world” pathogens (Table 2).

Table 2: Efficacy of MPDS against storage case isolates of bacteria.

<table>
<thead>
<tr>
<th>Organism Strain</th>
<th>Log10 reduction (6 hr)</th>
<th>RevitaLens OcuTec® MPDS</th>
<th>Biotrue MPS</th>
<th>OPTI-FREE® EverMoist® MPDS</th>
<th>OPTI-FREE® RepleniSH® MPDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stenotrophomonas maltophilia ATCC 15099</td>
<td>4.6</td>
<td>4.9</td>
<td>0.2</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>S. maltophilia B52</td>
<td>4.7</td>
<td>4.7</td>
<td>NT*</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>S. maltophilia S2PY</td>
<td>4.9</td>
<td>4.9</td>
<td>0.7</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>S. marcescens S1</td>
<td>4.8</td>
<td>4.8</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Achromobacter sp. S5OC</td>
<td>4.7</td>
<td>4.7</td>
<td>0.1</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>A. xylosoxidans S2OC</td>
<td>4.1</td>
<td>2.8</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>A. ruhlandii S4</td>
<td>4.1</td>
<td>5.0</td>
<td>0.2</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Ralstonia insidiosa DT</td>
<td>4.8</td>
<td>1.4</td>
<td>0.4</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Delftia acidovorans ATCC 17438</td>
<td>4.3</td>
<td>4.3</td>
<td>2.5</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>D. acidovorans 871</td>
<td>4.5</td>
<td>4.5</td>
<td>NT</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Unknown AH-1A</td>
<td>5.0</td>
<td>0.6</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Unknown HD-3A</td>
<td>5.0</td>
<td>1.9</td>
<td>0.2</td>
<td>0.3</td>
<td></td>
</tr>
</tbody>
</table>

*NT = not tested


Concentration of solutions through partial evaporation is another risk factor affected by compliance. Studies that simulate partial evaporation—similar to what might occur if patients top off solution or leave solution bottles or lens cases uncapped—have shown that RevitaLens OcuTec® MPDS experiences no significant loss in efficacy at 2x or 4x concentration. This is in sharp contrast to the 61%–93% loss in efficacy of OPTI-FREE® RepleniSH® MPDS against *C. albicans*, *F. solani*, and *A. castellanii* and the 48% loss in efficacy of Biotrue MPS against *C. albicans*.

We are also quite concerned about the potential for organisms in an evaporated solution to form a biofilm that “protects” pathogens and inactivates disinfectants in the case. Films can eventually create a bioburden on the lens surface itself, making the lens more resistant to disinfection. Solutions that have been formulated to reduce biofilm formation are helpful, as is regular replacement and mechanical cleaning of the contact lens case.

Compliance is an important shared responsibility between provider and patient. But given the chronic reports of poor compliance by patients, it gives me comfort to know that we have new-generation solutions that provide an umbrella of safety against rare but potentially devastating microbial infections such as *Acanthamoeba* or *Fusarium*.

Clinical Experience with RevitaLens

As the focus of this article demonstrates, efficacy against a broad range of pathogens is, by far, the most important factor to me in recommending a contact lens care system. I also want to see low rates of staining, corneal infiltrates and adverse events.

But from a patient perspective, the most important factors are comfort and convenience. Throughout the clinical trial, patients liked the convenience of a multi-purpose solution and the comfort they experienced while using RevitaLens OcuTec® MPDS, especially late in the day.

This was very interesting and reassuring. Common logic would suggest that a stronger disinfecting capability would come with a corresponding decrease in comfort or an increase in toxicity-related adverse events. This has not been the case at all with RevitaLens OcuTec® MPDS. Not only did patients rank it as being very similar in comfort to the leading MPS, but it also had fewer adverse events by a 4:1 ratio. These excellent results, combined with the effective, broad-spectrum antimicrobial activity that compares very favorably

6 JUNE 2011 • REVIEW OF OPTOMETRY
Silicone hydrogel contact lenses have had a largely positive impact on contact lens wearers, thanks to their higher oxygen transmission. However, these materials have also introduced new challenges, including a perceived increase in the incidence of corneal infiltrates. Known as contact lens-associated peripheral infiltrates (CLAPI) or contact lens-associated corneal infiltrates (CLACI), these infiltrates have been described as diffuse, white to gray-colored infiltrates appearing in the mid-peripheral cornea or confined to the superior and inferior central third of the cornea, near the limbus.

Corneal infiltrates are aggregations of inflammatory cells that occur following some insult or irritation to the corneal epithelium. The irritation causes an upregulation of the cyclooxygenase and lipoxygenase pathways, chemoattractant stimulation by leukotrienes, and subsequent inflammatory cell migration into the corneal stroma. Although hypoxia was a common etiology, this is much less likely to be the case with today’s high-Dk silicone hydrogel lenses. Thus, contact lens care solution interactions may play a greater role than in the past. Patients with CLAPI or CLACI may experience conjunctival redness, rapid onset of pain, discharge, sensitivity to light, puffiness of the eye lids, tearing, and irritation, all of which can contribute to dissatisfaction or dropout from contact lens wear. There is also the risk that breakdown of the corneal epithelial surface and formation of sterile infiltrates may lead to infectious ulcers.

Corneal infiltrates are typically assessed by applying sodium fluorescein dye to the ocular surface and observing the resulting pattern of staining. Compromised corneal epithelial cells easily absorb the dye, while intact, healthy cells do not. Staining may indicate solution toxicity, solution-lens interactions, physiological factors, infiltrative events, or some combination.

Carnt and colleagues reported that corneal infiltrates or even surpass hydrogen peroxide, make RevitaLens OcuTec® MPDS a winning solution for doctor and patient.


Corneal Infiltrates in the Era of Silicone Hydrogels

Your best bet is to stick with care systems designed specifically for silicone hydrogel lenses.

Scott Schatz, Ph.D., O.D., F.A.A.O.

Silicone hydrogel contact lenses have had a largely positive impact on contact lens wearers, thanks to their higher oxygen transmission. However, these materials have also introduced new challenges, including a perceived increase in the incidence of corneal infiltrates. Known as contact lens-associated peripheral infiltrates (CLAPI) or contact lens-associated corneal infiltrates (CLACI), these infiltrates have been described as diffuse, white to gray-colored infiltrates appearing in the mid-peripheral cornea or confined to the superior and inferior central third of the cornea, near the limbus.

Corneal infiltrates are aggregations of inflammatory cells that occur following some insult or irritation to the corneal epithelium. The irritation causes an upregulation of the cyclooxygenase and lipoxygenase pathways, chemoattractant stimulation by leukotrienes, and subsequent inflammatory cell migration into the corneal stroma. Although hypoxia was a common etiology, this is much less likely to be the case with today’s high-Dk silicone hydrogel lenses. Thus, contact lens care solution interactions may play a greater role than in the past. Patients with CLAPI or CLACI may experience conjunctival redness, rapid onset of pain, discharge, sensitivity to light, puffiness of the eye lids, tearing, and irritation, all of which can contribute to dissatisfaction or dropout from contact lens wear. There is also the risk that breakdown of the corneal epithelial surface and formation of sterile infiltrates may lead to infectious ulcers.

Corneal infiltrates are typically assessed by applying sodium fluorescein dye to the ocular surface and observing the resulting pattern of staining. Compromised corneal epithelial cells easily absorb the dye, while intact, healthy cells do not. Staining may indicate solution toxicity, solution-lens interactions, physiological factors, infiltrative events, or some combination.

Carnt and colleagues reported that corneal infiltrates or even surpass hydrogen peroxide, make RevitaLens OcuTec® MPDS a winning solution for doctor and patient.

Injunctive events (CIEs) were three times more likely in eyes that demonstrated solution toxicity, defined as diffuse punctate fluorescein staining in at least 4 of 5 corneal surface sectors. Szczotka-Flynn and colleagues also showed that corneal staining may be predictive of CIEs. More recently, Carnt published a meta-analysis of 20 trials evaluating adverse events in a total of 558 silicone hydrogel contact lens wearers (Figure 1). There were 70 CIEs in all, or 3.1 per 100 participant-months. There were no significant differences by lens type, but solution type did make a difference. The lowest incidence of CIEs occurred with hydrogen peroxide cleaning solutions. The incidence of CIEs was significantly higher with OPTI-FREE® RepleniSH® MPDS than with Clear Care® Peroxide Solution (p = .01) or OPTI-FREE® Express® MPDS (p = .01). Kislan and Hom have reported an unusually high rate of CIEs with a particular silicone hydrogel lens-solution combination. In a chart review of 54 contact lens patients with inflammatory corneal infiltrates, they found that 83.3% were using OPTI-FREE® RepleniSH® MPDS and 64.8% were using that solution in combination with senofilcon A lenses (Figure 2). Management of CLAPI/CLACI may include temporary discontinuation of contact lens wear or changing the contact lens care system. Although there is still much to learn about the relationship between silicone hydrogel lenses and contact lens care systems, clinicians may want to choose from among the latest generation of care systems that have been designed specifically for silicone hydrogel lenses. The new RevitaLens OcuTec® MPDS, for example, has demonstrated excellent antimicrobial efficacy with no apparent propensity for corneal infiltrate formation. In clinical trials, there were 4 times fewer adverse events with RevitaLens OcuTec® MPDS (2.8%) than with OPTI-FREE® RepleniSH® MPDS (11.8%) (Figure 3).
The Clinical Performance of a New Contact Lens Multipurpose Disinfecting Solution

A closer look at solution-induced corneal staining during silicone hydrogel lens wear.

Mark D.P. Willcox, Daniel Tilia, Percy Lazon, Brien A. Holden
Brien Holden Vision Institute, Sydney, Australia

Contact lens multipurpose disinfecting solutions (MPDS) are an important part of contact lens wear, providing disinfection and cleaning of lenses. Over the past few years, especially after the launch of silicone hydrogel contact lenses, the performance of these solutions has been examined in detail. Several publications have reported that these multipurpose disinfecting solutions, in conjunction with certain silicone hydrogel lenses, are associated with corneal staining during wear.1-3 This type of staining has been referred to as solution-induced corneal staining (SICS).

Recently, we have clinically tested the new multipurpose disinfecting solution RevitaLens OcuTec® MPDS to determine the rate of SICS with various lens types and compared these to our previously published data.3 RevitaLens OcuTec® MPDS uses a dual disinfection system that is composed of polyquaternium-1 and alexidine dihydrochloride. All procedures were conducted in accordance with the 2000 Declaration of Helsinki and were approved by a local ethics committee. Participants signed informed consent before enrollment. For each lens/solution combination, 40 participants were enrolled to wear the lenses on a daily wear schedule, with recommendation to use the RevitaLens OcuTec® MPDS solution as per the manufacturers recommendation and to use the lens case supplied with the solution. The lenses tested with RevitaLens OcuTec® MPDS were balaflcon A (PureVision®, Bausch + Lomb), lotraflcon A (NIGHT & DAY®, CIBA Vision) and comflcon A (Biofinity®, CooperVision). Use of each lens followed the same protocol: lenses, solutions and lens cases were replaced monthly and each lens/solution combination test was run for 3 months in total. Clinical examinations of the ocular surface were conducted at baseline, 2-week, 1-month and 3-month scheduled visits. At each visit to the clinic, the presence of SICS was recorded as described previously.3

The rate of SICS was determined as the number of first SICS events per 100 participant-months. As can be seen in Figure 1, the incidence of SICS with RevitaLens OcuTec® MPDS was generally low, between 0-9.1 per 100 participant-months dependent on the lens type worn. Figure 1 also compares the incidence of SICS of RevitaLens OcuTec® MPDS and two other commercially available dual disinfectant system MPDS, namely OPTI-FREE® Express® and OPTI-FREE® RepleniSH® solutions. The data for these OPTI-FREE® solutions with balaflcon A and lotraflcon A lenses have been previously published, and the methodology of those studies was identical to that used in the present study.2 Compared to OPTI-FREE® Express® or OPTI-FREE® RepleniSH®, the incidence of SICS of RevitaLens OcuTec® MPDS with the balaflcon A lens was less than half and was significantly different (p=0.041). There was a slight, but not significant, increase in SICS when lotraflcon A and RevitaLens combination was worn, compared to the other MPDS and this lens, but only by a factor of 1.3 times. RevitaLens OcuTec® MPDS did not produce SICS with the comflcon A lens.

Thus, RevitaLens OcuTec® MPDS is not associated with an increased incidence of SICS when used with 3 commonly worn silicone hydrogel contact lenses. This solution was well tolerated by the cornea during use.

The Rate of Microbial Contamination of Contact Lens Cases During Use

The multi-purpose disinfecting solution you choose can prove beneficial in reducing lens case contamination.

Mark D.P. Willcox, Hua Zhu, Shamik Iskandar, Daniel Tilia, Najat Harmis, Percy Lazon
Brien Holden Vision Institute, Sydney, Australia

Contact lens case contamination by microbes is receiving increasing attention due to the fact that lens case hygiene has been a risk factor for developing microbial keratitis.1,2 Studies over a number of years have shown that lens cases are contaminated at rates of between 50–80%. A recent study from our laboratories and clinical facilities has shown that use of silicone hydrogel lenses on a daily wear schedule with multi-purpose disinfecting solutions results in lens case contamination of around 80%.3 The lens case contamination was not dependent on the lensed used, but was dependent on the multi-purpose disinfecting solution used by participants in the clinical trials.3 This study also found that two multipurpose disinfecting solutions that vary only slightly in their ingredients, but contain identical dual disinfectants, had different levels of case contamination.

In the current study, we examined lens case contamination from a series of clinical trials of participants using RevitaLens OcuTec® MPDS with three different silicone hydrogel lenses (PureVision® [belaflcon A], Bausch + Lomb; NIGHT & DAY® [stroflcon A], CIBA Vision; Biofinity® [comflcon A], CooperVision). Overall, cases with RevitaLens OcuTec® MPDS contained the lowest number of genera/species regardless of the type of silicone hydrogel lens used. Use of RevitaLens OcuTec® MPDS resulted in equivalent percentage of lens cases being contaminated with Gram-positive bacteria, there was a statistically significant reduction in the percentage of lens cases that were contaminated with Gram-negative bacteria (7%) compared to AQuify® MPS (29%), ClearCare® peroxide solution (20%) or OPTI-FREE® RepleniSH® MPDS (45%) (p<0.001).

In conclusion, use of RevitaLens OcuTec® MPDS resulted in a lower number of genera/species of microbe being isolated from lens cases compared to most other multipurpose disinfecting solutions, as well as significant reductions in the percentage of cases from which Gram-negative bacteria were isolated. Isolation of Gram-negative bacteria from lens cases is significant as these bacterial types account for over 50% of the microbial types that cause microbial keratitis.4,5

“Overall, contact lens cases used with RevitaLens OcuTec® MPDS contained the lowest number of genera/species regardless of the type of silicone hydrogel lens used."

–Mark D.P. Willcox, Ph.D., F.B.C.L.A., M.A.S.M.


Important Safety Information – RevitaLens OcuTec® Multi-Purpose Disinfecting Solution is indicated for the care of soft (hydrophilic) contact lenses. Use this product to disinfect, clean, rinse, store, remove protein and condition patients’ lenses. Problems with contact lenses and lens care products could result in corneal infection and/or ulcers and lead to loss of vision. It is essential that patients follow the directions and labeling instructions for proper use and care of their contact lenses, lens case, and lens care products. Please see additional information included in the product carton.
**A Solution for Challenging Cases**

Sometimes, just changing the care system can pull a patient back from the brink of contact lens intolerance.

Marguerite B. McDonald, M.D., F.A.C.S.

As a corneal specialist and surgeon, I don’t see routine contact lens patients. The patients in my exam room are typically referral cases with significant problems who are on the brink of dropping out of contact lens wear. They fall into 3 basic categories: Young women whose birth control pills are drying out their eyes; perimenopausal women, sometimes with other age-related ocular surface problems; and allergy and external disease sufferers.

One of the first things I do with any “problem” patient is to spend some time educating them about the real benefits of using the most advanced products and the risks to their eyes of using the wrong products and/or abusing those products.

RevitaLens OcuTec® MPDS (Abbott Medical Optics Inc.) has been shown to deliver outstanding disinfection and sustained antimicrobial efficacy, even in the face of noncompliance.1,2 In addition to its disinfecting capabilities, this solution also delivers a longer-lasting wetting effect for some silicone hydrogel lenses.3 This may be due in part to the fact that it contains Tetronic 904, a non-ionic surfactant that has lubricating and re-wetting properties to condition the lenses.4 I strongly recommend rubbing the lenses with solution to manually de-bulk proteins, calcium, and other deposits. RevitaLens OcuTec® MPDS has been shown to provide up to 16 hours of end of the day comfort and provide >90% efficacy at removing proteins and other lens deposits (Figure 1).1

For patients with significant allergies or other external disease, one needs to achieve absolutely pristine cleaning, shorten the replacement schedule, and decrease the hours of wearing time per day. Although many clinicians turn to peroxide-based solutions for these eyes, I find that patients often misuse peroxide by failing to remove all peroxide from the lens before insertion. It is more comforting to me to have a solution like RevitaLens OcuTec® MPDS that achieves peroxide-level disinfection1 without the toxicity or compliance challenges.

Of course, the “sicker” the eye, the more interventions are required—and the lower we have to set our expectations. I recently saw a 28-year-old female patient with severe allergic conjunctivitis, dry eye, and exposure keratitis. She can only tolerate her lenses for 1 or 2 hours per day so she “saves” her lens time for the evenings, for dates and other social activities. Is any MPS alone going to “fix” this patient’s problems? No. But if a better care system—as part of a complete treatment regimen—can help increase her comfortable wear time to even 5 or 6 hours per day, it can have a huge impact on her quality of life. For a patient with severe and multiple external diseases, this is indeed a “home run.”

A contact lens care system should support healthy, comfortable contact lens wear. Ideally, it should provide thorough disinfection, not just with full compliance, but in the face of extreme noncompliance.

In my practice, RevitaLens OcuTec® MPDS has become that foolproof solution that all my patients need. It delivers outstanding disinfection capabilities that can stand up to real-world patient behaviors, while at the same time conditioning the lenses for increased ocular comfort.

---

**Effective Removal of Proteins**

<table>
<thead>
<tr>
<th>Lens Type</th>
<th>Cleaning Efficacy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Optix (SilHy)</td>
<td>95.1%</td>
</tr>
<tr>
<td>Acuvue Advance (SilHy)</td>
<td>93.1%</td>
</tr>
<tr>
<td>Acuvue 2 (HEMA)</td>
<td>94.1%</td>
</tr>
<tr>
<td>Other HEMA</td>
<td>90.4%</td>
</tr>
</tbody>
</table>

**Figure 1:** Highly effective protein removal with RevitaLens OcuTec® MPDS (equal to RepleniSH® MPDS).1

5. Data Table (Figure 1): AMO Data on File 103; 2010 Tighe.

**Important Safety Information – RevitaLens OcuTec® Multi-Purpose Disinfecting Solution**

1. This product should not be used for the care of soft (hydrophilic) contact lenses. Use this product to disinfect, clean, rinse, store, remove protein, and condition patients’ lenses. Problems with contact lenses and lens care products could result in corneal infection and/or ulceration and loss of vision. It is essential that patients follow the directions and labeling instructions for proper use and care of their contact lenses, lens case, and lens care products. Please see additional information included in the product carton.
Peroxide-quality disinfection.

1 MPDS convenience.

Peroxide-quality disinfection with the CONVENIENCE of a multi-purpose solution1

Excellent lens CLEANING2,4,6

CONDITIONS the lenses for increased lens-wearing COMFORT2,4,5,6,7

COMPATIBLE with silicone hydrogel and soft contact lenses3,6

References:


RevitaLens OcuTec and OcuTec are trademarks owned by or licensed to Abbott Laboratories, its subsidiaries or affiliates. © 2011 Abbott Medical Optics Inc. 2011.05.12.CN3430.

Important Safety Information: Problems with contact lenses and lens care products could result in corneal infection and/or ulceration and lead to loss of vision. It is essential that patients follow the directions and labeling instructions for proper use and care of their contact lenses, lens case, and lens care products. Please see additional information included in the product carton. RevitaLens OcuTec® Multi-Purpose Disinfecting Solution is indicated for the care of soft (hydrophilic) contact lenses, including silicone hydrogel lenses. Use this product, as recommended by your eye care practitioner, to disinfect, clean, rinse, store, remove protein, and condition.

For more information please visit www.abbottmedicaloptics.com

Peroxide-quality disinfection.1

MPDS convenience.

Multi-Purpose Disinfecting Solution

Rethink disinfection for greater reliability as well as practitioner and patient assurance.

Recommend The Next Generation in Multi-Purpose Solution Technology