

A multicenter investigation of OPTI-FREE[®] RepleniSH[®] multi-purpose disinfecting solution impact on soft contact lens patient comfort

Glenn S Corbin¹
Linda Bennett²
Louis Espejo³
Suzanne Carducci⁴
Andrew Sacco⁵
Robert Hannigan⁶
Stuart Schatz⁷

¹Wyomissing Optometric Center, Wyomissing, PA, USA; ²Bellmont, MA, USA; ³Rockville, MD, USA; ⁴Gaithersburg, MD, USA; ⁵Vestal, NY, USA; ⁶Taunton, MA, USA; ⁷College Park, MD, USA

Objective: Demonstrate that successful soft contact lens wearers using competitive multipurpose solutions report improvement in comfort with OPTI-FREE[®] RepleniSH[®] Multi-Purpose Disinfecting Solution (MPDS).

Methods: This 30-day, multicentered, open-label study enrolled 109 eligible soft contact lens wearers using COMPLETE[®] Multi-Purpose Solution (MPS) Easy Rub[®] or ReNu MultiPlus[®] MPS. The test solution (OPTI-FREE[®] RepleniSH[®] MPDS) was dispensed for use in place of habitual care solutions. Subjects assessed their experience with their habitual solution (baseline) and the test solution (Day 30) using Likert-style questions. Contact lens acuity and biomicroscopy findings were recorded at each visit.

Results: The test solution was associated with a statistically significant improvement in instillation comfort ($P = 0.02$), end of day comfort ($P < 0.0001$), clear vision ($P < 0.0001$) and overall satisfaction ($P < 0.001$). Subjects reported the test solution enhanced their overall lens-wearing experience more effectively than their previous solution ($P < 0.0001$) and that they would continue test solution use after the study ($P < 0.0001$).

Conclusions: The test solution was effective at improving comfort and overall contact lens experience compared to COMPLETE[®] MPS Easy Rub[®] or ReNu MultiPlus[®] MPS in successful contact lens wearers. These results indicate that changing contact lens care solutions, even in successful lens wearers, may improve comfort and overall lens-wearing experience.

Keywords: multipurpose solution, soft contact lens, disinfecting solution, patient comfort

Contact lens comfort has been the focus of many clinical studies and review articles.¹⁻⁶ This is not surprising as it is estimated that, while there are 3.5 million new contact lens wearers each year, approximately two to three million established lens wearers drop out of contact lens wear. Dryness and discomfort are cited as key reasons.^{7,8} For those who remain in contact lenses, ocular dryness continues to be a significant complaint, with up to four out of five lens wearers affected,³ and one in four contact lens wearers finding that it adversely affects their wearing time.⁹

Comfort in successful contact lens wearers should not be taken for granted.⁹ A patient who wears their lenses on a full-time basis over a certain wearing period is commonly considered to be a successful lens wearer. Comfort is a dependent variable and therefore subject to fluctuations during contact lens wear. Patient-specific factors as well as external factors can influence subjective comfort to varying degrees, even in successful full-time contact lens wearers.⁹ Most commonly, successful contact lens wearers experience a decrease in comfort towards the end of the day.^{2,10} While it may

Correspondence: Glenn S Corbin
50 Berkshire Court, Wyomissing,
PA 19610, USA
Tel +1 610 374 3134
Fax +1 610 374 0484
Email drcorbin@wyoopto.com

or may not be enough to reduce wearing time, this decrease in comfort is undesirable nonetheless. Maintaining and optimizing lens-wearing comfort for successful contact lens wearers is crucial to minimize contact lens dropout, and is the focus of the current study.⁵

Contact lens practitioners have an important role in supporting and maintaining the success of their contact lens wearers. This can be particularly difficult when patients do not voice complaints during their annual exams. Effective questioning at contact lens visits can elucidate otherwise unrecognized issues and generate possible opportunities for improvement in patient comfort. Similarly, a solid understanding of a patient's medical history, environment and lifestyle are valuable tools for predicting and managing a patient's ongoing success. In addition, thoughtful choice of a contact lens and its partner solution contribute to contact lens-wearing success.

Advances in contact lens material technology, providing greater flexibility in lens wear schedules and improved health benefits, allow practitioners to choose lenses ideally suited to a patient's individual requirements. These new materials have demonstrated tangible improvements in patient comfort, as well as in a patient's overall satisfaction.¹¹⁻¹⁶ While the optimal choice of contact lens is directly related to a patient's satisfaction, it is very important to consider the synergistic relationship between contact lens and lens care solution. Multipurpose solutions comprise different formulations that may provide additional benefits, extending contact lens-wearing success.¹⁷

In this investigation into lens-wearing comfort, two polyhexamethylene biguanide (PHMB) (0.0001%)-preserved lens care solutions, COMPLETE[®] Multi-Purpose Solution (MPS) Easy Rub[®] (AMO, Santa Ana, CA, USA) and ReNu MultiPlus[®] MPS (Bausch & Lomb, Rochester, NY, USA), were compared with a third solution, OPTI-FREE[®] RepleniSH[®] Multi-Purpose Disinfecting Solution (MPDS; Alcon Laboratories Inc, Fort Worth, TX, USA), preserved with Polyquaternium-1 (POLYQUAD[®]) and myristamidopropyl dimethylamine (ALDOX[®]) 0.0005%. PHMB is a broad-spectrum cationic antimicrobial agent. It electrostatically binds to (and in turn destroys) the cytoplasmic membranes of microbes, disrupting metabolic activity and resulting in irreversible loss of intracellular components.¹⁸ POLYQUAD[®] is a quaternary ammonium compound. An antimicrobial agent with attenuated toxicity, it reduces the surface tension at interfaces and denatures microbial cell wall proteins, causing microbial cell death.¹⁸ ALDOX[®], a cationic amidamine, is an antifungal/anti-amoebic that works in synergy

with POLYQUAD[®] in OPTI-FREE[®] RepleniSH[®] MPDS to meet the highest standard of ISO and FDA criteria for the disinfection of bacteria and fungi.¹⁹

Additionally, OPTI-FREE[®] RepleniSH[®] MPDS contains a TearGlyde[®] reconditioning system, incorporating Tetric 1304 and C9-ED3A (nonanoyl ethylenediaminetriacetic acid). The components are attracted to the surface and matrix of silicone hydrogel and traditional hydrogel lenses and form a network to maintain a thin layer of moisture on the lens surface throughout the day. OPTI-FREE[®] RepleniSH[®] MPDS has been shown to increase contact lens comfort in the most common hydrogel material among those who experience discomfort²⁰ and maintain a low wetting angle after 14 hours of lens wear as demonstrated in *ex vivo* clinical studies.²¹

OPTI-FREE[®] RepleniSH[®] MPDS is a new generation contact lens solution formulated to provide benefits in the key areas of lens wettability,²²⁻²⁵ lens cleaning,^{19,26} and biocompatible disinfection.²⁷ In addition, it has demonstrated clinical biocompatibility with both traditional hydrogel and silicone hydrogel lens materials.^{25,26} The current study investigates the patient benefit of transitioning successful full-time, daily wear, soft contact lens wearers currently using competitive older-generation multipurpose solutions to OPTI-FREE[®] RepleniSH[®] MPDS.

Methods

Materials

The test solution was OPTI-FREE[®] RepleniSH[®] MPDS. ReNu MultiPlus[®] MPS and COMPLETE[®] MPS Easy Rub[®] were the comparative solutions. Subjects wore their habitual soft contact lenses throughout the study.

Study population

This 30 day, open label study involving six optometric practices enrolled a total of 114 successful contact lens wearers. Patients able to wear their lenses on a full time basis (eight hours per day and seven days per week) were considered to be successful. There were 109 evaluable subjects in the study. One hundred eight (108) of these completed the questionnaire. Eligible subjects were aged between 18 and 65 years and were successful soft contact lens wearers using either ReNu MultiPlus[®] MPS or COMPLETE[®] MPS Easy Rub[®] as their usual care solution, and free of any contact lens-related symptoms with regard to comfort and vision. Subjects were required to wear soft lenses on a daily wear basis, with a two-weekly or monthly replacement schedule and wore their habitual soft lenses for at least one month prior to study enrollment. They were required to wear their

lenses for at least eight hours per day, seven days per week. Subjects using ReNu MultiPlus® MPS or COMPLETE® MPS Easy Rub® for at least 30 days prior to enrollment were eligible. Patient distribution at each site is summarized in Table 1. The mean age of subjects was 36 years and 71% of the subjects were female.

As a prerequisite for enrollment, subjects were required to have best corrected Snellen visual acuity of 20/30 or better in each eye; to be in good health; and to continue any pre-enrollment systemic medication regimens during the study. Attendance at both study visits and the completion of study questionnaires was also required. Subjects maintained during the study any regimen of rewetting drops and/or topical allergy drops that had been instilled during the 30 days prior to the study. No topical ocular drops, other than rewetting drops and/or topical allergy drops, were allowed during the study.

Patients wearing contact lenses on an extended wear (overnight) basis and those wearing monovision were excluded, as were those patients who had participated in another clinical trial within the 30 days prior to enrollment. Further exclusion criteria included a history of allergy or sensitivity to any test solution ingredient and, with the exception of allergy and/or rewetting drops, use of any topical ocular medications in the seven days prior to enrollment. Subjects who had changed brands of cosmetics or those who had modified their systemic medications within 30 days prior to enrollment were excluded, as were subjects with significant active corneal, eyelid or anterior segment infection or inflammation.

Safety was established by assessment of visual acuity, biomicroscopy and adverse events. The study was performed in compliance with the ethical principles of the Declaration of Helsinki and was approved by the Southwest Independent Institution Review Board. Informed consent was obtained from all patients prior to enrollment.

Procedures

At the baseline visit (Visit 1–Day 0), a subject's preliminary eligibility was established and demographic information

Table 1 Enrollment

Site	Number of patients
1	25
2	20
3	16
4	12
5	30
6	11
Total	114

recorded. Baseline measurements including distance visual acuity with contact lenses and biomicroscopy findings (lids, cornea and bulbar conjunctiva) were recorded. Eligible subjects completed study questionnaire A (Table 2a) to determine their baseline subjective experience with their habitual contact lenses and care regimen.

Subsequently, patients were dispensed a 30-day supply of their habitual contact lenses, a new lens case, 20 oz of test solution to use in place of their habitual lens-care solution, and were instructed (both orally and in writing) on the use of the test solution and on appropriate lens care.

The evaluation visit (Visit 2–Day 30) was conducted 30 ± 3 days after the baseline visit. Results for distance visual acuity with contact lenses as well as for biomicroscopy assessment of the lids, cornea and bulbar conjunctiva were recorded and any adverse events assessed. Subjects completed study questionnaire B (Table 2b), assessing their contact lens-wearing experience during the study period and comparing that experience with their previous solution experience.

Questionnaires

Subjects completed a questionnaire at the baseline (study questionnaire A) and evaluation visits (study questionnaire B) to determine patient benefit (Table 2b). Study questionnaire A included four Likert-style questions assessing comfort, vision, and overall lens-wearing experience. These questions have been used previously to subjectively assess lens wear.^{26,27} The evaluation visit questionnaire, study questionnaire B, included the baseline questions and two preference questions (Table 2b). Questionnaires were completed by the subject before any ocular assessments were made at each visit.

Distance visual acuity

Contact lens visual acuity was measured for distance. Acuities were measured using a Snellen letter chart (calibrated) for each eye individually under photopic lighting conditions.

Biomicroscopy

Subjects were evaluated to rule out any active ocular pathology that would interfere with successful contact lens wear. This involved a systematic examination of the eyelids, bulbar and palpebral conjunctiva and cornea. Findings were recorded as either 'normal' or 'abnormal'. Subjects with abnormal findings were excluded from the study.

Adverse events

Adverse events were considered to be any unfavorable or unexpected medical occurrence during the test solution

Table 2a Study questionnaire A

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. My lenses are comfortable upon instillation	<input type="checkbox"/> ¹	<input type="checkbox"/> ²	<input type="checkbox"/> ³	<input type="checkbox"/> ⁴	<input type="checkbox"/> ⁵
2. My lenses feel comfortable at the end of the lens-wearing day	<input type="checkbox"/> ¹	<input type="checkbox"/> ²	<input type="checkbox"/> ³	<input type="checkbox"/> ⁴	<input type="checkbox"/> ⁵
3. My vision is clear at the end of the lens-wearing day	<input type="checkbox"/> ¹	<input type="checkbox"/> ²	<input type="checkbox"/> ³	<input type="checkbox"/> ⁴	<input type="checkbox"/> ⁵
4. I am satisfied with my overall lens-wearing experience	<input type="checkbox"/> ¹	<input type="checkbox"/> ²	<input type="checkbox"/> ³	<input type="checkbox"/> ⁴	<input type="checkbox"/> ⁵

Table 2b Study questionnaire B

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. My lenses are comfortable upon instillation	<input type="checkbox"/> ¹	<input type="checkbox"/> ²	<input type="checkbox"/> ³	<input type="checkbox"/> ⁴	<input type="checkbox"/> ⁵
2. My lenses feel comfortable at the end of the lens-wearing day	<input type="checkbox"/> ¹	<input type="checkbox"/> ²	<input type="checkbox"/> ³	<input type="checkbox"/> ⁴	<input type="checkbox"/> ⁵
3. My vision is clear at the end of the lens-wearing day	<input type="checkbox"/> ¹	<input type="checkbox"/> ²	<input type="checkbox"/> ³	<input type="checkbox"/> ⁴	<input type="checkbox"/> ⁵
4. I am satisfied with my overall lens-wearing experience	<input type="checkbox"/> ¹	<input type="checkbox"/> ²	<input type="checkbox"/> ³	<input type="checkbox"/> ⁴	<input type="checkbox"/> ⁵
5. The study product enhances my overall lens-wearing experience more effectively than my previous solution	<input type="checkbox"/> ¹	<input type="checkbox"/> ²	<input type="checkbox"/> ³	<input type="checkbox"/> ⁴	<input type="checkbox"/> ⁵
6. I will continue to use the test solution after this study	<input type="checkbox"/> ¹	<input type="checkbox"/> ²	<input type="checkbox"/> ³	<input type="checkbox"/> ⁴	<input type="checkbox"/> ⁵

period of use. For enrolled subjects, any change from baseline in the clinical findings deemed unfavorable was considered an adverse event and recorded.

Statistical methods

A two-sided Wilcoxon rank sum test was used for comparisons between baseline and Day 30 assessments from patient questionnaires. A chi-squared test was used for test of equal proportions for the two comparison questions assessed only at Day 30. A paired *t*-test was used for within-patient changes in visual acuity. All tests were two-sided with a confidence level set to 95%. A *P*-value of 0.05 was taken as statistically significant. Statistical analysis was performed by an independent biostatistician using SAS software (SAS Institute, Cary, NC, USA).

Results

A total of 114 patients were enrolled at six study sites. Five subjects were excluded from the analysis (Table 3). Habitual

Table 3 Subject accountability

Reasons for study exclusion	Number of patients
Discontinued contact lens wearing during study	1
Received treatment during study that might interfere with study outcome	1
Withdrawn	3

lenses worn by the patients are shown in Table 4. There were five reported adverse events, all nonserious (Table 5). For the remaining 109 subjects, 108 completed study questionnaire A and 109 completed study questionnaire B.

At the Day 30 visit, there was no significant decrease in visual acuity (OD, *P* = 0.20; OS, *P* = 0.52). Most subjects achieved 20/20 both at baseline and at Day 30 (range 20/15–20/30). With the exception of the ocular adverse events

Table 4 Habitual lenses

Brand	# of Patients
Silicone hydrogel lenses	
Acuvue Advance	5
Acuvue Oasys	31
O2 Optix	3
Air Optix	2
Night & Day	3
PureVision	6
Traditional hydrogel lenses	
Acuvue 2	20
Frequency 55	5
Soflens (66, 38, MF)	22
Precision UV	2
Biomedics (55, XC)	2
Proclear	6
Freshlook	1
Definition AC	1

Table 5 List of reported adverse events

Patient ID	Event	Severity	Relation to study drug
116	Bilateral viral conjunctivitis	Moderate	Not related
211	Left eye seemed blurred and lens felt dirty	Mild	Not related
306	Stinging upon instillation of OU	Mild	Related
401	Left eye acute hordeolum in the lower lid	Moderate	Not related
606	Burning sensation when putting on contacts in the morning	Mild	Related

Abbreviation: OU, bilateral.

reported, there were no significant changes in biomicroscopy ratings during the study.

Responses to study questionnaire A (Day 0) were compared with those from study questionnaire B (Day 30). Subjects rated the test solution significantly better for all four subjective statements, including lens instillation comfort ($P = 0.02$, Figure 1); end of day comfort ($P < 0.0001$, Figure 2); clear vision at the end of the lens-wearing day ($P < 0.0001$, Figure 3) and overall satisfaction ($P < 0.001$, Figure 4) compared to their previous solution.

For the two direct comparison questions asked only at Day 30, 71% of the patients agreed that the test solution enhanced the overall lens-wearing experience more effectively

than the previous solution ($P < 0.0001$, Figure 5); and 81% of the patients reported that they will continue to use the test solution after the study ($P < 0.0001$, Figure 6).

Ninety-three patients agreed that their lenses with the previous solution were comfortable upon instillation. Of those, 68% reported that the test solution was more effective in enhancing their lens-wearing experience and 78% said that they would continue to use the test solution. It was 87% and 93%, respectively, of 15 patients who were neutral or did not find that their lenses with their previous solution were comfortable upon instillation.

Sixty-four patients agreed that their lenses felt comfortable at the end of the lens-wearing day when using

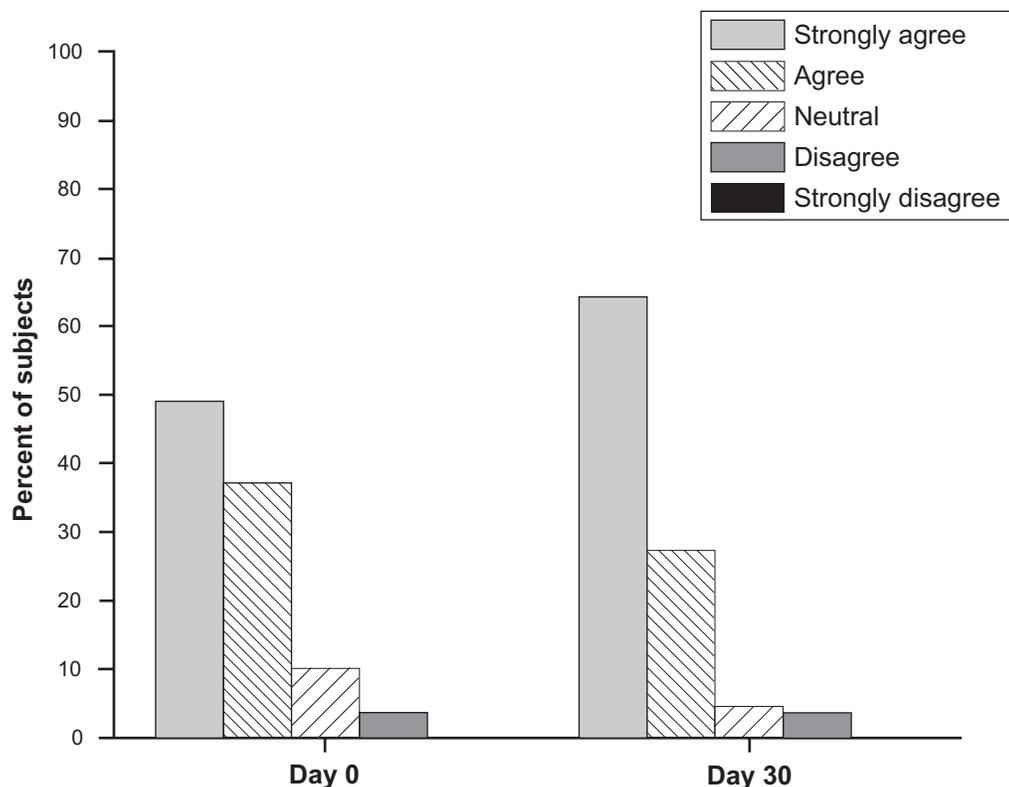


Figure 1 Insertion comfort. "My lenses are comfortable upon insertion."

Note: P -value = 0.024.

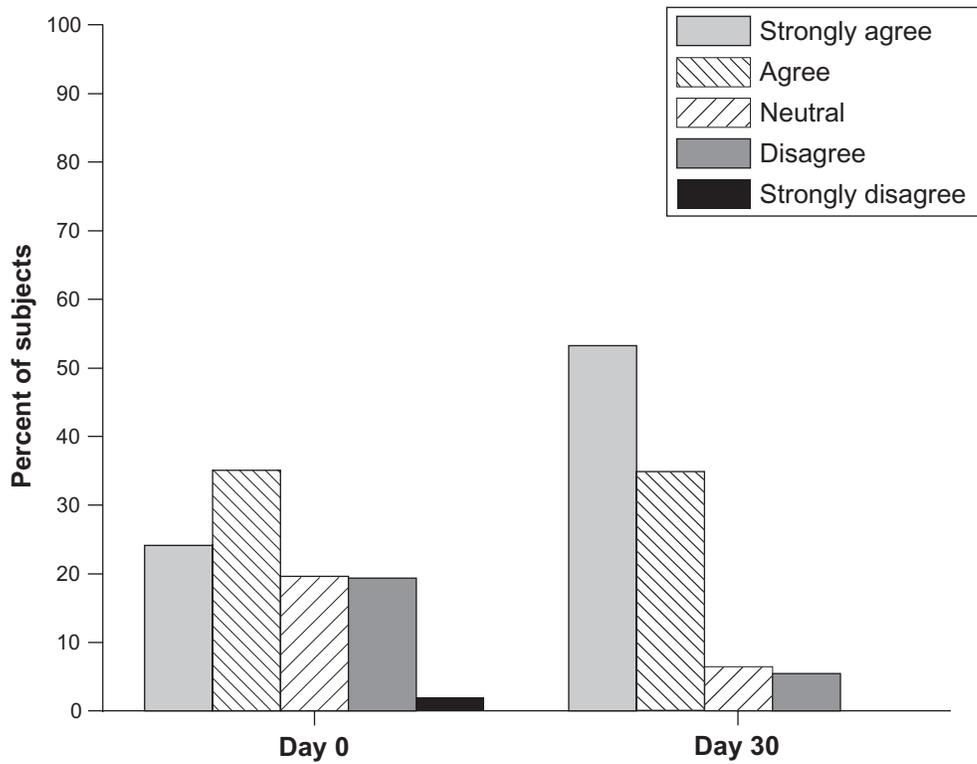


Figure 2 End of day comfort. "My lenses feel comfortable at the end of the lens-wearing day."
Note: P-value < 0.0001.

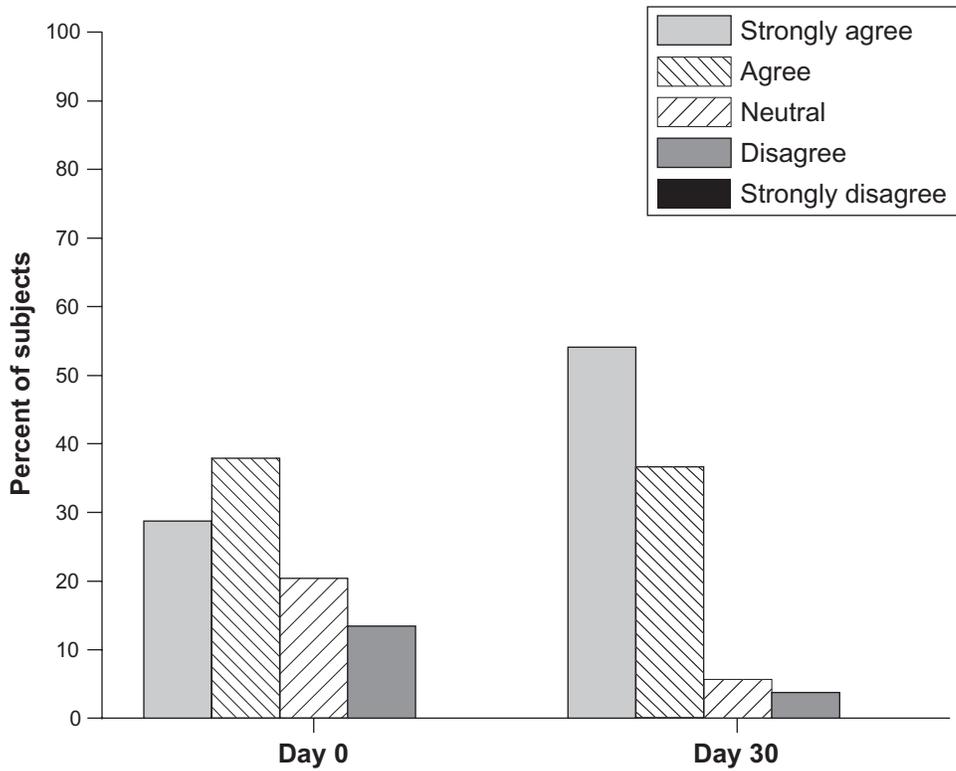


Figure 3 End of day vision. "My vision is clear at the end of the lens-wearing day."
Note: P-value < 0.0001.

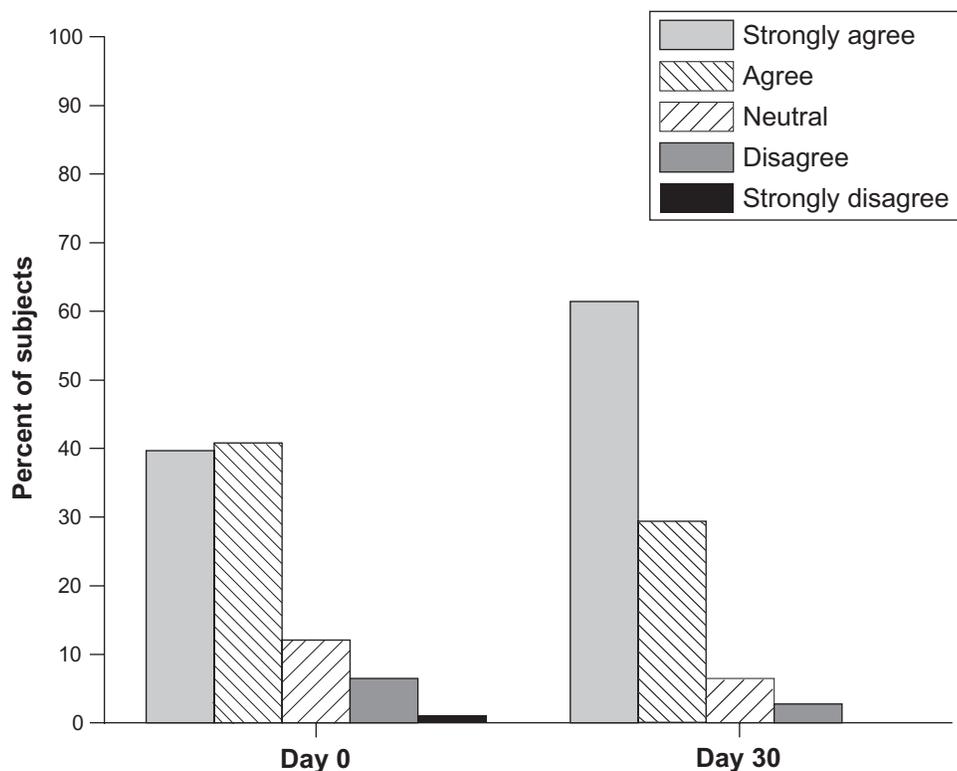


Figure 4 Satisfaction. "I am satisfied with my overall lens-wearing experience."
Note: *P*-value = 0.0009.

the previous solution. Of those, 63% reported that the test solution was more effective in enhancing their lens-wearing experience; and 77% agreed that they would continue to use the test solution. It was 82% and 86%, respectively, of 44 patients who were neutral or did not agree that their lenses felt comfortable at the end of the lens-wearing day when using their previous solution.

Seventy-two patients agreed that their vision was clear at the end of lens-wearing day when using their previous solution. Of those, 64% reported that the test solution was more effective in enhancing their lens-wearing experience; and 79% agreed that they would continue to use the test solution. It was 83% and 83%, respectively, of 36 patients who were neutral or did not agree that their vision was clear at the end of the lens-wearing day when using their previous solution.

Eighty-seven patients agreed that they were satisfied overall with their previous solution. Of these, 67% rated the test solution more effective in enhancing their lens-wearing experience, and 77% agreed that they would continue to use the test solution. It was 86% and 95%, respectively, of 21 patients who were neutral or did not agree that they were satisfied overall with their previous solution.

Results of the within-subject, before-after comparisons indicated that most subjects responded 'strongly agree' or

'agree' to questions concerning the test solution, regardless of their rating of the previous solution.

Discussion

Terry and colleagues²⁸ suggest, that when gauging success by wearing time alone, many 'successful' lens wearers may instead be 'contact lens survivors', enduring rather than enjoying contact lens wear. Even though contact lens wearers may be able to wear their lenses full-time, if they experience discomfort, they are at risk of dropping out of lens wear. Pritchard and colleagues¹ found that 12% of contact lens patients discontinued lens wear within five years of the initial fitting due to dryness and discomfort symptoms. Lens-wearing comfort appears to be a better predictor of ongoing successful wear, demonstrated by Brennan and colleagues,⁴ thus highlighting the importance of optimizing comfort in contact lens wearers.

One of the key factors that contributes to comfort is the health and integrity of the corneal surface.^{25,29,30} With the introduction of new lens materials, the biocompatibility of lens materials and lens care solutions has generated considerable clinical interest as it has become apparent that certain lens/solution combinations can cause disruption to the epithelium.^{31,32} In 2002, Jones and colleagues³¹ found

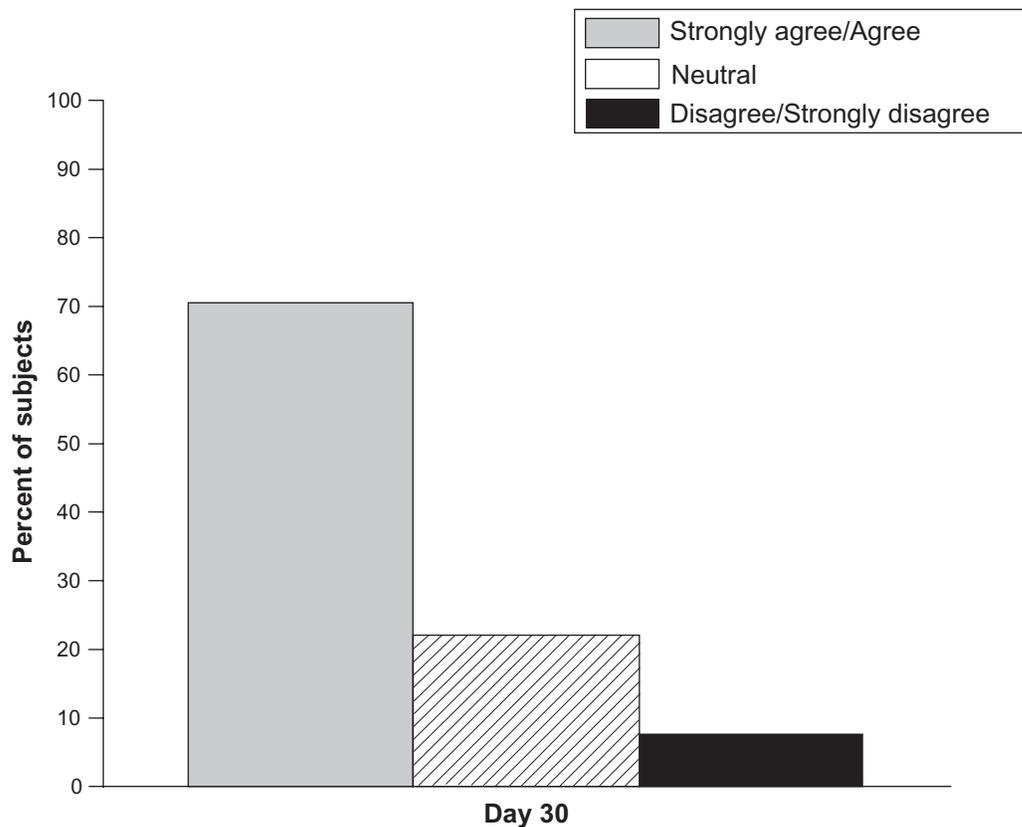


Figure 5 Overall experience. "The study product enhances my overall lens-wearing experience more effectively than my previous product."
Notes: P-value < 0.0001.

moderate to severe corneal staining in 37% of subjects when a multi-purpose solution with the preservative PHMB was used with PureVision® (Bausch & Lomb) silicone hydrogel lenses. More recently, a comprehensive analysis of FDA-cleared multi-purpose solutions with both silicone hydrogel materials and traditional hydrogel lenses was undertaken by Andrasko and Ryen,^{25,33} revealing that different lens/solution combinations can cause varying degrees of corneal staining.

Despite its high level of antimicrobial efficacy, OPTI-FREE® RepleniSH® MPDS has demonstrated biocompatibility with the ocular surface and has FDA clearance for use with silicone hydrogel and soft lenses. Hall and colleagues³⁴ demonstrated that OPTI-FREE® RepleniSH® MPDS sustains corneal barrier function by minimizing corneal damage and maintaining normal corneal permeability. OPTI-FREE® RepleniSH® MPDS has also been shown to exhibit minimal corneal staining with all tested lens/solution combinations.^{32,33}

Staining using fluorescein is routinely used to evaluate epithelial integrity,^{34–36} yet the significance of solution-related staining has been debated. While staining can be viewed as

a sign of corneal damage presenting a pathway for possible infection, a link between solution-related staining and infection has not been shown.

Nevertheless, in light of recent research, it is in a practitioner's best interest to minimize corneal staining in contact lens wearers. In 2007, Carnit and colleagues³⁷ showed staining was associated with a higher incidence of infiltrative ocular events. In addition, Andrasko and Ryen²⁵ found a moderate correlation between lens/solution-induced staining and reduced comfort. The implication for contact lens wearers is that higher levels of staining may increase the risk of infiltrative events and comfort-related problems. Minimizing corneal staining through careful consideration of the biocompatibility of the lens and lens care solution combination may contribute to improved comfort and contact lens-wearing success.

In the current study of 109 successful lens wearers who habitually used a competitive multipurpose solution, it is noteworthy that upon questioning, several subjects reported discomfort and dissatisfaction. In particular, 15 subjects were neutral or disagreed that their previous solution was comfortable on instillation and 21 were neutral or not satisfied with their previous solution. Following the use of

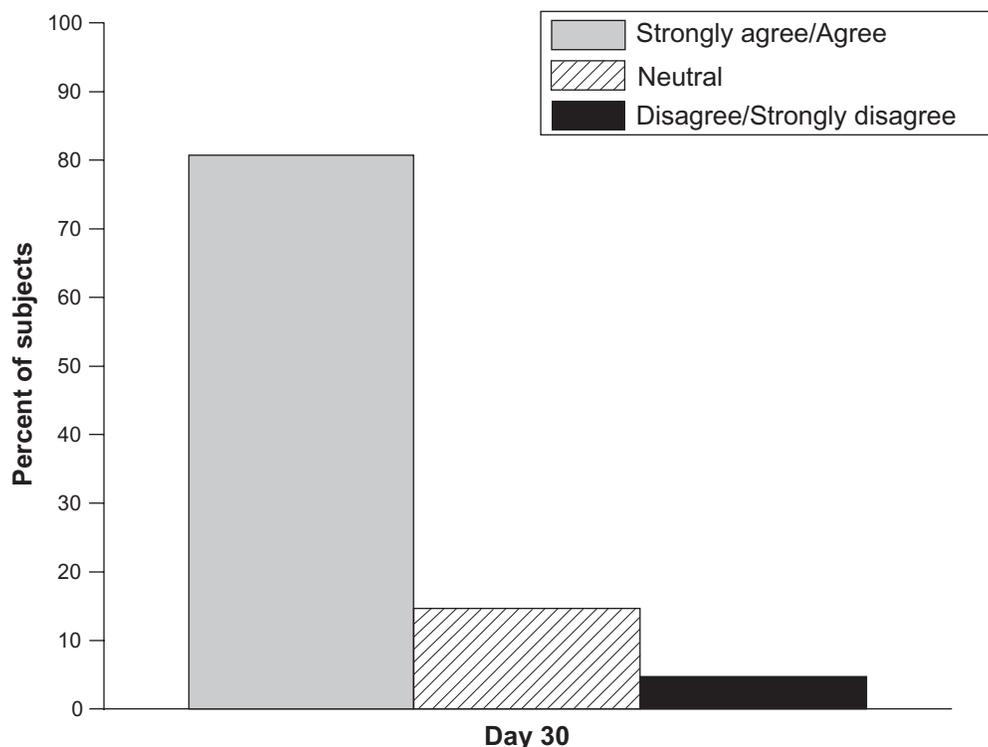


Figure 6 Solution preference. "I will continue to use the study solution after this study."
Note: P-value < 0.0001.

OPTI-FREE® RepleniSH® MPDS during the study period, of the 15 aforementioned subjects, 87% (13/15) rated the test solution more effective at enhancing their overall lens-wearing experience and 93% (14/15) agreed that they would continue to use the test solution. Of the 21 subjects dissatisfied with their previous product, 86% (18/21) rated the test solution more effective in enhancing their overall lens-wearing experience and 95% (20/21) agreed that they would continue to use the test solution.

These results show the improvement in subjective comfort in lens wearers who are neutral or not satisfied with their current lens care solution with the use of OPTI-FREE® RepleniSH® MPDS. It also highlights the importance of effective questioning of successful contact lens wearers to elicit and address any comfort-related issues.

Perhaps even more notably however, successful lens wearers who did report end of day comfort, clear vision at the end of a day's wear, or who reported satisfaction overall with their habitual lens-wearing experience also found a significant improvement in their lens-wearing experience after 30 days of OPTI-FREE® RepleniSH® MPDS use. Of the 93 subjects who agreed that the previous solution was comfortable upon instillation, 68% preferred the test solution for enhancing their overall lens-wearing experience and 78%

will continue to use the test solution. Of the 87 patients who were satisfied with their previous solution, 67% found the test solution enhanced their overall lens-wearing experience and 77% will continue to use the test solution.

These results indicate that satisfied contact lens wearers are likely to experience even greater satisfaction with lens wear when using OPTI-FREE® RepleniSH® MPDS. The implication for a contact lens practice is that proactive recommendation of OPTI-FREE® RepleniSH® MPDS for successful contact lens wearers is likely to further enhance comfort and overall contact lens-wearing experience.

These data are consistent with the earlier findings of Kern and colleagues³⁸ where patients were asked to switch from their habitual solution to OPTI-FREE® RepleniSH® MPDS. In a questionnaire given to successful contact lens wearers, 3,132 patients responded to rate their experience with OPTI-FREE® RepleniSH® MPDS. Of these respondents, 91% rated their lenses as feeling clean, 91% found it to be gentle on the eyes, 84% felt their lenses were moist, 83% noted lasting comfort and 58% agreed that they could wear their lenses longer with OPTI-FREE® RepleniSH® MPDS.

In addition to biocompatibility, lens cleanliness contributes to comfortable contact lens wear. Excessive deposits can degrade lens surface quality and negatively impact comfort.

The efficacy of OPTI-FREE® RepleniSH® MPDS in lens protein removal has been determined using *in vitro* lysozyme deposition models and *ex vivo* clinical studies that compared OPTI-FREE® RepleniSH® MPDS with other marketed multi-purpose solutions. OPTI-FREE® RepleniSH® MPDS demonstrated the greatest cleaning efficacy (as defined as a percentage of lysozyme removed with cleaning).²¹ In a separate study involving a seven-day regimen of immersion in lysozyme solution followed by soaking, OPTI-FREE® RepleniSH® MPDS demonstrated greater cleaning efficacy than other studied solutions.³⁵ A separate study investigating lipid removal showed that a POLYQUAD®/ALDOX® disinfection system was able to reduce deposition of the tear film lipid (cholesterol oleate) from senofilcon A, silicone hydrogel lenses by 36% compared to a peroxide-based system, when both were used as a no-rub regimen.³⁹ In a clinical evaluation of long-term users of solutions containing POLYQUAD® or PHMB, subjects using OPTI-FREE® solutions had significantly fewer deposits than those using PHMB-based solutions.²⁴ These difference in lens cleaning performance between OPTI-FREE® RepleniSH® MPDS and other solutions may be a contributing factor in the higher comfort ratings for OPTI-FREE® RepleniSH® MPDS in the current study.

The primary limitation of this study was its open label design. Subjects knew that they were using a new solution which could influence the study outcomes. In addition, due to the nature of the study design there was not a true control. This study did attempt to simulate real world conditions in regard to patient lens care regimens. Additional double-masked, controlled studies could provide additional insights into the effect of a lens care regimen on patient acceptance.

The data from the current study exemplify the benefits of OPTI-FREE® RepleniSH® MPDS that can contribute to increased comfortable wearing time through biocompatibility,²⁵ effective cleaning,^{21,24} and lens wettability in silicone hydrogel and hydrogel lens wearers.^{22,23}

Solutions are often overlooked as a means of addressing comfort issues in contact lens wearers. Understanding the relationship lenses and lens care can have on comfort will assist contact lens practitioners in tailoring a lens care plan suited to each individual patient. Educating a patient on these benefits through effective communication may in turn enhance compliance.

The financial benefit of contact lens wearers to a practice has been documented. Contact lens patients return greater revenue than those who wear spectacles alone. Contact lens dropouts erode potential income. Nurturing contact lens

wearers to get the most out of their contact lens-wearing experience is not only professionally rewarding but will contribute to practice growth.

Conclusion

Compared to their habitual contact lens solution, successful contact lens wearers increased in comfort and overall lens-wearing satisfaction after 30 days of using OPTI-FREE® RepleniSH® MPDS. This study provides evidence that proactive transitioning of patients to OPTI-FREE® RepleniSH® MPDS may lead to greater contact lens-wearing satisfaction.

OPTI-FREE® RepleniSH® MPDS provides practitioners with an opportunity to meet and anticipate patient needs, thus reducing the risk of patient dropouts and providing an effective means for practitioners to grow and maintain a successful contact lens practice.

Disclosure

Presented in part at the AOA annual meeting, June, 2009; Washington, DC, USA. The study was supported by Alcon Laboratories, Inc., Fort Worth, TX, USA. The authors thank Lauren Richard, B. Optom, for her medical writing contributions.

References

1. Pritchard N, Fonn D, Brazeau D. Discontinuation of contact lens wear: a survey. *Int Contact Lens Clin.* 1999;26(6):157–162.
2. Begley CG, Caffery B, Nichols KK, Chalmers R. Responses of contact lens wearers to a dry eye survey. *Optom Vis Sci.* 2000;77(1):40–46.
3. Chalmers R, Begley C. Dryness symptoms among an unselected clinical population with and without contact lens wear. *Cont Lens Anterior Eye.* 2006;29(1):25–30.
4. Brennan NA, Coles M-LC, Connor HR, et al. Silicone hydrogel contact lens comfort. *Optom Vis Sci.* 2007;84:E-Abstract 070037.
5. Fonn D. Targeting contact lens induced dryness and discomfort: What properties will make lenses more comfortable. *Optom Vis Sci.* 2007;84(4):279–285.
6. Foulks GN. Prolonging contact lens wear and making contact lens wear safer. *Am J Ophthalmol.* 2006;141(2):369–369.
7. Schlanger JL. A study of contact lens failures. *J Am Optom Assoc.* 1993;64(3):220–224.
8. Pritchard N, Fonn D. Dehydration, lens movement and dryness ratings of hydrogel contact lenses. *Ophthalmic Physiol Opt.* 1995;15(4):281–286.
9. Nichols JJ, Sinnott LT. Tear film, contact lens, and patient-related factors associated with contact lens-related dry eye. *Invest Ophthalmol Vis Sci.* 2006;47(4):1319–1328.
10. Begley CG, Chalmers RL, Mitchell GL, et al. Characterization of ocular surface symptoms from optometric practices in North America. *Cornea.* 2001;20(6):610–618.
11. Chalmers R, Long B, Dillehay S, Begley C. Improving contact-lens related dryness symptoms with silicone hydrogel lenses. *Optom Vis Sci.* 2008;85(8):778–784.
12. Riley C, Young G, Chalmers R. Prevalence of ocular surface symptoms, signs, and uncomfortable hours of wear in contact lens wearers: the effect of refitting with daily-wear silicone hydrogel lenses (senofilcon a). *Eye Contact Lens.* 2006;32(6):281–286.

13. Bergenske P, Long B, Dillehay S, et al. Long-term clinical results: 3 years of up to 30-night continuous wear of lotrafilcon A silicone hydrogel and daily wear of low-Dk/t hydrogel lenses. *Eye Contact Lens*. 2007;33(2):74–80.
14. Chalmers RL, Dillehay S, Long B, et al. Impact of previous extended and daily wear schedules on signs and symptoms with high Dk lotrafilcon A lenses. *Optom Vis Sci*. 2005;82(6):549–554.
15. Dillehay SM, Miller MB. Performance of Lotrafilcon B silicone hydrogel contact lenses in experienced low-Dk/t daily lens wearers. *Eye Contact Lens*. 2007;33(6):272–277.
16. Dumbleton K, Keir N, Moezzi A, Feng Y, Jones L, Fonn D. Objective and subjective responses in patients refitted to daily-wear silicone hydrogel contact lenses. *Optom Vis Sci*. 2006;83(10):758–768.
17. Lebow K, Schachet J. Evaluation of corneal staining and patient preference with use of three multi-purpose solutions and two brands of soft contact lenses. *Eye Contact Lens*. 2003;29(4):213–220.
18. Ward M. Soft Contact Lens Products. *Contact Lens Spectrum*. 2003;18(7):27–28.
19. Rosenthal RA, Bell WM, Schlech BA. Evaluation of a new contact lens disinfection formulation for disinfectant efficacy. Fort Lauderdale, FL: Poster presented at: Association for Research in Vision and Ophthalmology (ARVO); May 2005.
20. Potter B, Stiegemeier MJ, Wilson M, Larsen, Friederichs G. A clinical evaluation of solutions. *Rev Cornea Contact Lenses*. 2005;11:32–36.
21. Lin MC, Tatyana TF. Differences in protein-removal efficiency among multi-purpose solutions. Fort Lauderdale, FL: Poster presented at: Association for Research in Vision and Ophthalmology (ARVO); April, 2008.
22. Meadows D, Ketelson H, Napier L, Christensen M, Mathis J. Clinical ex vivo wettability of traditional and silicone hydrogel soft contact lenses. Birmingham, UK: Poster presented at: British Contact Lens Association (BCLA); May, 2006.
23. Schachet J, Zigler L, Wakabayashi D, Cohen S. Clinical assessment of a new multi-purpose disinfecting solution in asymptomatic and symptomatic patients. Denver, CO: Poster presented at: AAO; December, 2006.
24. Young G, Kier N, Jones S. Clinical evaluation of long-term users of two different contact lens care preservative systems. Birmingham, UK: Poster presented at: British Contact Lens Association (BCLA); May, 2008.
25. Andrasko G, Ryen K. Corneal staining and comfort observed with traditional and silicone hydrogel lenses and multipurpose solution combinations. *Optometry*. 2008;79(8):444–454.
26. Zigler L, Cedrone R, Evans D, Helbert-Green C, Shah T. Clinical evaluation of silicone hydrogel lens wear with a new multipurpose disinfection care product. *Eye Contact Lens*. 2007;33(5):236–243.
27. Stiegemeier MJ, Friederichs GJ, Hughes JL, Larsen S, Movic W, Potter WB. Clinical evaluation of a new multi-purpose disinfecting solution in symptomatic contact lens wearers. *Contact Lens Anterior Eye*. 2006;29(3):143–151.
28. Terry R, Schnider C, Holden B, et al. CCLRU standards for success of daily and extended wear contact lenses. *Optom Vis Sci*. 1993;70(3):234–243.
29. Jalbert I, Carnt N, Naduvilath T, Papas E. The relationship between solution toxicity, corneal inflammation, and ocular comfort in soft contact lens daily wear. Fort Lauderdale, FL: Poster presented at: Association for Research in Vision and Ophthalmology (ARVO); May, 2006.
30. Schendowich B, McGregor S. Managing Contact Lens Intolerance: Patients may become intolerant to contact lens wear for a variety of reasons. *CL Spectrum*. June, 2009. Available from <http://www.clspectrum.com/article.aspx?article=103012>. Accessed on November 10, 2009.
31. Jones L, MacDougall N, Sorbara G. Asymptomatic corneal staining associated with the use of balafilcon silicone-hydrogel contact lenses disinfected with a polyaminopropyl biguanide-preserved care regimen. *Optom Vis Sci*. 2002;79(12):753–761.
32. Andrasko GJ, Ryen KA, Garofalo RJ, Lemp JM. Compatibility of silicone hydrogel lenses with multi-purpose solutions. Fort Lauderdale, FL: Poster presented at: Association for Research in Vision and Ophthalmology (ARVO); May, 2006.
33. Data from Contact Lens Research Services. Available from <http://www.StainingGrid.com/>. Accessed November 18, 2008.
34. Hall JQ, Paugh JR, Peinovich MC, Ramsey AC, Meadows D. A pilot study of the effect of silicone-hydrogel lenses and marketed multipurpose solutions on human epithelial barrier function. Fort Lauderdale, FL: Poster presented at: Association for Research in Vision and Ophthalmology (ARVO); May, 2007.
35. Hong B, Stauffer P, Meadows D, Keith D. Assessment of cleaning efficacy of contact lens multi-purpose disinfecting solution by in vitro lysozyme deposition model. Fort Lauderdale, FL: Poster presented at: Association for Research in Vision and Ophthalmology (ARVO); May, 2005.
36. Paugh JR, Webb JR, Ramsey AC, Meadows D, Napier L. Clinical and epithelial barrier evidence of lens material and multipurpose solution bio-incompatibilities. Birmingham, UK: Poster presented at: British Contact Lens Association (BCLA); May, 2008.
37. Carnt N, Jalbert I, Stretton S, Naduvilath T, Papas E. Solution toxicity in soft contact lens daily wear is associated with corneal inflammation. *Optom Vis Sci*. 2007;84:309–315.
38. Kern J, Napier L, Meadows D. Assessment of patient satisfaction with a new multi-purpose disinfecting solution using a patient outcome survey. Boston, MA: Poster presented at: American Optometric Association (AOA); June, 2007.
39. Heynen ML, Lorentz H, Dumbleton K, Varikooty J, Woods C, Jones LW. Lipid deposition on senofilcon A silicone hydrogel contact lenses disinfected with 1-step hydrogen peroxide and Polyqua®/Aldox® preserved care regimens. Fort Lauderdale, FL: Poster presented at: Association for Research in Vision and Ophthalmology (ARVO); May, 2009.

Clinical Ophthalmology

Publish your work in this journal

Clinical Ophthalmology is an international, peer-reviewed journal covering all subspecialties within ophthalmology. Key topics include: Optometry; Visual science; Pharmacology and drug therapy in eye diseases; Basic Sciences; Primary and Secondary eye care; Patient Safety and Quality of Care Improvements. This journal is indexed on

Submit your manuscript here: <http://www.dovepress.com/clinical-ophthalmology-journal>

Dovepress

PubMed Central and CAS, and is the official journal of The Society of Clinical Ophthalmology (SCO). The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.