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ORIGINAL RESEARCH

Results from a global survey of contact lens-wearer satisfaction with OPTI-FREE® PureMoist® Multi-Purpose Disinfecting Solution

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Jessie Lemp
Jami R Kern

Global Medical Affairs,
Alcon Laboratories, Inc, Fort Worth,
TX, USA

Purpose: The objective of the study reported here was to obtain information on acceptance and satisfaction with OPTI-FREE® PureMoist® Multi-Purpose Disinfecting Solution (MPDS) from contact lens wearers globally.

Methods: Eligible contact lens wearers provided baseline demographic and lens-wear-regimen information, and advised their ocular dryness/discomfort level and current lens-wear experience. Volunteers received OPTI-FREE PureMoist MPDS and a survey consisting of ten statements about the trial solution. Volunteers were instructed to use the solution daily and to complete the survey after 2 weeks of use. Descriptive statistical analysis was conducted on data from the entire group, from the subset of respondents reporting ocular dryness and/or discomfort at trial initiation (symptomatic subgroup), and from each geographic region.

Results: Volunteers from nine countries returned 10,610 surveys, in which 50% of respondents classified themselves as having ocular dryness/discomfort. Lens comfort and visual performance responses from the total population and the symptomatic subgroup were significantly more positive after 2 weeks of OPTI-FREE PureMoist use than at baseline, irrespective of the habitual lens-care solution. In the USA, Southeast Asia, and Europe, 14% to 20% more respondents reported that their contact lenses provided all-day comfort after 2 weeks of OPTI-FREE PureMoist use compared with baseline ($P<0.0001$). Australia reported 31% more patients with all-day comfort after OPTI-FREE PureMoist use ($P<0.0001$). Approximately four out of five respondents from both populations reported their intent to continue using OPTI-FREE PureMoist. Globally, 39% of all respondents and 58% of symptomatic respondents experienced reduced end-of-day dryness with their contact lenses after use of OPTI-FREE PureMoist ($P<0.0001$).

Conclusion: Results from this large survey indicate that respondents globally viewed OPTI-FREE PureMoist MPDS favorably, suggesting improved comfort and reduced end-of-day dryness with this solution compared with their habitual solutions. Most individuals planned to continue using OPTI-FREE PureMoist, suggesting that it may provide additional benefit over their habitual solutions.

Keywords: survey, ocular dryness, ocular discomfort, lens-care solution, silicone hydrogel lens

Introduction

Advances in contact lens material and the development of frequent-replacement lenses (ie, daily, weekly, biweekly) have produced measurable improvements in the comfort of contact lenses.[1–6] Despite these improvements, a recent Canadian survey showed that 23% of contact lens wearers permanently discontinued lens wear, the primary reasons being discomfort and dryness.[7] A study of 1,092 soft contact lens wearers demonstrated that discomfort is a problem even among successful lens wearers, with 31% of patients reporting at least 2 hours of discomfort per day.[6] In general, discomfort symptoms get

Correspondence: Jessie Lemp
Global Medical Affairs,
Alcon Laboratories, Inc, 6201 South Freeway, TC-44, Fort Worth,
TX 76134, USA
Tel +1 817 615 2739
Fax +1 817 615 5105
Email jessie.lemp@alcon.com

worse toward the end of the day, irrespective of the type of lens-care solution.[8] However, there are many causes of contact lens-related dryness and these have recently been reviewed.[9] The review suggested that degree of tear dysfunction positively correlates with soiled lens surfaces and an increased need for compliance with lens care.[9] Today's multipurpose solutions have been developed with the aim of improving wettability and comfort,[10] and recent advances in lens-care solution development have led to the introduction of properties to reduce the accumulation of lipid deposits on contact lenses.[10–12]

Clinical outcomes can vary with the use of different contact lens multipurpose solutions (MPSs) for a number of reasons, including the differing components contained within each MPS and the interaction of the MPS with the contact lens material and ocular surface. Silicone hydrogel contact lenses, which were introduced in 1998, have higher oxygen transmissibility than traditional hydrogel lenses.[13] This is associated with a reduction in limbal hyperemia[14] and reduced corneal swelling.[15] In 2011, silicone hydrogel lenses accounted for two-thirds of the contact lens market,[16] representing a steady increase over previous years as eye care professionals increasingly fit patients with these lenses. However, certain silicone hydrogel lenses have demonstrated reduced surface wettability compared with traditional hydrogel lenses[17] and other silicone hydrogel lenses,[17,18] which raises concerns about the ability of these lenses to maintain a stable tear film over the lens surface. The consensus among eye care professionals is that impaired wettability can result in discomfort, reduced visual performance, and rapid deposition.[19]

OPTI-FREE® PureMoist® Multi-Purpose Disinfecting Solution (MPDS; Alcon Laboratories, Inc, Fort Worth, TX, USA) contains a proprietary multifunctional block copolymer, poly(oxyethylene)-poly(oxybutylene) (HydraGlyde® Moisture Matrix [Alcon Laboratories]), that improves lubrication[20] and provides wettability of silicone hydrogel lenses for at least 16 hours.[21,22] OPTI-FREE PureMoist MPDS became commercially available in 2011 in Europe, Australia and the USA and is now available in Asia and South America.

The aim of the study survey was to obtain information regarding patient acceptance of and satisfaction with OPTI-FREE PureMoist MPDS from a large number of respondents globally.

Methods

Participants

Practices across the USA, Europe (the Netherlands, Switzerland, Germany, and France), Asia (Malaysia, Singapore, and the Philippines), and Australia were enlisted to participate. Surveys are ongoing in other countries, the results of which will be presented in the future. Each eye care practitioner was asked to identify up to 24 survey volunteers in their practice.

Eligible volunteers had to be using an MPS without additional products (such as daily or enzymatic cleaners), have normal eyes with no ocular problems, have no ocular or systemic disease or be taking medication that could affect contact lens wear, and have vision that was correctable to at least 20/30 with their contact lenses. Volunteers with no known sensitivity to OPTI-FREE® Express® or OPTI-FREE® RepleniSH® MPDS or other solutions preserved with Polyquad® preservative (all Alcon Laboratories, Inc) were included. Volunteers also had to be willing to begin wearing a new pair of their habitual contact lenses at the start of use of the trial solution use, wear their lenses daily for at least 8 hours per day, avoid use of prescription or over-the-counter ocular products or medications (with the exception of rewetting drops, as needed), and avoid overnight contact lens wear during the trial period. Volunteers agreed to use the trial solution for 2 weeks and answer the follow-up survey at the end of the 2-week trial period.

Survey design

Using an office-based baseline survey, eligible volunteers provided demographic information and advised their current MPS brand, contact lens brand, current ocular dryness/discomfort, and current lens-wear experience. Eligible volunteers were provided with trial solution (OPTI-FREE PureMoist MPDS), a new pair of lenses, a new Alcon green and white screw-top lens case, and the follow-up survey in their native language. They were instructed to use the provided solution every day as directed and to complete the survey, either via a postcard or the Internet (if available), after 2 weeks of using OPTI-FREE PureMoist MPDS. The survey consisted of ten statements about the trial solution, and volunteers were asked to indicate their agreement with each statement on a Likert-style scale (from "Strongly agree" to "Strongly disagree"; Figure 1). The first seven statements were also asked in the baseline in-office survey.

Outcomes and statistical analysis

Demographic information and survey data were obtained from the volunteers. Pre- and post-survey responses were compared using standard *z*-tests with superiority at the $\alpha = 0.05$ two-sided significance level. Data were analyzed from the entire group, from each individual country and/or geographic region, from the subset of respondents reporting

After (2) two weeks of using OPTI-FREE® PureMoist® Solution, please complete this questionnaire by checking the box that best describes your lens-wearing experience over the last 3 days with OPTI-FREE® PureMoist® Solution

	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
1. When I use this solution, I can comfortably wear my lenses all day long	☐	☐	☐	☐	☐
2. When I use this solution, my lenses feel moist from insertion to removal	☐	☐	☐	☐	☐
3. When I use this solution, my lenses feel like new	☐	☐	☐	☐	☐
4. When I use this solution, my lenses feel dry at the end of the day	☐	☐	☐	☐	☐
5. When I use this solution, my vision is clear at the end of the day	☐	☐	☐	☐	☐
6. When I use this solution, I forget I am wearing lenses	☐	☐	☐	☐	☐
7. When I use this solution, my lenses feel comfortable at the end of the day	☐	☐	☐	☐	☐
8. I prefer this solution to my previous solution	☐	☐	☐	☐	☐
9. My lenses are more comfortable with this solution	☐	☐	☐	☐	☐
10. I would continue to use this solution	☐	☐	☐	☐	☐

Figure 1 Follow-up survey after 2 weeks of OPTI-FREE® PureMoist® Multi-Purpose Disinfecting Solution (Alcon Laboratories, Inc, Fort Worth, TX, USA) use.

dryness and/or discomfort at trial initiation (symptomatic subgroup), and from the subsets of respondents habitually using OPTI-FREE solutions or non-OPTI-FREE MPSs.

Results

Demographics and baseline characteristics

Eye care professionals from nine countries were enlisted to recruit volunteers. A total of 10,610 completed surveys were received. The mean age of the volunteers was 36.6 ± 14.0 years and approximately 75% were women (Table 1). At trial initiation, most of the habitually used contact lenses were made of frequent-replacement silicone hydrogels. Approximately 75% of the participants wore their habitual lens brand during the 2-week trial period, 9.8% were fitted with a new prescription of the same lens brand, and 15.5% were refitted with a new lens brand. As shown in Figure 2, 50% of the respondents reported dryness and/or discomfort with their contact lenses at the start of the 2-week trial period.

Survey responses by entire population and by symptomatic subgroup

Figure 3 compares survey responses about lens comfort and visual performance at baseline and at 2 weeks. Answers from

Table 1 Demographics and baseline characteristics of survey respondents

Demographic/baseline characteristic	N=10,610
Mean age ± standard deviation (SD), years	36.6 ± 14.0
Sex, n (%)	
Women	7,910 (74.7%)
Men	2,677 (25.3%)
Country, n (%)	
United States	8,761 (82.6%)
Malaysia	972 (9.2%)
France	188 (1.8%)
Germany	159 (1.5%)
Australia	139 (1.3%)
Netherlands	138 (1.3%)
Singapore	124 (1.1%)
Philippines	101 (1.0%)
Switzerland	27 (0.2%)
Current contact lenses (prevalence ≥3%), n (%)	
Silicone hydrogel lenses	
AcuvueOasys	2,549 (24.0%)
Air optix aqua	1,569 (14.8%)
Biofinity	1,344 (12.7%)
PureVision	442 (4.2%)
Acuvue advance	424 (4.0%)
Air optix night and day	387 (3.6%)
Hydrogel lenses	
Acuvue (acuvue, acuvue 2, toric)	484 (4.6%)
Proclear compatibles	396 (3.7%)
Other (unknown)	1,305 (12.3%)

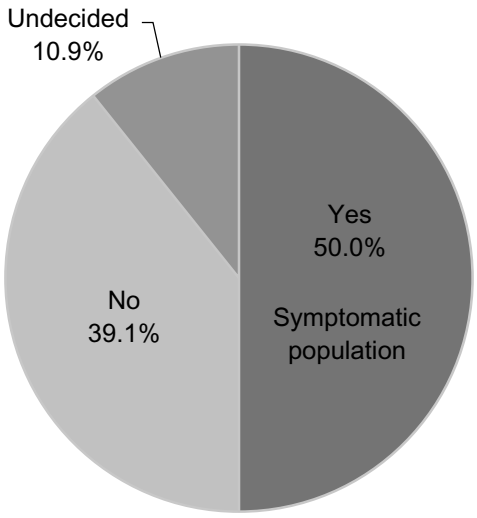

Figure 2 Responses to baseline question "Do you experience dryness and/or discomfort while wearing contact lenses?" (n=10,370).

the entire respondent population were significantly more positive after 2 weeks of OPTI-FREE PureMoist MPDS use compared with answers at baseline ($P<0.0001$, Figure 3A). The subset of respondents with baseline dryness/discomfort symptoms similarly showed improvement in comfort from baseline to 2 weeks, but the magnitude of improvement was more pronounced in the symptomatic subgroup than in the entire respondent population ($P<0.0001$, Figure 3B). When the study population was divided based on habitual OPTI-FREE users (OPTI-FREE RepleniSH or OPTI-FREE Express) and non-OPTI-FREE users (other multipurpose solutions), both groups reported significant improvement in their lens-care experience with OPTI-FREE PureMoist MPDS ($P<0.001$ for both, respectively; Figure 3C and D).

Volunteers provided responses about OPTI-FREE PureMoist MPDS compared with their habitual solution (Figure 4).

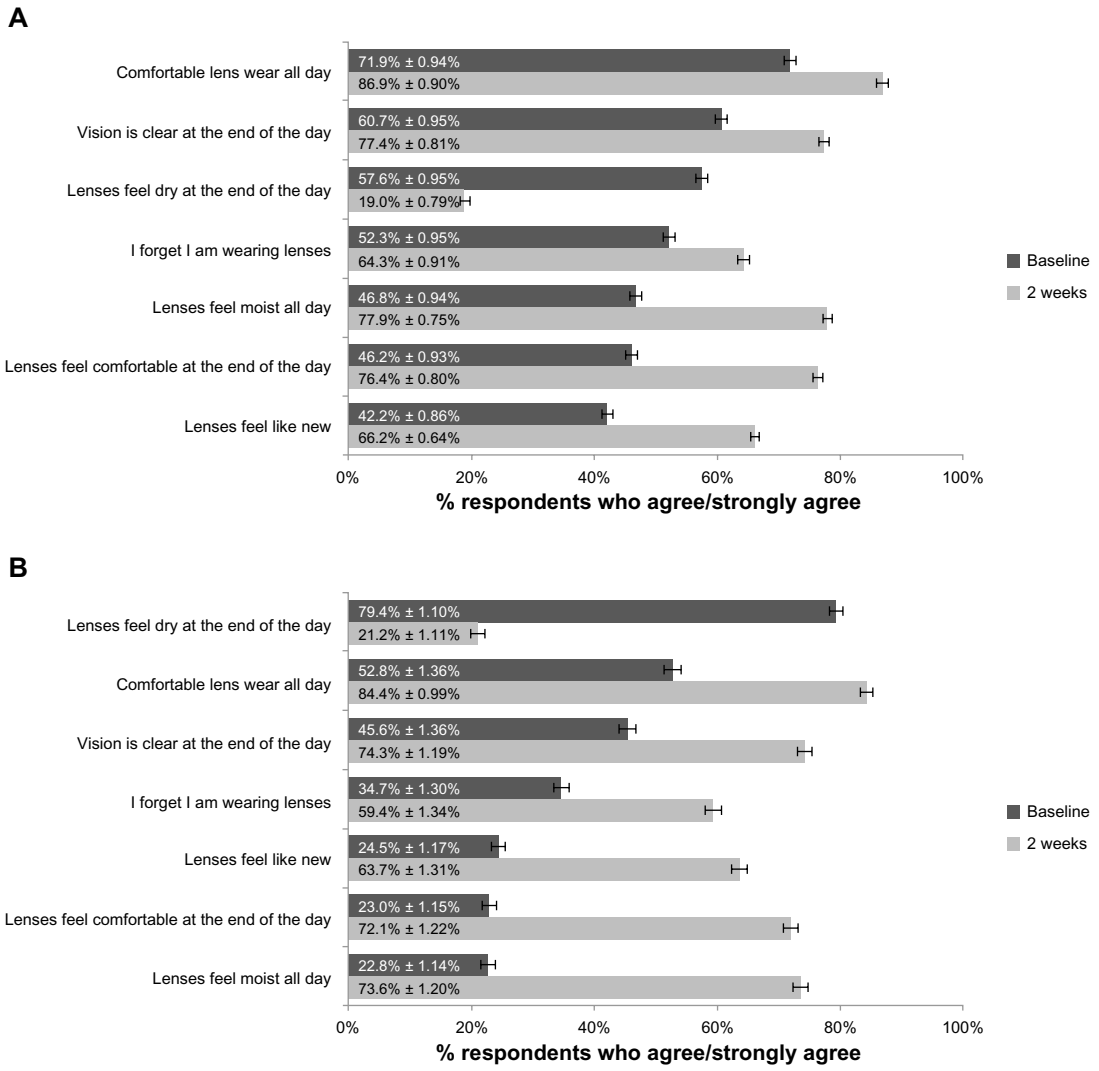

Figure 3 (*Continued*)

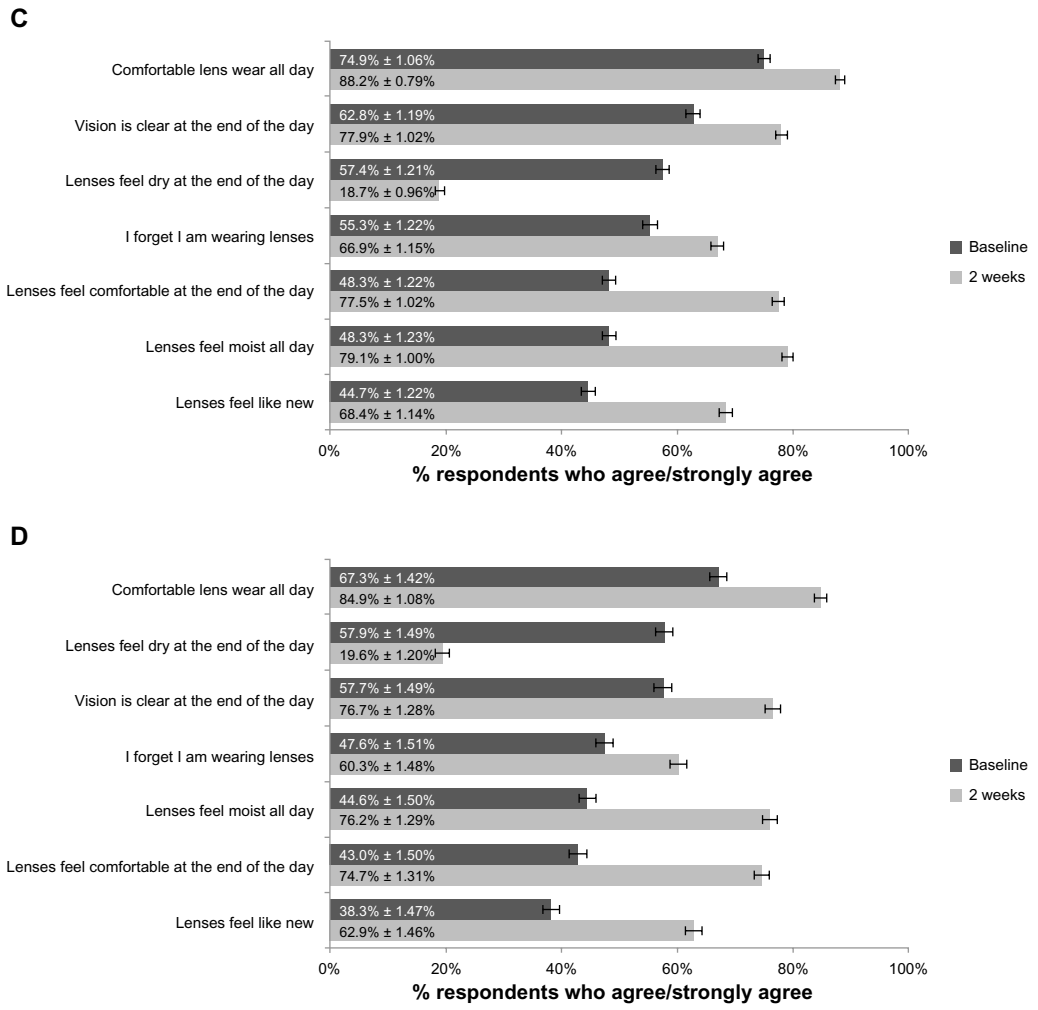

Figure 3 Survey responses about eye lens comfort. (**A**) From the entire respondent population at baseline (n=up to 10,604) and after 2 weeks of OPTI-FREE® PureMoist® Multi-Purpose Disinfecting Solution (MPDS; Alcon Laboratories, Inc, Fort Worth, TX, USA) use (n=up to 10,602). (**B**) From the symptomatic respondent population at baseline (n=up to 5,182) and after 2 weeks of OPTI-FREE PureMoist MPDS use (n=up to 5,179). (**C**) From the users of OPTI-FREE® solutions (OPTI-FREE® RepleniSH® and OPTI-FREE® Express® [both Alcon Laboratories, Inc; n=6,375–6,397]). (**D**) Non-OPTI-FREE® users (n=4,193–4,207).
Notes: *P*-values for all statistical comparisons of baseline and 2 weeks were <0.0001. The 95% confidence interval is displayed at the end of each bar in each graph. Base: (**A**) all respondents (n ranges from 10,568 to 10,603); (**B**) respondents that experience dryness (n ranges from 5,163 to 5,181); (**C**) OPTI-FREE Replenish and OPTI-FREE Express users (n ranges from 6,375 to 6,397); (**D**) non-OPTI-FREE Users (n ranges from 4,193 to 4,207).

Sixty-six percent of the total population (Figure 4A) and 73% of the symptomatic subgroup (Figure 4B) preferred OPTI-FREE PureMoist MPDS. Approximately four out of five respondents from both populations reported that they would continue to use OPTI-FREE PureMoist MPDS.

Survey responses by global region (North America, Australia, Southeast Asia, and Europe)

Australia had the largest absolute increase (31 percentage points) in reports of all-day comfort after 2 weeks of OPTI-FREE PureMoist MPDS use (58% versus 89%; $P<0.0001$; Figure 5); in the remaining three regions, an increase of 14 to 20 percentage points was reported in the proportion of volunteers in who contact lenses provided all-day comfort after 2 weeks of OPTI-FREE PureMoist MPDS use ($P<0.0001$). The USA and Australia had the largest absolute decrease (60.6 and 64.3 percentage points, respectively; $P<0.0001$) in symptomatic respondents reporting issues with end-of-day dryness after 2 weeks of OPTI-FREE PureMoist MPDS use, followed by Southeast Asia (45.1 percentage points) and Europe (44.1 percentage points; $P<0.0001$; Figure 6).

Discussion

More than 10,000 contact lens wearers in nine countries across four continents (North America, Asia, Europe, and

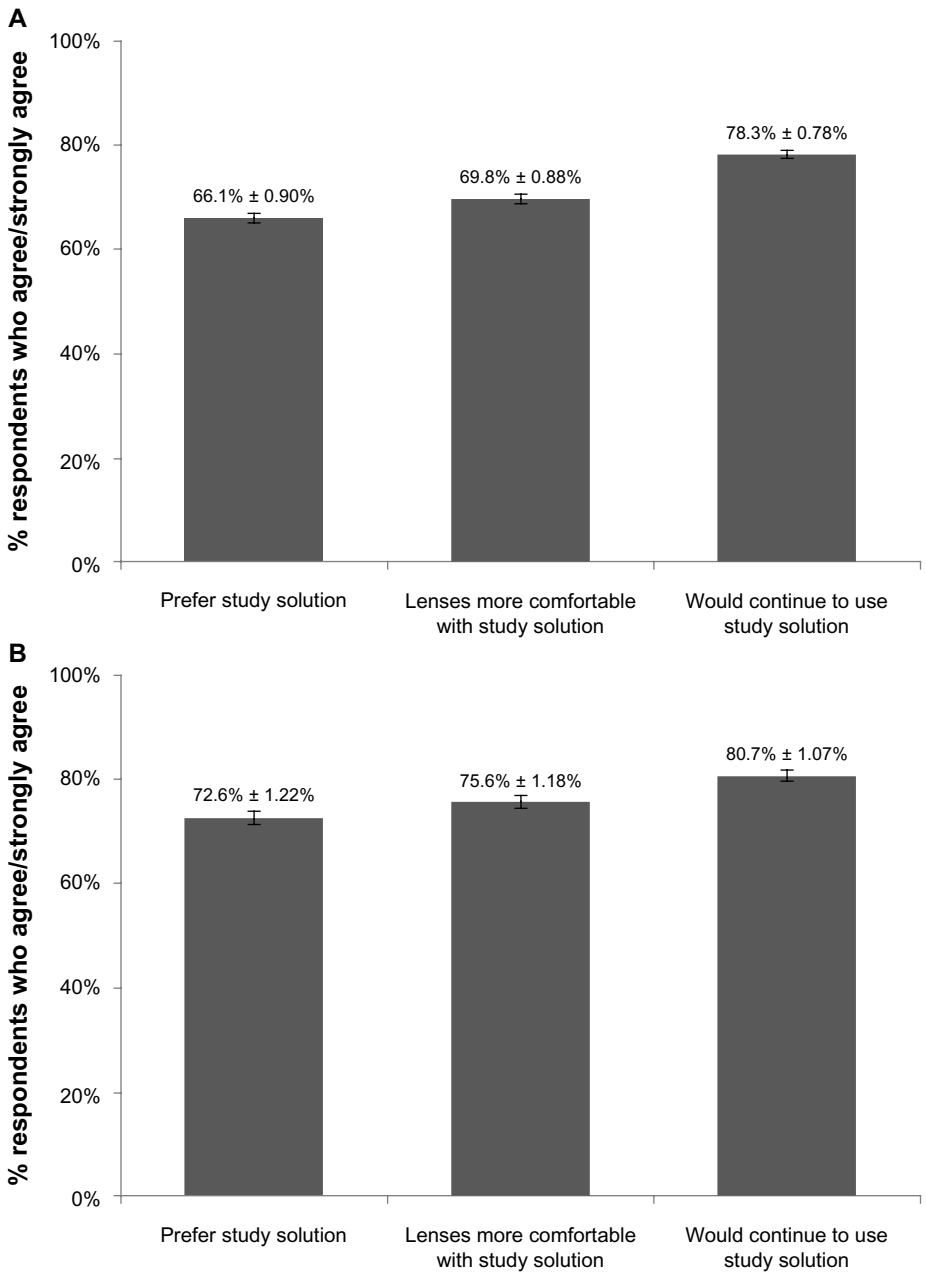

Figure 4 Comparison between preference of optical solutions and intent to continue use of OPTI-FREE® PureMoist® Multi-Purpose Disinfecting Solution (Alcon Laboratories, Inc, Fort Worth, TX, USA). (**A**) From the entire respondent population (n=up to 10,600). (**B**) From the symptomatic respondent population (n=up to 5,177).
Notes: Not all respondents answered each question. n-values ranged from 10,408 to 10,600. The 95% confidence interval is displayed at the end of each bar. Base: (**A**) all respondents (n ranges from 10,407 to 10,599); (**B**) respondents that experience dryness (n ranges from 5,093 to 5,176).

Australia) responded to the study survey after transitioning from their habitual MPS to OPTI-FREE PureMoist MPDS for 2 weeks. Approximately two-thirds of these respondents wore silicone hydrogel lenses, which is in agreement with a recent global survey showing that 50%–75% of contact lenses prescribed are silicone hydrogel lenses.[23] Respondents answered questions about contact lens comfort more favorably after 2 weeks of OPTI-FREE PureMoist MPDS use than at baseline. This pattern was more pronounced in the large subset of volunteers with baseline dryness/discomfort symptoms, suggesting that the trial may have been even more helpful to symptomatic contact lens wearers. Based on the favorable survey results at 2 weeks, it is not surprising that nearly two-thirds of total respondents and nearly three-quarters of the symptomatic population preferred OPTI-FREE PureMoist MPDS to their habitual solution. This is consistent with the fact that 78% of respondents reported intent to continue to use the trial

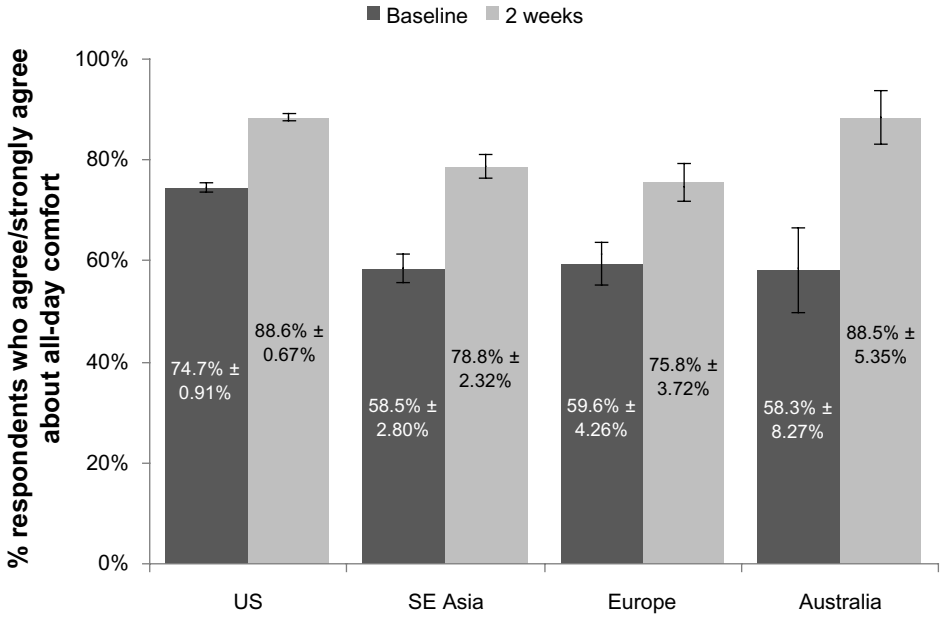

Figure 5 Respondent opinion about all-day comfort at baseline and after 2 weeks of OPTI-FREE® PureMoist® Multi-Purpose Disinfecting Solution (Alcon Laboratories, Inc, Fort Worth, TX, USA) use by global region.

Notes: Southeast (SE) Asia = Malaysia, Philippines, and Singapore; Europe = France, Germany, the Netherlands, and Switzerland. *P*-values for all statistical comparisons of baseline and 2 weeks were <0.0001. The 95% confidence interval is displayed at the end of each bar. Base: all respondents by region (n ranges from 139 to 8,755).

solution after survey completion. Overall, attitudes toward OPTI-FREE PureMoist MPDS were similar across all of the global regions. The majority of respondents in each region reported greater comfort with and preference for OPTI-FREE PureMoist MPDS, and expressed intent to continue its use.

This survey, like most surveys, has some limitations compared with well-controlled clinical studies. Lack of a control arm and product masking may introduce bias, which limits the conclusions that can be drawn from this data. Participants were not rigorously selected and there is a possibility of nonresponse bias due to the lack of follow-up

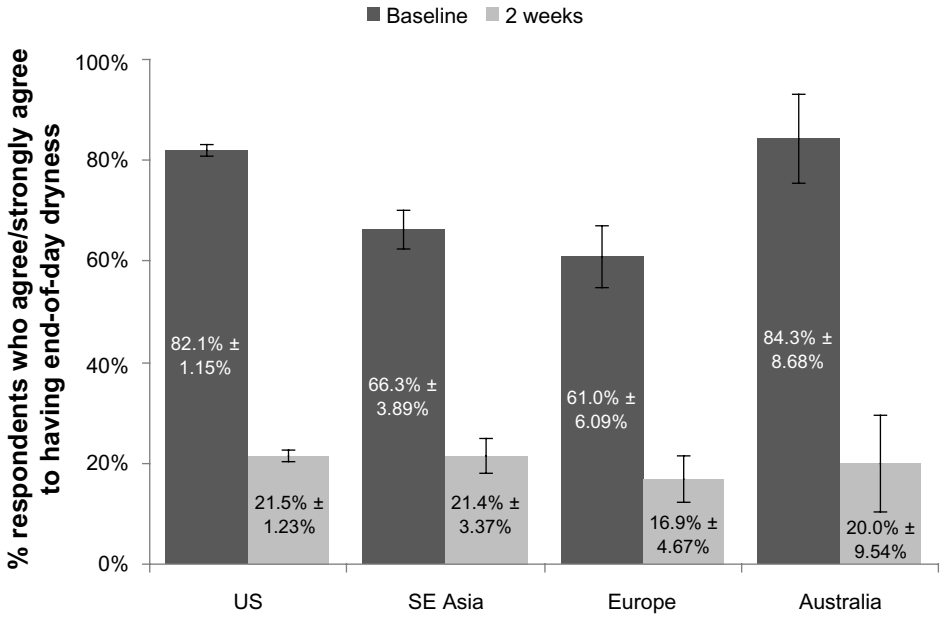

Figure 6 Symptomatic respondents agreement to having end-of-day dryness at baseline and after 2 weeks of OPTI-FREE® PureMoist® Multi-Purpose Disinfecting Solution (Alcon Laboratories, Inc, Fort Worth, TX, USA) use by region.

Notes: Southeast (SE) Asia = Malaysia, Philippines, and Singapore; Europe = France, Germany, the Netherlands, and Switzerland. *P*-values for all statistical comparisons of baseline and 2 weeks were <0.0001. The 95% confidence interval is displayed at the end of each bar. Base: all respondents by region (n ranges from 70 to 4,284).

visits to ensure survey completion. The results of this survey may also be confounded by the fact that comfort levels are dependent on the contact lens–lens care combination used.[24] Nonetheless, this survey provides a real-world example of typical frequent-replacement contact lens-wearer behavior, where users judge a new MPS based on how it compares with their previous solution. While respondents from the USA were overrepresented relative to those from the rest of the world, responses were similar across global regions.

Conclusion

Despite the limitations of this survey, the results demonstrate that respondents around the world viewed OPTI-FREE PureMoist MPDS favorably, suggesting improved comfort with this solution compared with their habitual solutions. It appears that most individuals who tried OPTI-FREE PureMoist planned to continue using it, supporting the notion that it provides additional benefit over their habitual solutions. Symptomatic contact lens wearers particularly may benefit from using OPTI-FREE PureMoist to reduce end-of-day dryness.

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Disclosure

Both authors are employees of Alcon Laboratories, Inc. The authors declare no other conflicts of interest in this work.

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