

European survey of contact lens wearers and eye care professionals on satisfaction with a new water gradient daily disposable contact lens

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Background: Delefilcon A daily disposable water gradient contact lenses (CLs; DAILIES TOTAL1[®]) have radically different properties at the lens surface when compared with the core, resulting in high oxygen transmissibility with a lubricious surface.

Purpose: To assess the real-world success of delefilcon A daily disposable CLs using a European survey, and to determine whether a successful experience changes eye care professionals' (ECPs) CL preference or anticipated recommendation patterns.

Methods: Current soft CL wearers, aged ≥ 18 years, were eligible for participation. Baseline demographics and 2-week data were obtained by ECPs after fitting ≥ 5 to ≤ 10 participants with delefilcon A CLs.

Results: Twenty-four ECPs from 16 European countries assessed the use of delefilcon A CLs in 280 participants. Nearly two-thirds (62.9%; number [n]=176) of the participants reported dryness and/or discomfort with their habitual CLs. There was a 78.9% reduction in the proportion of participants with end-of-day dryness after 2 weeks of using delefilcon A CLs ($P < 0.0001$). More participants agreed that they could wear their CLs comfortably all day long with delefilcon A CLs (93.2%; n=261) versus habitual CLs (58.2%; n=163; $P < 0.0001$). There was a strong preference for delefilcon A CLs when compared with habitual lenses worn, with 81.8% of participants agreeing with the statement "I prefer these lenses to my previous contact lenses." Delefilcon A CLs were also highly rated by ECPs following their experience with fitting the lens. All (100%) ECPs agreed or strongly agreed that the perceived comfort with delefilcon A CLs is better than that with other daily disposable lenses and that they would recommend these lenses to colleagues.

Conclusion: The results indicate that delefilcon A daily disposable water gradient CLs may offer wearers greater comfort than their habitual CLs.

Keywords: water gradient contact lens, delefilcon A, comfort, silicone hydrogel, daily disposable

Introduction

Eye care professionals (ECPs) play a key role in advising contact lens (CL) wearers about the type of CLs that would best suit their needs. CL wearers have four main concerns regarding CLs: comfort; vision; health; and convenience.¹ These factors can influence the decision as to whether or not people use CLs for vision correction. For example, one of the main reasons for CL failure is that wearers experience dryness or discomfort.^{2,3} Indeed, many studies have shown that these are the two principal reasons for dissatisfaction and the subsequent discontinuation of CLs.^{2,4-8} Although lower discontinuation rates have been reported for silicone hydrogel CLs, discomfort – in particular, end-of-day discomfort – remains the main reason for discontinuation despite

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the advances that have been made in terms of CL material, design, and CL care.^{2,3}

Some types of CLs can destabilize the tear film and increase evaporation, which may contribute to the feeling of dryness for CL wearers.⁹ Wearer discomfort and lens dryness remain the most important factors for individuals discontinuing CLs.³ These symptoms typically occur late in the day when dryness and discomfort symptoms are more prevalent with the CL wearer.¹⁰ Recent improvements, such as the inclusion of moisturizing agents in the lens solution, have increased comfort throughout the day for wearers.¹¹ There remains a challenge with surface hydrophobicity of silicone hydrogel CLs, which may interfere with lens lubricity, vision quality, and wearer comfort.^{12–16} However, increasing the water content of silicone hydrogel CLs can, in turn, reduce the oxygen permeability of the lens.¹⁷ Although some improvements have been made in terms of optimizing features of surface hydrophilicity and lubricity in some silicone hydrogel lenses, there remains a need for a lens that stays lubricious throughout the day to increase comfort and reduce dryness for wearers.¹⁶

Delefilcon A daily disposable water gradient CLs (DAILIES TOTAL1®; Alcon Laboratories, Inc.; Fort Worth, TX, USA) have unique properties at the lens surface when compared with the lens core, resulting in high oxygen transmissibility with a lubricious surface. The CLs are made from delefilcon A, with a water gradient composition from its silicone hydrogel core (33% water) to its ultrasoft surface gel (>80% water), and they provide a low coefficient of friction and superior surface hydrophilic properties compared with other daily disposable CLs.^{18–20} The ultrasoft surface gel is approximately 6 µm thick (10% of the lens thickness), it is highly lubricious, and it is designed to bind water, while not disturbing the high oxygen transmissibility of the core.¹⁹ Lenses with greater surface hydrophilicity, such as delefilcon A daily disposable CLs, may have distinct advantages over other types of soft CLs in that they offer the highest lubricity among all soft hydrogel CLs and, moreover, they retain 100% of their lubricity through to the end of the day, ensuring end-of-day comfort for the wearer.²¹

This paper reports results from a European Product Experience and Clinical Evaluation (PEaCE) survey to evaluate the acceptance of these delefilcon A daily disposable CLs in real-world conditions.

Materials and methods

This was a European survey conducted between November 2011 and April 2012 to assess the patient's experience and overall acceptance of delefilcon A daily disposable CLs and

to determine whether a positive patient experience can change ECP CL preference or anticipated recommendation patterns. Participation was voluntary.

Survey design

ECPs from 16 European countries were invited to fit and dispense up to ten current soft CL users with delefilcon A daily disposable CLs. Each participant who agreed to wear delefilcon A daily disposable CLs completed a baseline questionnaire and then a second questionnaire after 2 weeks of wearing delefilcon A daily disposable CLs. In addition, all ECPs were surveyed at baseline and after fitting between five and ten participants with delefilcon A daily disposable CLs, or at 3 months from the start of the survey (whichever came first). Survey data were omitted if the initial and/or follow-up questionnaires were incomplete. A comparison with other daily disposable or weekly/monthly soft CLs was made based on habitual CL wear.

Survey population

Male and female participants aged ≥ 18 years old and who were current soft CL wearers (as chosen at the discretion of the ECP) were eligible for participation. Participants who voluntarily agreed to complete the survey were current CL wearers who required refractive correction in both eyes (refractive astigmatism ≤ 1.00 D) and who had a CL prescription within the available power range (-0.50 D to -6.00 D in 0.25 D steps). Neophytes were not eligible for participation. Furthermore, participants were not using ocular medications and they had no ocular or systemic disease that was likely to interfere with CL wear.

Survey efficacy variables

ECP attitudes and participant satisfaction with delefilcon A daily disposable CLs were determined using a 5-point scale (responses included: strongly agree; agree; neither agree or disagree; disagree; and strongly disagree) for the participants' level of agreement with the survey statements. The survey statements assessed the participants' experience of wearing delefilcon A daily disposable CLs in terms of dryness or discomfort, end-of-day dryness, perception of wearing the lenses, and all-day comfort and moistness.

Statistical analysis

A standard, unpaired *z*-test for proportions was used to compare participants' responses for their preferences (level of agreement with survey statement) regarding their habitual CL or delefilcon A daily disposable CL, using a two-sided, 5% significance level.

Results

Baseline findings and survey demographics

In this ongoing, real-world survey, a total of 24 ECPs from 16 countries across Europe assessed the use of delefilcon A daily disposable CL among 280 participants. The majority (77%) of participants were female and between 21 years and 39 years old (Table 1). The three most commonly used baseline (habitual) soft CL brands were DAILIES® AquaComfort Plus® (Alcon Laboratories, Inc.), 1-DAY ACUVUE® MOIST® (Johnson & Johnson Visioncare, Jacksonville, FL, USA), and Biofinity (CooperVision, Inc., Pleasanton, CA, USA), each of which was worn by 12% of participants at baseline (Table 2). Nearly two-thirds (62.9%; number [n]=176) of participants reported dryness and/or discomfort with their habitual CLs (Figure 1).

Participant experience after 2 weeks of wearing delefilcon A daily disposable contact lenses

When asked whether participants agreed or disagreed with the statement “My lenses feel dry at the end of the day”, 67.9% (n=190) were in agreement (agreed or strongly agreed)

Table 1 Participant demographics

N=280	n (%)
Male	65 (23.2)
Female	215 (76.8)
Age (years)	
≤20	22 (7.9)
21–29	103 (36.8)
30–39	101 (36.1)
40–49	48 (17.1)
≥50	6 (2.1)
Country	
United Kingdom	39 (13.9)
Finland	36 (12.9)
Denmark	32 (11.4)
Luxembourg	28 (10.0)
Norway	23 (8.2)
Germany	18 (6.4)
Sweden	16 (5.7)
Russia	16 (5.7)
Netherlands	15 (5.4)
Spain	12 (4.3)
Czech Republic	10 (3.4)
Austria	9 (3.2)
Portugal	8 (2.9)
France	8 (2.9)
Switzerland	5 (1.8)
Italy	5 (1.8)

Abbreviations: N, total number; n, sample number.

Table 2 Participant habitual contact lens

Brands	Total %^a
DAILIES® AquaComfort Plus® ^b	12.2
1-DAY ACUVUE® MOIST® ^c	12.2
Biofinity ^d	11.9
FOCUS® DAILIES® All Day Comfort ^b	9.7
AIR OPTIX® AQUA ^b	9.0
ACUVUE® OASYS® ^c	7.2
1-DAY ACUVUE® TruEye® (narafilecon A) ^c	6.8
AIR OPTIX® NIGHT and DAY® ^b	5.0
Activize 1 Day/Proclear 1 Day ^d	2.9
Biomedics 1-Day ^d	2.5
Soflens Daily Disposable ^e	1.8
Preference ^d	1.4
PureVision®	1.4
Avaira ^d	1.4
Frequency 55 ^d	1.4
Others	13.2

Notes: ^aHabitual brand was known for 278 participants; ^bAlcon Laboratories, Inc. Fort Worth, TX, USA; ^cJohnson and Johnson Vision Care, FL, USA; ^dCooperVision, Inc., Pleasanton, CA, USA; ^eBausch and Lomb Incorporated, Rochester, NY, USA.

for their habitual CLs, whereas at the end of 2 weeks of wearing delefilcon A daily disposable CLs, 14.3% (n=40) of participants were in agreement ($P<0.0001$; Figure 2). This was a 78.9% reduction in the proportion of participants who had experienced end-of-day dryness with delefilcon A daily disposable CLs when compared with participants' habitual CLs.

Almost all (97.5%; n=272) participants were in agreement with the statement “My lenses feel like new” after 2 weeks of delefilcon A daily disposable CL wear. Fewer participants thought the same of their habitual CLs (43.9%; n=122; $P<0.0001$; Figure 3). Additionally, 90.4% (n=253) of participants sometimes forgot that they were wearing

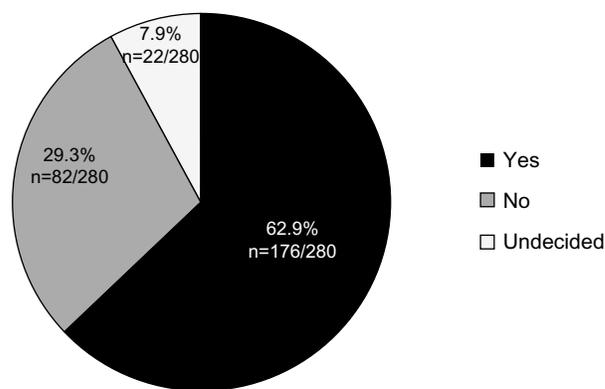


Figure 1 Participant experience of dryness/discomfort at any time with their habitual contact lenses (n=280).

Note: Question: do you experience dryness and/or discomfort while wearing your contact lenses?

Abbreviation: n, number.

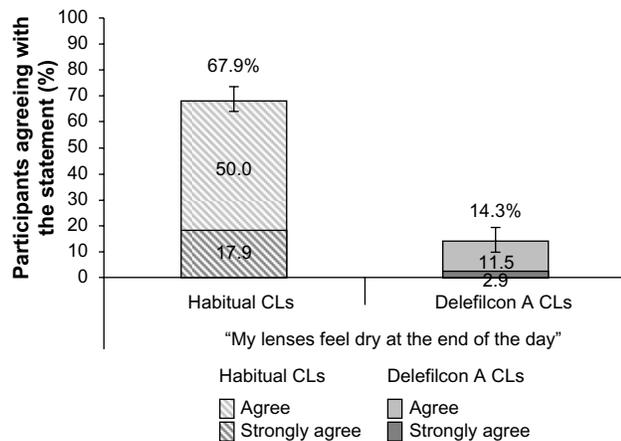


Figure 2 End-of-day lens dryness after 2 weeks with delefilcon A water gradient CLs compared with habitual CLs (n=280).

Notes: $P < 0.0001$ for habitual CLs versus delefilcon A CLs. Other responses to the statement "These lenses feel dry at end of the day" for habitual CLs and after 2 weeks with delefilcon A were, respectively: undecided, 10.7% and 9.0%; disagree, 17.9% and 46.6%; and strongly disagree, 3.6% and 30.1%. Error bars represent the 95% confidence intervals.

Abbreviations: CL, contact lens; n, number.

delefilcon A daily disposable CLs, whereas 51.8% (n=145) of participants sometimes forgot they were wearing their habitual CLs ($P < 0.0001$; Figure 3).

A total of 58.2% (n=163) of participants were in agreement with the statement "I can comfortably wear my/these lenses all day long" with their habitual CLs ($P < 0.0001$; Figure 4).

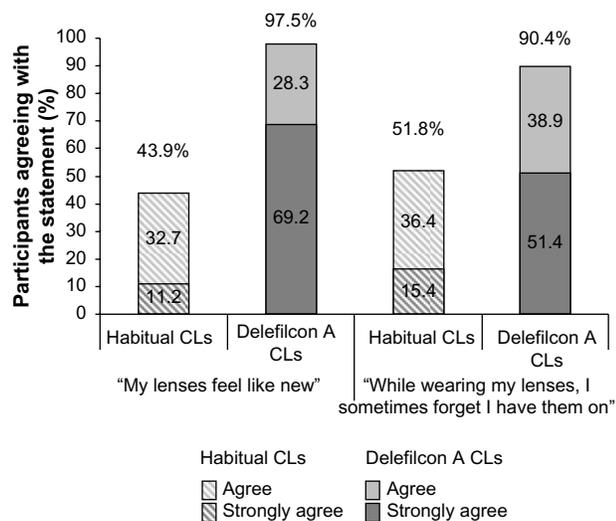


Figure 3 Perception of lenses after 2 weeks with delefilcon A water gradient CLs compared with habitual CLs (n=280).

Notes: $P < 0.0001$ for habitual CLs versus delefilcon A CLs for participants' agreement with both statements. Other responses to the statement "My lenses feel like new" for habitual CLs and after 2 weeks with delefilcon A were, respectively: undecided, 21.9% and 2.2%; disagree, 30.9% and 0.4%; and strongly disagree, 3.2% and 0.0%. Other responses to the statement "While wearing my lenses, I sometimes forget I have them on" for habitual CLs and after 2 weeks with delefilcon A were, respectively: undecided, 11.1% and 5.4%; disagree, 30.0% and 3.2%; and strongly disagree, 7.1% and 1.1%. Error bars represent 95% confidence intervals.

Abbreviations: CL, contact lens; n, number.

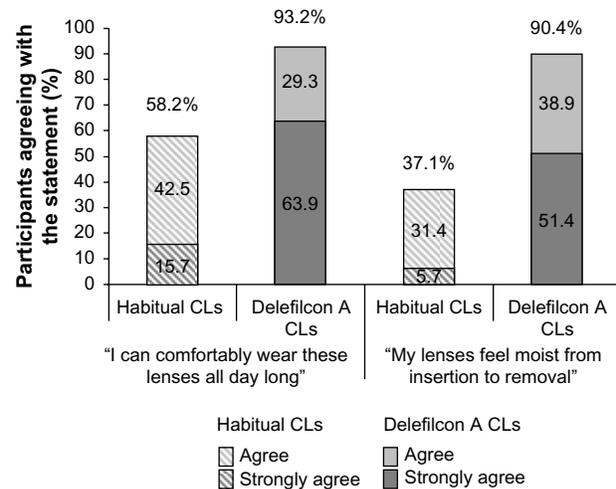


Figure 4 Participant experiences of all-day comfort and moistness with delefilcon A water gradient CLs compared with habitual CLs (n=280).

Notes: $P < 0.0001$ for habitual CLs versus delefilcon A CLs for participants' agreement with both statements. Other responses to the statement "I can comfortably wear these lenses all day long" for habitual CLs and after 2 weeks with delefilcon A were, respectively: undecided, 11.1% and 3.2%; disagree, 26.4% and 3.2%; and strongly disagree, 4.3% and 0.4%. Other responses to the statement "My lenses feel moist from insertion to removal" for habitual CLs and after 2 weeks with delefilcon A were, respectively: undecided, 16.4% and 4.6%; disagree, 40.0% and 4.6%; and strongly disagree, 6.4% and 0.4%. Error bars represent 95% confidence intervals.

Abbreviations: CL, contact lens; n, number.

After 2 weeks of wearing delefilcon A daily disposable CLs, 93.2% (n=261) of participants were in agreement with the same statement. This was a 60.1% increase in the proportion of participants who were in agreement with this statement for delefilcon A daily disposable CLs versus habitual CLs. In addition, 37.1% (n=104) of participants were in agreement with the statement "My lenses feel moist from insertion to removal" with their habitual CLs compared with 90.4% (n=253) of participants after 2 weeks of delefilcon A daily disposable CL use ($P < 0.0001$; Figure 4). This was a 143.3% increase in the proportion of participants who reported that their lenses are moist until removal with delefilcon A daily disposable CLs.

For habitual CLs, a total of 63.8% (n=178) of participants were in agreement with the statement "My vision is clear at the end of the day", whereas at the end of 2 weeks of wearing delefilcon A daily disposable CLs, 93.2% (n=261) of participants were in agreement with the statement ($P < 0.0001$; Figure 5). This represented a 46.6% increase in the proportion of participants who had clear vision until the end of the day. Furthermore, nearly twice as many participants agreed with the statement "My lenses feel comfortable at the end of the day" when using delefilcon A daily disposable CLs compared with habitual CLs (45.0% [n=126] versus 85.3% [n=238], respectively) – this was an increase of 88.9% in the

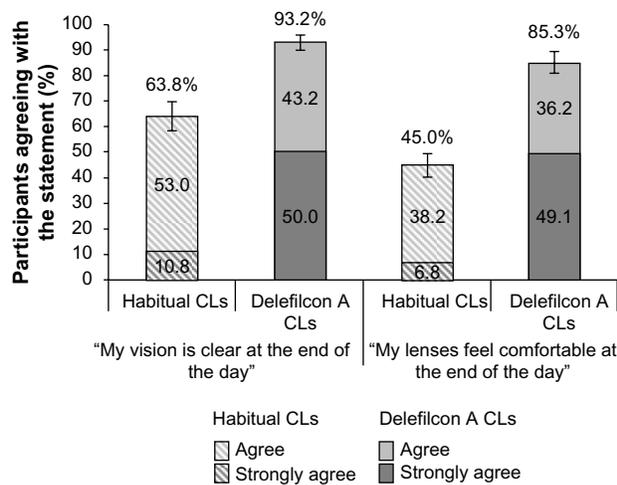


Figure 5 Participant end-of-day vision and comfort with delefilcon A water gradient CLs compared with habitual CLs (n=280).
Notes: $P < 0.0001$ for habitual CLs versus delefilcon A CLs for participants' agreement with both statements. Other responses to the statement "My vision is clear at the end of the day" for habitual CLs and after 2 weeks with delefilcon A were, respectively: undecided, 11.5% and 2.9%; disagree, 20.8% and 2.1%; and strongly disagree, 3.9% and 1.8%. Other responses to the statement "My lenses feel comfortable at the end of the day" for habitual CLs and after 2 weeks with delefilcon A were, respectively: undecided, 15.4% and 9.0%; disagree, 32.5% and 4.7%; and strongly disagree, 7.1% and 1.1%. Error bars represent 95% confidence intervals.
Abbreviations: CL, contact lens; n, number.

proportion of participants who agreed with the "end-of-day comfort" statement ($P < 0.0001$; Figure 5).

In response to the question "Did you feel a 'wow' experience when first inserting DAILIES TOTAL1® contact lenses?", 67.9% (n=190) of participants answered "yes", 17.9% (n=50) answered "no", and 14.3% (n=40) were undecided.

Overall, 81.8% (n=229) of participants agreed with the statement "I prefer these lenses to my previous contact lenses", with 56.8% (n=159) of participants strongly agreeing that they preferred delefilcon A daily disposable CLs. Moreover, the majority (78.9%, n=221) of participants were interested in purchasing delefilcon A daily disposable CLs, with 5.4% (n=15) of participants not interested and 15.7% (n=44) undecided.

Eye care professionals' ratings of delefilcon A daily disposable contact lenses

All (100%; n=24) ECPs were in agreement that the perceived comfort with delefilcon A daily disposable CLs is better than that with other daily disposable lenses (Figure 6). Nearly 80% of the ECPs (n=19) were in agreement that their patients' vision with delefilcon A daily disposable CLs was better than that with other daily disposable CLs. Moreover, 95.8% (n=23) agreed that delefilcon A daily disposable

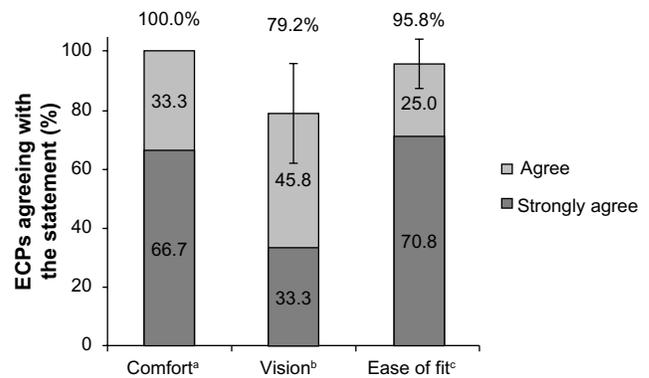


Figure 6 Delefilcon A CLs are highly rated by ECPs for comfort, vision, and fit (n=24).
Notes: ECPs were asked whether they agreed or disagreed with the following statements: ^a"The comfort with DAILIES TOTAL1® (Alcon Laboratories, Inc., Fort Worth, TX, USA) contact lenses is better than with other daily disposable lenses"; ^b"The vision with DAILIES TOTAL1® contact lenses is better than with other daily disposable lenses." Other responses were: undecided, 20.8%. ^c"DAILIES TOTAL1® spherical contact lenses are easy to fit." Other responses were: undecided, 4.2%. Error bars represent the 95% confidence intervals.
Abbreviations: CL, contact lens; ECP, eye care professional; n, number.

CLs were easy to fit, and the same proportion preferred to fit delefilcon A daily disposable CLs over other daily disposable CLs.

All ECPs (100%; n=24) stated that they would recommend delefilcon A daily disposable CLs to colleagues and that the lenses would be a welcome addition to their business. Furthermore, all of the ECPs felt that delefilcon A daily disposable CLs represented a significant advancement in soft CLs and that the technology behind the delefilcon A daily disposable CLs results in excellent clinical performance. The majority (87.5%; n=21) of ECPs agreed with the statement "After explaining the higher oxygen benefits of DAILIES TOTAL1® contact lenses, I feel my previous traditional hydrogel (HEMA) daily disposable lens wearers are willing to pay more for these lenses." Only 4.2% (n=1) disagreed with this statement, and 8.4% (n=2) were undecided. After participating in the survey in which they fitted participants with delefilcon A daily disposable CLs, 95.8% of ECPs said their preferred daily disposable CL was delefilcon A water gradient CLs. Pre-evaluation, the most popular daily disposable CLs were 1-day ACUVUE® MOIST® (33.3%), 1-day ACUVUE® TruEye® (narafilcon A; Johnson & Johnson Vision Care; 29.2%), DAILIES® AquaComfort Plus® (25.0%), Proclear 1-Day (CooperVision, Inc.; 8.3%), and Focus® DAILIES® All Day Comfort (Alcon Laboratories, Inc.; 4.2%).

Discussion

Overall, participants favored delefilcon A daily disposable CLs when compared with their previous habitual CLs. This survey of delefilcon A daily disposable water gradient CLs

shows that the majority of participants perceived that they had improved comfort and vision and less dryness compared with their habitual CLs. More participants agreed that they could wear delectilcon A daily disposable CLs comfortably all day long when compared with their habitual CLs. In addition, more participants perceived that they had improved clear vision that lasted until the end of the day with delectilcon A daily disposable CLs compared with habitual CLs. The initial impression of participants when they first used delectilcon A daily disposable CLs was generally positive. When assessing the participants' response to their habitual CLs feeling like new, it should be noted that some of them wore monthly replacement CLs as their habitual CLs, thereby influencing the comparison with delectilcon A daily disposable CLs. Participants reported a high purchase intent for delectilcon A daily disposable CLs, suggesting a high level of satisfaction among wearers.

The ECPs who completed the survey were also favorable towards delectilcon A daily disposable CLs, agreeing that perceived comfort and vision were better with delectilcon A daily disposable CLs than other daily disposable CLs. Furthermore, the ECPs felt delectilcon A daily disposable CLs were a welcome addition to their practice, that they were a significant advancement in technology, and that they were easy to fit; moreover, the ECPs preferred delectilcon A daily disposable CLs to other daily disposable CLs. All ECPs would recommend delectilcon A daily disposable CLs to their colleagues.

The results of our survey, which suggests that there is a strong wearer preference for delectilcon A daily disposable CLs compared with other soft hydrogel CLs, complement the results of other studies investigating delectilcon A daily disposable CLs. In one study, delectilcon A daily disposable CLs exhibited the least amount of impact on ocular physiology and the least amount of change in lens surface appearance after 8 hours of wear when compared with two other daily disposable silicone hydrogel CLs.²² In another study involving participants classified as being symptomatic for end-of-day dryness, delectilcon A daily disposable CLs had higher comfort ratings than other available daily disposable silicone hydrogel CLs.¹⁶ Long-term studies assessing wearer comfort, vision, and fit with delectilcon A daily disposable CLs are required to see whether the positive experience participants had in the short term is confirmed.

Similar surveys are currently underway in the United States and Canada, and data from these will be presented once they have been completed. As such, the results reported here provide a perspective on European CL wearers only;

however, the survey reports real-world evidence, giving a good indication of both participant and ECP preference for delectilcon A daily disposable CLs over other types of soft CLs. It should also be noted that survey methods are not typically as robust as randomized controlled trials for the purposes of differentiating specific attributes. The participants in the current survey were recruited from the ECPs' presenting population at the discretion of the ECPs and, therefore, were not randomized or stratified, as is the case in randomized controlled trials. Participants may have also responded positively towards not needing any lens care products for daily disposable CLs. Moreover, as delectilcon A daily disposable CLs have been designed with innovative, high-performance technology, a subject-expectancy effect may have been introduced. For example, participants who were hoping for an improvement, such as the 62.9% of wearers in this survey who reported dryness or discomfort with their habitual CLs, may have responded positively to something new. Importantly, the results from this survey are consistent with and complement the well-controlled clinical study results,^{16,21,22} suggesting that any positive bias towards delectilcon A daily disposable CLs has not had a large impact on the results. The study by Varikooty et al¹⁶ assessed patients' subjective comfort for three different silicone hydrogel daily disposable CLs and showed that delectilcon A CLs had the highest mean end-of-day comfort score. It would be of interest to conduct a similar survey with wearers who were asymptomatic or with soft CL neophytes.

While ECPs are interested in new technology, the shift in the "most preferred" CL can only be explained by a distinctly positive experience in participants' responses to delectilcon A daily disposable CLs. When results of a survey return very large differences, the credibility of the survey is enhanced. This was the case with the current survey, in which very large shifts occurred in both participants' and ECPs' responses, with results at or near 100% agreement in many instances.

In conclusion, delectilcon A daily disposable water gradient CLs give exceptional customer satisfaction, offering wearers greater comfort when compared with their habitual CLs. In addition, delectilcon A daily disposable CLs appear to increase end-of-day comfort for wearers.

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Disclosure

Inma Pérez-Gómez and Tim Giles are employees of Alcon. The authors report no other conflicts of interest in this work.

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