

Fitting MyDay into practice

Across Europe, the benefits of silicone hydrogel materials are widely recognised by eye care practitioners and they have become the materials of choice when fitting reusable contact lenses. Silicone hydrogels now represent 74 per cent of the reusable soft contact lens market in Europe.¹

However, despite being widely available for over five years, the growth of daily disposable silicone hydrogels has been limited, with silicone hydrogels representing a smaller percentage of the daily disposable contact lens market compared to the proportion of silicone hydrogels in the reusable segment (Figure 1).

So what would it take for daily disposables to replicate the success of silicone hydrogel reusable lenses? If we take a look back in history, growth in the silicone hydrogel reusable lens segment was relatively slow in the first five years following the introduction of the first-generation silicone hydrogel materials (Figure 2).

Various reasons have been put forward to account for this limited growth, including compromised comfort due to mechanical properties of early silicone hydrogels,² higher costs and a lack of appreciable benefits.

During the first five years of daily disposable silicone hydrogels, growth in uptake appeared remarkably similar to the first five years of reusable silicone hydrogels

Dimple Shah, Dr Paul Richardson and Dr Jose Vega introduce CooperVision's new daily disposable silicone hydrogel contact lens, MyDay, featuring a unique chemistry of silicone channels

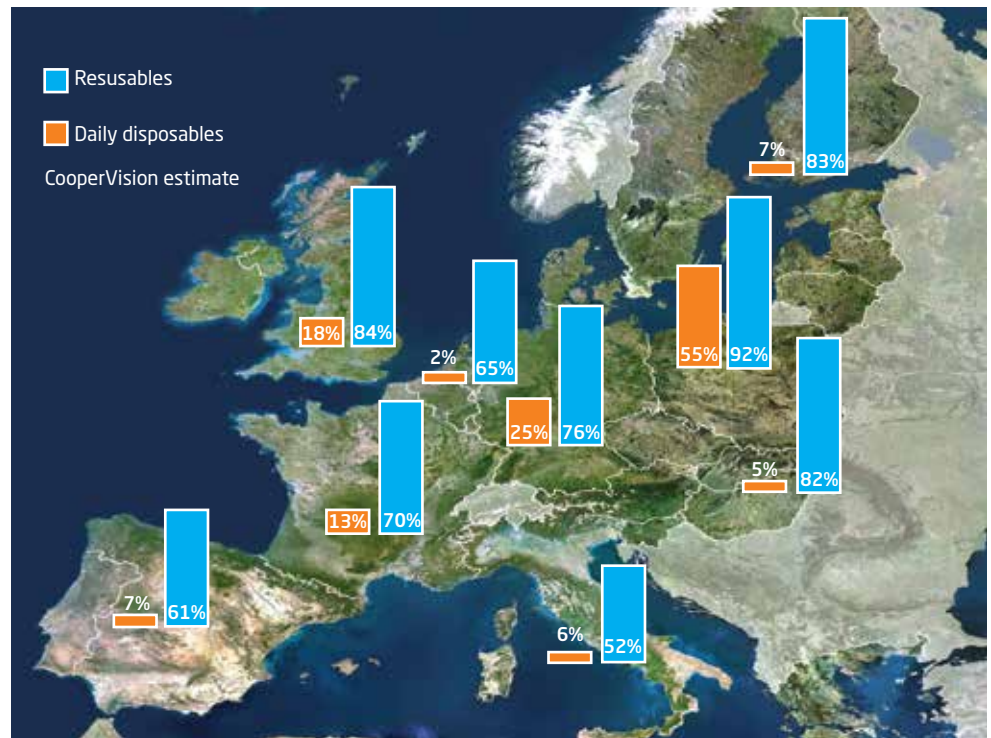


Figure 1 The percentage value of silicone hydrogel lenses within reusable and daily disposable segments¹

(Figure 2). Could the same factors be responsible? And, if so, would a next-generation daily disposable silicone hydrogel, without these barriers to wider acceptance, help replicate the success of reusable silicone hydrogels?

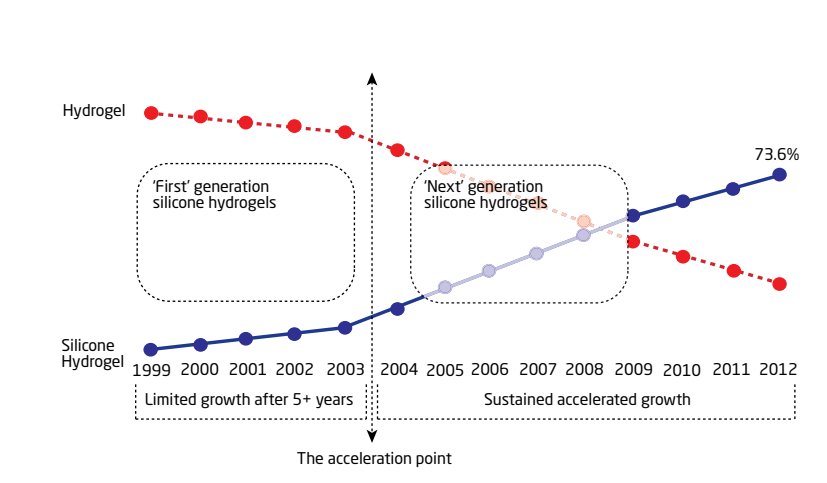


Figure 2 Percentage of hydrogels versus silicone hydrogels in the reusable segment from 1999 to 2012 (total EU value)

Material	Stenfilcon A
Water content	54%
Base curve	8.4mm
Diameter	14.2mm
Sphere powers	+6.00D to -10.00D* (0.25D steps to -6.00D and 0.50D steps to -10.00; 0.25D steps to +5.00D and 0.50 steps to +6.00D)
Centre thickness	0.08mm
Dk	80
Dk/t	100
UV filter	UVA: 85%, UVB: 96%
Edge thickness	0.07mm
Edge design	Rounded edge
Modulus	0.4 MPa
Handling tint	Light blue

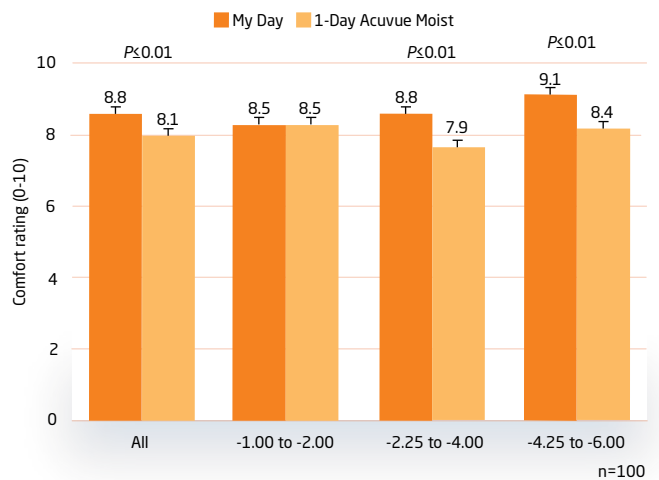
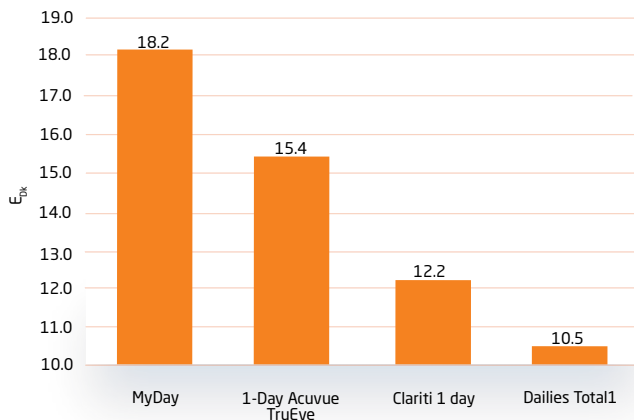


Figure 3 Effective Dk of silicone hydrogel daily disposable contact lenses

Figure 4 Mean comfort ratings after two weeks of use

Technical features

CooperVision's MyDay is a new daily disposable silicone hydrogel lens designed to address the patient's need for health, comfort and ease of handling. The technical properties of the lens are summarised in Table 1.

The MyDay material, stenfilcon A, features a silicone chemistry that has a long silicone backbone with hydrophilic side chains. The resulting network of silicon-rich channels, at a nanometer-size scale that does not impact clarity, is effective at transporting oxygen through the lens. As a result, less silicon is needed to achieve the desired oxygen permeability which allows the lens to be optimised for other properties, including low modulus and high water content. The efficient silicone network permits the use of increased hydrophilic materials, resulting in a lens that is more hydrogel-like and naturally wettable.

The silicone chemistry optimises the performance of the lens for the daily disposable wearer. It incorporates an oxygen transmissibility level ($Dk/t=100$ at $-3.00D$) which is more than double the goal for a daily wear lens,³

and a high water content (54 per cent) which contributes to excellent surface wettability and a softer lens. These properties are combined with a low modulus (0.4MPa), the lowest for any daily disposable silicone hydrogel, for a hydrogel-like wearing experience while maintaining the ease of handling of a silicone hydrogel lens. The result is an optimal balance in performance which can also help in the transition from a hydrogel material to a silicone hydrogel.

Effective Dk

In order to characterise the effectiveness of different silicone chemistries on silicon's contributions to Dk, the parameter Effective Dk (E_{DK}) can be used, where E_{DK} is the ratio of Dk to the percentage silicon content (Si) in a wet lens. E_{DK} is an index quantifying how effectively oxygen is transported through a silicone hydrogel, based on silicon and water contents.

In Table 2, the E_{DK} of four daily disposable silicone hydrogel lenses with different silicone chemistries has been evaluated. MyDay has the highest E_{DK} in this study, with a value

of 18.2 ± 0.4 . Compared to Clariti, for example, which has an E_{DK} of 12.2 ± 0.1 , MyDay contains 4.4 per cent silicon and achieves a $Dk=80$, whereas Clariti has 4.9 per cent silicon and a lower Dk of 60. Published values of Dk and water content are used in the calculation. Figure 3 shows the E_{DK} of the four lens types diagrammatically for comparison.

Clinical performance

To evaluate the clinical performance of MyDay, a multi-centre study was conducted at six sites in the UK among 100 subjects. This was a four-week, randomised, bilateral, double-masked, cross-over evaluation with subjects wearing MyDay and 1-Day Acuvue Moist for two weeks each. 1-Day Acuvue Moist (etafilcon A, Johnson & Johnson Vision Care) is the current market-leading daily disposable in Europe.¹

Subjects were adapted soft lens wearers with spherical distance contact lens prescription from -1.00 to $-6.00D$ using a variety of lens brands. They were instructed to wear the lenses on a daily wear disposable basis (≥ 40 hours per week) until each two-week follow-up appointment. Of the 100 subjects enrolled, all were dispensed lenses and all completed the study.

Comfort

The mean ratings for overall comfort at two weeks' follow-up (Figure 4) were significantly higher for MyDay compared to 1-Day Acuvue Moist (8.8 vs 8.1, $P < 0.01$).

For practitioners, average or mean ratings do not reflect the way they observe product performance in practice. In reality, practitioners form an opinion on the product's

TABLE 2

Evaluation of the different silicone chemistries

Lens type	Si (%)	Dk (Barrers)	WC (%)	Modulus* MPa	E_{DK}
MyDay	4.4±0.1	80	54	0.4	18.2±0.4
1-Day Acuvue TruEye	6.5±0.1	100	46	0.7	15.4±0.2
Clariti 1 day	4.9±0.0	60	56	0.5	12.2±0.1
Dailies Total1	13.3±0.1	140	33	0.7	10.5±0.1

* Measured at $-3.00D$



Contact Lens Monthly

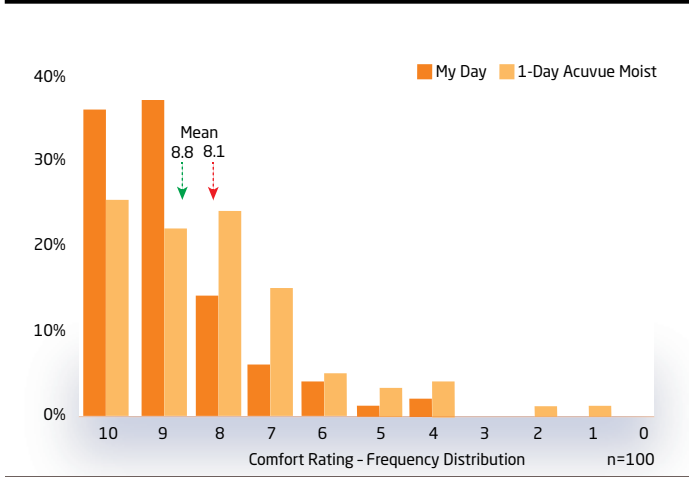


Figure 5 Frequency distribution of comfort ratings after two weeks of use

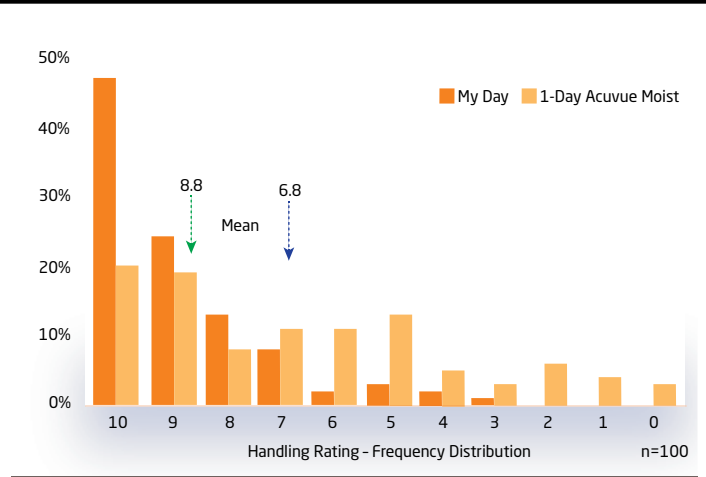


Figure 6 Frequency distribution of handling ratings after two weeks of use

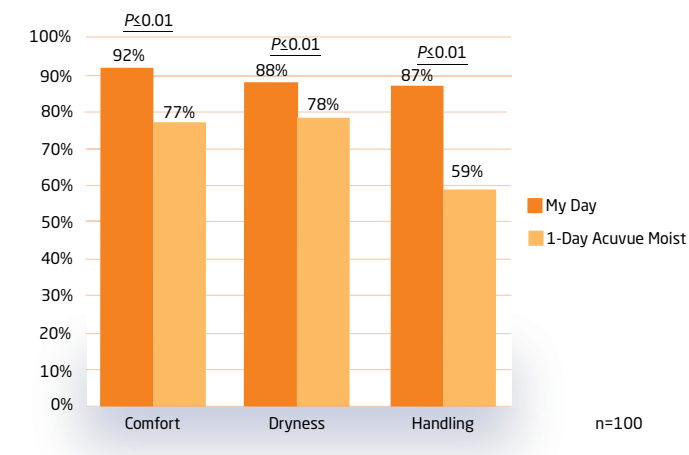


Figure 7 Subjective satisfaction after two weeks of use

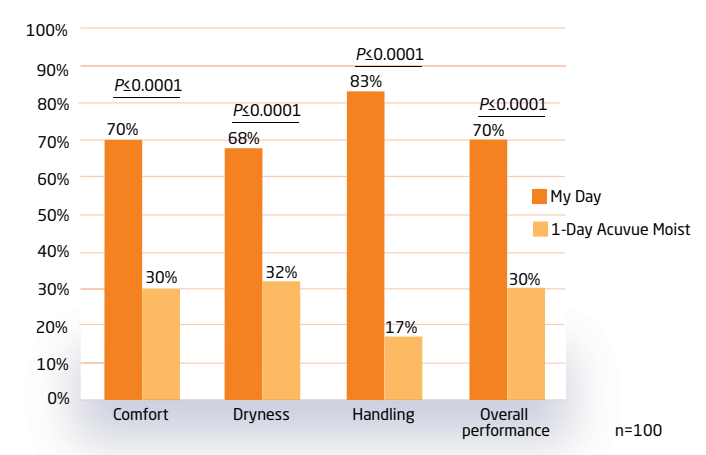


Figure 8 Subjective lens preference after two weeks of use

performance based on the frequency of happy patients versus unhappy patients. Figure 5 shows the same data in a more meaningful way and demonstrates that 73 per cent of subjects rated MyDay at 9 or 10 out of 10 for comfort.

Comfort assessed by SMS text messaging at four time points (8.00, 12.00, 16.00 and 20.00h) on three separate days (Days 3, 7 and 13) confirmed that mean scores were higher with MyDay at each assessment and, in most cases, the differences were statistically significant.

Dryness

The mean ratings for overall dryness at follow-up were significantly better for MyDay versus 1-Day Acuvue Moist (8.5 vs 8.1, $P \leq 0.013$). The proportion of subjects reporting being 'completely' or 'somewhat satisfied' with respect to dryness was also higher for MyDay (88 per cent vs 78 per cent, $P = 0.0004$). Dryness assessed by SMS text messaging at three time points (12.00, 16.00 and 20.00h) on three separate

days confirmed that mean ratings were similar on Day 3 for the two lens types; however, on Days 7 and 13, MyDay was rated significantly better than 1-Day Acuvue Moist for each assessment.

Handling

Figure 6 shows that handling with MyDay was rated significantly higher than with 1-Day Acuvue Moist (8.8 vs 6.8, $P < 0.0001$).

Satisfaction and preference

After two weeks of wear a significantly higher proportion of subjects were 'completely' or 'somewhat' satisfied with MyDay than with 1-Day Acuvue Moist for comfort, dryness, and handling ($P \leq 0.001$, Figure 7).

Subjects were also questioned at the final visit about their preferences with respect to comfort, dryness, handling and overall performance. In each case, a significantly higher proportion of subjects expressed a preference for MyDay versus 1-Day

Acuvue Moist ($P \leq 0.0001$). In four out of the four lens performance measures subjects preferred MyDay lenses compared to 1-Day Acuvue Moist lenses (Figure 8).

Anterior eye ocular health response

For slit-lamp findings, at the two-week visit MyDay lens-wearing eyes showed significantly less limbal hyperaemia. The frequency of eyes showing grade 0 redness was significantly higher with MyDay compared to 1-Day Acuvue Moist for limbal hyperaemia (72.5 per cent vs 61.5 per cent, $P = 0.025$). These findings confirm the excellent ocular physiological response provided by the high oxygen transmissibility of the MyDay lenses.

Discussion

The MyDay lens shows excellent performance among existing contact lens wearers. Overall comfort is significantly better with MyDay than with the market-leading daily



disposable, 1-Day Acuvue Moist. Comfort is also better at different time points during the day. MyDay's high water content and natural surface wettability help maintain a comfortable lens-wearing experience that lasts through the day and enhances lens movement on the eye, which is important for a comfortable fit and optimal tear exchange. MyDay also performs better for dryness, a key symptom of contact lens discomfort.⁴

Handling with the MyDay lenses is significantly better than with 1-Day Acuvue Moist. With the lowest modulus of any daily disposable silicone hydrogel lens, MyDay offers the softness of a hydrogel but with the handling of a silicone hydrogel lens. These properties help provide easy adaptation and successful upgrading, especially from a hydrogel to a silicone hydrogel lens.

MyDay also contributes to less eye redness than 1-Day Acuvue Moist resulting in whiter looking eyes, a sign easily visible and demonstrated to the patient. High oxygen transmissibility is known to be associated with lower levels of induced limbal hyperaemia.⁵ MyDay's Dk/t of 100 offers more

than double the transmissibility goal for a daily wear lens.³

Satisfaction ratings are also higher with MyDay and wearers prefer the lens to 1-Day Acuvue Moist for comfort, dryness, handling and overall performance. Appreciable differences in these important features can again help in upgrading wearers to a lens with better ocular response.

Conclusion

The MyDay lens marks a next generation of daily disposable silicone hydrogel lenses with the potential to replicate the success of silicone hydrogel reusable lenses in the daily disposable sector, through appreciable differences in performance, including comfort.

The silicone chemistry has enabled the creation of optimally balanced properties of high oxygen transmissibility, high water content and a naturally wettable surface as well as a low modulus. These features, along with UV protection, all at an affordable price and available in a wide parameter range, are important to meet the patient's need for health, comfort and ease of handling. Eye care practitioners can now be

confident of successfully upgrading their hydrogel-wearing patients as well as introducing contact lenses to new wearers. ●

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