

# Synergy between pure comfort and successful lens design

**Jonathan Walker** looks at the latest contact lens in the CooperVision portfolio, the combination of a well-established toric design with a high-tech silicone hydrogel material

**W**ith the advent of silicone hydrogel soft contact lenses came the inevitable progression into other lens designs, primarily torics and eventually multifocals. So CooperVision, which is the biggest manufacturer of hydrogel toric contact lenses in the world, decided to develop its own silicone hydrogel toric too (Figure 1). It was important for the company to ensure it encapsulated the new high-tech silicone hydrogel material that it had developed and used in Biofinity, with the well established and successful design of the Biomedics Toric.

CooperVision had already started to develop its expertise in silicone hydrogel materials when the merger with Ocular Sciences Inc (OSI) took place in 2004. Four years previously OSI had entered into a joint research and development agreement with a Japanese company called Asahikasei Aime. So with the new research and development facility at Pleasanton, California and under the watchful eye of director Dr Arthur Back, the scientists set out to turn these early material developments into a marketable lens.

In 2006 after much research and numerous prototypes, CooperVision launched Biofinity. Known also by its generic name of comfilcon A, this material was a complete departure from previous silicone hydrogel materials. The first generation silicone hydrogels had to be surface-treated to avoid the discomfort caused by the hydrophobic monomer silicone being active on the surface of the lens. To avoid this scenario the next generation of silicone hydrogels had an internal wetting agent within them such as polyvinylpyrrolidone (PVP), this negated the need for surface treatments. In 2006 Biofinity was launched without either of the restrictions of the previous

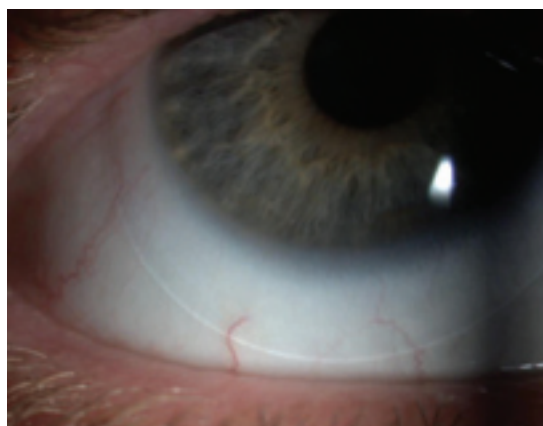


**Figure 1** Correction for astigmats

generations. This latest generation of silicone hydrogels bucked the trend of previous silicone hydrogels by having a different correlation between water content and oxygen permeability (Dk).

Soft toric lenses have to be ballasted to prevent the nasal orientation that all soft lenses make, this ballasting by its very nature will make the lens thicker at some point on the lens. So, once increased thickness is involved, the oxygen transmissibility (Dk/t) of all lenses will decrease in the area of the ballast, thus in turn can induce potential changes within the cornea.

So the age-old question has to be asked, how much oxygen does the cornea require? That question was answered some 10 years ago now with the work of Harvitt and Bonanno.



**Figure 2** High Dk is known to be related to reduced redness

Through the use of fluorophotometry, they demonstrated that there was a relationship between the pH of the stroma, and the oxygen transmissibility of the lens on the surface of the cornea. They showed that the lower the Dk/t the more acidic the stroma became. So in daily wear, to avoid the stroma becoming acidic requires a lens with a Dk/t of 35.

Unfortunately most of the conventional hydrogels do not achieve this level of oxygenation, and can lead on to chronic hypoxic changes in the cornea. Additionally to the hypoxic changes in the cornea is limbal hyperaemia. This has been shown by Papas to be directly related to hypoxic conditions which are exacerbated with time, to a point whereby the patient notices their eyes go red in the evenings. Because of the high Dk of Biofinity, patients often comment about how white their eyes appear, even late in the evening (Figure 2).

The Biofinity material comfilcon A, has a Dk value of  $128 \times 10^{-11}$ , so even at the prism ballast, where the thickest point on the lens can be found, the Dk/t only drops to  $44 \times 10^{-9}$  but that is still well above the Harvitt & Bonanno criteria for daily wear of  $35 \times 10^{-9}$ . The combination of Biofinity having the highest Dk value of all the currently available silicone hydrogel torics, and coupled with the extensive power range from -8.00 to +6.00 in 4 cyls around the clock in  $10^\circ$  steps, makes it a useful option for correction of astigmats.

## Comfort factors

The oxygen permeability and comfort properties of Biofinity are attributable to a new material technology called Aquaform. This allowed the scientists at CooperVision's research and development facility in California to develop a lens that was neither surface treated nor needed an internal wetting

agent. This was achieved by the use of long silicone chains in a highly hydrophilic material.

The Biofinity material with Aquaform technology has a low modulus of elasticity which is an important property if maximum comfort is to be achieved. There has been a great deal of debate with regard to the modulus of elasticity (stiffness) and comfort, and there is little doubt that a high modulus of elasticity is associated with reduced comfort. We all remember the initial discomfort of an RGP lens, so it is little surprise that a stiffer material increases discomfort. We must remember that a contact lens and the upper lid form a dynamic situation, where the upper lid is constantly sliding over the lens surface. Any resistance to this movement will detract from the overall comfort. This resistance to the movement is measured by the coefficient of friction, and along with other properties is shown in Table 1.

Biofinity has a comparable low coefficient of friction which is another important factor in the comfort area. Another, but very important, property that is frequently overlooked is the edge. Biofinity boasts a consistent edge that is not only well rounded but positioned slightly posteriorly to the centre. Finally, as practitioners we believe intuitively that wettability is directly linked with on-eye performance of a contact lens. Unfortunately there are numerous clinical signs to consider when assessing the stability of the patient's tear film on the surface of the contact lens. Primarily we want a material to maintain the tear film for as long as possible between blinks. Scientists at CooperVision use diffuse illumination to compare the wettability of different materials, a technique that is very easy to adopt in the consulting room (Figure 3).

## The design

The patent literature has numerous toric designs, many having good merits and were very successful with the previous generation of hydrogels. As mentioned previously the material properties of silicone hydrogels such as Biofinity are quite different and thus need adjusting to acquire the optimum performance. The Biomedics Toric, which was initially developed in conjunction with the Institute of Eye Research in Australia, has been successfully fitted to patients all over the world for almost 10 years now. So why change? CooperVision asked the R&D team at Pleasanton to marry the highly successful Biofinity material with the trusted design of the Biomedics Toric.

As was previously stated, all soft



**Figure 3** What do we look for?

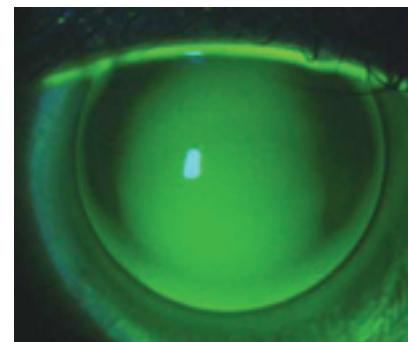
- Reflex from anterior lens surface
- Tear film appearance (smooth, grainy, thin)
- Stability of the tear film
- Surface dry spots before and after blink

toric lenses require ballasting. The Biomedics Toric is no exception to this and the design incorporates a horizontal ISO thickness profile to ensure that there are no inconsistencies within the thickness values, and that it remains the same throughout the wide ballast area. When the patient blinks, the upper lid traverses down across the lens surface. If there is any variation in thickness, then the upper lid will not traverse in a reproducible fashion, causing a rotational effect upon the lens and causing it to mislocate. This rotational effect will push the lens off axis with the expected loss of vision. This lens-lid interaction is the key feature of the Biomedics design which has now been incorporated into the new Biofinity Toric. In addition, a slightly larger optical zone has been added to the design to enhance vision even further.

## Fitting the Biofinity Toric

On the eye the Biofinity Toric looks a little tighter than the Biomedics Toric and this is due to the Biofinity Toric effectively fitting a little tighter than other lenses out of the family such as Biofinity Sphere. This is borne out by the fact that the sagittal depth of the Biofinity Toric is 12 per cent larger than Biofinity sphere.

To fit the Biofinity Toric the first thing that is required is an up-to-date spectacle prescription. Once that has been obtained it must be converted, with the use of a back vertex chart,



**Figure 4** Toric corneas used to be the province of rigid lenses only

back to the ocular refraction. This is a very important step, particularly for prescriptions over -4.00. Medium to high prescriptions must be carefully transposed back to the ocular refraction as quite often it is the cylinder power that needs to be reduced. -6.50/-1.25 x 180 once corrected for back vertex distance may have a cylinder power of just -0.75. Keratometry readings could be taken at this point, and while they may not influence the first choice of lens, they are useful for future aftercare appointments.

The Biofinity Toric has 8.7mm base curve and the customary 14.5mm overall diameter. Care should be taken to ensure that the lens is completely settled before checking and, in the author's experience, there is still value in sending patients out on a contact lens trial. On the patient's return, careful notes are made of the position of the laser marking as any mislocation must be incorporated into the final prescription, and the final lenses can now be ordered.

The power range is from -8.00 to +6.00 in four cyls around the clock in 10° steps. Practitioners also have the option of just using one Biofinity Toric in one eye, while the other can wear a Biofinity sphere. Patients, rarely if ever will notice any difference in comfort between these two lenses, but will often benefit from the improved vision of correcting a dominant eye with a Biofinity Toric, especially with the small -0.75 cyls.

## Avoiding the dropout!

Graeme Young showed us over six

**TABLE 1**  
Biofinity (Comfilcon A)

Water content	48%
Oxygen permeability	128 x 10 <sup>-11</sup>
Modulus (MPa)	0.75
Coefficient friction	0.015
Surface treatment	None
FDA classification	Group 1

years ago that astigmats represent a disproportionate group in a multi-centre study of discontinued contact lens wearers. So why is there such a high proportion of astigmats among discontinued patients? Young's work highlighted the anomaly that 44 per cent of our patients are astigmats, but only 22 per cent of all soft lens fits are with torics. Over the last three of four years the majority of lens manufacturers have added a -0.75 cyl to their ranges. This now means that the low astigmat, who previously would have worn a spherical lens in the belief that it will correct his astigmatism, can now wear a toric cylinder to correct these low amounts of astigmatism and enhance close work. Another reason Young gave for the low number of toric wearers is lens discomfort. Improved materials should help address this. It should be remembered that all dropouts were once asymptomatic. So attention should always be given to patients with uncorrected low cylinders and wearing old hydrogel materials; just because they are asymptomatic doesn't mean you should not attempt to refit them to avoid problems appearing in the future.

### Grow your contact lens practice

With the use of modern electronic communications, patients are more aware than ever of the choice they have not only in their contact lenses but additionally the practitioners who can supply them. From Facebook to Twitter, they openly talk about their lenses to each other, and when they don't understand, they just 'Google it'. Today's patients are better informed than ever before, and the astute practitioner will take advantage of this by keeping them informed of the latest developments in materials and designs.

Biofinity is part of a new generation of silicone hydrogel lenses without any surface treatments or additives. It has a very high oxygen permeability which allows flexible wear (Biofinity has now been given a seven day/six night licence by the FDA for extended wear).

Biofinity will have an exhaustive power range, giving the practitioner confidence that they will not be caught out with the lens that they require being out of range. Now, with the launch of Biofinity Toric, comes a great opportunity to upgrade existing toric wearers and correct those patients with low 0.75 cyls, even when they are oblique. ●

● Jonathan Walker is global professional services consultant to CooperVision



## Sing-along-a-CIBA

It's Thursday so it must be London. As the first of the contact lens industry's 2009 roadshows came to the capital, *Optician* went along to hear the latest developments in presbyopic correction

**B**uilding patient loyalty was the theme for this latest series of one-day courses under CIBA Vision's Academy for Eyecare Excellence banner. The events provided various opportunities to learn, from lectures and fitting workshops to a poster quiz and supporting online material.

More than 200 practitioners attended the London event, with a total of 700 expected at six venues around the UK and Ireland. The roadshow will be followed by a second series later this year, on attracting new patients. Both focus on 'Maintaining the EDGE (ie Every Day Great Eyecare)' and growing the contact lens business in a challenging climate.

Head of professional affairs **Mark Draper** opened the programme with new information on contact lens dropouts. Consumer surveys across Europe showed that a year after fitting, 78 per cent of patients were still wearing the lenses and brand prescribed, 10 per cent were still in lenses but had switched brand, and 12 per cent were no longer wearing lenses.

As in every other study of dropouts, discomfort was the primary reason for discontinuation, accounting for nearly half. Among these, risk factors identified were part-time use, less than two years' wear, poor lens handling and, notably, presbyopia.

Among recommendations for reducing dropout was to update patients to new technology, talk about benefits rather than features, and focus on the patient's lifestyle. CIBA provides a contact lens questionnaire for patients to complete at each aftercare visit.

Optometrist and training specialist **Sarah Morgan** explored the psychology of presbyopia, the emotional impact of becoming presbyopic, and how to influence the outcome of the patient visit in a positive way.

Avoid terms such as 'ageing' and 'getting old', she warned, and opt instead for 'gradual change over time'. Demonstrate how reading glasses affect distance vision and ask whether there are any situations in which patients find glasses inconvenient. Bear in mind that presbyopia is not only a near vision problem and that choice of vision correction depends on pre-existing



refractive error as well as lifestyle needs.

Explain that multifocal lenses are 'the closest thing to natural vision' and offer patients a range of options, which may still include 'bedside readers'. Imagine that the patient is a member of your family, use phrases such as, 'If you were my sister this is what I'd recommend for you,' and follow up with, 'How does that sound?'

In fact it sounded fine as Morgan led the audience in a *Mamma Mia*-style sing-along on the trials of becoming presbyopic. Is 40 the new 30? Not really, was the message from those who among them were already presbyopic and had not yet tried CIBA's new multifocal lens.

Moving on to the main business of the day, CIBA's clinical affairs manager Jayne Schofield presented the new design, Air Optix Aqua Multifocal, the latest silicone hydrogel option to reach the market. There were useful tips for selecting the best candidates and evaluating vision. When trialling the lenses, one approach was not to mention multifocals but just put them in and caution that adaptation could take 'a day or two'. Set a couple of visual goals and document these on the record to review.

Clinical and professional marketing consultant **Marcella McParland** highlighted the business opportunities that presbyopia presented. Only 5 per cent of contact lens fits are

multifocals and only 6 per cent of presbyopes wear contact lenses. But if the same proportion of this age group as those aged 15-34 wore contact lenses, there would be an extra 3m users in the UK.

Half of women in their 40s said they felt contact lenses would have a positive effect on their quality of life. More than half of all emerging presbyopes said they wanted good vision at both distance and near. Yet multifocal lenses showed the greatest deficiency in ratings vs expectations of all lens types.

The potential to grow the presbyopic market, and hence practice profitability, was huge, and new multifocal designs were now becoming available to capitalise on this opportunity.

## Age-related vision changes

**Dr Shehzad Naroo** looked at clinical aspects of the ageing eye with a review of physiological and pathological changes and their effect on contact lens fitting. It was important to reassure emerging presbyopes that changes to their vision were normal and age- rather than disease-related, he said.

Systemic and ocular changes in this age group might affect the tear layer and cause dry eye, which could be exacerbated by the effects of systemic medication. Contact lens wearers might not relate any such symptoms to their condition but blame their

contact lenses. Age-related changes to the cornea included reduced sensitivity, steepening curvature and changes to cyl axis. Vision when driving was an important consideration in older presbyopes.

Lancashire optometrist **Mike Broadhurst** closed the programme with some tips on retaining patients through good customer service and communication. Competent service led to satisfied patients, but when service was memorable and exceeded expectations, patients remained loyal.

Remember that patients have many acceptable options for accessing eye care and don't be tempted to raise prices without improving service. Pay attention to factors such as the look of the practice and its staff, consistency at each patient visit and regular communication via telephone and newsletters, as well as ensuring the professional and technical competence of all the practice team.

Scripting interactions with patients was key to producing a positive response. Use loyalty generating phrases, such as 'It's great to see you', 'I'll be happy to' and 'My pleasure'. When things don't go well, fix the problem but also offer something extra. Other tools included repeat purchase discounts and loyalty schemes. ●

● Watch the lectures from the EDGE roadshow at [www.cibavisionacademy.co.uk](http://www.cibavisionacademy.co.uk) and gain CET points.