Reset – A novel wetting and cleaning drop for enhanced contact lens comfort

Nick Atkins introduces a new wetting and cleaning drop, the use of which can lead to a reduction of protein deposits on soft lenses

Practitioners are dealing with an increasing number of patients complaining of symptoms associated with ocular dryness. Contact lens wearers are far more predisposed to dryness symptoms and signs, with it being a well documented cause of discontinuation[1] and this remains one of the chief challenges still remaining in contact lens practice.

While the goal of eliminating hypoxia has largely been resolved with the advent of silicone hydrogel materials, the equally important criteria for patient acceptance – comfort – has yet to be completely solved. Discontinuation from contact lens wear occurs as a result of poor comfort in 72 per cent of the cases,[2] with dryness being the most commonly reported symptom.[3-5] Symptoms of discomfort and dryness with contact lens wear have been related to lens movement and edge profiles,[6] dehydratation,[7] protein and lipid deposition,[8] modulus of rigidity, wettability and lubricity,[9,10] and solution toxicity.[11,12]

Whether the patient is fitted for daily wear, with hydrogel or silicone hydrogel lenses, or flexi, extended or continuous wear with silicone hydrogels, it can be seen that problems can still occur and that these are ultimately linked to the drop-out rate for contact lens wear. Clearly, getting to the root cause of the problem and ideally resolving it with a change of lens type, modality or lens care system would be seen as ideal, particularly where the problem is potentially threatening to contact lens wear; however, one area that is frequently overlooked in less severe and intermittent cases is the role that might be played by comfort/rewetting drops. For both daily and continuous wear a case can be made for the use of rewetting drops to assist with comfort issues due to dryness, dehydration and, with the addition of a surfactant, deposition.

Wetting drops

In recent years there have been numerous new eye drop introductions, with different active ingredients, that target specific areas of the tear film with the aim of restoration and prolonged symptom relief. With correct diagnosis of the underlying cause as well as understanding of the differences between products and how they work, practitioners can increasingly help improve their patients' comfort during prolonged wearing times, during certain tasks and/or in adverse environments.

Figure 1 The drop is compatible with all types of contact lenses

The ideal contact lens rewetting solution can be said to require the following key features:

- Provide immediate relief
- Gives prolonged residency in the tear film/on the contact lens surface
- Preservative-free (non-toxic to the ocular surface)
- Does not blur vision following instillation.

Additional benefits might include:

- Helping to maintain a clean contact lens surface
- Easy/simple to use/instil
- Small droplet size to avoid blurring/washing away the tear film
- Affordability.

Introducing Reset Dual Action Lensdrops

Reset (Figure 1) is a new generation contact lens wetting and cleaning drop, marketed in the UK by Advanced Eyecare Research and indicated for relief of ocular discomfort due to alteration of the pre-corneal tear film during contact lens wear. The drop is compatible with all types of contact lenses and may be instilled directly in the eye during lens wear. It is preservative-free in the eye and comes in a convenient 10ml multi-dose bottle.

For drop instillation to be as comfortable as possible the solution should have a pH and tonicity close to natural tears. The pH of tears is 7.4-7.5 with most drops around pH 7.4. Most solutions are an isotonic solution of 0.9 per cent sodium chloride, although occasionally a hypertonic solution is used in severe aqueous deficient dry eye to increase corneal absorption. Viscosity is extremely important with the right level ensuring the appropriate amount of lubrication and retention. Too low and although it spreads well it will evaporate quickly. Too high can increase retention time but is likely to disturb vision.

For many years cellulose derivatives have been used as the 'standard' therapy in preparations often referred to as 'artificial tears'. An example of such a solution is hypromellose. Cellulose derivatives are water soluble polymers formulated in a range of viscosities to enhance retention time of the drop in the eye. They can be useful for mild or transient environmental dryness symptoms, as they provide immediate effect and do not blur the vision. Carboxymethylcellulose (CMC) is a semi-synthetic derivative of cellulose used as a lachrymal substitute due to its

TABLE 1
Reset Composition

Components	Action
Carboxymethylcellulose	Wetting/lubrication
Pluronic F-127	Cleaning/lubrication
OxyChlorite - $NaClO_2$ - H_2O_2	'Preservative-free' preservation

mucus-like properties and particularly high ocular tolerability.

Table 1 shows the key elements of the Reset formulation as well as their primary function. In addition to the actives CMC and Pluronic F127, product conservation is maintained with the OxyChlorite system, whose principal characteristic is to guarantee the microbiological safety of the product inside the bottle and then to rapidly decompose into non toxic substances, after being instilled in the eye and coming into contact with the proteins and enzymes naturally present in the tear film and on the surface of the cornea. As a result, these characteristics permit the product to avoid the problems due to the use of traditional preservatives in ophthalmic preparations.

OxyChlorite is part of a new category of ophthalmic 'physiodegradable' product conservation systems known as oxychloro derivatives or stabilised oxychloro complexes (SOC) and was first seen in Regard, the preservative-free multipurpose solution from Advanced Eyecare Research, in 2003.[13] The preserving action is the result of the synergy between the chlorite ion and hydrogen peroxide, which provides an active disinfection and then releases oxygen to the corneal surface (Figure 2).[14] Sodium chlorite generates chlorine dioxide which is very effective in killing Gram+ and Gram- bacteria, yeasts and fungi, subsequently breaking down into the components of natural tears, salt, water and oxygen. Sodium chlorite is activated by acidic cellular components and has been used safely for many years as a treatment for municipal drinking water.

Clinical data

A recent study evaluating Reset for ocular tolerability, efficacy in improving ocular comfort and protein deposit cleaning ability found that using the drops at least three times a day enhances lens comfort by both wetting and cleaning the contact lenses.[15] The clinical efficacy was evaluated in a controlled, in-vivo, contralateral eye (Reset in one eye, physiological saline in other eye) study over 45 days (visits at 15, 30 and 45 days) with 20 soft (low and high water content, ionic and non ionic materials) and 10 RGP (fluorosilicone acrylate) contact lens wearers. Reset demonstrated excellent tolerability overall and Figure 3 shows a significant reduction in ocular discomfort for both the soft lens wearers (55 per cent, p<0.001) and the RGP wearers, although the latter result was not statistically significant (p=0.06).

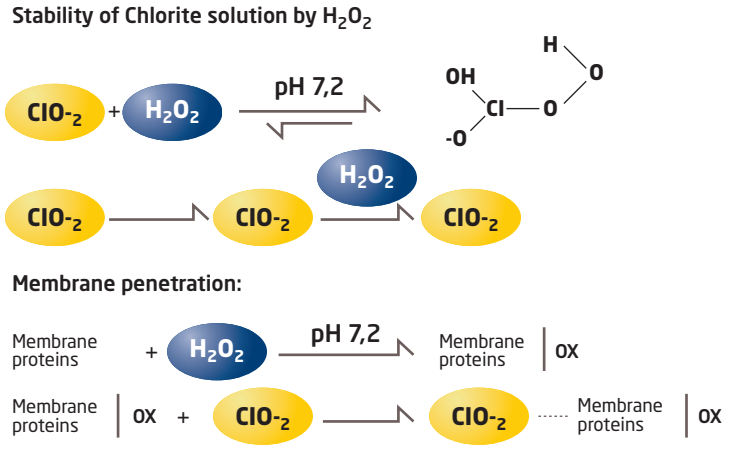

Figure 2 Summary of the synergistic antimicrobial system H_2O_2 + ClO^-_2

The accumulation of protein deposits on soft contact lenses was measured *in-vitro*

The soft contact lenses utilised with the test and control solutions were analysed by spectrophotometry to quantify the protein deposits on the lens surfaces. The results indicated a statistically significant reduction of 41 per cent (p<0,01) in the accumulation of protein deposits on the lenses treated with Reset compared to saline solution. The reduction was statistically significant for the soft contact lens subgroups for Type II and (-52 per cent) and Type III (-51 per cent) lens types. The results are represented graphically in Figure 4.

Reducing corneal staining

Interestingly a recent study has suggested another use for rewetting drops. It suggested that a CMC-containing pre-application drop can reduce corneal staining resulting from disinfection with a polyhexanide multi-purpose solution (MPS).[16]

In this investigator-masked, randomised, two-way cross-over study, 30 adapted soft contact lens (SCL) wearers wore a new Group II lens (alphafilcon A, 66 per cent water) daily for four weeks and disinfected lenses using a MPS containing 0.0001 per cent polyhexanide. A lens lubricant containing either CMC or povidone as the primary viscolyser was applied to the lens each day before lens wear. Biomicroscopic signs and symptomatology were assessed. The difference in scores, zero to four weeks and the difference between lubricants were analysed.

The cumulative fluorescein staining scores for combined eyes demonstrated a significant increase over time (eg cumulative staining score; p = 0.004 and p < 0.001 for CMC and povidone, respectively, matched pairs t-test, two-tailed), suggesting that for both lubricants the staining worsened with wear. This effect was expected and likely driven by the MPS. However, the mean cumulative staining scores for CMC and povidone were significantly different (p = 0.003) suggesting a greater increase in corneal staining for the povidone lubricant. The symptom scores were not significantly

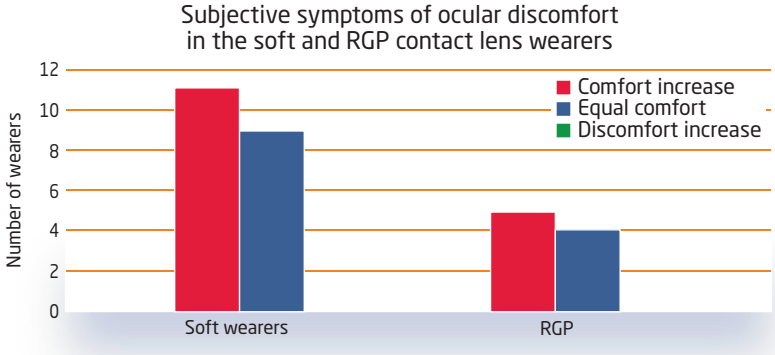

Figure 3 Subjective symptoms of ocular discomfort in the soft and RGP contact lens wearers. The symptoms of ocular discomfort were expressed according to the semi-quantitative scale: +1 = significant comfort improvement; 0 = equal comfort; -1 = increased discomfort

different, zero to four weeks by regimen or between pre-instillation drops.

This result is consistent with a proposed mechanism for CMC to neutralise cationic disinfectants and may offer clinicians another means to reduce this type of corneal staining.

Discussion

Reset appears to act as an efficacious lubricant for the ocular surface, giving the product mucus-like characteristics. A notable aspect of the formulation is the use of OxyChlorite preservative system which confers the characteristics of a unit-dose drop, in that it is preservative free in the eye with all the associated advantages. It can be speculated that the recommendation of rewetting drops for regular use as part of the wearer's care programme is inhibited by the fact that, for most clinicians, the most important feature – that the drop is preservative-free – typically means the use of relatively uneconomic (for frequent daily instillation at least) unit-dose drops. Consequently the availability of drops like Reset with their 'disappearing preservatives' should begin to encourage more practitioners to 'prescribe' the routine use of such drops with the majority rather than the minority of patients. Perhaps their role should be thought of as discomfort prevention rather than comfort maintenance only if there is a 'problem'?

Anecdotally, many patients report better comfort on insertion by adding a rewetting drop into the 'bowl' of the lens. This author and other contact lens practitioners also regularly advocate the use of drops post lens removal.[17] This may offer a therapeutic benefit by immediately supplementing the tear film following lens removal. Ideally, the solution used pre, during and post wear would, out of convenience, be the same and with this rate of usage a multi-dose, preservative-free solution would be preferable.

With the lipid deposition that afflicts Group II hydrogels and some silicone hydrogel[8] materials there is certainly a case for the use of an in-eye cleaning agent to help maintain a clean lens surface. It can be seen that this might be particularly beneficial for extended and continuous wearers of silicone hydrogel lenses.

Conclusion

On the basis of the reported findings Reset can be utilised as a wetting and lubricating drop by healthy contact lens wearers and is well tolerated. Additionally, used as needed, it demonstrates a significant efficacy to reduce the symptoms of ocular discomfort in the group of soft contact lens wearers

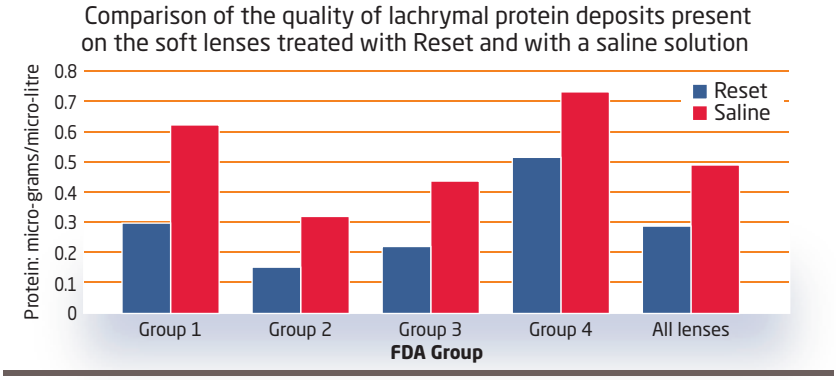

Figure 4 Comparison of the quantity of lachrymal protein deposits present on the soft lenses treated with Reset (right eye) and with a physiological saline solution (left eye). For each group, the figures represent the average value measured

and although not statistically significant, a general improvement in ocular discomfort among RGP lens wearers. Finally, after a continuous use of Reset, the accumulation of protein deposits on soft contact lenses was significantly reduced. Being a CMC-based rewetting agent, Reset could also assist in reducing the corneal staining sometimes seen with certain silicone hydrogel, MPS combinations.

This makes a strong case for contact lens practitioners to seriously consider recommending the routine the use of an in-eye cleaning and rewetting drop such as Reset, as part of their contact lens care programme in both daily and continuous wear modalities.

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