

A Silicone Hydrogel Update

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With the impending introduction of spherical silicone hydrogel Daily Disposable lenses by Vistakon in the UK this Autumn, the full range of wearing modalities in silicone hydrogel lenses has now been realised.

It was Contamac that introduced the high impact offering in this arena by providing a silicone hydrogel material in a new way altogether. This new approach is a long awaited and clinically significant boon to a large segment of patients, with complex clinical situations covering a large variety of indications, and whose prescriptions and lens design requirements often fall outside the "normal" range. While it could be argued that this subset of contact lens wearers would benefit most from silicone hydrogel lenses, they had to wait almost nine years from the date they were first released until Contamac developed this new material.

Contamac introduced Definitive™, a daily wear silicone hydrogel material in "button" form, designed to be lathe-cut to order in virtually any Rx and any design, at the practitioner's local preferred, specialty lens laboratory.

So for the first time patients have access to the benefits of silicone hydrogel lenses at both ends of the modality spectrum and everything else in between; from spherical daily disposable lenses to the most complex designs, including lenses for high powered prescriptions and irregular corneas such as Keratoconus, post-surgical, etc. It is this group of patients with "challenged" corneas, where the clinical benefits of increased oxygen delivery may most dramatically impact lives.

So as the industry has now closed the availability holes in materials and designs, we approach the ten year anniversary of silicone hydrogels and as the menu of these wearing modalities, designs and prescriptions has become more complete, it's a good time to take a look at where we are in general with silicone hydrogel lenses.

Practitioners worldwide are increasingly prescribing silicone hydrogel lenses for new fits and refits from hydrogel materials as hypoxic signs such as neo-vascularization, limbal hyperemia, microcystic formations, stromal striae, endothelial polymegethism are all significantly reduced. For many of us mature industry veterans, this conversion to silicone hydrogel materials from standard hydrogels is reminiscent of the movement from PMMA to GP materials in the 1980's. Silicone hydrogel lenses are a remarkable achievement in polymer chemistry.

So does that mean that the increased oxygen supply delivered by silicone hydrogel lenses results in greater, long-term wearing comfort and overall, resounding clinical success?

Well, yes and no.

In a literature review performed by Dr SM Dillehay in 2007, he concluded "Clinical studies of high-Dk/t silicone hydrogel lenses, further support a significant connection between the level of available oxygen during contact lens wear and improved patient symptoms of comfort, including dryness."¹

But in spite of the advances in oxygen delivery, these materials haven't resulted in the complication free contact lens wear that practitioners are still looking for, especially in overnight and continuous wear. It appears that the corneal acidosis which results from trapped corneal debris underneath the contact lens, increases over time to inflammatory levels in spite of the increased presence of oxygen. The secret to successful extended wear seems to lie beyond the mere supply of greater amounts of oxygen.

An extensive literature review performed by Szczotka et al² reviewing multiple silicone hydrogel study data on a combined 9,336 subjects and 18,537 eyes, made the following conclusions: "Based on published or presented studies between 1991 and 2006, there is approximately a twofold higher risk for corneal inflammatory events in users of silicone hydrogel lenses when typically worn for up to 30 days extended wear when compared with low Dk extended wear lenses when typically worn for 7 days extended wear. The increased risk cannot be definitively linked to silicone hydrogel lens materials because the effect of material on outcome is confounded by length of wear."

Frustratingly the anticipated reduction in risk for microbial keratitis with high Dk silicone hydrogel lenses during overnight wear, did not occur. Inflammatory, infiltrative complications are being experienced by patients wearing their lenses overnight at the same rates as those seen with standard hydrogels over the same period of extended wear.

Additionally some silicone hydrogel materials exhibit a higher modulus than that seen with hydrogel materials, resulting in reduced initial comfort for some patients, especially in refit situations. Other reported complications include an increased incidence of GPC (Giant Papillary Conjunctivitis), SEALS (Superior Epithelial Arcuate Lesions) and corneal erosions. Some preserved care systems in combination with certain materials have resulted in increased reports of toxicity-related corneal staining.

As a result practitioners are now figuring it out and settling in on the common sense approach: reap the increased oxygen benefits of silicone hydrogel lenses by prescribing them for daily wear and avoid the inflammatory, infiltrative complications of overnight and extended wear.

For patients with "challenging clinical situations", the advantages of increased oxygen in a daily wear approach, make silicone hydrogel in high prescriptions and specialty designs an obvious clinical choice and long overdue. At Contamac, we knew it all along. Daily Wear Silicone Hydrogels are the way to go. Definitive™. Definitely.

1. Eye Contact Lens. 2007 May;33(3):148-55. Dillehay SM.

2. Optom Vis Sci. 2007 Apr;84(4):247-56. Szczotka-Flynn L, Diaz M.

