Presbyopia is all the rage in eye care, with presbyopia–correcting drops taking center stage in both direct-to-consumer and direct-to-doctor messaging. Despite the many benefits that these drops have, their use is limited to non-emmetropic patients and those who require specialty contact lenses due to corneal issues. Although today’s advances in multifocal scleral lenses might not get the same media love as presbyopia drops, the technology in the pipeline is sure to excite any optometrist. This article breaks down the issue with decentration in scleral lenses and provides an overview of some options that aim to aid in the fitting process.

**THE RACE TO IMPROVE SCLERAL LENSES**

For years, practitioners who regularly prescribed scleral lenses could thrill their patients who had sharp distance vision with lens designs that offered unparalleled comfort. However, their presbyopic patients, who demanded excellent vision at far and near while remaining spectacle-free, presented a unique challenge.

For decades, monovision has been the go-to modality for fitting patients with presbyopia. By correcting the patient’s dominant eye for distance and their nondominant eye for near, many patients could function at a high level throughout the day without additional spectacle correction. However, as scleral lens fitting has advanced, requests for high-performing multifocal lenses have also been growing. In fact, according to Woods et al, patients prefer the visual acuity with multifocal contact lenses over monovision for most activities.¹

Another recent study showed that multifocal lenses have even become the contact lens modality of choice for 80% of practitioners.² Thus began the race to develop a new generation of scleral lenses with superior, easy-to-fit multifocal optics. The potential for a properly fitting scleral lens to provide unmatched visual acuity is indeed promising. Scleral lenses themselves typically center well with limited movement.

APPENDIX

**NEW IMPROVEMENTS IN MULTIFOCAL SCLERAL LENS TECHNOLOGY**

A look at what’s available to help navigate the common fitting issue of lens decentration.

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while blinking, remain stable at the center of the patient’s visual axis, and can hydrate the cornea, thanks to a post-lens fluid reservoir. In contrast to a soft lens dehydrating the cornea and causing distorted optics within the lens itself, a scleral lens will not contribute to these issues.

**THE ISSUE WITH DECENTRATION**

Today, most labs that design and manufacture multifocal scleral lenses have become heavily focused on scleral lens decentration and how it plays a significant role in visual performance. The human eye's visual axis, also known as the pupillary center, is located slightly off-center, notably superior nasal to the visual axis. This is because the fovea is anatomically positioned inferior-temporally within the retina, thus creating a superior-nasal line of sight compared with the pupillary axis. We refer to this angular distance as angle lambda/angle kappa.

It is well known that most scleral lenses typically settle inferior-temporally on the eye because of scleral elevation differences, lens weight and/or structure, gravity, and superior lid interaction. Therefore, the center of the typical scleral lens sits inferior-temporally to the actual eye’s line of sight (Figure 1).

Recently, the theory of optical decentration in multifocal contact lenses was tested using a center-near soft multifocal lens. It was discovered that a 1.0 mm nasal offset provided patients with better near acuity and subjective improvement in their quality of vision. It was immediately hypothesized that a similar offset/decentration in multifocal scleral lenses would yield similar results. In the Multifocal Off-center Optics Visual Effectiveness Study (MOOVES) 2-year update study, it was found that an average decentration of the optics by 1.75 mm created an average score of 9.0 for near acuity, 8.7 for distance acuity, 8.7 for comfort, and 9.0 for overall lens experience on a 10-point scale.

Yet another compelling study out of Spain found that the defocus curve achieved using a decentered multifocal design resulted in more optimal distance and near visual acuity outcomes compared with a conventional multifocal scleral lens. By alleviating the decentration of the optic zone, we are also helping to reduce higher-order aberrations, namely that of coma and trefoil.

**SURVEYING THE LATEST SOLUTIONS**

When presented with these compelling data, it’s no wonder that many of the scleral lens labs have developed and begun marketing new and improved multifocal scleral designs. For example, the Ampleye (Art Optical) scleral GP multifocal lens offers the potential for customized optics. The company recommends a standard decentration with...
a 2.50 mm-sized center near the zone that is decentered 0.75 mm toward axis 45° OD and 0.75 mm toward axis 135° OS. This can be further customized by the practitioner as needed. For the lens to achieve proper orientation due to the decentration, correct insertion by the patient becomes even more critical. The insertion process is assisted by a black dot, placed along with the lens’ steep meridian 180° from the engraved “R” or “L” mark located on the right or left lens, respectively. Typically, this dot should be inserted superiority.

The Zenlens multifocal scleral lens (Bausch + Lomb Specialty Vision Products) has black dots on the underside. Thus, it is important to stress proper insertion and orientation of these lenses to your patients.

For practitioners who like to use online calculators and visuals to see precisely how much decentration their patients need, Blanchard Lab now has an online calculator that allows practitioners to do just that. Using the company’s new Optimized Pupil Optics feature (Figure 2) on the Onefit Med scleral lens (Blanchard Contact Lenses/CooperVision), up to 1 mm of total decentration is possible. Once again, proper insertion is essential, and Blanchard places a black dot at the 6:00 clock position, similar to that on the Zenlens.

AccuLens has developed a novel concept called OnPoint Alignment Technology. By laser marking the company’s trial lenses, practitioners can easily customize the exact location of the center near add power.

MUCH TO LOOK FORWARD TO

There are numerous consistencies within the multifocal scleral lens market. Just as most companies are aggressively moving toward decentered optics, they are also moving their multifocal designs to the front surface of the lens. This shift is mainly because, in most scleral lens patients, back surface toricity is being heavily employed to provide a more rotationally stable lens.

Recently, the Scleral Shape Study Group found that back toric lenses can help ensure better peripheral alignment and centration in most patients. In addition, many companies focus on center-near optics in their lenses, such that minus power increases toward the periphery while having varying add powers that will typically range from +1.00 to +3.50 in 0.25 D steps. As the population ages, demand will surely increase for multifocal options in all modalities. Given the apparent benefits that scleral lenses possess, namely rotational stability, optical superiority, and suitability for corneal surface health, we can expect constant enhancements in their ability to improve our patients’ lives.

8. Camarillo G, Privado-Aroco A, Soria GV, Planells MR. Decentered multifocal optics reduce aberrations and optimize visual outcomes. Contact Lens Spectrum. digital IMPORTANT: This article has been updated to reflect the latest information available. Contact lens practitioners should consult the latest articles and guidelines before making clinical decisions.