Recent data shows that Varilux Physio Enhanced™ provides improved vision, particularly in low light.

Progressive addition lens wearers face a common problem: decreased acuity in dim lighting conditions. While everyone’s vision is diminished in dark, low-contrast situations, progressive lens wearers have a unique predicament: As the pupil expands in dark settings, a larger beam of light enters the eye. This wider beam utilizes a larger area of the spectacle lens, and as more of the spectacle lens is utilized, more of the aberrations inherent in the lens cause wavefront distortions in the beam. This can result in reduced contrast sensitivity and diminished quality of vision.

Varilux Physio Enhanced™: A New Benchmark in Progressive Lens Design

At the annual meeting of the American Academy of Ophthalmology in October 2010, I presented on a poster on Varilux Physio Enhanced™, a new wavefront-corrected progressive lens design that incorporates pupil size modeling data for improved low-light vision. The full poster, “Factoring Pupil Size Changes into a Wavefront-Optimized Progressive Lens Design Improves Vision in Low Light Conditions,” is included on the following pages.

Varilux Physio Enhanced™ uses W.A.V.E. Technology 2™ to identify and manage distortions. Built on earlier W.A.V.E. Technology™, Wavefront Advanced Vision Enhancement, which minimizes the amount of distortion caused by light passing through the lens. W.A.V.E. Technology 2™ incorporates pupil size modeling. This complex model allows designers to fine tune the design to provide the sharpest possible vision for all patients in all lighting conditions. Cumulative results from a double-masked wearer study and optical bench testing suggest that, compared with progressive lens designs that do not incorporate pupil size modeling, the Varilux Physio Enhanced™ lens provides superior vision, with the greatest benefit seen in low lighting conditions.

The Importance of Contrast Sensitivity

These findings have important implications, as contrast sensitivity is a vital component of visual quality. Numerous everyday activities require the ability to discern objects, depth, and dimensions under low-contrast conditions. When driving in the rain, fog, or in the evening, for example, we rely on contrast sensitivity to distinguish forms that may blend in with the background, including pedestrians.

The ability to carry out more mundane tasks, such as reading a menu or dialing a phone in a dimly lit restaurant, also contribute to quality of life. Although some patients are more sensitive to changes in contrast sensitivity than others, the fact that we are now able to provide this added benefit marks a new achievement in progressive lens design.

Clearer, Crisper Vision, One Innovation at a Time

Progressive addition lenses have come a long way, with each incremental advance providing better vision for our patients. In addition to the breakthrough in pupil size modeling, Varilux Physio Enhanced™ lenses achieve higher levels of sharpness by customizing the design to patient prescription and viewing distance. This level of sophistication means that our patients can enjoy safer night driving and less strain during daily activities such as reading, television watching, and computer use. The design and quality of vision caused adaptation and help ensure the one thing we all want: happier patients.

Marguerite B. McDonald, MD, FACS

Marguerite B. McDonald, MD, FACS, is a cornea/ refractive/eye care surgeon with Ophthalmic Consultants of Long Island, Lynbrook, NY, and a pioneer in wavefront-based refractive correction. Dr. McDonald, who performed the world’s first wavefront-based laser vision correction procedure, also conducted the first wavefront-based laser surgeries in the USA.

Wavefront-Optimized Progressive Lens Design with Pupil Size Modeling Enhances Low-Light Vision for Presbyopes — Marguerite B. McDonald, MD, FACS
**Factors Pupil Size Changes into a Wavefront-optimized Progressive Lens Design Improves Vision in Low Light Conditions**

Marguerite B. McDonald, MD, FACS*, and the Essilor Study Group**

**METHODS**
A double-masked, randomizing, center-opposing treat study compared the new Varilux Physio Enhanced lens to the original Varilux Physio wavefront corrected lens.

Subjects: 60 N
- Average age: 52.3 years
- Average IOP: 14.3 ± 2.0 mm Hg
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- Average IOP: 14.3 ± 2.0 mm Hg
- Add 3.7 to 1.0 D; 1.0 mm Hg
- 85% P2002 or better in each eye

Prior primary means of correction: Intraocular lenses

Contact lenses

Keratoconic lenses

Comparison of Wavefront Aberration Levels

**CONCLUSIONS**
- Varilux Physio Enhanced lens is significantly better in low light conditions than the Varilux Physio Enhanced lens in the same conditions.
- There were no significant differences in contrast sensitivity or contrast sensitivity at the same level.
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