

# VARILUX

THE EDUCATION RESOURCE FOR DISPENSING OPHTHALMOLOGISTS



For more information contact Luzerne Optical Laboratories LTD at 1-800-233-9637 or at [www.LuzerneOptical.com](http://www.LuzerneOptical.com).

## Quality of Vision and Advanced Progressive Lens Technology

**Varilux Physio 360™ and Varilux® Physio™ lenses use state-of-the-art optical technology to provide patients with an enhanced visual experience**

Practitioners have long known that there is more to good vision than 20/20 Snellen or ETDRS acuity. In particular, as excimer laser surgery grew in popularity, patients were seen who had good Snellen acuity but were dissatisfied with their vision, particularly at night. This spurred vigorous investigation into the relationships between higher order aberrations (HOAs), contrast sensitivity, and patients' quality of vision.

### QUALITY OF VISION

The term "quality of vision" describes the combined quantitative (ie, 20/20 acuity) and qualitative factors that create the optimal visual experience. At present, we lack a universally accepted way to define and measure quality of vision, but its importance to patients is unquestionable. The lessons learned from refractive surgery are now bearing fruit in the realm of spectacle correction for presbyopes. With the advent of wavefront-optimized Varilux Physio 360™ and Varilux® Physio™ progressive lenses, practitioners can now take advantage of wavefront science to provide presbyopes with an improved visual experience.<sup>1</sup>

### CONTRAST SENSITIVITY

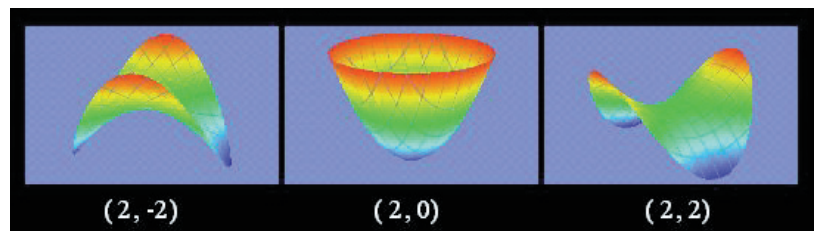
Life, unlike acuity charts, does not take place under controlled lighting conditions. Nor does it feature only high-contrast views (ie, sharp-edged black letters printed on a white background). The visual challenges patients encounter each day (and night) are varied and complex; and good contrast sensitivity is an essential component of seeing well across a wide range of conditions.

Contrast sensitivity is the optical system's ability to detect detail, depth, and dimension by quite literally discerning shades of difference

system—the progressive lens—is very much within the practice's control.

### CORRECTING ABERRATIONS

Aberrations in the spectacle lens can limit quality of vision even when a patient can read the 20/20 line. In other words, not all 20/20 vision is created equal, and presbyopes' spectacles play an important role in determining how they perceive and rate their quality of vision. The implications for dispensers are obvious: the higher the patient's perceived quality of vision, the happier the patient; and the happier



**FIGURE 1** A Wavefront map showing the Zernike second-order terms, sphere and cylinder, which can also be derived in a different form from phoropter information.

between lighter and darker areas such as may exist between objects and their surroundings. Patients who can distinguish fine gradations without difficulty describe their vision as being "sharp" or "crisp."

A number of factors determine a person's sensitivity to contrast. Age is one—and a reason why helping presbyopes achieve the best possible optical correction is so important. Some factors, such as neural processing, are not remediable by optical correction. However, a key component of the presbyope's optical

the patient, the more successful the practice will ultimately be.

Refractive technologies have traditionally corrected only gross aberrations, ie, sphere and cylinder. The advent of wavefront technology has given clinicians a more sophisticated picture of how an optical medium, such as a progressive lens, acts upon the light that passes through it and how this in turn impacts the quality of the image that is received at the retina. (*Editor's note: See "A Wavefront Primer for Dispensers" in this issue.*)

## WAVEFRONT-OPTIMIZED PROGRESSIVE PERFORMANCE

Using W.A.V. E. Technology™, a patented design and manufacturing process, Essilor engineers created Varilux Physio lenses by eliminating or reducing lens-induced aberrations that affect visual acuity and quality of vision. As a result, Varilux Physio lenses provide four key performance benefits:

### 1. Sharpened Distance Acuity

HOAs, particularly coma, are often present in the distance field of progressive lenses. This creates visual distortion and limits the sharpness of focus that can be achieved with conventional progressive designs, particularly as the eye moves to the lens periphery. By controlling coma in the distance portion of the lens, Varilux Physio provides three

times less higher order aberration at distance for sharper vision across a widened field.<sup>1</sup>

### 2. Wider Intermediate Vision

As the add power of the lens increases, so does induced astigmatism. This distortion is managed by locating it on either side of the progressive channel. The Varilux Physio design reduces the impact

## SPECIAL FEATURE

### A WAVEFRONT PRIMER FOR DISPENSERS

The introduction of wavefront-optimized Varilux Physio 360°™ and Varilux® Physio™ progressive lenses has brought a new dimension to spectacle dispensing for presbyopes. While it is not necessary for patients to understand wavefront technology in order to appreciate the enhanced visual performance of Varilux Physio lenses, a basic familiarity with the technology can increase the dispenser's confidence in the quality of the product being offered to presbyopes.

#### FROM PHOROPTER TO ABERROMETER

Wavefront optics can be confusing at the outset because it requires learning a new vocabulary that is different from the vocabulary of phoropter-based optics. The sphere and cylinder terminology we've grown comfortable with describes lens curvatures that can be seen and even felt. Sphere and cylinder are also part of the wavefront vocabulary, comprising second order (also called lower order) aberrations of the optical system.

The wavefront language associated with higher order aberrations describes in finer detail what the optical system (the spectacle lens,

patient's eye, etc) does to light. For example, coma, a third-order aberration, derives its name, which means comet, from the effect it has upon how a point of light projected on the retina is perceived. In the perfect optical system, the patient sees a sharply focused pinpoint of light. When coma is present, the point appears blurred and has a feathery tail like a comet. Other higher order terms such as trefoil and spherical aberration have different effects on light.

#### WHAT IS A WAVEFRONT?

A wavefront is a sophisticated mathematical concept that describes how a beam of light (the wavefront) is affected when it passes through an optical system. Wavefronts are measured by devices called aberrometers. In the eye, for example, aberrometers measure the wavefront of a beam of light reflected from a point on the fovea. If all the photons from that point were to arrive back at the aberrometer's reference surface simultaneously, the wavefront would be perfectly flat. If some get to the reference surface a little sooner

(due to traveling a shorter path) or a little later, (due to taking a longer path) an irregular wavefront is produced (See Figure 1 in the feature article, "Quality of Vision and Advanced Progressive Lens Technology."). Any deviation in the wavefront from perfectly flat indicates aberration in the visual system.

Scientists know from working with lens optics in astronomy and photography that the flatter the wavefront the more perfect the optical system and the better the modulation transfer function. (Modulation transfer is a term that describes how completely an image is preserved when it passes through a lenticular system, such as the eye or a progressive lens.) In the ideal case, images that pass through a spectacle lens will be undistorted so that patients not only achieve 20/20 acuity but optimal sharpness and contrast sensitivity as well.

#### W.A.V. E. TECHNOLOGY™ IMPROVES LENS OPTICS

Wavefront technology has allowed Essilor researchers to better measure the ability of various progressive lens designs to transfer distortion-free images. Specifically,

Varilux Physio lenses are the result of a patented design and manufacturing process called W.A.V. E. Technology: Wavefront Advanced Vision Enhancement™. The process involves identifying the lower and higher order aberrations induced by a lens of a given design, prescription, and material and then fine-tuning the design to eliminate or reduce those aberrations that affect visual acuity and quality of vision. These sophisticated lens designs are precisely reproduced in molds created by digital surfacing technology that is accurate to 0.1 micron. (Varilux Physio 360° also uses digital surfacing to shape the back surface of the lens.) The result is an optimized wavefront produced by the lens—and received by the eye.

#### PATIENT BENEFITS

Laboratory and clinical studies show that wavefront-optimized Varilux Physio lenses provide better vision than conventional progressive designs. Specifically, patients benefit from larger fields of distortion-free vision and improved contrast sensitivity, particularly in low-light conditions. ■

of this astigmatism by decreasing its amplitude and directing its axis to a vertical position, which studies show is more easily “ignored” by the human visual system. The result is sharper, more natural vision in an intermediate zone that is also up to 30% wider than is available in a traditional progressive lens.<sup>1</sup>

### 3. Extended Near Vision

Subtle variations in sphere power (called “defocus” in wavefront parlance) that occur along the length of the near zone can cause eye strain. Varilux Physio addresses this issue by better controlling the power distribution and reducing the maximum defocus by 10%.<sup>1</sup> This enhances wearers’ viewing comfort by extending the vertical reach of the reading zone and making it more uniform in power.

### 4. Enhanced Contrast Sensitivity

When the pupil widens, as it does for distance viewing and in low-light conditions, HOAs have a proportionally greater impact on vision quality. This manifests as decreased contrast sensitivity, night vision symptoms, etc. By decreasing the HOAs created by the eyeglass wearer’s lenses, Varilux Physio optimizes vision, particularly in low-light

Essilor, Varilux, Panamic, Ipseo, and VisionPrint System are registered trademarks and Physio and Varilux Physio 360° are trademarks of Essilor International, S.A. W.A.V.E. Technology and W.A.V.E. Technology: Wavefront Advanced Vision Enhancement are trademarks of Essilor of America, Inc.

## I N T H E N E W S

### Expansion of Varilux® Ipseo® Rollout

Since its controlled launch in March of 2005, the Varilux Ipseo progressive lens has secured its place as a premium personalized progressive addition lens. The Varilux Ipseo lens is the first to take patients’ physiological viewing habits into account. Specifically, the patient’s head-and-eye-movement behavior is measured using the VisionPrint System®, an in-office device about the size of a lensometer. The resulting data is used to personalize the progressive design based on the prescription and the way each patient uses his or her eyes. In 2007, Essilor will further expand the availability of VisionPrint Systems throughout the USA, providing a broader group of ECPs with the opportunity to offer Varilux Ipseo lenses. The company also introduced the Varilux Ipseo Premiere Program (VIPP), an initiative to support practice marketing and patient education efforts.

conditions. In fact, studies show that Varilux Physio increases contrast sensitivity by up to 30% compared to conventional lenses.<sup>2</sup>

### QUALITY OF LIFE

In essence, ophthalmology is about one thing: giving each patient the best possible view of the world. Since spectacle lens wearers comprise the majority of the patient roster, it only makes sense for the practice to have the most advanced tools at its disposal. For most presbyopes, Varilux Physio general-purpose progressive lenses are that tool. ■

### REFERENCES

1. McDonald MB and the Essilor Study Group: Wavefront technology improves vision by reducing aberrations in progressive lenses. American Academy of Ophthalmology Annual Meeting, 2006, Las Vegas, NV: PO209.
2. Essilor, date on file.

### Core Concepts

- MDs**
  - 1 The Varilux Physio design is based on wavefront optics
  - 2 By reducing lens-induced aberrations, Varilux Physio lenses improve vision quality
  - 3 Varilux Physio lenses increase contrast sensitivity by up to 30%
- OPTICIANS**
  - 1 Quality of vision is more than 20/20 Snellen acuity
  - 2 Contrast sensitivity is a vital component of perceived quality of vision
  - 3 Varilux Physio lenses provide improved contrast sensitivity

## VARILUX MD

VariluxMD™ is published bi-monthly for Essilor of America, Inc. by Ethis Communications, Inc.  
**EDITOR** Michael E. Green, MD  
**PUBLISHER** Essilor of America  
**EDITORIAL DIRECTOR** Clarissa J. Ceglie  
**ART DIRECTOR** DeborahAnne Chingas Sandke  
 Essilor of America, Inc.  
 13515 North Stemmons Freeway  
 Dallas, TX 75234

Varilux is a registered trademark and VariluxMD is a trademark of Essilor International. Copyright 2007 Ethis Communications, Inc. All rights reserved. Neither Essilor of America, Inc. nor Ethis Communications, Inc. assume any responsibility for injury or damage to persons or property arising from the use of information or ideas contained in this publication.

## EDITOR’S COLUMN MICHAEL E. GREEN, MD



Ophthalmology’s core mission is to provide the best possible vision to our patients. We do this in a number of ways, from tending to patients’ ocular health to providing refractive correction. Good vision is also the bottom line for patients, particularly presbyopes.

Dispensing state-of-the-art eyewear affords the practice a golden opportunity to touch patients’ lives in meaningful and memorable ways. The eyewear we dispense serves as a daily reminder of the patient’s experience with us. If that experience was pleasant and the products we’ve dispensed enhance the patient’s quality of life, we have not only done our job, we have opened the door to an ongoing relationship with that patient and possibly to her network of family and friends. ■

[ brilliant ]



UP TO 30% INCREASED CONTRAST SENSITIVITY



### The only lens that lets you see life best—in all its colorful details

When it comes to sharp vision, visual acuity is only part of the story. Contrast sensitivity is the other. Because of its patented W.A.V.E. Technology™, only a VARILUX® PHYSIO™ lens is proven to increase contrast sensitivity by up to 30%. This helps separate foreground from background and makes colors brighter and details sharper—so your patients can see the world with optimal clarity, depth, and dimension. Call your sales representative to find out about VARILUX PHYSIO today.

For more information contact Luzerne Optical Laboratories LTD at 1-800-233-9637 or at [www.LuzerneOptical.com](http://www.LuzerneOptical.com).

