CATARACT NEWSLETTER

SOLOMON
EYE ASSOCIATES
PHYSICIANS AND SURGEONS

1.1 KNOW THE OPTIONS

" Patients now present for a cataract consultation with a folder full of information about the latest in lens design..."

1.2 WAVEFRONT DIAGNOSTICS

"Our ability to test the human optical system is largely borrowed from technology applied to much larger imaging systems like the Hubble Telescope. "

2.1 SPHERICAL ABERRATION

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2.2 APPLIED TECHNOLOGY

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The Future of Cataract Surgery: It is the little things that make the difference.

The practice milieu is rapidly changing in the era of "lifestyle" lenses. Presbyopia-correcting Intraocular Lenses (IOLs), Toric IOLs, and aspheric IOL technology, has enabled an adept surgeon to tailor post-operative outcomes to the particular demands of each patient. When asked at a recent experts meeting, regarding essential practice patterns, Dr. Solomon's responded, " ...customizing lens selection is integral in producing a happy patient."

Serve as Educator

Know the Options

When asked to elaborate, Dr. Solomon stressed the importance of the pre-operative encounter, highlighting a thorough explanation of both available non-surgical and surgical options, all the while paying careful consideration to patients' expectations and concerns. The internet has empowered the consumer. Patients now present for a cataract consultation with a folder full of information about the latest in lens design, and we as eye care specialist are expected to be well versed on the topic.

Dr. Solomon is leading the charge with what he calls *"WAVEFRONT OPTIMIZED"* lens selection. Over the past three decades, patients have benefited from smaller incisions, more accurate measurements of axial length and keratometry, increased precision in lens calculations, and astigmatism correction, therefore attaining uncorrected visions of 20/20 in much greater proportions- but contrast sensitivity has been found not to improve to the same degree. So how can we, as conscientious eye care providers, maximize contrast sensitivity to attain superior vision?

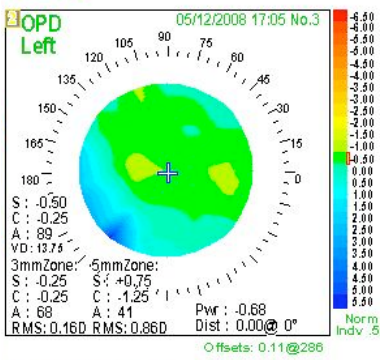
Beyond Sphere and Cylinder

Wavefront Diagnostics

A patient's ability to see a letter on a black-and-white Snellen chart is an accepted method of assessing visual acuity (resolution). The importance of **contrast sensitivity** cannot be overlooked. The ability of a patient to see a STOP sign at midday, tells us very little with regard to the very same patient, and the very same STOP sign during evening rush hour, or in early morning fog.

Our ability to test the human optical system is largely borrowed from technology applied to much larger imaging systems like the Hubble Telescope. With Wavefront Profiling, an array of laser beams are projected onto a surface, and in the case of the human eye- the retina- and the reflected rays are then analyzed for aberrations. This provides a much more precise depiction of the overall optical system, beyond sphere and cylinder. More importantly, this system demonstrates the effect as the pupil enlarges under low light conditions.

The total higher-order aberration of the phakic eye is composed of aberrations arising from the anterior corneal surface and the crystalline lens. However, for the purpose of the pseudophakic eye the crystalline lens does not apply, so the corneal surface is isolated. Therefore higher-order aberrations can be derived from corneal topographic data. Accurate measurement of total ocular aberration is the foundation, and recognition of the contribution of the cornea to the overall image, allows us to calculate the appropriate IOL for each eye. For this Dr. Solomon prefers Marco's 3-D Wave ™ (Jacksonville,Fa.)

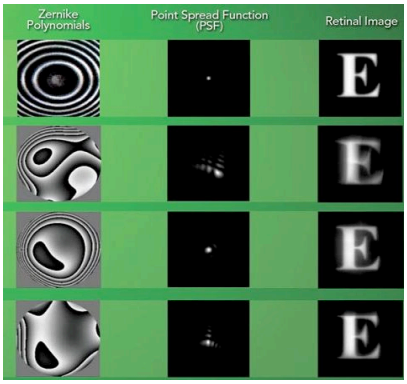


With the application of enhanced skiascopy, the 3-D Wave ™ can gather all the necessary data needed to proceed with wavefront-guided IOL calculations.

Source of Dysphotopsia

Spherical Aberration

Beyond lower-order aberrations, like sphere an cylinder, spherical aberration has been highlighted as a leading cause of unpleasant low-light visual phenomena, including glare and halos. The normal spherical aberration of the cornea is +0.27 um and does not vary much with age. In contrast the crystalline lens in the average naval pilot, is -0.27 um, and is expected to become less negative with age. Therefore, by age 60, the average total spherical aberration is +0.40 um, which contributes greatly to the halos and glare seen around point sources in low light conditions. Hence, the proposed total spherical aberration associated with high contrast sensitivity is 0 to +0.1 um. As a result, the ideal lens should induce a slightly negative spherical aberration. In turn, each of the major lens manufactures in the US market, has developed their version to best harness the effect of spherical aberration and improve functional vision. The first of the three lenses was the Technis (Advanced Medical Optics) which compensates for the average corneal spherical aberration in the young adult eye; -0.27 um of spherical aberration at the 6-mm optical zone. This lens has been proven to increase reaction times at night by half a second, or roughly fifteen yards if traveling at sixty miles per hour. The AcrySof IQ (Alcon Laboratories), is designed to reduce the average corneal spherical aberration by -0.20 um at the 6-mm optical zone. Lastly the SofPort AO (Bausch & Lomb) is specifically designed to induce zero spherical aberration. Therefore, it will not contribute to any pre-existing higher-order aberrations.



Snellen and Beyond

Applied Technology

Although the average corneal spherical aberration is +0.27 um, the deviation is large under the bell shaped curve. Therefore, it cannot be assumed that each patient undergoing surgery is the "average". If spherical aberration is not assessed preoperatively, an opportunity for visual enhancement is lost. Dr. Solomon completed a study comparing Wavefront-guided lens implantation with lenses calculated with traditional biometry (keratometry and interferometry). The two groups were analyzed and under photopic conditions there was a trend toward statistical significance. However, like similar reported studies, the wavefront optimized group performed significantly better on contrast sensitivity under mesopic conditions. (data in press)

With new technologies comes a a better understanding of previously illusive aspects of visual performance. Beyond 20/20 vision and spectacle independence; this is another step in our quest for visual enhancement and brings each patient closer to their ultimate visual potential.

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Reprints, questions, or consultation call 301.464.1885 or 301.982-4565 or e-mail: Jonathan D. Solomon, M.D. @ www.solomoneyeassociates.com/contactus

BIOGRAPHY

Jonathan D. Solomon, M.D., is a board certified Ophthalmologist specializing in Anterior Segment Surgery, including Cataract and Refractive surgery. He graduated with honors from the University of Maryland, received his medical degree from Temple University and completed his post-graduate training at the prestigious Casey Eye Institute and Devers Eye Institute of Portland, Oregon. As a fellow of the American Academy of Ophthalmology, American Society of Cataract and Refractive Surgery, International Society of Refractive Surgery, and exclusive Corneal Society, he serves as an executive board member of the Maryland Society of Eye Physicians and Surgeons. Dr. Solomon continues to remain active in the academic community, as a Clinical Instructor at The Wilmer Eye Institute, The Johns Hopkins University. He also serve as a consultant to leading manufactures of precision surgical equipment and intraocular lens implants, in an effort to improve surgical outcomes.

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