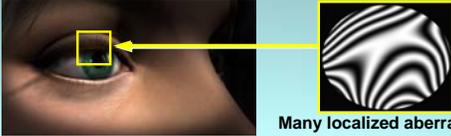


# Wavefront Guided Contact Lenses

**WAVEFRONT GUIDED CONTACT LENSES**  
The Ultimate Specialty Refractive Lens  
2009 Update

Global Specialty Lens Symposium  
January 15-18, 2009  
Leroy G. Meshel, MD\*

**Human Eye...An Imperfect Instrument**

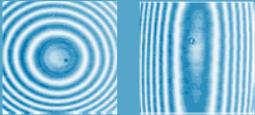


Many localized aberrations  
"Optical fingerprint"

Wavefront allows a customized match for the "optical fingerprint" of the eye

**Result: 100% refractive error measured**

**Conventional**



Sphere      Cylinder

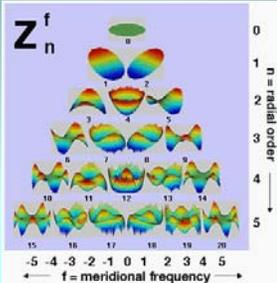
**Wavefront-guided**



Perfect Match

**Higher order aberrations**

- Spherical aberration
- Secondary astigmatism
- Coma
- Trefoil



**Lower Order Aberrations**

- Tilt (prism)
- Defocus (sphere)
- Astigmatism (cylinder)

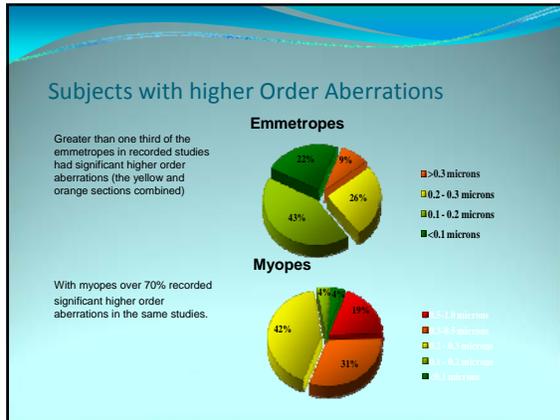
Lower order aberrations are easily corrected with glasses or contact lenses

**Why is HOA getting so much attention?**

- Any standard optical device can change the HOA a patient perceives because of the aberrations induced by the medium itself
- Conventional refractive surgery can increase HOA
- New instrumentation to measure HOA
- Industry has (and is developing) practical ways to correct HOA

Leroy G. Meshel, MD  
Ross, CA

# Wavefront Guided Contact Lenses



### How to fit Wavefront Guided Soft Contact Lenses

- Use an aberrometer to measure the patient's lower and higher order refractive needs
- If the patient has aberrations that could affect VA, fit with a pair of acquisition soft contact lenses as provided by the manufacturer
- Retake the aberrometry readings for both eyes over the acquisition contact lenses



### The Wavefront Process

- Data Acquisition

A specially designed "acquisition" trial lens is placed on the eye; wavefront analysis is performed through the "acquisition" trial lens. This collects LOA and HOA, and measurement of optimal optical zone placement in the lens.

Acquisition Lens with Alignment Markings

Wavefront Over Refraction US Patent 6,086,204

### Acquisition Lens on Eye

Wavefront Contact Lens Measuring

Inputs: Lens ID: 0000251051808, Trial lens power: -3.0, Trial lens BC: steep 2

Results: Zernike at 6.5 (0.0mm)

Lens Information: Decentration: 0.19, Horizontal: 0.827, Vertical: -0.175, Lens rot: -2.8

Zernike data

Decentration is calculated.

Lens rotation is noted.

Trial lens power and Trial lens BC are entered.

### The Wavefront Process

- Data Transfer

Transfer the measured information to the manufacturer for the manufacture of the patient's WFG Soft Contact Lenses.

This information will vary in form depending on the aberrometer.

Pupil Center: [318.2, 244.3]

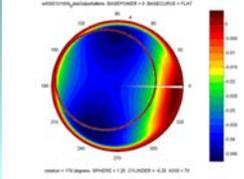
CL Center: [309.0, 243.0]

CL Angle: 174

Leroy G. Meshel, MD  
Ross, CA

# Wavefront Guided Contact Lenses

Rotation is controlled and the optic center is placed over the pupil—regardless of overall lens centration and rotation.



“... lens decentration along with rotational stability is important to provide the best visual performance...”

--Thomas Hobbs, OD  
CL Spectrum, 2008

## Summary of Initial 86 Eye Study

- The purpose of this study to assess WFGCL fit, BCVA of WFGCL vs. previous modality and to assess the efficacy of the production process from in office capture of information to ultimate dispensing of WFGCL.
- Each eye was fit with a first WFGCL and their BCVA was assessed against previous modality.
- If the first WFGCL didn't improve vision or fit successfully, then a second WFGCL was made with the over refraction measurement. BCVA was then assessed again.

## Summary of Initial 86 Eye Study

**Successful Fits**

- 67% (58/86) of eyes achieved a successful fit on the first lens and showed an increase in BCVA
- An additional 19% (16/84) of eyes achieved a successful fit on the first lens and had VA equal to their previous modality BCVA
- A total of 94%(81/86) eyes were fit successfully with VA at least equal to previous BCVA after a second lens (if needed).



## Summary of Initial 86 Eye Study

- It is important to note that of those subjects that did not achieve at least one line improvement, most commented on a subjective improvement in visual quality
- All results were against patients previous BCVA modality, and 80% reported satisfaction with that visual correction.

BCVA Increase With WCL	# eyes
3+ lines	1
2+ lines	6
1+ line	39
3+ letters	21
Equal VA (objective)	14
Refit	5
Total	86

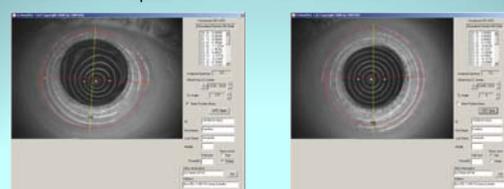
## Clinical Summary-86 Eyes

BCVA Increase	# Eyes after 2 <sup>nd</sup> lens
3 lines	1
2 lines	6
1 line	39
letters	21
equal VA	14
refit	5
Total	86

- 19/32 lenses were refit in this last group reflecting the more challenging nature of the patients in this group (keratoconus, post LASIK, etc.)
- It is important to note that of those subjects that did not achieve at least one line improvement, most commented on a subjective improvement in visual quality

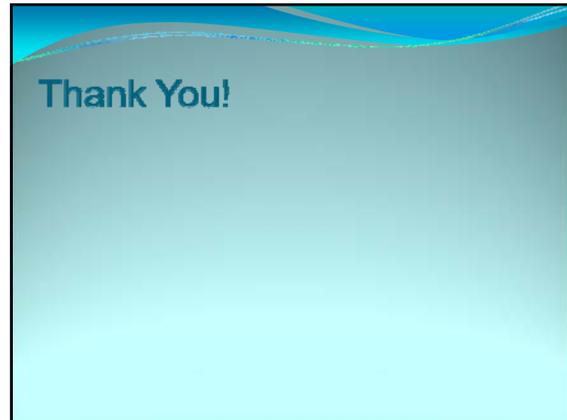
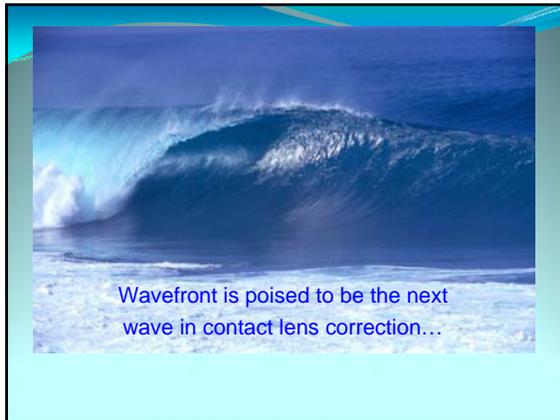
## Case Study: Former Olympic skier

- Refraction: -10.00 -10.00x27
- Previous VA 20/60
- VA with Wavefront lenses 20/32
- Achieved stereopsis
- Refraction: -8.50 -0.50x80
- Previous VA 20/20
- VA with Wavefront 20/20 with a reported reduction in night glare.



Leroy G. Meshel, MD  
Ross, CA

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Leroy G. Meshel, MD  
Ross, CA