

IKA Presents:
**Corneal Technologies for
 The Contact Lens Practitioner:
 A Clinical Workshop**
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International Keratoconus Academy
 of Eye Care Professionals
www.keratoconusacademy.com

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**Disclosures
 Dr. Eiden**
 (consulting, lecturer, research, or financial interest*)



Alcon
 Allergan
 Avellino
 Bausch & Lomb / B&L Specialty Vision
 Cooper Vision
 Euclid
 Glaukos
 LENZ
 Oculus
 Optovue
 Novartis
 Sight Sciences
 Sight Glass
 Special Eyes
 Synergys
 Visible Genomics*
 VTI

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 Keratoconus Specialists of Illinois
 International Keratoconus Academy
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 Indiana Univ., Illinois, UMSL, PCO, Midwest and SUNY Colleges of Optometry



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**Disclosures
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- Avellino Labs
- Acton
- Advanced Ophthalmic Systems
- BostonSight
- Bausch + Lomb
- Contamac
- CornealGen
- EycensLive
- EyePrintDoc
- Formlens
- Google
- Gas Permeable Lens Institute
- Glaukos
- International Keratoconus Academy
- Mojo Vision
- Ocular Surface Innovations
- Oculus
- Ocity
- STAPLE program
- Scleral Lens Education Society
- Spicra
- Synergys
- Visionary Optics
- VisiOnix

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**Disclosures
 Dr. Morgenstern**



- ◆ Alcon - Speaker
- ◆ American Optometric Association - Consultant
- ◆ Avellino - Speaker
- ◆ Chenega HealthServices, LLC* - Contractor
- ◆ Glaukos - Speaker
- ◆ International Keratoconus Academy - President
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**Disclosures
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CONSULTING/SPEAKER Allergan,
Avellino, EyePromise, Tarsus

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Technologies to Experience

Didactic followed by workshop

- Placido Topography
- Ocular Surface & Dry Eye Diagnostics
- Tomography
- Wavefront Aberrometry
- Specular Microscopy
- Anterior Segment Photography
- Corneal Genetic Testing
- Corneal Cross Linking

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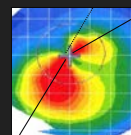
General Notes Applicable to All Devices

- Most important to assess the health of the eye
 - The lens is just a part of the management
 - Assess risk prior to lens fitting
- Universal metrics will be covered in the didactic
- Comparing metrics of the same device from different brands is not directly comparable
 - Measurements will be accurate and repeatable with same device over time
 - Even same brand may introduce error if not calibrated routinely
- Scan quality matters
 - Garbage in, garbage out
- Review of common technologies but certainly not every one
 - If you have questions about a non-covered specific technology, please ask us after the workshop

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Placido Based Corneal Topography

- Assess anterior corneal surface curvature
- Placido ring reflection
 - Affected by tear film quality - important to view ring image to assess artifacts
 - Mires: Smooth = normal, Broken = tear film
- Instantaneous capture
- Curvature with calculated elevation
- Symmetry most important
- Axial = smoothed, Tangential = exact
- Values of interest
 - K >47D
 - I-S >1.4D = top to bottom symmetry
 - Skew >20 degrees with >1.5D of Kcyl = axis symmetry



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Integrated Placido Topography & Ocular Surface/Dry Eye Diagnostic

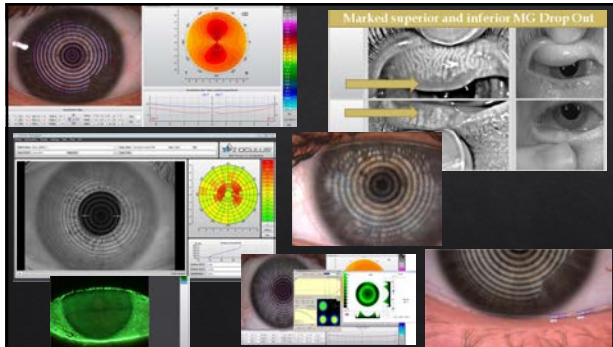


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Ocular Surface & Dry Eye Diagnostics

- Reflection and IR based imaging
- Devices are objectively quantifying data
 - Some automatically
- Static analysis
 - Meibography = morphology, drop out
 - Vital dye staining = extremely important
 - Tear meniscus height
- Dynamic analysis
 - Non-invasive tear break up = reflection on cornea, document first break in rings
 - Blink analysis = blink rate and incomplete blink
 - Interferometry = lipid layer thickness
- Values of Interest
 - NITBUT: <10sec
 - Staining: Cornea >5 punctate, Conjunctiva >9 punctate, Lid margin staining >2mm in length or >25% width

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Corneal/Anterior Segment Tomography Scheimpflug / ASOCT

- Cross-sectional imaging and reconstruction
 - Global corneal analysis
- Assess anterior, posterior and thickness
 - Multiple derived values
- Two main imaging technologies
 - Scheimpflug
 - OCT
- True elevation with calculated curvature
- Elevation maps: Float vs Apex
- Values of interest
 - Anterior curvature values: same metrics as previous
 - Anterior elevations >15um
 - Posterior elevations >20um
 - Corneal thickness <500um
 - Epithelial thickness difference >10um with donut pattern



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Integrated Scheimpflug Tomography Full Sequence Overview

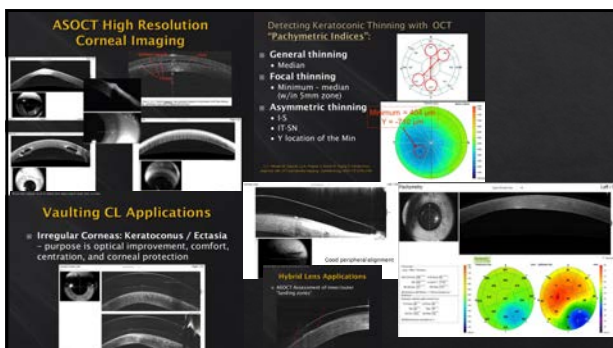


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Anterior Segment OCT

- ◆ Corneal Imaging
- ◆ Angle and iris assessment
- ◆ Global pachymetry – corneal disease dx & management
- ◆ Epithelial Thickness – keratoconus / ocular surface Dx / monitoring
- ◆ Contact Lens Applications - design and assessment

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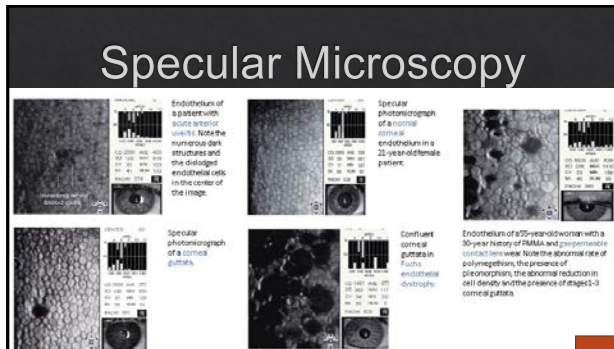
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Wavefront Aberrometry

- Objective measurement of optical quality
 - Measured in root mean squared microns
- Most common technology is Hartmann shack
- Highly sensitive, non-specific
 - Total ocular aberrometry = Includes cornea, lens, vitreous and retina
 - Calculate a specific structure if combined with other technology to ray trace based on curvature
- Directly affected by pupil size
- Aberrations
 - Lower Order: correctable with spectacles and it depends
 - Defocus = Myopia and Hyperopia, Astigmatism = Astigmatism (LOL)
 - Higher Order: non correctable with spectacles, mostly contribute to poor visual quality
 - Coma = Comet tail, Trefoil = Starburst, Spherical = Halo
 - Spherical Aberration: great for increase depth of focus but too much will disrupt vision
- Values of interest
 - Total HO RMS: >0.4um
 - Coma: >
 - Trefoil



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Specular Microscopy

- Objective analysis of endothelial cells
 - Cell density = number of cells
 - Hexagonal cell ratio = pleomorphism, loss of 6 sided shape
 - Coefficient of value = polymegathism, enlarged size
- Non-contact
- Direct visualization of cells
 - Guttata
- Symmetry is key
- Density does not necessarily equal function
 - Risk benefit and provocative testing will guide choices
- Values of interest
 - CD <1000 cells
 - HEX <50%
 - CV >40%

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Anterior Segment Photography

- Documentation
 - Ideal for comparison
 - Communication
 - Image analytics can allow for objective quantification
- Slit lamp techniques are critical to ability to image
 - Diffuse illumination: General imaging
 - Direct illumination: Subtle pathology
 - Optic Sections: Depth
 - Specular illumination: Endothelium
 - Sclerotic scatter: Opacity
 - Retro illumination: Opacity and reflex irregularity

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Genetic Testing Keratoconus / Corneal Dystrophy

- Objective risk analysis and diagnosis
- Buccal swab
- FDA approved (Avagen, Avellino, Menlo Park, CA)
- Diagnosis
 - Monogenic / Mendelian diseases: 1 gene = disease
 - 70 TGFBI Corneal Diseases
- Risk analysis
 - Polygenic diseases: Multiple genetic variants = risk for disease
 - Keratoconus
 - 75 keratoconus related genes / 2K+ gene variants
- Genetic counseling

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Corneal Cross Linking

- Treatment to slow or halt ectatic disease progression
- FDA approved **TREATMENT SYSTEM** (iLink, Glaukos, Irvine, CA) in 2016
 - Standard of care
 - Medicolegal implications
 - 2 parts make the treatment
 - UV-A illumination device = (KXL, Glaukos, Irvine, CA)
 - Riboflavin topical = (Photrex (riboflavin 5'-phosphate ophthalmic solution) 0.146%, Glaukos, Irvine, CA) and (Photrex Viscous (riboflavin 5'-phosphate in 20% dextran ophthalmic solution) 0.146%, Glaukos, Irvine, CA)
 - Labeling and indications
 - Progressive keratoconus & post refractive corneal ectasia
 - 14 years of age to 65 years of age

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ASYMMETRIC STEEP ELEVATED THIN ABERRATED HIGH VARIABILITY HIGH RISK

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BREAK INTO 5 EQUAL SIZED GROUPS FOR THE WETLAB

ROTATE STATIONS EVERY 10 MINUTES

WEAR A MASK

Thank you for attending

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