

Fitting Tips for the High Astigmatic and Irregular Cornea Patient

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Disclosures

- Some of the content of this COPE Accredited CE activity was prepared with assistance from B+L, Metro, and SynergEyes.
- Dr. Harthan has no direct financial or proprietary interest in any companies, products or services mentioned in this presentation.
- Dr. Harthan speaks, consults and/or does research for:
 - Allergan
 - B+L
 - Contamac
 - Metro
 - Shire



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Objectives

- Understand the new custom soft, hybrid, corneoscleral and scleral lens designs and their applications for the regular and irregular cornea.
- Review how to select initial lenses based on history, corneal profile and topographic analysis.
- Review dynamic lens assessment.
- Review lens evaluation for each design.
- Discuss common troubleshooting tips.
- Review clinical cases with anterior segment photography and videography.



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Case 1

- 7 year old
- Manifest refraction:
 - OD: +2.00 - 3.00 x 160, 20/40
 - OS: plano - 0.50 x 180, 20/20
- Cyclo:
 - OD: +3.00 - 3.50 x 160, 20/40
 - OS: +0.50 - 0.50 x 180, 20/20
- Family Ocular History:
 - 10 year old sister is -20.00 OU and has been wearing contact lenses since 18 months old



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Case 2

- 16 year old
- First time CL wearer
- Manifest Refraction:
 - OD: -8.75 - 4.50 x 035, 20/60
 - OS: -6.75 - 3.75 x 179, 20/50
- Patient has regular astigmatism- not keratoconic
- SLE unremarkable



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Case 3

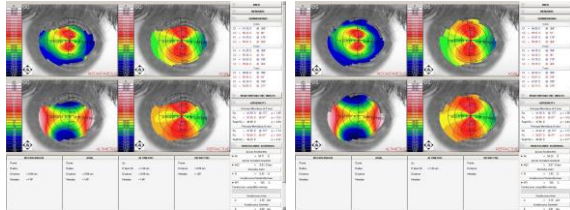
- 39 y/o HM
- Presented for GEE
- CC: blur @ distance & near, constant
- POH: SRx, tried CLs, no improvement
- PMH: unremarkable
- Meds: none
- VAcc: 20/100+, 20/25
- MRx:
 - OD +2.25-19.25x180, 20/40
 - OS +0.50-13.50x180, 20/25



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41.61/56.04

39.52/50.98



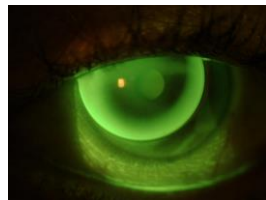
Custom Soft Lenses

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Why Soft Lenses?

- Patients need to wear lenses
- Improvement in lens fit
- Lens intolerance
 - GP lens
 - Hybrid lens



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Candidates for Custom Soft Lenses

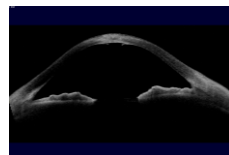
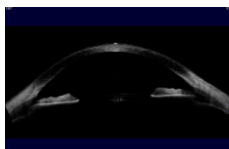
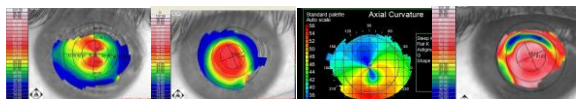
- High regular astigmatism
- High irregular astigmatism
- Post-refractive surgery
- Patients who have had intolerance to GP lenses
 - Corneal or scleral

- Unilateral KC
- Initial KC fits
 - Easier insertion and removal than sclerals or hybrids
- Pellucid
- Post-PKP
- Patients who dislike piggyback lenses

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Understanding Corneal Shape



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Base Curve

The base curve directly impacts VA.

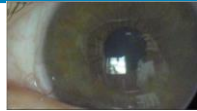
- In general, if your BC is too steep vision will be reduced.
- Steep- VA clearer immediately after blink, then slowly fades (CBS)
- Flat- VA blurred after blink then clears

- Over-refraction
 - Flat lenses tend to really fluctuate.
 - Steep lenses usually are immediately clear but worsen.

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Periphery



The skirt or periphery directly impacts fit.

- You need about 1 mm (or slightly more) movement on most of these.
 - The majority are fairly thick and you need some tear exchange.
- Steepen or flatten the periphery to achieve a fit devoid of bubbles.
 - When there is fluting steepen the periphery.
 - Steep 1, 2, 3
 - Flat 1, 2, 3

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Managing Patient Expectations

- May have to accept slightly decreased VA in exchange for increased comfort.
- Post refractive surgery patients tend to have highest expectations.
- Re-fitting to a different contact lens type takes time.

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Lens Care

- These lenses are often kept for an extended time frame
- In general, peroxide is the solution of choice
- Often supplemental cleaners are needed
 - Consider daily cleaners
- Replacement Monthly to Quarterly

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Basic Designs

- Particularly indicated when there is mostly lenticular cylinder

- Many labs:
 - Alden
 - Coopervision
 - Proclear XR® and
 - Biofinity XR® (Toric)
 - SpecialEyes
 - Metro
 - X-Cel

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CooperVision® Biofinity® XR and XR Toric

- Biofinity® XR
 - +15.00D to -20.00D
 - Monthly
 - 6 nights EW
- Biofinity® XR Toric
 - +10.00D to -10.00D
 - Cyl = -0.75D to -5.75D
 - Axes = 10 to 180, 5 to 180
 - Monthly
 - 6 nights EW

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Custom Designs (High Astigmatism and Irregular Cornea)

- KeraSoft® IC Design
- RevitalEyes® Post-Surgical (Metro)
- NovaKone (Alden)
- HydroKone™ (Visionary)
- RevEyes™ (Visionary)
- FlexLens (X-Cel)
- Specialeyes
- Many more!



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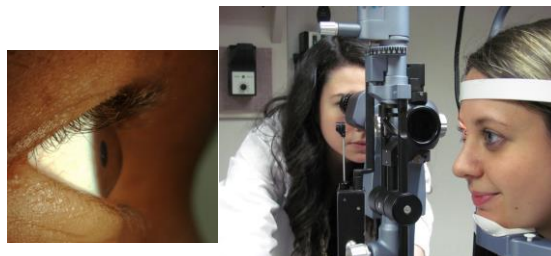
Fitting Process

- Refraction
- HVID
- Topography
- Profile
 - With slit lamp or even pen light
- Identify Corneal Shape
- Use fitting guide to select initial lens
- Use dynamic assessment form
- VA is directly dependent on BC
- Periphery determines comfort and position

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Corneal Profile



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Fitting Tips

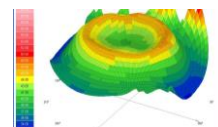
- Lenses are fit with reference to the overall corneal shape rather than the steepest area
- Re-trial if fit is not as expected
- Evaluate lens within 5 min
- Let lens settle for 20 min before over-refraction
- Ordering:
 - Make record of degrees of rotation and direction
 - Record over-refraction
 - Record back vertex distance
 - Record periphery

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Indications for Steep Peripheries

- When STD lenses show fluting or unstable rotation
- When steepening the base curve improves the fit but VA is then clearer after the blink
 - Remember C-B-S
- Post-refractive surgery
- Central KC with steep periphery
- Post-graft corneas
 - Oblate profile



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Indications for Flat Peripheries

- Flattening the periphery allows the lens to correctly drape over the central cornea.
- If STD lenses show central bubbles, general poor vision or VA clearer after blink and flattening the base curve improves VA but gives flat fit characteristics.

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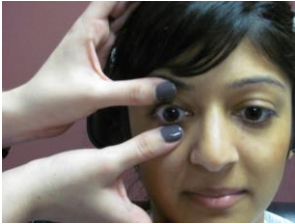
Additional fitting tips & Trouble shooting

- **Over-refraction is unstable**
 - Central fit may not be optimal
- **Visual Acuity Improves after blink**
 - Central fit is too steep
 - Try flatter base curve
- **Visual Acuity Declines after blink**
 - Central fit is too flat
 - Try steeper base curve

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Lens Removal



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Case 4

- 33 year old African American male presents for CL fitting to CL clinic.
- Pertinent ocular history: keratoconus OU
 - Diagnosed 6 years prior
- Systemic conditions: asthma
- Systemic medications: albuterol PRN

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Clinical Exam

- VAsc:
 - OD: 20/100
 - OS: 20/70
- Pupils equal, round, reactive to light and accommodation OD, OS
- EOMs: Full range of motion OD, OS
- Confrontation fields: Full to finger count OD, OS
- Refraction:
 - OD: +1.25 -4.25 x063, 20/60
 - OS: +2.50 -3.50 x089, 20/30
- IOP: 19mmHg OD, 18mmHg OS
- Posterior Segment WNL OD/OS

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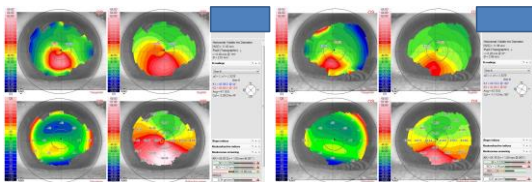
Previous CLs

- Has not worn CLs in 2 years
- Soft Torics
 - Good comfort; unstable vision
- GPs
 - Good vision, uncomfortable
 - Discontinued 3 years ago
- Started new internship and would like to not wear glasses
 - Image distortion

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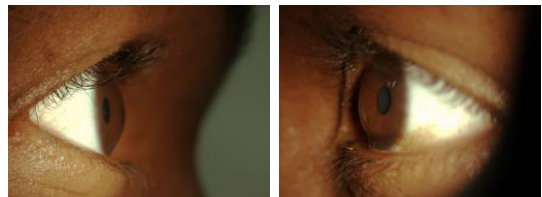
Topography



HVID = 11.83

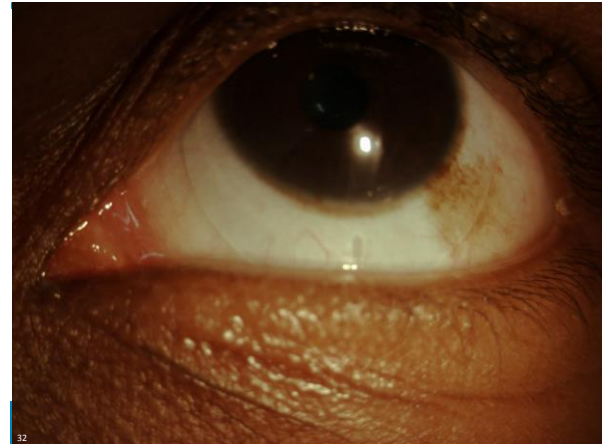
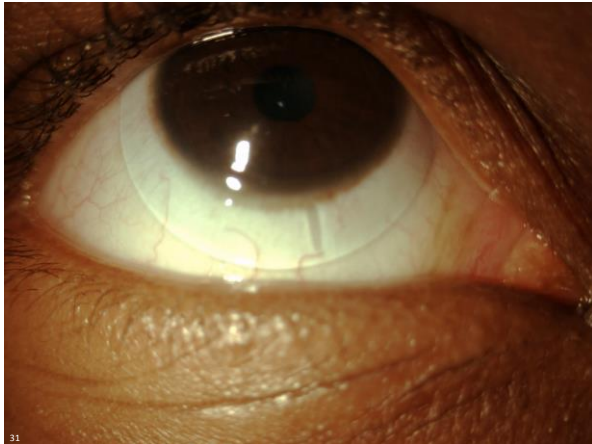
HVID = 11.96

Corneal Profile



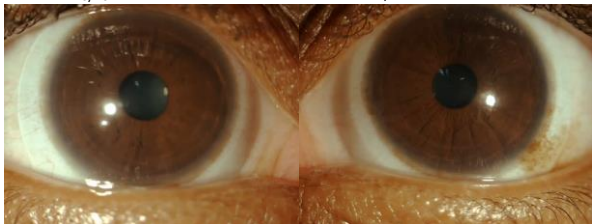
30





KeraSoft® IC Lenses

- OD: 8.8/ +1.00-3.50x060/14.5
- OS: 8.6/ -0.50-1.75x085/14.5
- VA 20/20
- VA 20/20



Patient Update

- Patient able to wear CLs comfortably for up to 16 hours/day.
- Started graduate school.
- Referred multiple patients to clinic secondary to satisfaction with new lenses.

Case 5

- 41 y/o AAF
- Keratoconus OU
- s/p intacs OD in 2005
- Reported blur at both distance and near.
- Dryness with current contact lenses.

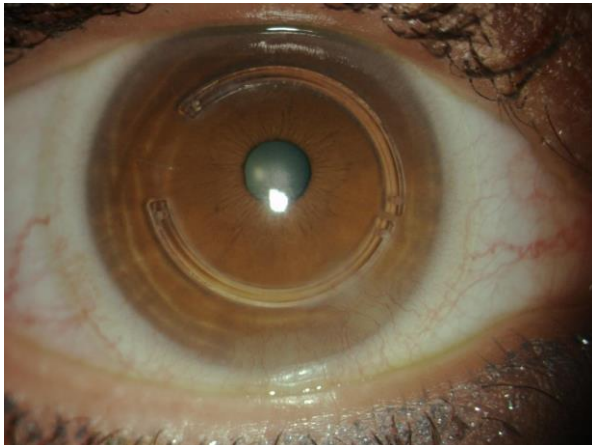
Refractive data

- VA (through patient's current soft CLs)
 - OD: -5.00-4.25x105, 20/25
 - OS: -5.50-7.00x110, 20/70
- New Spectacle Rx:
 - OD: -5.25-4.50x091, 20/30
 - OS: -2.50-7.25x110, 20/70
 - Add: +1.00, 20/25 at near

Additional Concerns

- Inferior neovascularization OD
- Dryness concerns
- Patient wears CLs 16-18 hours/day
- Patient does NOT want to wear GPs
- Patient needs MORE oxygen

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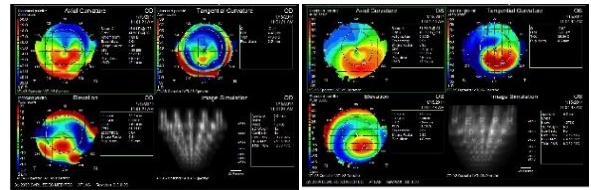


Hybrid Lens Designs

J. Harthan OD, FAOD



Topography



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Patient Update

- Patient cried at dispense
 - Overwhelmed with improvement in vision and comfort
- Patient able to wear CLs comfortably for up to 16 hours/day
- Corneal neovascularization stable; no progression after 1 year

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The Hybrid Advantage

- Clear GP vision with soft lens comfort
- Ideal for patients with astigmatism, presbyopia, keratoconus and irregular cornea.

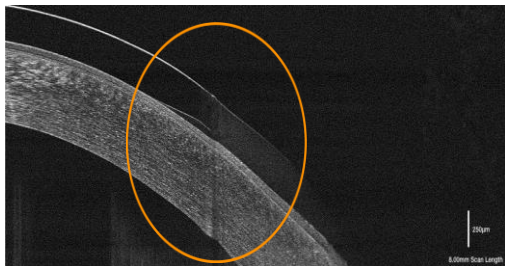


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Courtesy of SynergEyes



Distinguishing Feature: Hyperbond® Junction



Courtesy of SynergEyes



Vision Correction - Duette

Duette
CONTACT LENSES

Great Vision for Patients with Astigmatism

Diameter	14.5mm
Base Curves	7.1 to 8.3 in 0.1mm steps
Skirt Curves	8.7 Flat2, 8.4 Flat, 8.1 Medium
Lens Powers	+10.00 to -15.000 +8.00 to -8.000 in 0.250 steps +8.50 to +10.000 in 0.500 steps -8.50 to -15.000 in 0.500 steps
Materials	84 Dk Sily skirt, 130 Dk GP center
Class II UV blocker	UVA and UVB

Duette® Advanced Hybrid Design High Dk (84) Sily Skirt & Hyper Dk (130) GP utilizing patented HyperBond® technology.

Hyper Dk (130) GP center
Landing zone design enhances tear exchange & comfort
Tear lens optimizes vision
High Dk (84) Sily skirt

Courtesy of SynergEyes



Vision Correction-MultiFocal Duette Progressive

Duette
PROGRESSIVE
CONTACT LENSES

A Multifocal Lens with Progressive GP Vision & Soft Lens Comfort

NEW 2014

Diameter	14.5mm
Base Curves	7.1 to 8.3 in 0.1mm steps
Skirt Curves	8.7 Flat2, 8.4 Flat, 8.1 Medium
Lens Powers	+5.50 to -8.000 in 0.250 steps -8.50 to -10.000 in 0.500 steps
Add Zone Size	3.0mm
Add Powers	+1.000, +1.750 and +2.500
Materials	84 Dk Sily skirt, 130 Dk GP center
Class II UV blocker	>80% UVA and 95% UVB radiation
Wear & Replacement	Daily Wear. Replace at 6 months.

Courtesy of SynergEyes



Fitting: Order Empirically

- Applying same principles for GP or Soft lens fitting
- Factoring in corneal diameter for skirt selection
- Benefits of empirical ordering:
 - The ability to deliver an improved first lens experience
 - No investment in fitting sets
 - Reduces number of fitting visits

How To Fit Duette and Duette Progressive for Normal Corneas

- Empirical Fit
- Provide K's and Spec Rx
 - Add and Age for Duette Progressive
- 0.50D Steeper than Flat K
- Flat Skirt
- No Fluorescein Required

Lens Calculator

Enter your patient's name, corneal curvatures and spectacle prescription

K's

OD 44.50/45.00 x

OS 43.25/44.00 x

180

Rx

OD -4.25 - 0.50 x

OS -3.50 - 0.75 x

175

Duette Empirical Lens Calculator

Enter your patient's name, corneal curvatures and spectacle prescription

OD: 44.50 / 45.00 x

OS: 43.25 / 44.00 x

180

Rx: OD -4.25 - 0.50 x, OS -3.50 - 0.75 x

175

Recommended Lens Size: 14.5mm

Base Curve: 8.7 Flat2, 8.4 Flat, 8.1 Medium

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Lens Calculator

Instant analysis and recommendation for your patient's initial pair of Duette Progressive lenses

OD 7.5 BC with 8.4 radius skirt
-4.50D distance power
1.75D add power

OS 7.7 BC with 8.4 radius skirt
-4.00D distance power
1.75D add power

When Not To Prescribe Duette

- Severe dry eye patients who have been unsuccessful in other contact lenses. Treat ocular surface disease first before prescribing contact lenses.
- Lenticular cylinder
- Patients who seek convenience over everything else

Dispensing Visit

Set Patient Expectations!!!

- Patient may experience a period of adaptation to the feel of the lens
- Multifocal vision adaption
- Check binocular visual acuity for baseline
- I&R takes practice: make sure your patient is comfortable with process

Over-Refraction

- Take care not to over-minus
- Remember to be aware of possible residual astigmatism
 - Duette lenses do not correct lenticular astigmatism
- Allow enough time for the lenses to settle on the eye to get an accurate over-refraction

Duette Lens Assessment

- Coverage
- Centration
- Movement
 - 1 mm goal
- Comfort
- Acuity
- Over-refraction

Troubleshooting

- Inferior Decentration
 - Steepen lens
- Lens Edge Fluting
 - Steepen skirt (leave BC and power)
- Vision
 - Check for lens centration
 - Residual astigmatism- order enhanced profile
- No Movement
 - If BC correct, order with Flat 2 (8.7) skirt)
- Inadequate Comfort
 - Instill with several drops of solution

Inserting Duette Lenses

- Similar to inserting soft lenses
- Place the lens on the tip of finger
- A drop of preservative-free lubricant can be added to the bowl, if desired
- Pull down on the lower lid and gently place the lens on the eye
- Release the eyelid and blink several times



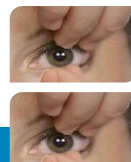
Courtesy of SynergEyes



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Removing Duette Lenses

- Dry fingers are key!
- Pinch bottom of soft skirt at the 5 & 7 o'clock position – keeping the pads of the fingers together as you pinch
- Hold the pinch for a count of two and lift lens away from the eye
- Dry your fingers before removing the next lens



Courtesy of SynergEyes



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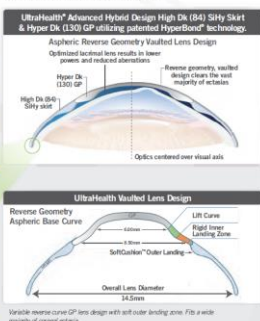
Irregular Cornea-UltraHealth

— **ULTRAHEALTH** The Most Advanced Hybrid Lens for Irregular Corneas

Diameter: 14.5mm
Vault Values: 50 to 550 in 50µ steps
8.7 FlatQ 50-250
Skirt Curves: 8.7 FlatQ, 8.4 Flat, 8.1 Medium, 7.9 Skirt
Lens Powers: +10.00 to -20.00
+10.00 to +2.50 in 0.500 steps
+2.00 to -8.00 in 0.250 steps
-8.50 to -20.00 in 0.500 steps
Materials: 84 Dk SiHy skirt, 130 Dk GP center
Class II UV blocker
Wear & Replacement: Daily Wear. Replace at 6 months.



UltraHealth Requires a Diagnostic Soft



Variable reverse curve GP lens design with soft outer landing zone. Fits a wide majority of corneal ectasia.

Courtesy of SynergEyes



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How To Fit UltraHealth for Irregular Corneas

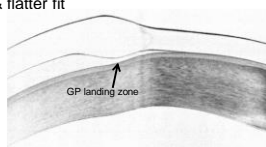
- Diagnostic Lens Fitting
- 3 Step Process
- Evaluate UltraHealth with Regular Fluorescein
- SiHy Skirt Does Not Lift and Sustain the GP Lens Portion Off The Cornea

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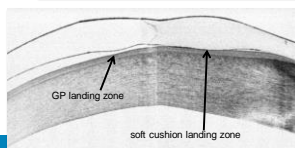
UltraHealth Design Improvements

New design, materials & flatter fit

ClearKone



UltraHealth
landing zones widened



Courtesy of SynergEyes



UltraHealth Fitting Sequence

- 1 Vault (μ)
- 2 Skirt radius
- 3 Power (D)

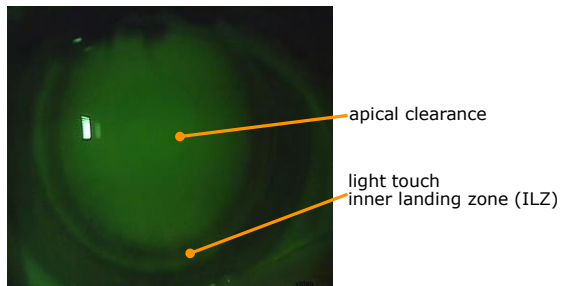
- Begin with 250µ, 8.4 flat skirt
- Ideal fit = 100µ above the apex of the cornea at dispensing
- Lens settles between 30µ-60µ with wear



Courtesy of SynergEyes



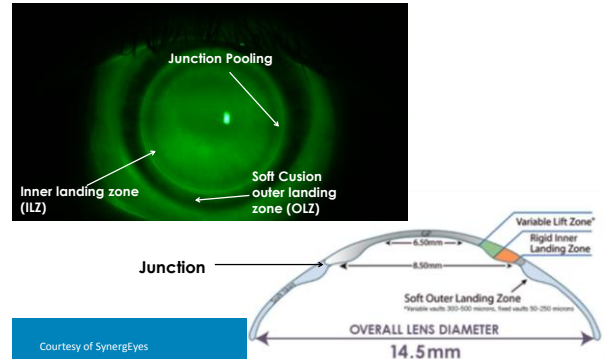
UltraHeath Ideal Fit



Courtesy of SynerEyes

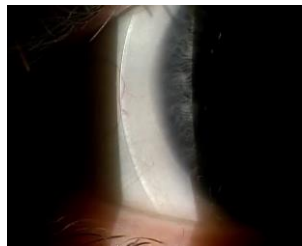


Skirt Determination – Ideal Fit



Courtesy of SynerEyes

UltraHeath Ideal Fit



½ - 1 mm movement with blink supports tear exchange

Courtesy of SynerEyes



ULTRAHEALTH^{FC}

NEW Hybrid Lens for Oblate Cornea

UltraHealth FC (Flat Curve)

- New lens series for flat corneas
- Lenses range from 55µ to 505µ in 50 micron steps and three skirt radii: 8.4, 8.1, 7.9
- Powers: +10.00D to -20.00D



radial keratotomy

Courtesy of SynerEyes



Recommended Solutions

Daily Cleaner

- Approved for both Soft and GP Materials

Disinfection Systems

- Hydrogen Peroxide
- ClearCare (Alcon)

- Biotrue (B&L)

Rewetting drops

- Approved for both Soft and GP Materials

Training Videos:

- <http://www.synergeyes.com/consumer/duette/videos/>
- <http://www.synergeyes.com/consumer/ultrahealth/videos-2/>



Courtesy of SynerEyes



Case 6

- 30 yo Female, Dx: Myopic Astigmatism
- Soft toric lens wear with fluctuating vision OU
- Presenting VA cCL: OD 20/30-, OS 20/25
- Refraction:
 - OD -1.75-1.25x008
 - OS -1.50-2.25x005
- Keratometry:
 - OD- 44.25/46.50
 - OS- 44.00/46.75

Duette Lenses Trialed
OD 7.5 -2.50 8.4 (flat)
OS 7.6 -2.00 8.4 (flat)

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Courtesy of SynerEyes



Lens Fit OD - 7.5 /-2.50/ 8.4 (flat)



- Slightly decentered
- Good movement
- +0.50 Over refraction
- Plan: Reorder lens slightly steeper for better centration
 - Duette 7.4 -2.50 8.4(flat)

**Although NaFI is not necessary to fit Duette, it can be used as a problem solver

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Courtesy of SynergEyes



Case 6 Dispense visit

- Dispensed Duette lenses:
 - OD 7.4/8.4 (flat)/-2.50
 - OS 7.5/8.4 (flat)/-2.00
- Great fit and comfort OU
- I&R training, lens care, build up wear-time

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Courtesy of SynergEyes



Follow Up

- Presenting Duette VA:
 - OD 20/20, OS 20/20
- Wear Time 12-16 hours per day
- Great comfort and fit
- Patient comment "I love my vision"
- "Comfort took a little getting used to but they are great now"

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Courtesy of SynergEyes



Scleral Lenses

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Sclerals

- CLEK study correlates corneal GP lens wear with scarring
- Options expanding
 - Opportunities growing due to
 - Materials
 - Higher Dk GP and soft lenses
 - Larger blanks for GPs
 - Computer lathes can generate asymmetric designs
 - Sclerals
 - Quickest growing segment of GP button sales
 - Have been used for several years for specialty labs

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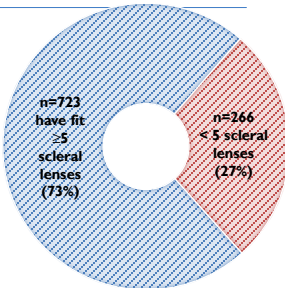
SCOPE: Scleral Lenses in Current Ophthalmic Practice Evaluation

- SCOPE I
 - Purpose:
 - Describe international scleral lens prescription and management practices
 - Method:
 - Fitters were asked to report their current scleral lens prescribing practices

Wang CL, Hartman J, Sherrer C, Rao J, Rao A, Choudhry NT, Hodge DO, Schumacher MM. Demographic Characteristics and Prescribing Patterns of Scleral Lens Fitters: The SCOPE Study. Eye Contact Lens. 2017;35(4):247-254.
Hartman J, Rao CL, Rao J, Rao A, Sherrer C, Choudhry NT, Hodge DO, Schumacher MM. Scleral Lens Prescription and Management Practices: The SCOPE Study. Eye Contact Lens. 2017;35(4):255-261.



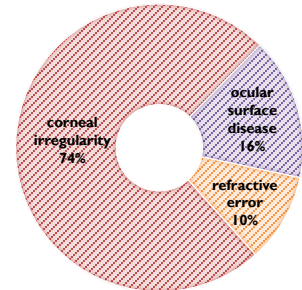
SCOPE I Results:
989 Respondents
>84,000 fits



Wong, C.H., Marshall, J., Sheehan, C., Chen, J., Chen, B., Choudhury, M., Dudgeon, D., Edwards, R.M., Epidemiologic Characteristics and Prescribing Patterns of Scleral Lens Fitting: The SCOPE Study. Eye Contact Lens. 2017 Jan 14.
Wong, C.H., Chen, J., Chen, B., Choudhury, M., Dudgeon, D., Edwards, R.M., Scleral Lens Prescription and Management Practices: The SCOPE Study. Eye Contact Lens. 2017 Apr 5.



SCOPE I Results:
Indications for Scleral
Lens Fitting



Wong, C.H., Marshall, J., Sheehan, C., Chen, J., Chen, B., Choudhury, M., Dudgeon, D., Edwards, R.M., Epidemiologic Characteristics and Prescribing Patterns of Scleral Lens Fitting: The SCOPE Study. Eye Contact Lens. 2017 Jan 14.
Wong, C.H., Chen, J., Chen, B., Choudhury, M., Dudgeon, D., Edwards, R.M., Scleral Lens Prescription and Management Practices: The SCOPE Study. Eye Contact Lens. 2017 Apr 5.



Prevalence of Corneal Irregularity

- Olmsted county, MN (Kennedy et al, 1986)
 - Frequency of KC = 1:2,000
 - Prevalence: 54.5 per 100,000
 - Diagnosis based on:
 - Scissoring reflex
 - Keratometry
 - M = F

- Netherlands (Godefrøij 2016)
 - Data extraction from largest health insurance provider
 - Annual incidence: 13.3 per 100,000
 - Prevalence: 265 per 100,000
 - 5- to 10-fold higher than previous studies

- Highly prevalent in Middle East, India, China
- 4:1 Asians to Caucasian
 - present at earlier age
 - require corneal graft at earlier age

Gruber, D., Moll, M., Riemann, H., Keratoconus is more prevalent than we thought. Contact Lens Spectrum. 2017 Apr 14-15.
Wong, C.H., Marshall, J., Sheehan, C., Chen, J., Chen, B., Choudhury, M., Dudgeon, D., Edwards, R.M., Epidemiologic Characteristics and Prescribing Patterns of Scleral Lens Fitting: The SCOPE Study. Eye Contact Lens. 2017 Jan 14.
Godefrøij, C.H., de Wit, C.A., Vermeulen, C.J., Oosterhof, W.M., Age-specific incidence and prevalence of keratoconus: a nationwide population study. Acta Ophthalmol. 2017 May 15;95(5):517-521.
Choudhury, M., Wong, C.H., Marshall, J., Sheehan, C., Chen, J., Chen, B., Choudhury, M., Dudgeon, D., Edwards, R.M., Scleral Lens Prescription and Management Practices: The SCOPE Study. Eye Contact Lens. 2017 Apr 5.



Prevalence of Dry Eye – DEWS II

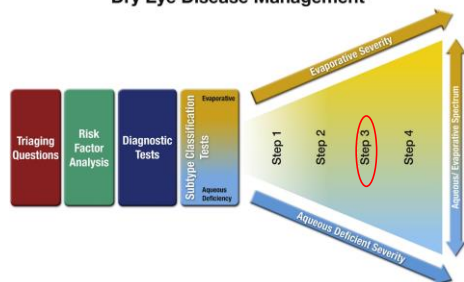
- Higher in Asian populations
- DES increases linearly with age
- Rate of MGD increases linearly with age
- High rates reported in:
 - Younger subjects
 - School children

- Differences in prevalence rate by sex become significant only with age.
- Limited studies evaluating disease incidence.

DeBorja, T., Finner, P., Borman, J., Johnson, K., Chen, C., Yu, K.C., Schumacher, D., Vithana, P., Vithana, J., Yu, K., Wang, L., TOSU DEWS II epidemiology report. Clin Exp Opt. 2017 Jul 15;91(2):224-242.



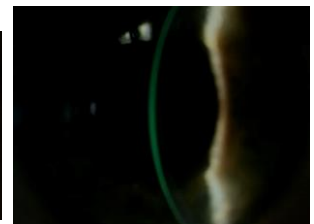
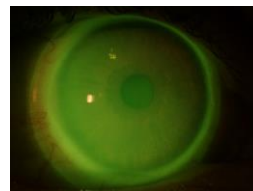
Dry Eye Disease Management



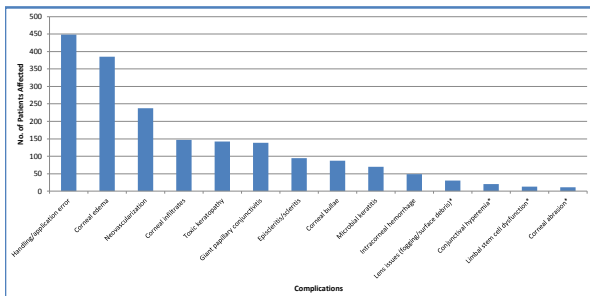
The Order for Dry Eye 2017 12, DTE-02000 (10-01-14) (rev 201705-06)



Well-Fitting Scleral Lens



SCOPE I: Reported Complications

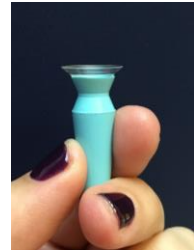


Bar CE, Hoffman G, Zoller C, Barr J, Ray A, Chinnai KT, Hodge DO, Schmeck MM. Ocular Health Characteristics and Prescribing Patterns of Scleral Lens Users: The SCOPE Study. Eye Contact Lens. 2017 Jun 14; 43(6):345-351. doi: 10.1177/1555259417708888. [Epub ahead of print].



Lens Selection

- Highly dependent on:
 - Prescription
 - Shape of the eye
 - Regularity of the eye
 - Steepness of the eye
 - Ocular surface disease
 - Lid tension



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Fitting the Regular Cornea

- Fit diagnostically or ordered empirically
- Lenses range from 13.5mm to 14.5 OAD
- Lens choice is impacted by corneal size
- Provide excellent comfort and vision
- Offer an excellent alternative for:
 - Corneal astigmatism
 - Patients who have failed with soft lenses
 - Good first option for new wearers with significant refractive error

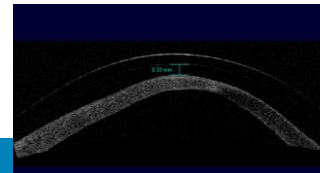


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Fitting the Irregular Cornea

- Size is based on how much irregularity there is and how delicate the cornea is.
- The larger the lens, the more fluid will bathe the cornea and help rehabilitate the ocular surface.
- With lenses that have extreme peaks and valleys, very large lenses can lead to bubbles.



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Candidates

Uncomplicated Refractive Error Irregular Corneas

- Post-hydrops
- Keratoconus
- Very uneven grafts
- Post- LASIK and refractive surgery
- Allows: increased wearing time, reduces corneal staining, improves VA

Damaged or Diseased Ocular Surface

- Steven's Johnson Syndrome
- Sjogren's Syndrome
- Graft-Versus-Host-Disease
- Instrumental in reducing further damage
- Serves as a tear reservoir to allow corneal healing and improved vision

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Diseased Surfaces

- Goal is to bathe the surface in fluid and to protect the ocular surface while enhancing vision.
- Must use a larger lens to create an appropriate fluid chamber.
- Role of Scleral Lenses in OSD:
 - Support the surface
 - Protect the surface
 - Mitigate symptoms
 - Vision rehabilitation
- Does not eliminate need for supplemental treatment!
- NOT curative!

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Lids

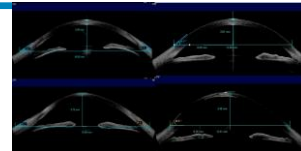


- Patients with small fissures need smaller lenses
- Critical with patients with cicatricial diseases like SJS and Scleroderma
 - Narrow fissures and tough and/or scarred skin
- Must select a lens that can be easily inserted between the lids

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Base Curve versus Sagitta



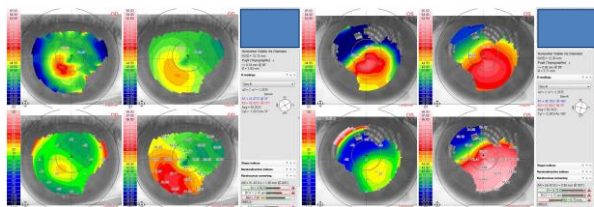
- Fittings sets come either way
- The fitting relationship is all about the sagitta
- Must keep in mind the height of the cornea
- Newer designs with greater customization in smaller diameters
- Availability:
 - As large as 26mm OAD
 - Larger lenses for more severe ocular surface disease
 - Variety of designs

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http://www.ebscohost.com/ehost/abstract?resultid=18884296&url=/openurl?url=/jstor/201307050906/1888429613000204/v1_301307050906/ehost/abstract/gr1.png



Topography – Observe shape, size, K readings, HVID

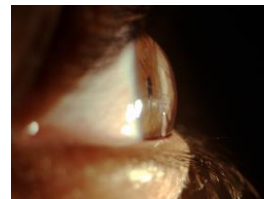


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Corneal Profile

- Works with any lens set
- May be done with or without the slit lamp

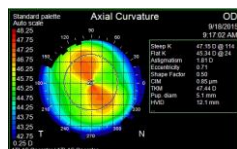


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How to select OAD

- Regular Corneas:
 - Topographical determination of HVID
 - Add approximately 2.0mm to the HVID
 - For the average 12.00mm cornea, select initial lens of 14.0mm diameter
- Comparable size to soft lenses



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Evaluation

- Three key zones:
 - Conjunctiva
 - Limbus
 - Central Cornea

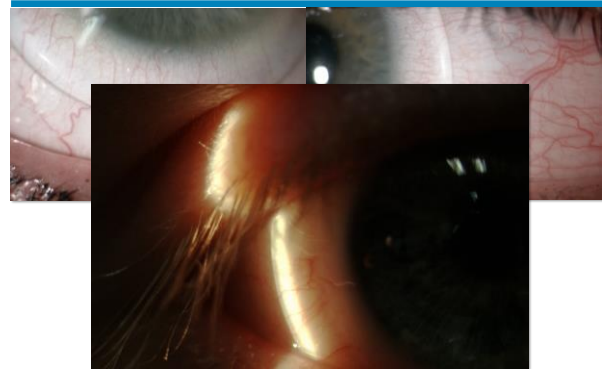
90



Conjunctiva

- Should look like a well fitting soft lens
- No drag or blanching
 - Look with high mag for blood flow in the conjunctival vessels
- No impingement
 - The lens should not compress or dig into the conjunctiva
 - Easily seen with OCT on raw image
- It is preferable that the conjunctiva is not pulled up under the lens
- Indirect view of edge
 - Assess for shadows that may indicate lift off

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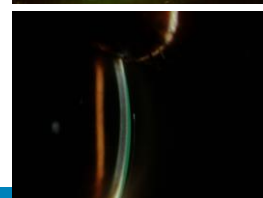


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Limbus

- The limbus must be cleared
- Compression at the limbus could damage delicate stem cells
- Observe with optic section and fluorescein
 - Optic Section
 - Should be able to perceive clearance
 - Overall
 - Fluorescein should obscure pattern
- Observe with OCT



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Central Cornea

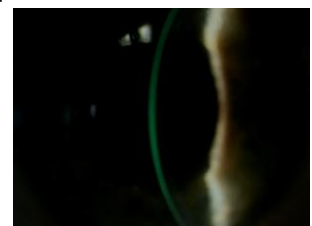
- Overall with fluorescein:
 - Helpful to determine relative clearance in comparison to limbus
 - If bowl was filled during fitting process, the pupil should be slightly obscured

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Optic Section

- Central area of lens should align with the cornea
- Depending on the fitting sets, goal = 150-300 microns of central clearance
- 1:1 relationship between lens thickness and post-lens tear layer



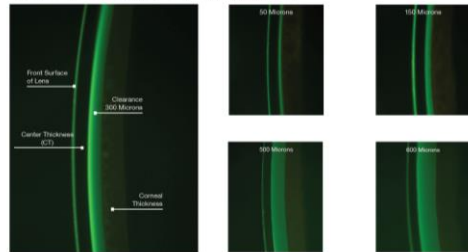
96



SCLERAL LENS FIT SCALES

To accurately estimate the amount of settling (settlement) underneath the posterior surface of a scleral lens necessitates a reference point for comparison. Although some have suggested central thickness for the reference, we prefer the

central thickness (CT) of the lens itself which will be listed on the manufacturer's invoice. In each of the examples below, the CT is 0.39mm (393 microns). In most scleral lens designs, the ideal amount of clearance is about 300 microns.



See website link for Central Reading and Optics

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Tear Exchange Evaluation

- A push up test should allow some movement of the lens
- Indenting the globe at the edge of the lens should create a small bubble or if using NaFI, should see if flow under the edge
- Applying NaFI to the surface of a settled lens should result in NaFI under the lens within 5 minutes

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Spin Test

- Rotate the lens with your finger
- The lens should spin freely
- Should not catch on the conjunctiva



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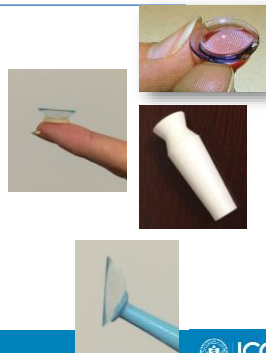
Lens Settling

- Lenses settle 50-150 microns
- Varies with the "softness" of the conjunctiva
- Importance of follow-up visits with lenses on for 2 hours minimum

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Lens Application & Removal

- Lens application: horizontal, fluid-filled
 - DMV Scleral Cup inserter
 - can cut off bottom
 - 2 or 3 finger "tripod" method
 - dental band
- Lens removal:
 - re-wet eye prior to removal
 - DMV Ultra remover
 - 2 finger method



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Lens Application

- High-tech
 - See-Green™ Lens Inserter
 - (Dalsey Adaptives)
 - Scleral lens suction cup with LED light
 - Scleral lens suction cup stand with wire slot
 - Scleral lens suction cup stand
 - Ezi Scleral Lens Applicator ring
- Low-tech



Credit: LLC-Tom Arnold

Scleral Lens Application

- Lens Handling
 - Hand washing: lanolin-free soap
- Filling the lens – COMPLETELY
 - Preservative free is essential
 - Saline 0.9% nebulizer vials (off label)
 - Unisol 4
 - PuriLens (off label)
 - LacriPure (FDA approved)
 - Preservative free tears
 - Optive
 - Systane
 - Celluvisc- may be added to PF saline to reduce spilling



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Scleral Lens Application

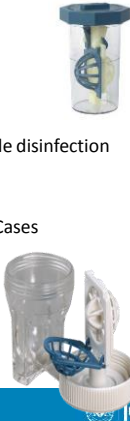


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Case Considerations

- Large PROSE Disinfection Case
 - Can use with catalyst from hydrogen peroxide disinfection system
 - Nightly use
- Modified Hydrogen Peroxide Cleaning System Cases
 - Break off the covers
- Menicon PROGENT Disinfection Case
 - Recommended for use every 2 weeks
 - Fits lenses 11-22mm



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Scleral Lens Removal

- Lenses are typically removed using a suction cup
 - Squeeze the moistened suction cup to grasp the lens
 - Apply it just below the line of sight
 - Use the suction cup like a fulcrum tipping it up forward to remove the lens
 - You may also use the other hand to push gently with the lid on the edge of the scleral lens breaking the suction and allowing for removal

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Scleral Lens Removal



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Troubleshooting

PROBLEM	REASON	SOLUTION
Large central bubble	Insertion bubble	Remove lens Use more viscous solution Decrease vault
Lens awareness	Edge lift	Steepen haptic Toric haptic
Central corneal staining	Solution toxicity Not enough central vault	Change to PF solution Increase vault
Limbal corneal staining	Solution toxicity Not enough limbal clearance	Change to PF solution Steepen limbal vault Goal: 40-80 microns
Conjunctival staining	Steep haptic	Flatten haptic Toric haptic
Reduced vision	Over-refraction Poor wettability	Front-surface toric Surface treatment

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Surface Non-Wetting

- Frequent rewetting drops and blinking
- 'Windshield wiper' with sterile cotton tip applicator
- 'Squeegee' front surface with suction cup
- Remove, clean, reapply
- Stronger cleaners:
 - Daily extra strength cleaner/MiraFlow
 - Ultrazyme Enzymatic Cleaner
 - Boston One-Step Liquid Enzymatic Cleaner
 - Menicon PROGENT
- Surface Treatment
 - Manage OSD
 - HydraPeg



Debris Under the Lens

- 1st: Adjust fit
 - Eliminate corneal and limbal touch
 - Minimize vault and excessive edge lift (immediate NaFl exchange)
- 2nd: Trial filling bowl with a few gtts preservative free artificial tears
- 3rd: Rinse lens with preservative free saline if storing in preserved solution
- 4th: Recommend morning 'eye dunk' prior to lens application or midday side rinse with preservative free saline



Case 7

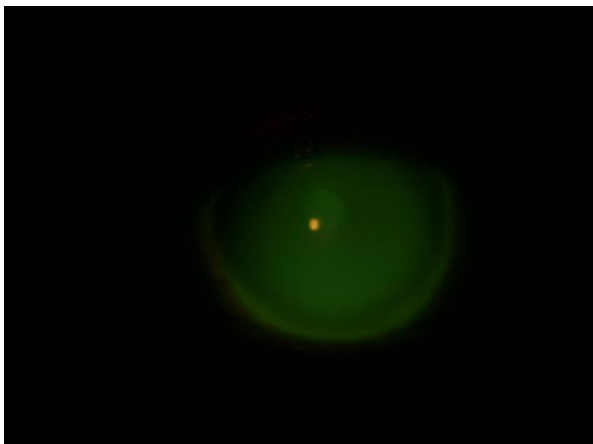
- 24 y/o CF presented with complaints of blurred vision OD>OS
- Has worn soft contact lenses for years
 - Good comfort
 - Can only wear for 6-8 hours
 - Blurred vision
 - Fluctuates throughout the day OD>OS
- PMH: seasonal allergies
- POH: unremarkable
- Medications: Allegra PRN

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- VA cc:
 - OD: 20/25
 - OS: 20/20
- Manifest Refraction:
 - OD: +4.00-3.75x 170, 20/25+
 - OS: +4.00-0.75x 175, 20/20
- Soft lens evaluation:
 - Full corneal coverage, decentration, movement 1mm, unstable rotation OD

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Case 8

- 61 y/o HF presented for CL fitting
- Had multiple corneal surgeries in Mexico in 1992 to correct "astigmatism"
 - Had another one in 1998
- PMH: unremarkable
- POH: pain upon awakening per patient
- Medications: none

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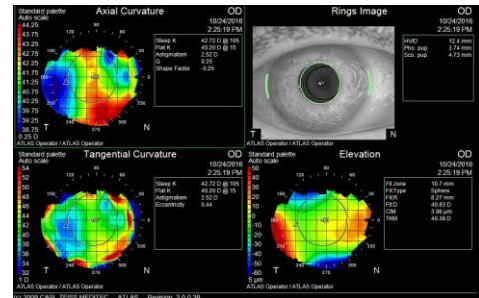


- VA cc
 - OD: 20/30-
 - OS: 20/40-
- Refraction:
 - OD: +3.50-1.50x013, +2.50, 20/25+
 - OS: +4.00-1.25x010, +2.50, 20/25

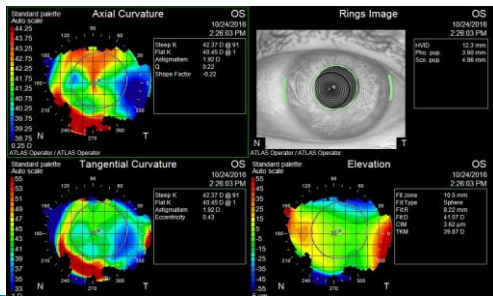
115



Topography OD K's 40.20/42.72



Topography OS K's 40.45/42.37



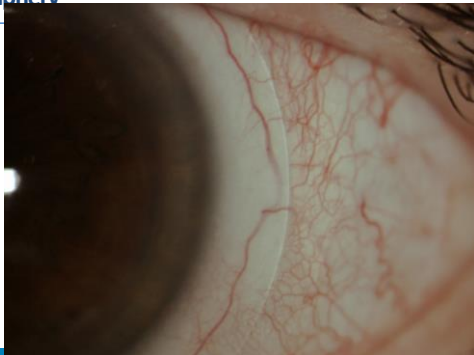
Scleral Lenses



7.40/+0.25/15.60/ add +3.00
VA 20/20-

7.20/3.00/15.60/ add +3.00
VA 20/25+

Periphery



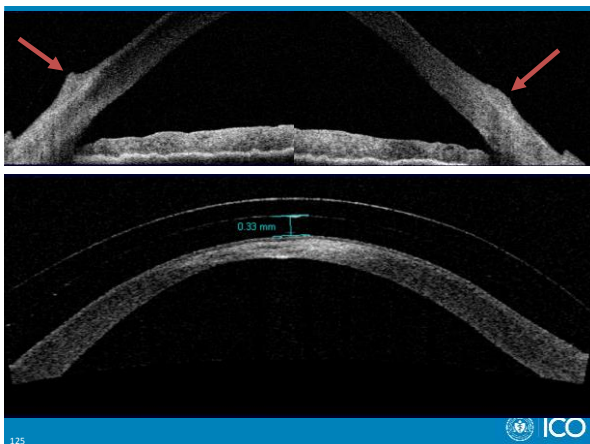
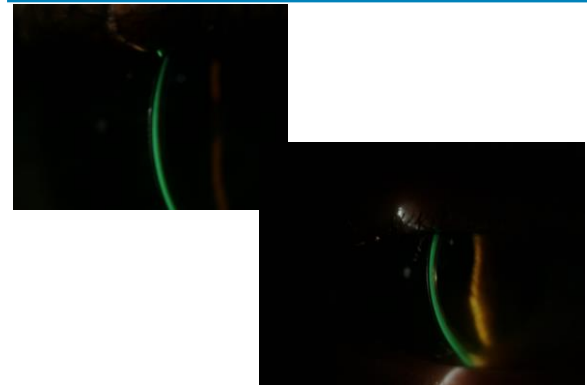
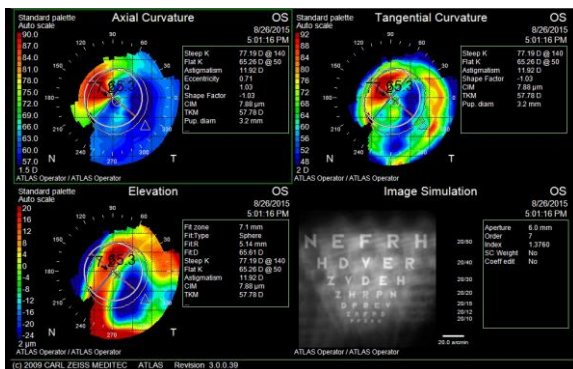
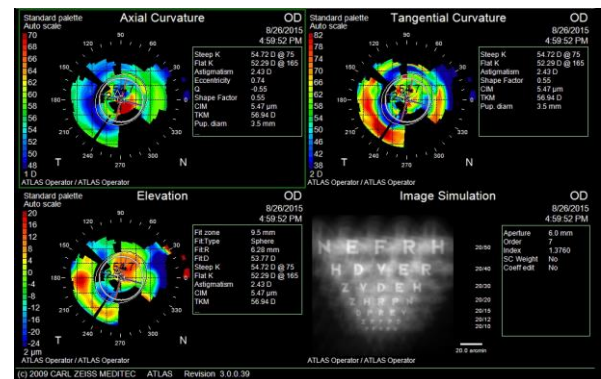
Case 9

- 44 y/o CM presented for CL fitting
- Diagnosed with KCN over 15 years ago
 - Currently wearing piggyback lenses
 - Acceptable comfort
 - Does not like handling 2 pairs of lenses
- PMH: asthma, sleep apnea
- POH: KCN
- Medications: inhaler PRN, cpap machine

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- VA cc (through piggyback lens system):
 - OD: 20/50
 - OS: 20/40+
- Refraction:
 - OD: -16.00-3.75x180, 20/200
 - OS: -14.50-2.75x180, 20/150



Case 10

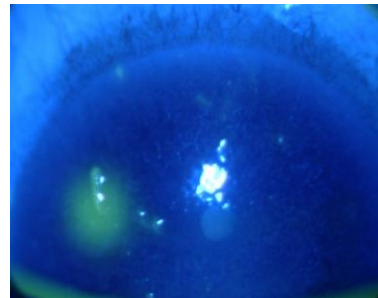
- 70 y/o CF presented for CL fitting
- Sjögren's Syndrome
 - Restasis
 - NPATs, gel, ointment
 - Autologous serum
 - BCL
 - Moisture goggles
 - Punctal plugs

- VA cc (through SRx):
 - OD: 20/25 distance, 20/25 near
 - OS: 20/30+ distance, 20/25 near
- Refraction:
 - OD: -1.00-1.00x005, add +2.50, 20/20-
 - OS: -0.50-1.00x160, add +2.50, 20/20-
- Corneal Diameter: 12.7 mm OD, 12.9 mm OS

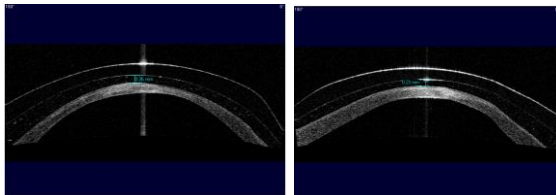
127



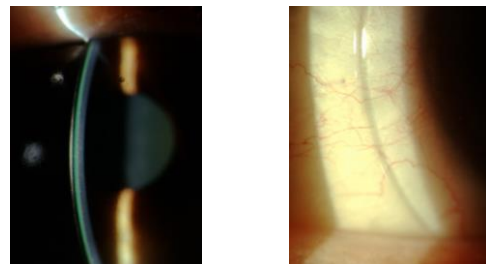
Ocular Staining OD, with Filament



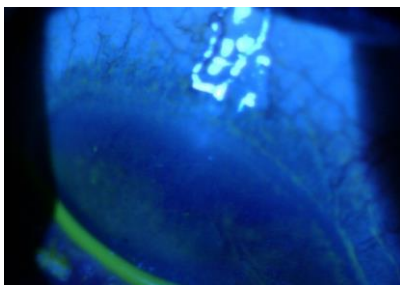
Visante™ OCT of Scleral Lenses



Adequate Fit



Corneal Staining After One Month of Scleral Lens Wear



Conclusion

- Very successful products for a variety of patients
 - New lens designs can be utilized for a variety of irregular corneal conditions
- Select product based on needs
- Assess vision, movement, rotation, comfort and over-refraction to finalize order
- Evaluating the corneal profile can be very helpful for initial lens selection

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Questions??
JHarthan@ico.edu