

**Scleral Lens
Grand Rounds:
Basic**

Maria K Walker, OD, PhD

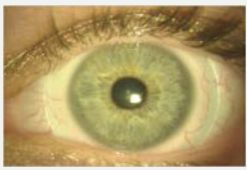
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FINANCIAL DISCLOSURES

- In the past year, Dr. Walker has received research funding or honoraria from the following for-profit companies:
 - Alcon Laboratories
 - ABB Optical
 - Bausch Health Specialty Vision Products

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Scleral Lenses in 2022



- Over 20 brands from over 15 manufacturers
- 14-22mm in diameter
- Advancements in
 - Design
 - Free-form landing zones
 - Multifocal/aberration control optics
 - Material
 - High Dk (up to 200)
 - Coatings
 - Technology for fitting
 - Scleral topography
 - Aberration measurement
 - Understanding of outcomes
 - Edema/IOP/corneal health
 - Safety of SL more established

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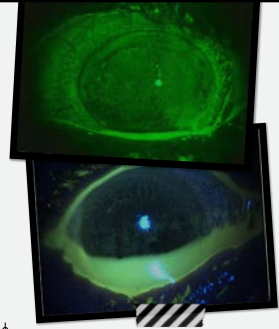
Indications for SL wear

- Keratoconus
- Pellucid Marginal Degeneration
- Post-LASIK Ectasia
- Post-Radial Keratectomy
- Post-Penetrating Keratoplasty
- Post-Infectious Irregularities
 - Herpetic
- Post-Scarring / Surgical
 - Penetrating injury scars
 - Suture irregularities



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Indications for SL wear



- Graft versus Host disease
- Sjogrens
- Sarcoidosis
- Rheumatoid Arthritis
- Ocular surface exposure (post-surgical)
- Neurotrophic Keratopathy
- Neuropathic Ocular Pain
- Limbal Stem Cell Deficiency
- Ocular Cicatricial Pemphigoid
- Familial Dysautonomia
- Ocular Allergies
- Steven's Johnsons syndrome

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**Case 1:
Keratoconus**



- + Patient SP, 38yo WM
- + KC for 15+ years
- + Wears PureVision toric OD
 - -4.25-1.75x020 20/20
- + Scleral lens OS
 - Fit without scleral topography

Left eye

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Keratoconus

- + Patient SP, 38yo WM
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 - -4.25-1.75x020 20/20
- + Scleral lens OS
 - Fit without scleral topography

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Keratoconus

- + Initial lens parameters
- + Diameter: 17.0
- + Shape: prolate
- + SAG: 4900
- + PWR: -3.00-1.75x180
- + Landing zone: flat2(+60um)/steep2(-60)
- + Material: Dk 100 (Boston XO)

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"Late Forming" Bubbles

- + Small micro-bubbles
- + Indicative of edge lift
- + NaFl can help visualize

New lens ordered:
 flat 2 x steep 6
 (120um more toricity)
 -3.00-1.75x160
 (24deg rotation)

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Keratoconus

- + TRIAL 2 LENS
- + Diameter: 17.0
- + Shape: prolate
- + SAG: 4950
- + PWR: -3.00-1.75x160
- + Landing zone: flat2(+60um)/steep6(-180)
- + Material: Dk 100 (Boston XO)

New lens ordered:
 flat 2 x steep 9
 (90um more toricity)
 -3.50-1.25x172
 (SCOR over-refraction)

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Case 1: Keratoconus

- + FINAL LENS
- + Diameter: 17.0
- + Shape: prolate
- + SAG: 4950
- + PWR: -3.50-1.25x172
- + Landing zone: flat2(+60um)/steep9(-270)
- + Material: Dk 100 (Boston XO)

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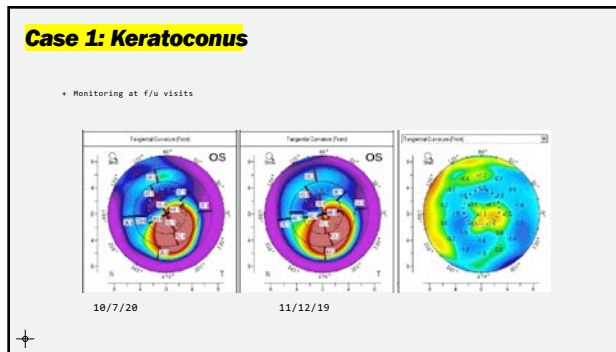
Keratoconus

- + Comparing between initial and final lenses
- + Initial lens: flat 2 x steep 2
- + Final lens: flat 2 x steep 9
- + Rotational differences, power updates

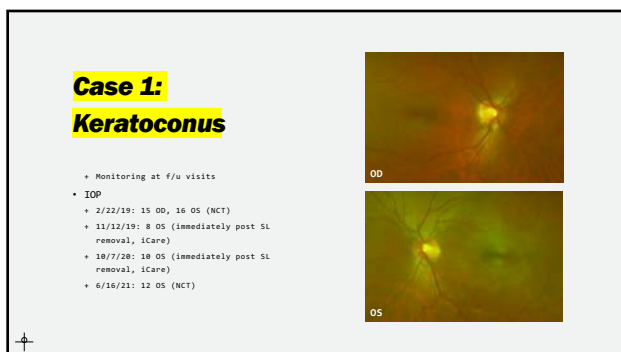
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**Key Takeaways:
Keratoconus Case**

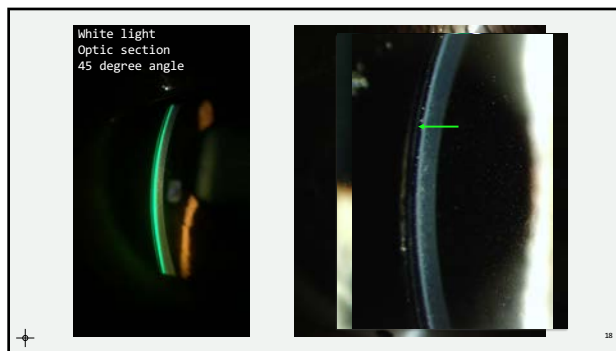
- You usually need more lens landing zone toricity than you think
- Appearance (especially of a flat edge) may be misleading
- NaFl can be extremely useful in evaluating the edges of a lens
- Tomography is useful for disease progression and monitoring health during SL wear

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**Key Takeaways:
Keratoconus Case**

- You usually need more lens landing zone toricity than you think
- NaFl can be extremely useful in evaluating the edges of a lens
- Tomography is useful for disease progression and monitoring health during SL wear
- Additional consideration (not appreciated here): Don't expect a uniform fluid reservoir

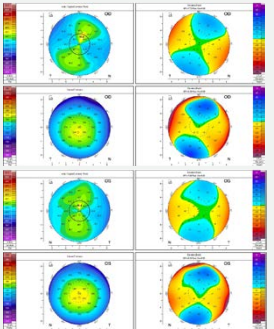
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**Case 2:
High Myopia**

- + Patient HR, 44yo Asian female
- + Longtime corneal GP wearer - new patient to UEI, unhappy with comfort of GP
- + (+)refractive amblyopia OS
- + Refraction:
 - -14.75 +1.75
 - -17.25-1.25x001 +1.75




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High Myopia

- Lens 1: OD
 - 14.8mm Dia
 - 7.67mm BC
 - -14.00 pwr +1.00 add
 - 1.5mm near zone, 0.5mm SN
 - 3900 sag
- Lens 1: OS
 - 14.8mm Dia
 - 7.67mm BC
 - -15.25 pwr +1.00 add
 - 2.0mm near zone, 0.5mm SN
 - 3900 sag

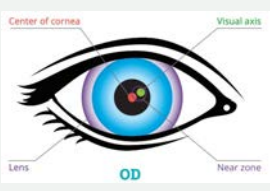
Landing zone: flat 2 x steep 2 OU



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Multifocal Scleral Lenses

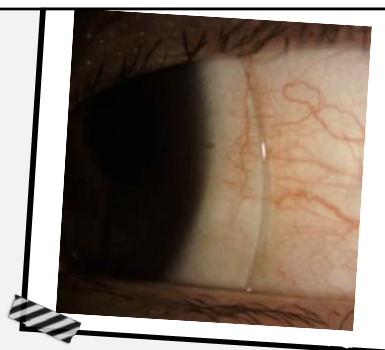
- + Offset of multifocal optic
 - 0.5mm superior nasal
- + Near zone with different diameters
 - 1.5mm on dominant eye
 - 2.0mm on non-dominant eye



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High Myopia

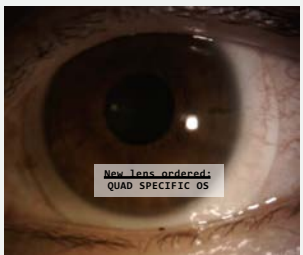
- + Mild impingement temporally OS
- + Discomfort starting at hour 4-5
- + "extreme" discomfort and "extreme" redness lasting overnight



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High Myopia

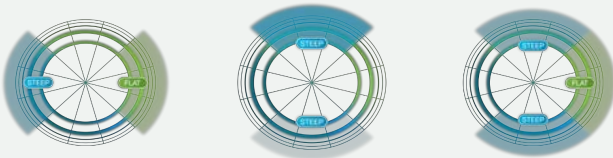
- + TRIAL 2 LENS
- + Diameter: 14.8 OU
- + SAG: 3900 / 4000
- + PWR: OD: -14.00; OS: -15.25
- + Landing zone: OS: flat 5/steep 3
- + Material: Dk 100 (Boston XO)



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Quadrant-Specific Lenses

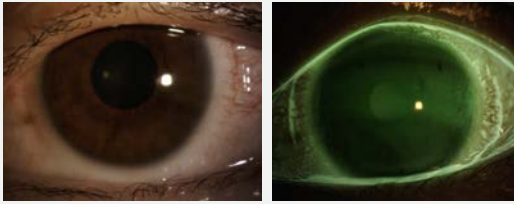
+ NaFl to visualize landing zone



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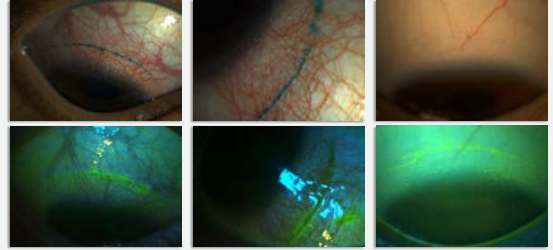
Quadrant-Specific Lenses

+ White light and NaFl post-removal to visualize landing area



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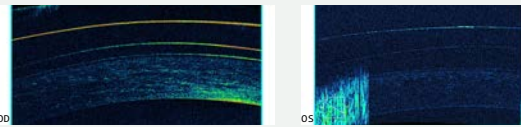
Tip: Use Lissamine Green & NaFl



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OCT

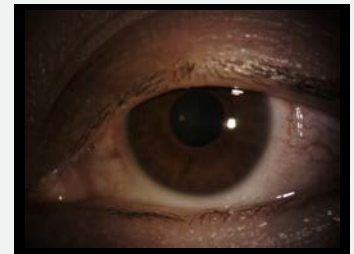
+ Can be useful for areas of low clearance
 + Consider side effects of excessive clearance (MDF, hypoxia)



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Case 2: High Myopia

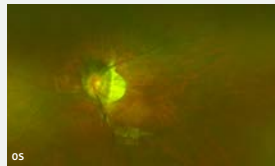
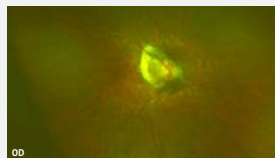
Staining and hyperemia post-removal



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Case 2: High Myopia

+ Progressing staphyloma
 • IOP
 + 9/21/21: 14 OD, 17 OS (NCT)
 + 10/21/21: 15 OD, 15 OS (immediately post SL removal, iCare)
 + 11/11/21: 16 OD, 17 OS (immediately post SL removal, iCare)



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**Key Takeaways:
 High Myopia Case**

- Every patient has different sensitivities to lens fits
- Landing edge modification needs can be subtle
- Technology is only as useful as the data you get from it
- Don't forget to manage and monitor the underlying disease

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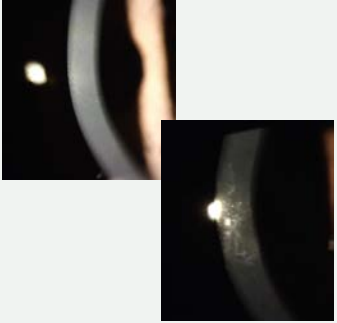
Case 3:
Keratoconus (#2)

- + Patient SM, 41yo AA female
- + KC - official Dx recently but history of reduced vision for "years"
- + Seen 3 mo ago and referred for CXL consult - here for 2nd opinion
 - Also being monitored as glaucoma suspect - IOP fluctuated with recent weight loss
- + Medical h/x (+)for recent gastrectomy
- + Currently not wearing any lenses - h/o GP wear with poor comfort
- + Kc eval and scleral lens fit OU
 - Used sMap scleral topography

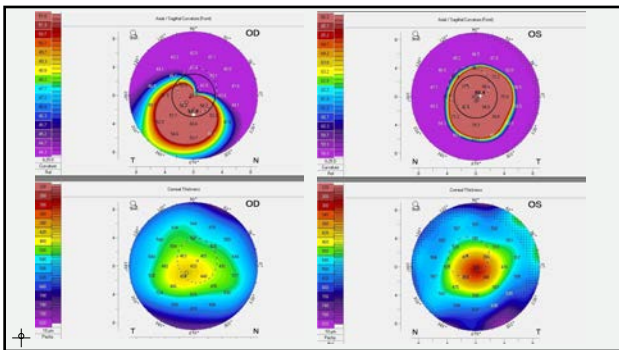
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Keratoconus

- + Patient SM, 41yo AA female
- + Kc evaluation
 - OD: relatively mild (+)FR, no other signs
 - OS: more severe (+)FR, thinning, striae, munsons

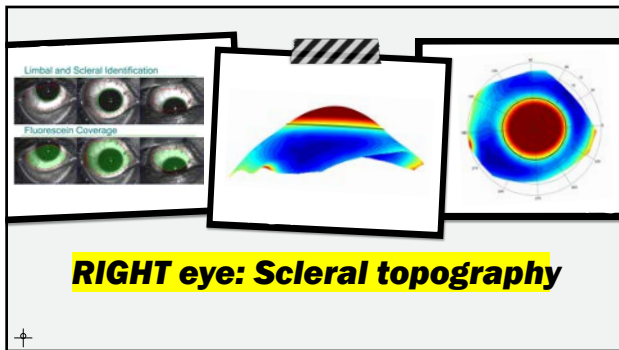


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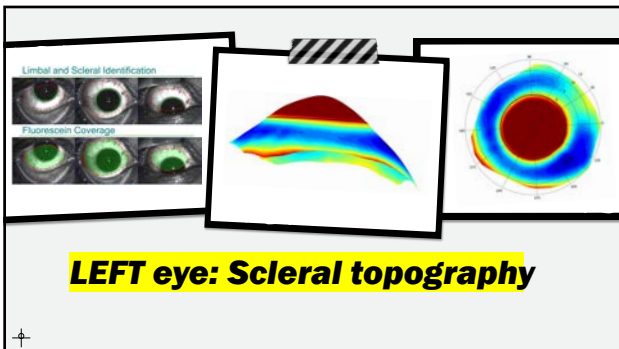
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RIGHT eye: Scleral topography



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LEFT eye: Scleral topography



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Keratoconus


- + Initial lens parameters: OD
- + Diameter: 16.0
- + Shape: prolate
- + SAG: 4664
- + PWR: -3.50
- + Landing zone: 163um toric at axis 080
- + Material: Dk 100 (Hexa100)



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Keratoconus

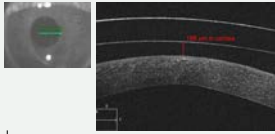

- + Initial lens parameters: OS
- + Diameter: 16.0
- + Shape: prolate
- + SAG: 4992
- + PWR: -2.50
- + Landing zone: 134um toric at axis 090
- + Material: Dk 100 (Hexa100)



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Keratoconus

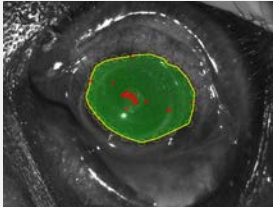
- + Using OCT technology
- + Area of close fit apically
- + Kc typically has uneven FR

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One...and, done!

- + Advantages of scleral topography
 - Faster to get to final lens
 - Saves time and money later
- + Disadvantages of scleral topography
 - Can be challenging to acquire scan
 - Money for you and patient \$\$\$



Main factor affecting scan:
Palpebral aperture size

Tip: select scleral topography patients that will be successful!

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Keratoconus: Case 3

- + RIGHT eye
- + Assessment of fit with NaFl
- + Tear exchange
- + Landing zone



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Keratoconus: Case 3


- + LEFT eye
- + Assessment of fit with NaFl
- + Tear exchange
- + Landing zone



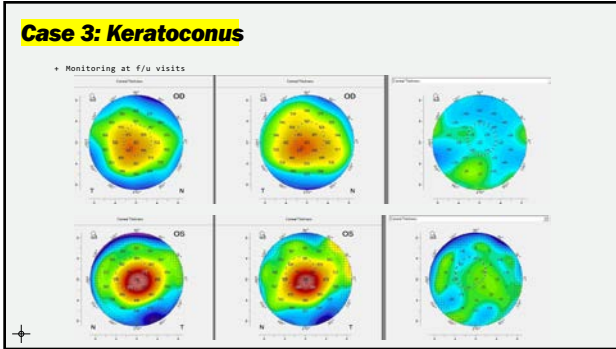
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Keratoconus: Case 3

- + POST-removal staining
- + Epithelial bogging
- + Kc-type staining
- Vertical anterior striae



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Case 3: Keratoconus

+ Factors:

- Age
- Progression

+ (risks for further progression)

- Cost

Corneal-crosslinking candidate?

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Case 3: Keratoconus

+ ONH: 0.4 c/d OU

- IOP

+ 10/7/21: 13 OD, 6 OS (NCT)

+ 12/02/21: 9 OD, 5 OS (immediately post SL removal, iCare)

+ Discussion of IOP and ONH health in SL wear

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Key Takeaways: Keratoconus (2nd) Case

- Scleral topography can have many benefits
 - Reduces lens remakes
 - Makes fitting process more efficient for doctor and patient
- NaFl can be extremely useful in evaluating the edges of a lens
- Proper counseling on CXL and who is candidate is important

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Thank you for your attention

Questions?

Feel free to email me with questions:
mkwalker@central.uh.edu

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