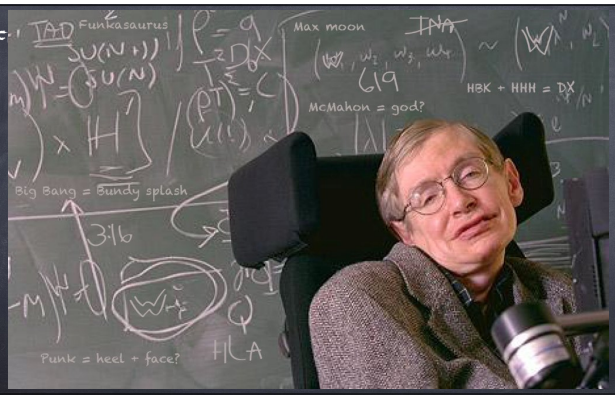
Scleral Lens Troubleshooting

"dont go lookin' for trouble, 'cos trouble will find you."
Steve Goodman

Tom Arnold, OD, FSLS

"Fitting sclerals is easy.....until it's hard."

-Dr. John Potter

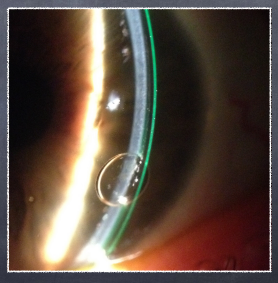


- Disclosures
  - Laboratorios Lumilent
  - Bausch & Lomb SVP
  - Blanchard Lab
  - EyePrint Prosthetics
  - BostonSight
  - Oculus USA
  - Eaglet Eye

Favourite band -The Beatles

Lesson 1 - Bubbles

- Two different scenarios:
  - Insertion
  - During wear



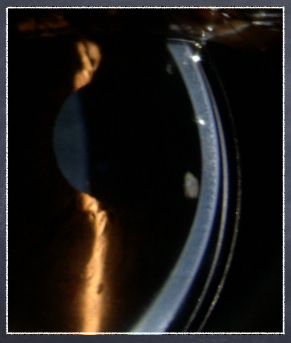
Insertion bubbles

Causes:
- Not enough saline in bowl
- Not aligned properly
- Applying w/ too much force

Remedies:
- Over-fill bowl
- Insert gently
- Use a stand
- Add 3-5 drops of viscous tears first - top up w/ saline

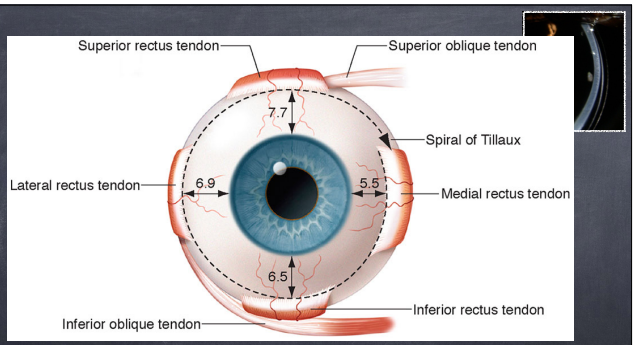
Bubbles during wear

- Causes:
  - Haptic not aligned
  - Too much central vault creates pumping action
- Remedies:
  - Toric haptic
  - Scleral toricity may be 300 μm in "normal" eye
  - Decrease vault



Lesson 2 - Decentration

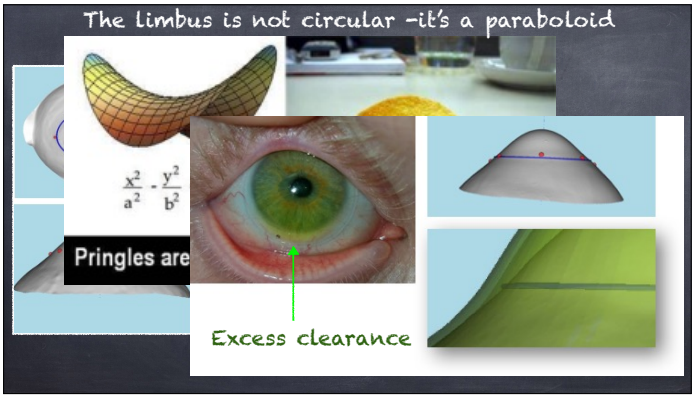
Spiral of Tillaux



Spiral of Tillaux

Which means that.....

The limbus is not circular -it's a paraboloid



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RESEARCH & SCIENCE

Original Research

QUALITATIVE ASSESSMENT OF SCLERAL SHAPE PATTERNS USING A NEW WIDE FIELD OCULAR SURFACE ELEVATION TOPOGRAPHER: THE SSSG STUDY

By Gregory DeNaeyer, OD[1], Donald R. Sanders, MD, PhD[2], Elef van der Worp, OD[3], Jason Jedlicka, OD[4], Langis Michaud, OD[5], Sheila Morrison, OD[6]

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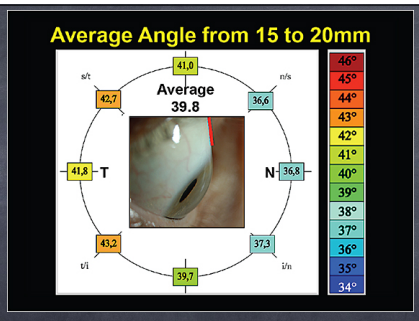
Scleral Surface Patterns

Table 1 Scleral Surface Patterns Observed in 140 Scleral Lens Patients

Group	Pattern Description	N(%)
1	Spherical	8 (5.7%)
2	Toric-Regular	40 (28.6%)
3	Asymmetric High or Low Points	57 (40.7%)
4	Periodicity different from 180°	35 (25%)

65.7%



Scleral is straight from the limbus

courtesy of Pacific University - Kojima & Caroline

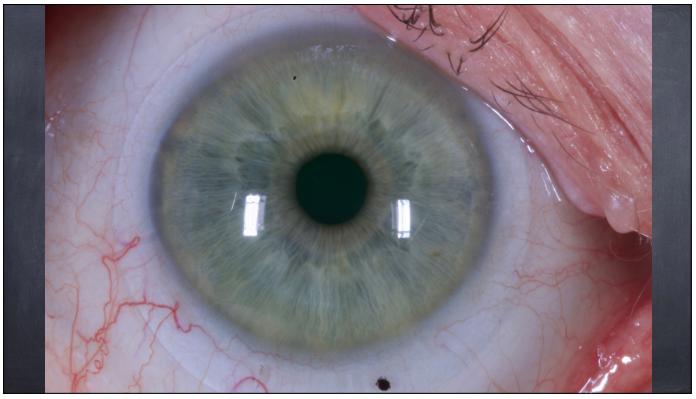
Remedies for decentration

- Toric haptic (haptic -from the Greek "haptikós"- to grasp or touch)
- Steepen the haptic the vertical meridian
  - Keep in mind that this may be the "flatter" meridian in "against-the-rule" scleral toricity
- Wider, straighter haptic may help

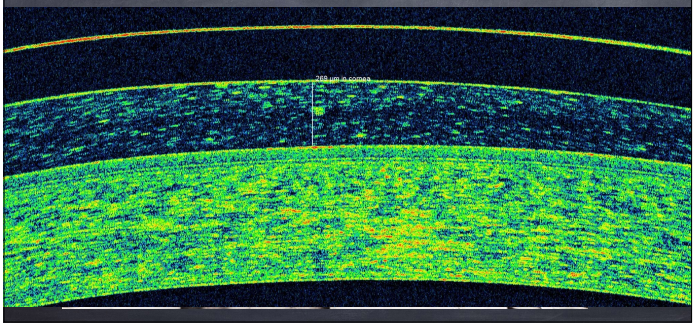
Don't become discouraged if you encounter a challenging patient.....

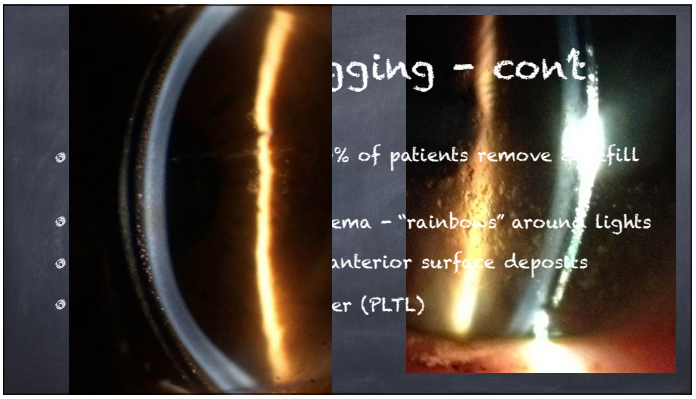
Remedies - Impingement

- Flatten the haptic
- Consider a toric haptic
- Many lenses now offer quadrant-specific haptics
- (four meridians)



Lesson 5 -Midday Fogging



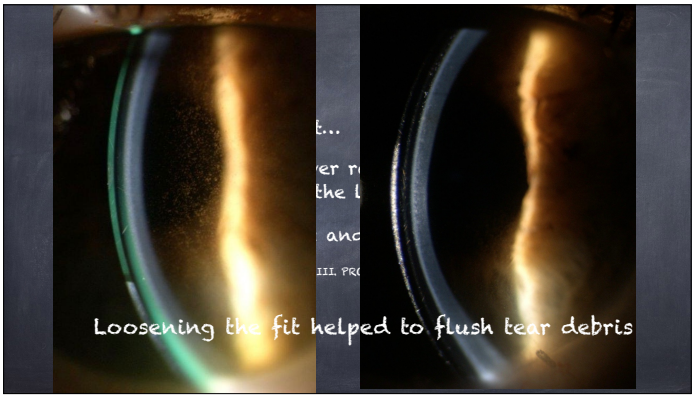


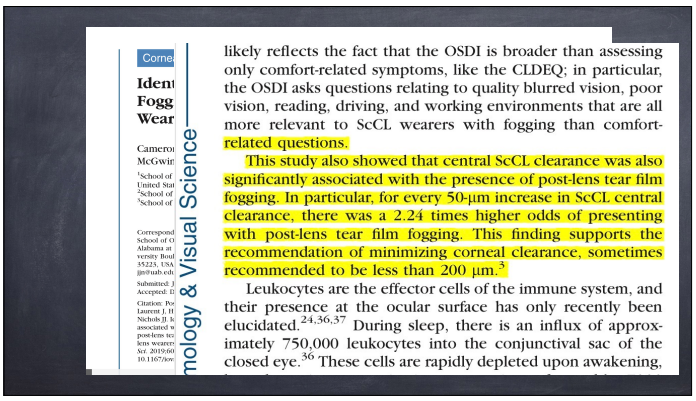
gging - cont.

- % of patients remove fill
- ema – "rainbows" around lights
- nterior surface deposits
- er (PLTL)

Possible causes of MDF.....

- Haptic not aligned to sclera; esp. with excessive vault
- Rocking of lens stimulates mucin production from goblet cells
- Pumping action of blinking forces debris into PLTL
- Rule out GPC
- .....on the other hand.....





Cornea

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Laurent J. H
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Sci. 2019;60
10.1167/iov

Cornea & Visual Science

likely reflects the fact that the OSDI is broader than assessing only comfort-related symptoms, like the CLDEQ; in particular, the OSDI asks questions relating to quality blurred vision, poor vision, reading, driving, and working environments that are all more relevant to ScCL wearers with fogging than comfort-related questions.

This study also showed that central ScCL clearance was also significantly associated with the presence of post-lens tear film fogging. In particular, for every 50-µm increase in ScCL central clearance, there was a 2.24 times higher odds of presenting with post-lens tear film fogging. This finding supports the recommendation of minimizing corneal clearance, sometimes recommended to be less than 200 µm.[5]

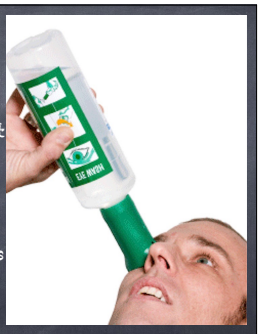
Leukocytes are the effector cells of the immune system, and their presence at the ocular surface has only recently been elucidated.[24,36,37] During sleep, there is an influx of approximately 750,000 leukocytes into the conjunctival sac of the closed eye.[36] These cells are rapidly depleted upon awakening,

other considerations...MDF

- Reduce central clearance
- Oblate designs might be helpful
- Toric haptics (at least 150 µm difference)
- Reduce overall diameter (OAD)
- Add 3-4 drops of viscous, non-preserved art. tear
- Strive for uniform clearance in mid-periphery

...don't forget the

- Treat the meibomian gland dysfunct
  - Lid scrubs, heat mask at home
  - In-office lid debridement
- Eye wash in the morning before lens

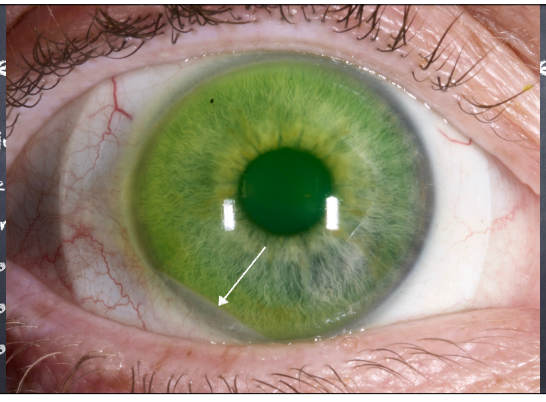


Mast cell stabilizers may help esp. during allergy season

but sometimes.....

Le ... e

- Conj
- Some
- Comr



...is it a problem?

- Long-term effects are unknown
- Often prolapse resolves when lens is removed
- Some practitioners report it in approx. 20% of patients
- If conj. remains adherent to cornea, concern is that it may lead to neovascularization & stem cell damage

possible remedies.....

- Smaller lens diameter
- Reduce limbal clearance
- Dr. Maria Walker (UHCO) recommends aiming for less than 100µm over limbus

If yo anic

Lesson 7 - High-order aberrations (HOA)

- The interface of air-tears-anterior corneal surface is the area of greatest refractive change[1]
- In eyes that are ectatic, optical errors are induced by the highly aberrated cornea
- In keratoconus, protrusion leads to irregular astigmatism, vertical coma and other third-order aberrations
- In post-RK corneas, incisions to the level of the endothelium create an irregular refracting surface not correctable with conventional scleral lenses

Kumar M, et al, Use of Wavefront Imaging Technology....Eye Contact lens 2016;42;12-16

ORIGINAL INVESTIGATION

Comparison of Wavefront-guided and Best Conventional Scleral Lenses after Habituation in Eyes with Corneal Ectasia

Gareth D. Hastings, MPhil, BOptom,[1,*] Raymond A. Applegate, OD, PhD, FAAO,[1] Lan Chi Nguyen, MBA,[1] Matthew J. Kauffman, OD,[1] Roxana T. Hemmati, OD,[1,2] and Jason D. Marsack, PhD, FAAO[1]

SIGNIFICANCE: Visual performance with wavefront-guided (WFG) contact lenses has only been reported immediately after manufacture without time for habituation, and comparison has only been made with clinically unrefined predicate conventional lenses. We present comparisons of habitual corrections, best conventional scleral lenses, and WFG scleral lenses after habituation to all corrections.

PURPOSE: The purpose of this study was to compare, in a crossover design, optical and visual performance of eyes with corneal ectasia wearing dispensed best conventional scleral lens corrections and dispensed individualized WFG scleral lens corrections.

METHODS: Ten subjects (20 eyes) participated in a randomized crossover study where best conventional scleral lenses and WFG scleral lenses (customized through the fifth radial order) were worn for 8 weeks each. These corrections, as well as each subject's habitual correction and normative data for normal eyes, were compared using (1) residual higher-order aberrations (HORMS), (2) visual acuity (VA), (3) letter contrast sensitivity (CS), and (4) visual image quality (logarithm of the visual Strehl ratio, or logVSX). Correlations were performed between Pentacam biometric measures and gains provided by WFG lenses.

RESULTS: Mean HORMS was reduced by 48% from habitual to conventional and 43% from conventional to WFG. Mean logMAR VA improved from habitual (+0.12) to conventional (−0.03) and further with WFG (−0.09); six eyes gained greater than one line with WFG over conventional. Area under the CS curve improved by 26% from habitual to conventional and 14% from conventional to WFG. The percentage of the eyes achieving normal levels were as follows: HORMS, 40% for conventional and 85% for WFG; VA, 70% for conventional and 95% for WFG; and CS, 60% for conventional and 90% for WFG. logVSX improved by 16% from habitual to conventional and 25% further with WFG. Reduction in aberrations with WFG lenses best correlated with posterior cornea radius of curvature.

CONCLUSIONS: Visual performance was superior to that reported with nonhabituated WFG lens wear. With WFG lenses, HORMS and logVSX significantly improved, allowing more eyes to reach normal levels of optical and visual performance compared with conventional lenses.

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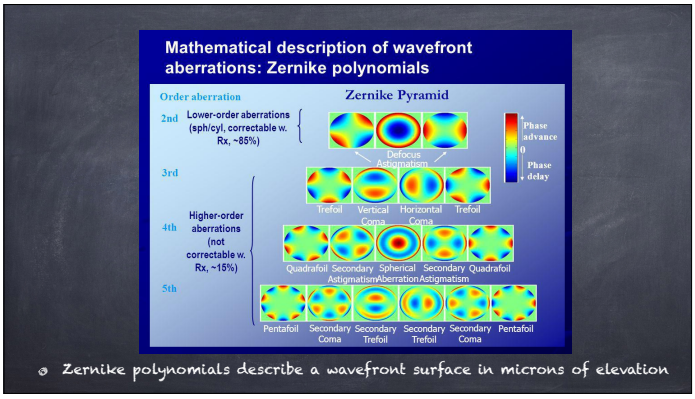
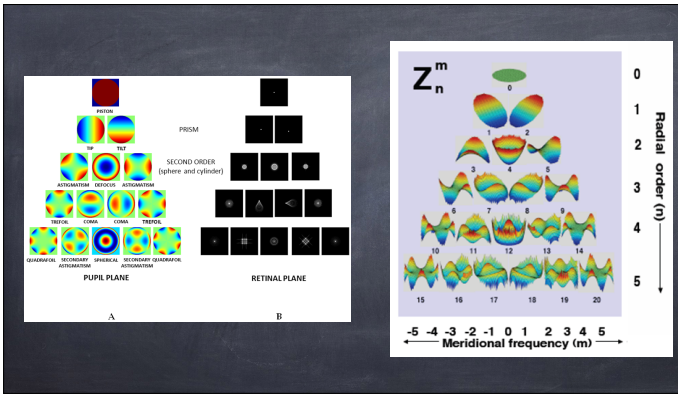
HOA's -cont.

- Affected by age - coma increases
- Irregular astigmatism
- Scarring
- Pupil size
- Accommodation
- Zernike polynomials describe a wavefront surface in microns of elevation
- Whole eye is difficult because it changes dynamically

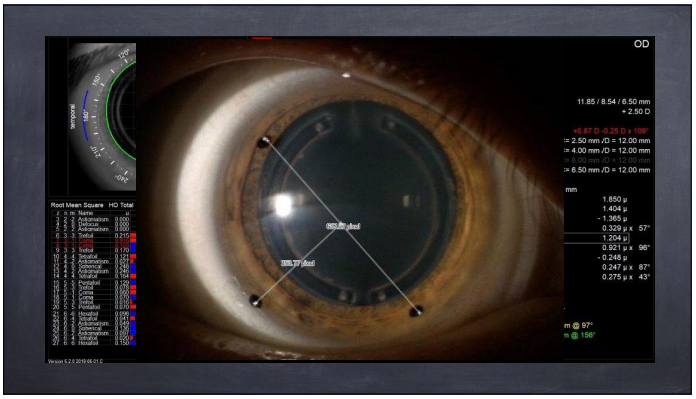
- Zernike polynomials describe a wavefront surface in microns of elevation

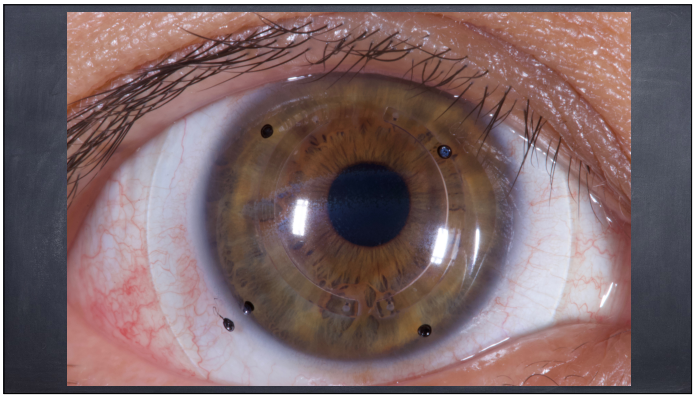


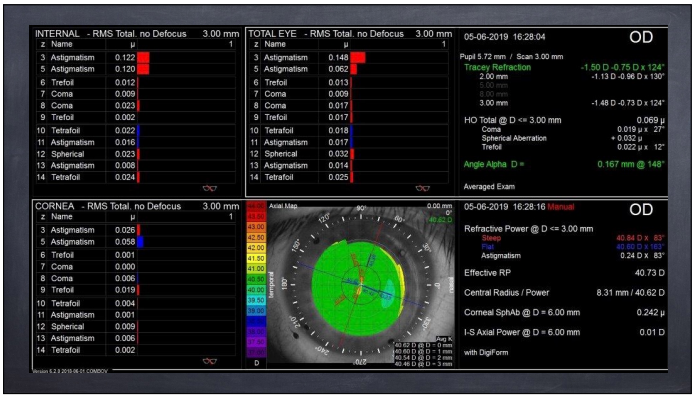
- Zernike polynomials describe a wavefront surface in microns of elevation



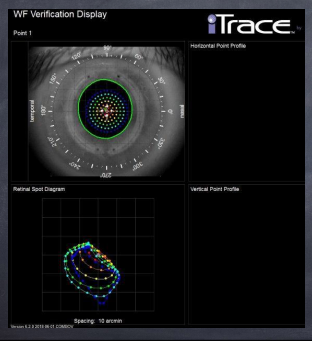
Sclerals incorporating wavefront optics



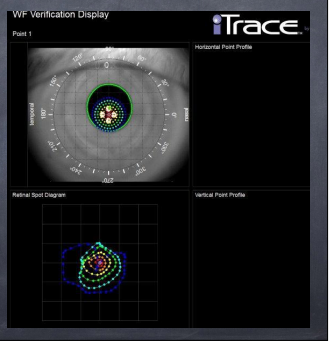




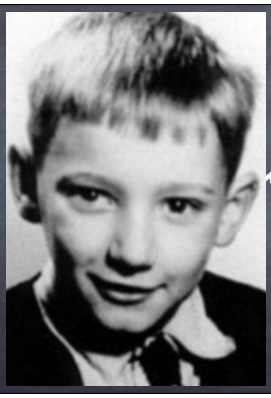
Before



After



Post-RK



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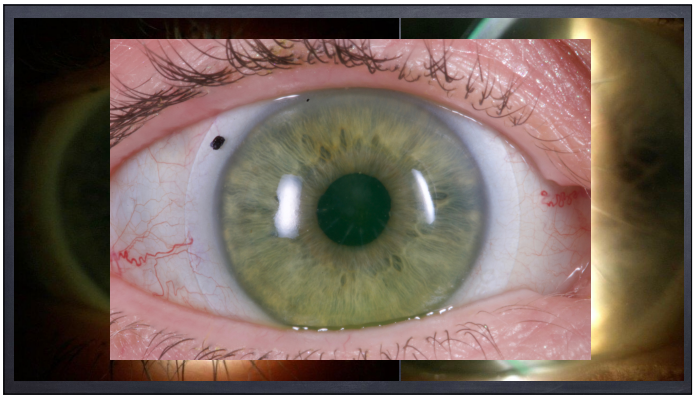

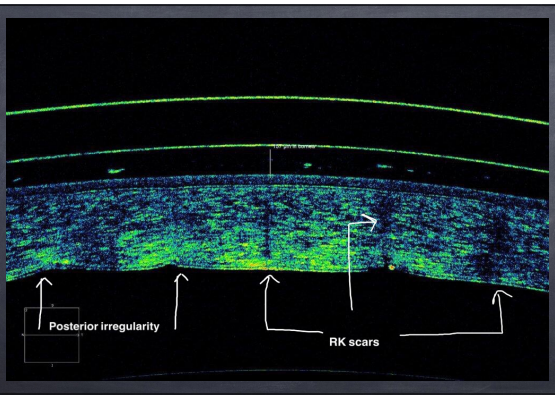

So???? What can be done?

- Centering the optical center of the lens over the line-of-sight can reduce vertical coma
- Changing the eccentricity (e^2) of the lens may reduce aberrations
- Several laboratories are working to incorporate correction of HOA's into the optics of their lenses

Thanks for listening!

- Tom Arnold
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- Blindtex52 on Instagram
- Scleral Lens Practitioners
- http://www.2020sugarland.com

We would love to hear from you!