

What Would You do? How to Select an Appropriate CL Option for Your KCN Patient

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Financial Disclosures Clark Chang, OD, MS, FAAO

- Allergan (C)
- Dompe Pharmaceutical (S)
- Eyenovia (C)
- Glaukos (Employment)
- Oculus (S)
- Visus Therapeutics (C)

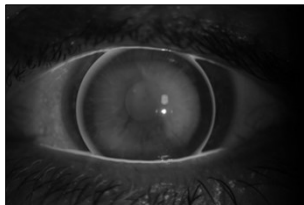
C=Consultant, S=Speaker Bureau

Financial Disclosures Christine Sindt, OD, FAAO

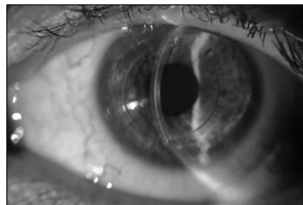
- EyePrint (O)
- Mojo Vision (R)

O=Ownership, R=Research Support

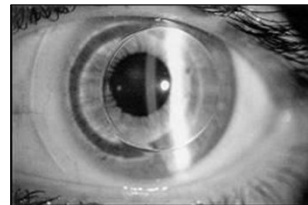
Best-Fit CL Option(s) For Your KCN Patients Beyond the Era of One-Size-Fits All



RGP



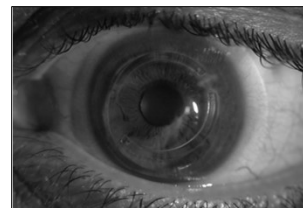
Soft KC



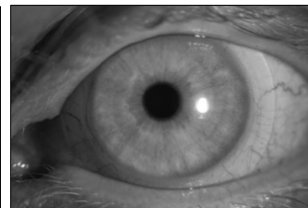
Piggyback



Recessed CL System



Hybrid



Scleral

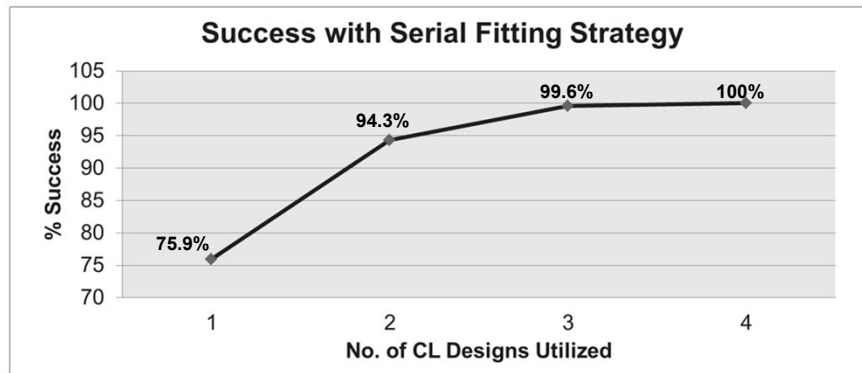
Courtesy of National KC Institute

Best-Fit CL Option(s) For Your KCN Patients

An Evidenced-Based IIT: Beyond One-Size-Fits All

Retrospective Study (n= 329 Consecutive KC/Ectasia eyes)

- Clark Chang, Angela Shin, & Peter Hersh (Unpublished Data)



Overall Success Rate = 95.1%

Best-Fit CL Option(s) For Your KCN Patients

An Evidenced-Based IIT: Subgroup Comparison

Retrospective Study (n= 329 Consecutive KC/Ectasia eyes)

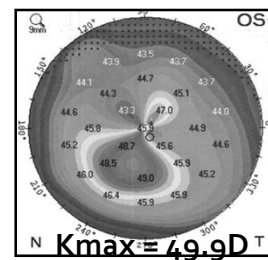
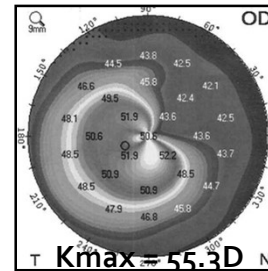
- Clark Chang, Angela Shin, & Peter Hersh (Unpublished Data)

	Non-Surgical	Surgical
Success Rate	94.2%	97.70%
	(229/243)	(84/86)
Habitual VA	20/60.52	20/56.14
Final CLVA	20/27.88	20/28.70
Tolerance at Presentation	63.4%*	39.4%*
Tolerance after Fitting	95.8%	98.5%

Best-Fit CL Option(s) For Your KCN Patients

Case RB – Custom Soft KCN Save the Day

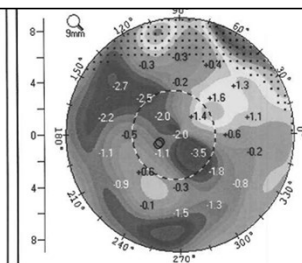
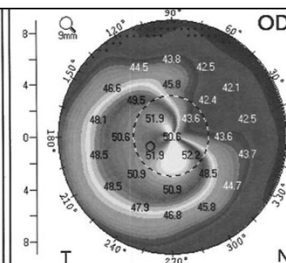
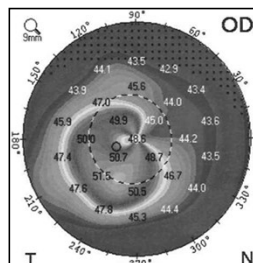
- 68 y/o WM, HX of KCN OU, ~40 yrs
- GP intolerance & d/c CL wear
- unhappy with UCVA & BSCVA
- Ant seg exam consistent with KCN
 - (-) Scar/Nodule
 - NS 1+ OU & otherwise WNL
- Manifest Ref
 - OD: +3.50, -5.25 x030 20/60-
 - OS: -1.50, -1.75 x140 20/25-



Best-Fit CL Option(s) For Your KCN Patients

Case RB – Custom Soft KCN Save the Day

- Post-Op 3 Mths
 - UCVA OD 20/50** OS 20/40
 - MRVA OD 20/40 OS 20/25-
 - MR (OD) +0.50, -3.25 x065**
 - MR (OS) -1.50, -1.75 x140



3 Mths Post-op

Pre-op

Best-Fit CL Option(s) For Your KCN Patients

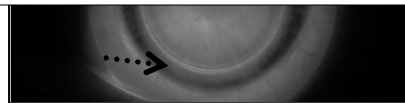
Case RB – Custom Soft KCN Save the Day

CLOR (OD) +0.75, -1.50 x065 20/30+

CLOR (OS) +0.75, -1.00 x050 20/20-3

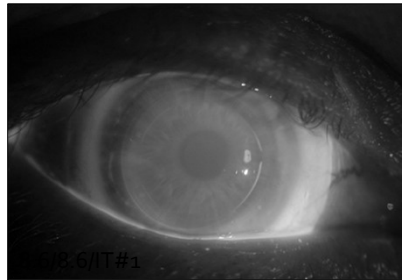
A: Residual Cylinder OU

P: Discuss CL Refit OU in Custom Soft KC CLs

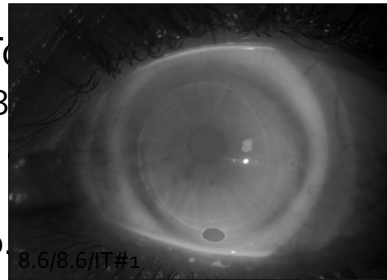


Best-Fit CL Option(s) For Your KCN Patients

Case RB – Custom Soft KCN Save the Day



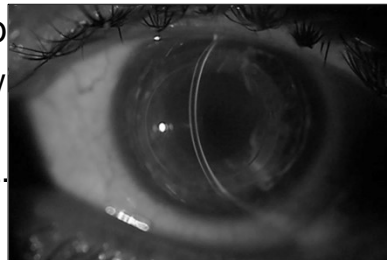
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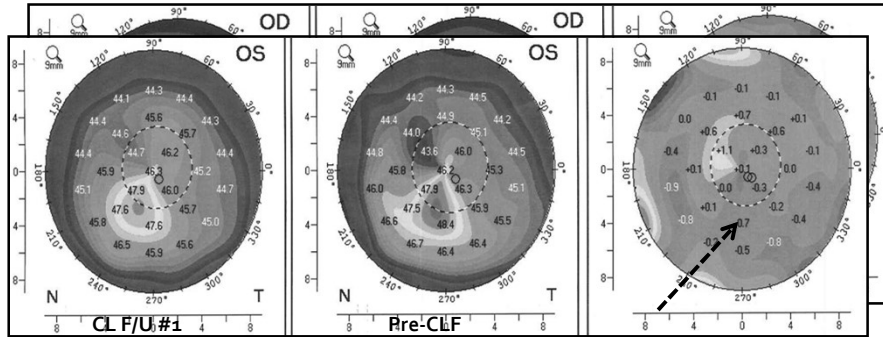
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Best-Fit CL Option(s) For Your KCN Patients

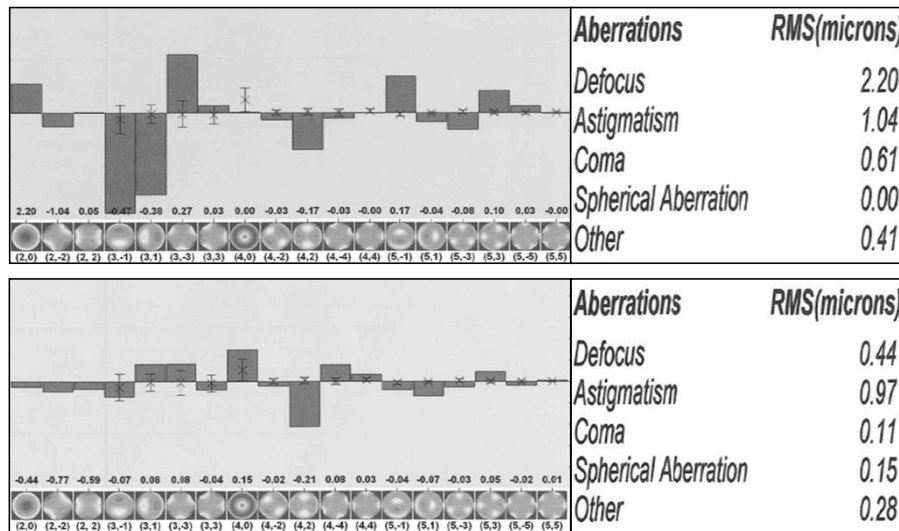
Case RB – Custom Soft KCN Save the Day



OD: 8.2/8.6/15.0mm/IT#1/+0.25, -2.25 x038 20/25-
 OS: 8.5/8.4/15.0mm/IT#1/-1.50, -1.00 x149 20/20

Best-Fit CL Option(s) For Your KCN Patients

Case RB – Custom Soft KCN Save the Day



Best-Fit CL Option(s) For Your KCN Patients

Corneal GP: A Well-and-Alive Convention

- Avoid “Apical Bearing”!
- Match peripheral Q-values (if possible)
- “Size Matters”
 - Asymmetry that is larger and/or more decentered may need larger lenses & OZ
- Address Vision Needs
 - Irregularity, astigmatism, presbyopia

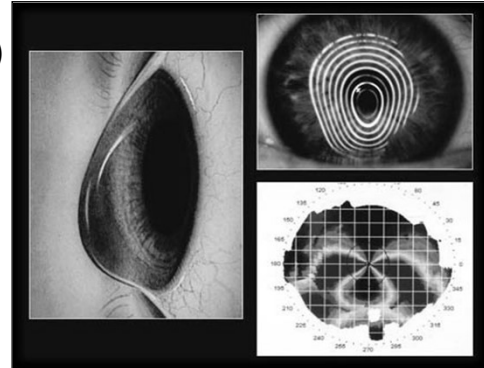
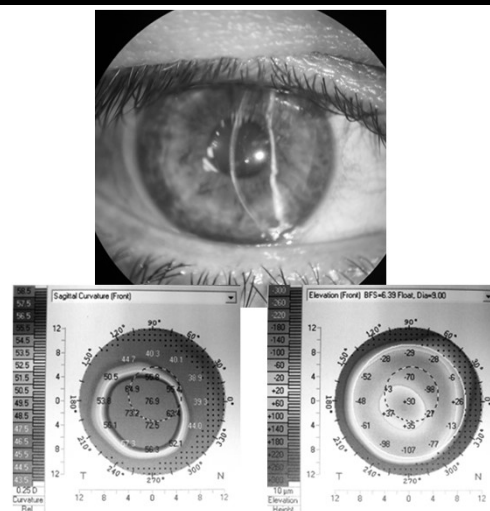


Image Courtesy, Patrick Caroline

Best-Fit CL Option(s) For Your KCN Patients

Case: Advance KCN with Central Cone

- 50-year-old female presents with blurred vision and discomfort
- She has piggybacked in the past
- Currently wears scleral contact lenses which are 3 years old.
- Pt reports she has better comfort with her scleral lenses but had better vision with her old piggyback system
- Recently tried her old lenses again but could not tolerate the comfort

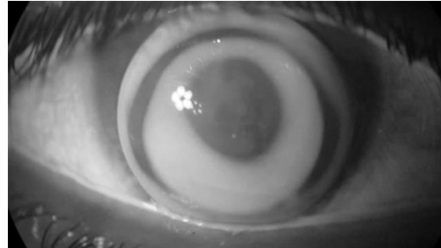


Best-Fit CL Option(s) For Your KCN Patients

Case: Advance KCN with Central Cone

OD Diagnostic Fitting

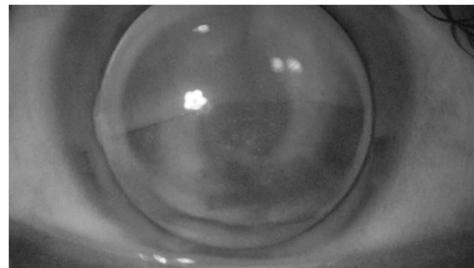
- X Cone 5.63 BC/ 9.5mm
- Reverse geometry
 - This was the steepest lens in the fitting set, yet still had harsh apical bearing
 - Lens touched lower lid which caused discomfort
 - Therefore, try a smaller diameter



Best-Fit CL Option(s) For Your KCN Patients

Case: Advance KCN with Central Cone

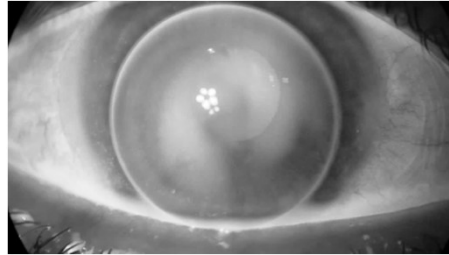
- Rose K 5.30 BC/ 8.3mm
- STD PC's
 - Less lid interaction but...
 - Central bearing
 - So needed to go steeper



Best-Fit CL Option(s) For Your KCN Patients

Case: Advance KCN with Central Cone

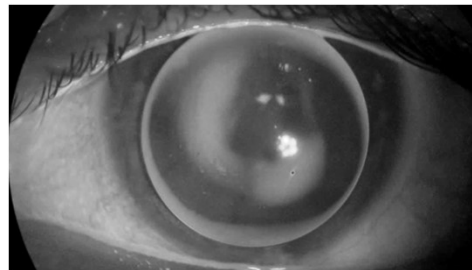
- Rose K 5.10 BC/ 8.3mm
 - Cone clearance, but...
 - Drops to lower lid, (because it's steeper) and now pt has lid discomfort



Best-Fit CL Option(s) For Your KCN Patients

Case: Advance KCN with Central Cone

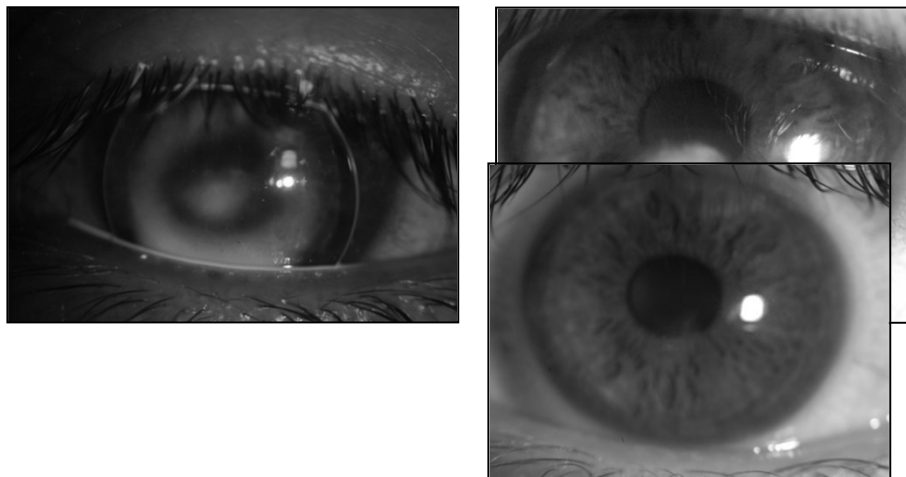
- Rose K 5.20 BC/ 8.3mm
- STD PC's
 - Gracing touch over cone
 - No lower lid interaction
 - Pt sees well and feels good!



Best-Fit CL Option(s) For Your KCN Patients

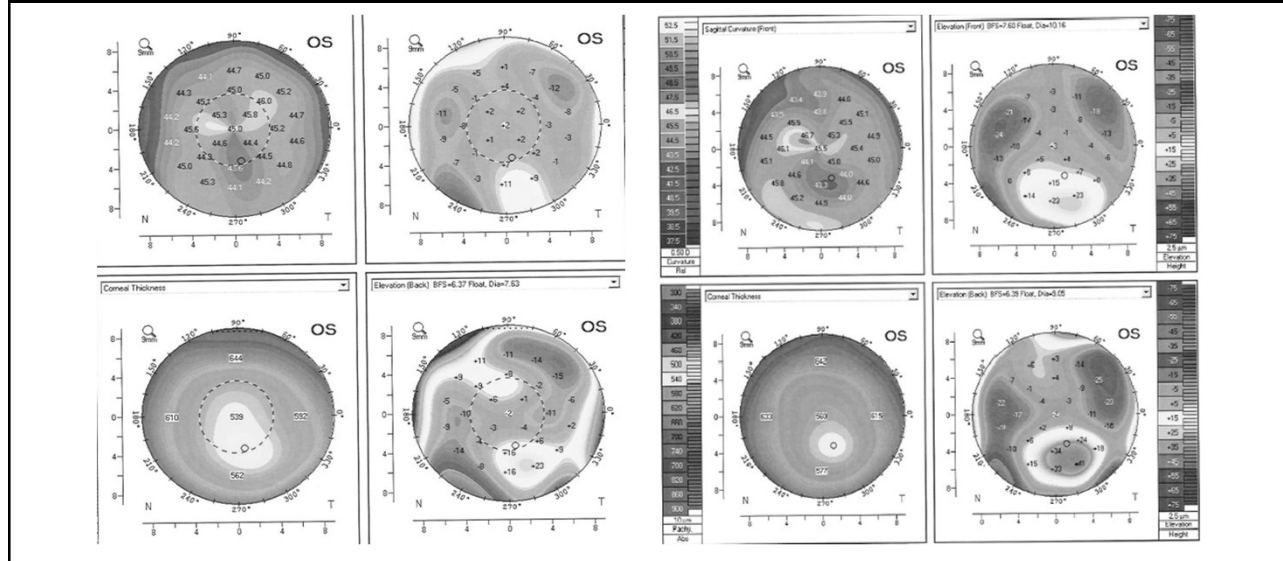
Case: Advance KCN with Central Cone

- Patient's comfort problems concerned her lids, so piggybacking did not help her comfort
 - Going with a smaller design allowed for a steeper fit while still staying clear of the lower lid
- A reverse geometry lens allows for flatter BC to be used and results in lower powers/ thinner lenses, BUT
 - In this case the reverse geometry lens touched her lower lid causing discomfort
 - Since the cone was centrally located, a large lens was not needed to center the lens on the pupil
- A scleral lens can give excellent comfort, BUT
 - Old lens may develop deposits or become warped, compromising VA
 - When CL completely vaults the cornea, some KCN patients don't see as well



Best-Fit CL Option(s) For Your KCN Patients

Case VD: Progressive KC With Diminishing Vr-QoL



Best-Fit CL Option(s) For Your KCN Patients

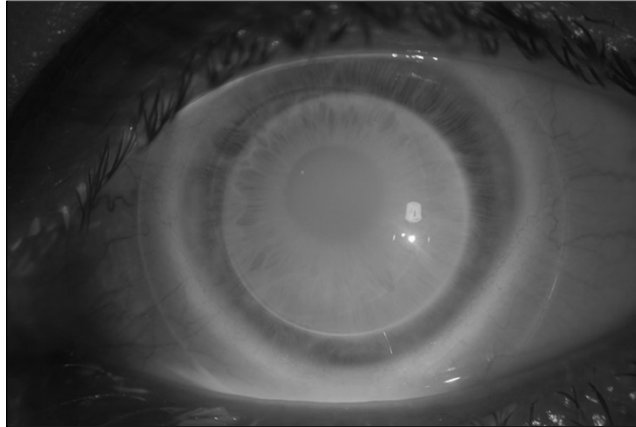
Case VD: Progressive KC With Diminishing Vr-QoL



- 18 yo KCN c/o decreasing VrQoL
 - Despite OD & OS VA 20/20 with soft toric CLs
 - Glare & starburst, all day (Worse at night & in OS)
 - Pupils 5.5 / 8.5 mm, OU
 - Pt prefers Pilo 1% >> Brimonidine gtt
- Patient requested for keratoplasty
 - Assessment: Progressive KCN, OU
 - Plan: CXL OD first before OS & refit CL at 1mo post CXL

Best-Fit CL Option(s) For Your KCN Patients

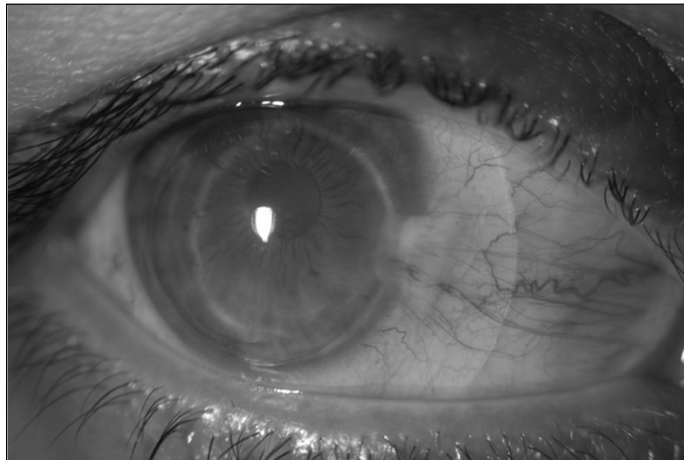
Case VD: Progressive KC With Diminishing Vr-QoL



- OD - Synergeyes A/7.2/8.2/-6.50/EP
- OS – Synergeyes A/7.3/8.3/-5.00/EP

Best-Fit CL Option(s) For Your KCN Patients

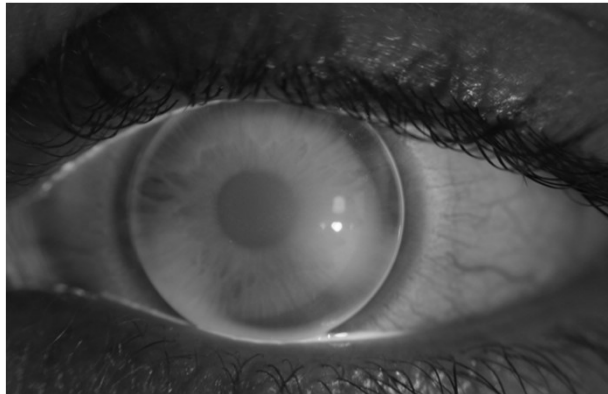
Modern Hybrid Lens Design & Benefits



KCN + Pterygium

Best-Fit CL Option(s) For Your KCN Patients

Case VD: Progressive KC With Diminishing Vr-QoL

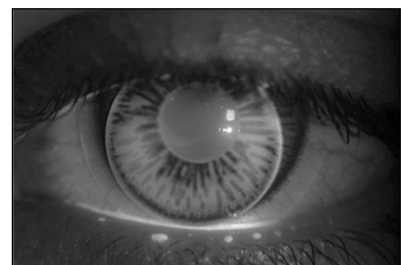
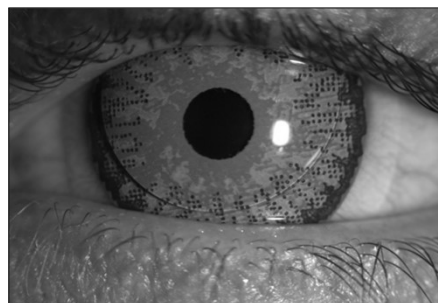


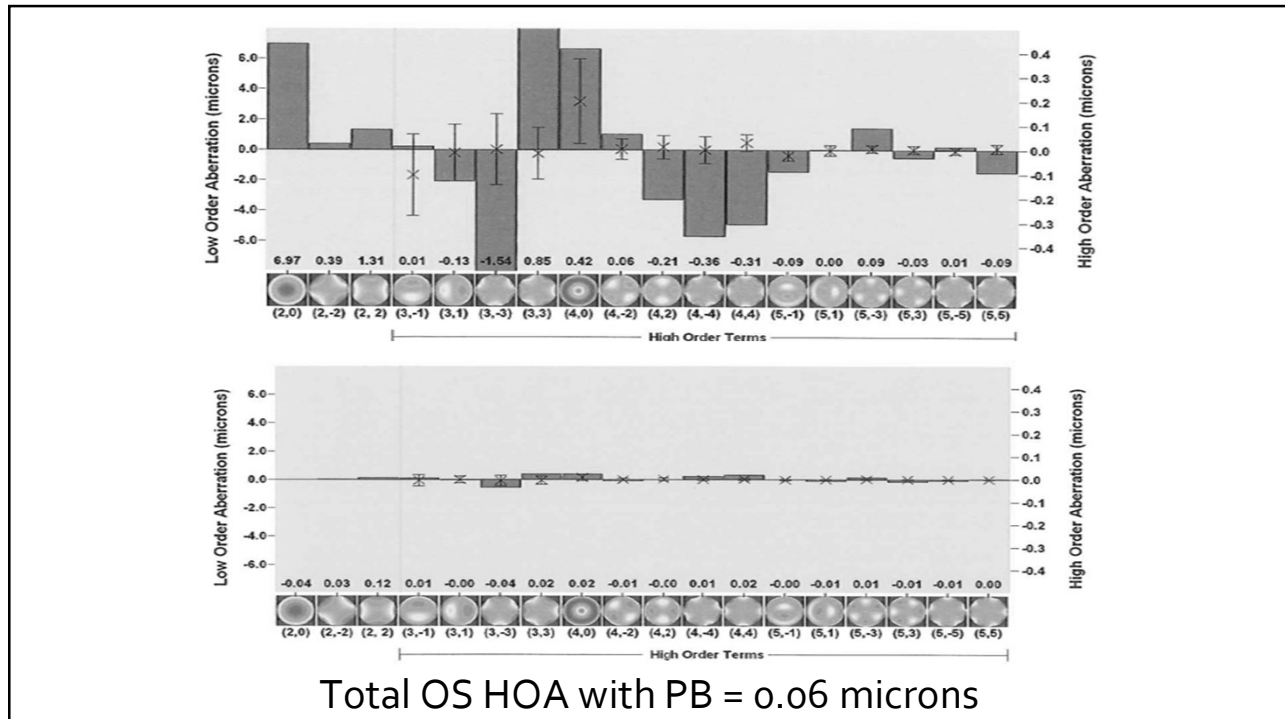
- OD 44.00(7.67mm)/-3.75/11.2mm/OZ 10.0/1-STP PC
 - OS 43.75(7.71mm)/-2.75/11.2mm/OZ 10.0/1-STP PC
- * Boston XO material and plasma treatment ordered

Best-Fit CL Option(s) For Your KCN Patients

Case VD: Progressive KC With Diminishing Vr-QoL

- f/u #3
 - CLVA OD 20/20 (OR: PL) OS 20/20 (OR: PL)
- SLE: Good movements (SCL & GP)
 - Good GP NaFL
 - Cornea: (-) SPK





Best-Fit CL Option(s) For Your KCN Patients

Case: The Nerve of "Idiopathic" Diplopia

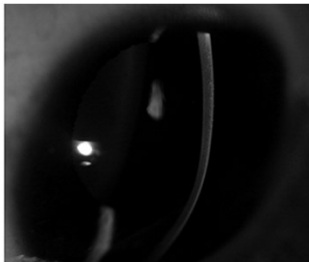
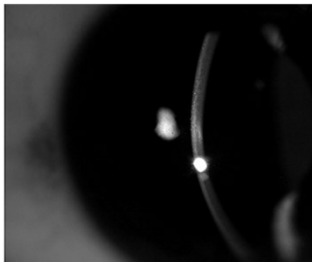
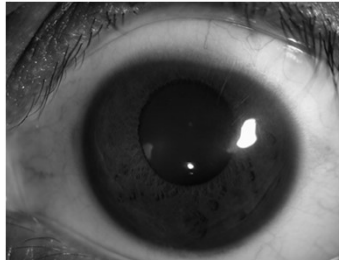
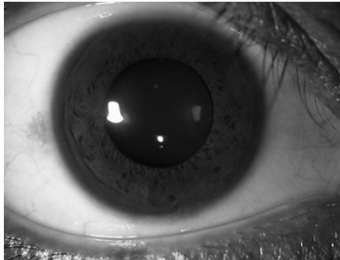


Patient image used with permission

- 25-year-old male
- cc: bilateral blurred VA & diplopia, >5 years
- Last eye exam: 1 month ago, but they were unable to improve his vision
 - OD -14.25 +1.75 X 121 20/60
 - OS -12.00 +1.25 X 015 20/80
- Medical Hx significant for NF-1 & was sent for MRI to rule out optic nerve lesions.
 - MRI negative: neurologist suggested aggressive lubrication for dry eyes
- Referred to me for Contact Lens Fitting

Best-Fit CL Option(s) For Your KCN Patients

Case: The Nerve of "Idiopathic" Diplopia

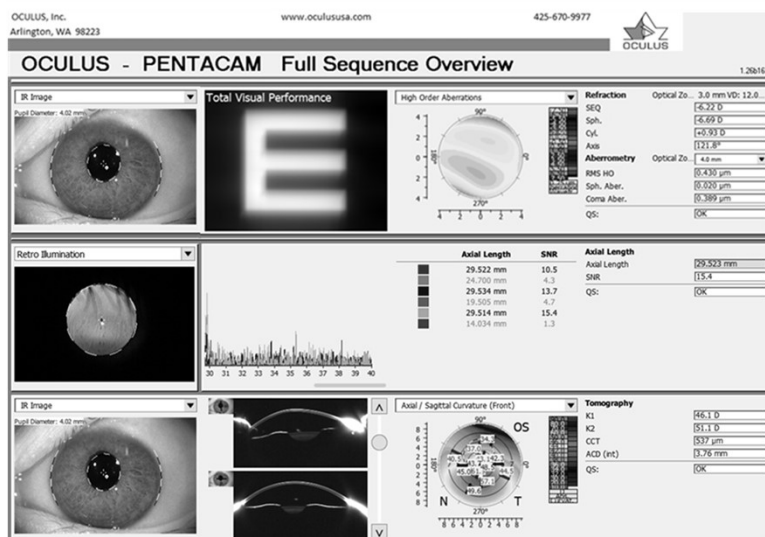


- OD: central thinning with faint apical haze with Descemet's striae
- OS: inferior/ central thinning. Clear cornea. Ovoid pupil with superior displacement. Superior pannus

Best-Fit CL Option(s) For Your KCN Patients

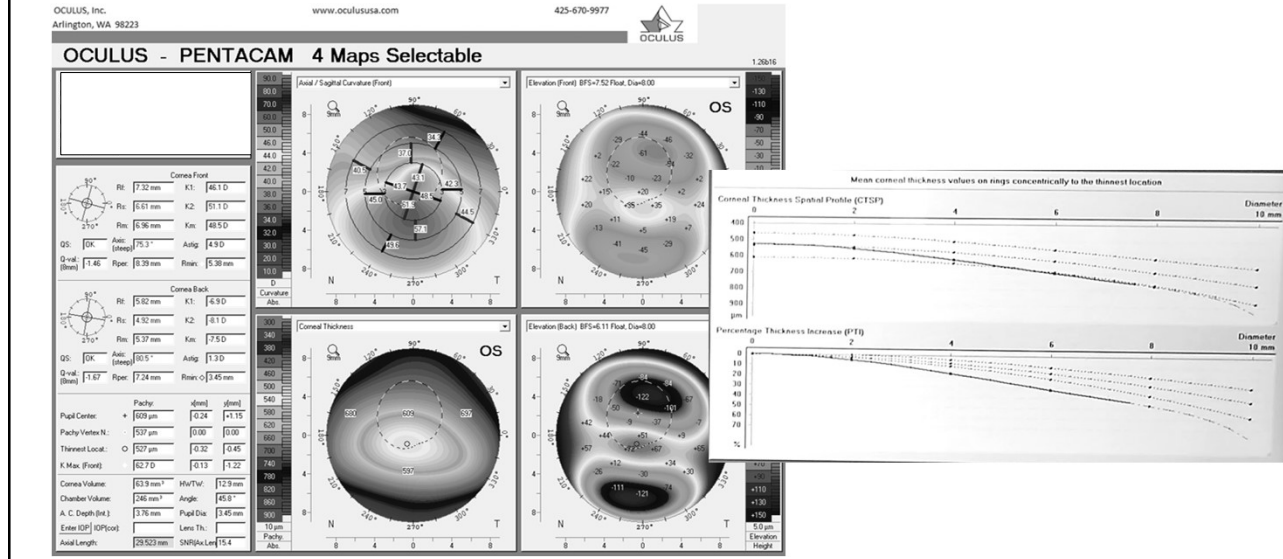
Case "Idiopathic" Diplopia: Full Sequence Review

- Refraction and Aberrations
- Retroillumination
- Biometry
- Scheimflug Topography
 - Cornea
 - CSP PRO



Best-Fit CL Option(s) For Your KCN Patients

Case "Idiopathic" Diplopia: Full Sequence Review

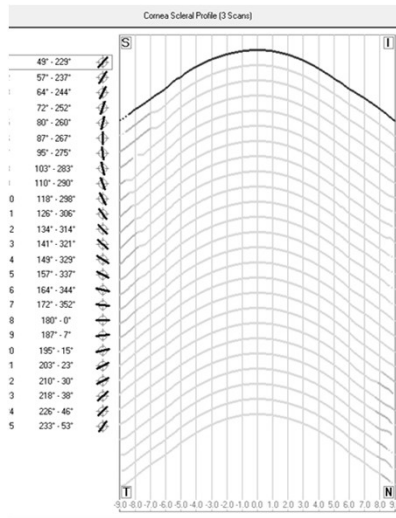


Best-Fit CL Option(s) KCN

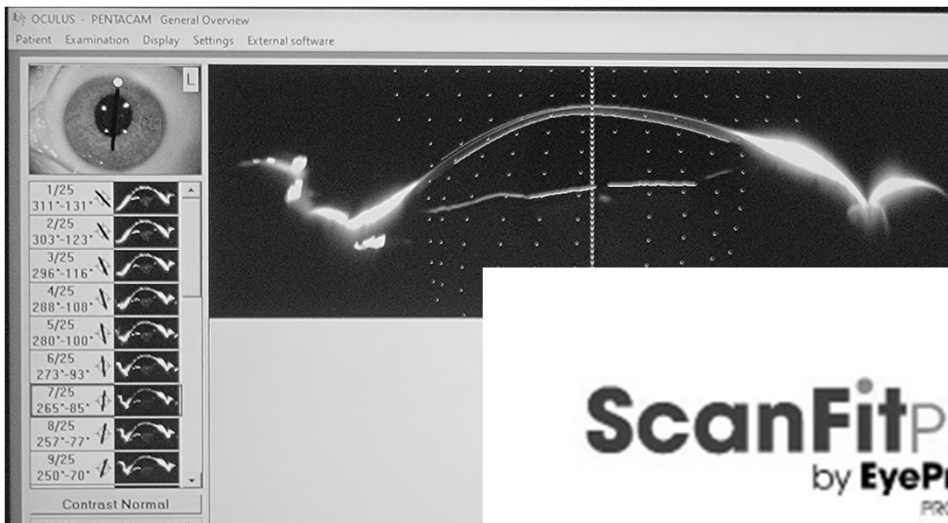
Case "Idiopathic" Diplopia

Scleral Shape Scans

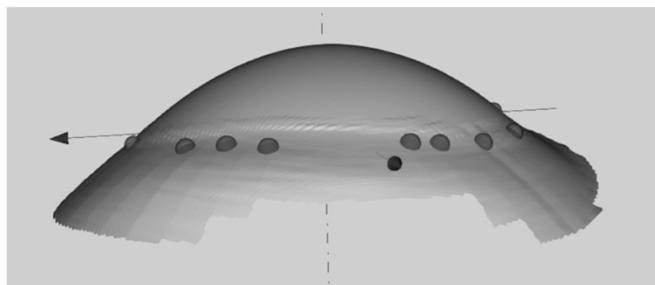
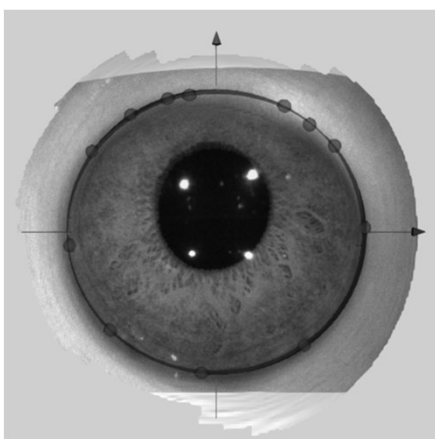
- Up to 3 images
- Stitched together
- Out to 18mm



Best-Fit CL Option(s) For Your KCN Patients Case "Idiopathic" Diplopia: Scleral Profilometry Guidance

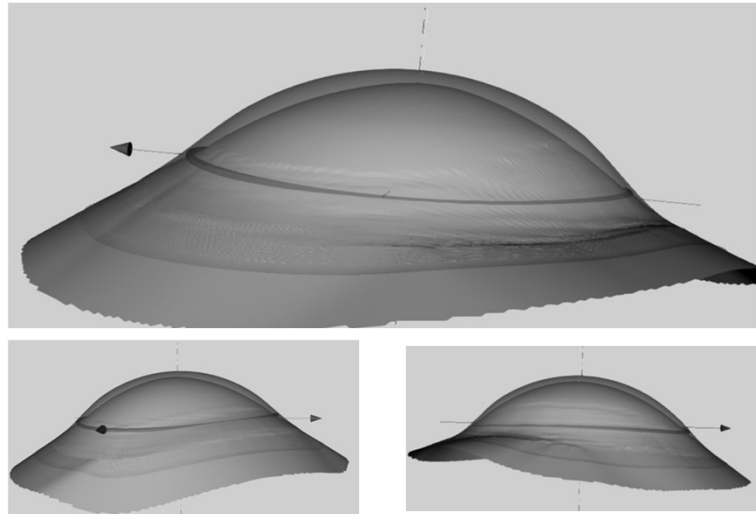


Best-Fit CL Option(s) For Your KCN Patients Case "Idiopathic" Diplopia: Limbal Evaluation

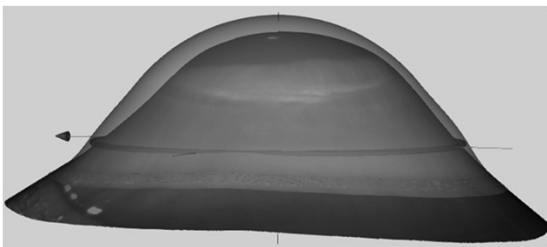


Best-Fit CL Option(s) For Your KCN Patients ***Case "Idiopathic" Diplopia: Back Surface Designs***

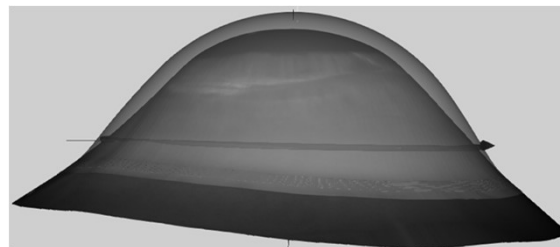
- Central clearance
 - Vault
 - Centration
- Mid-peripheral clearance
- Limbal clearance
- Bump/ anti-bumps



Best-Fit CL Option(s) For Your KCN Patients ***Case "Idiopathic" Diplopia: Decentered Optics, Steep Cone***

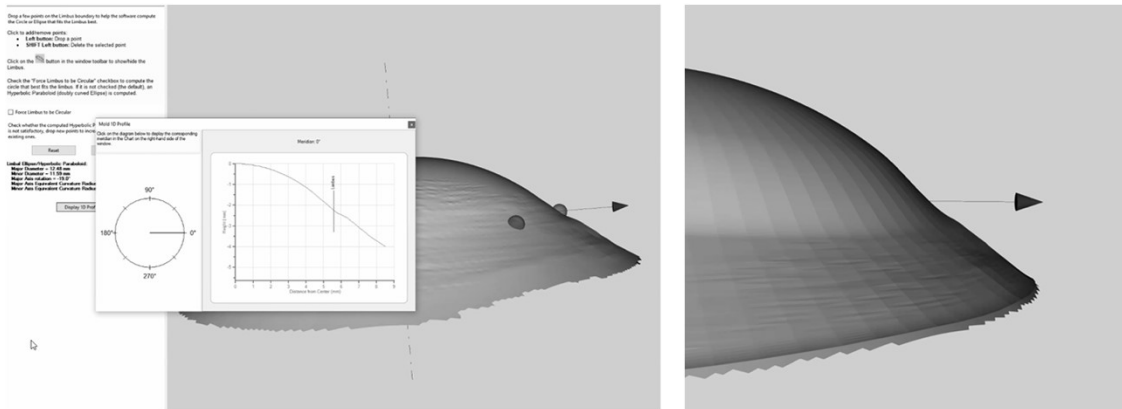


Without optic zone decentration

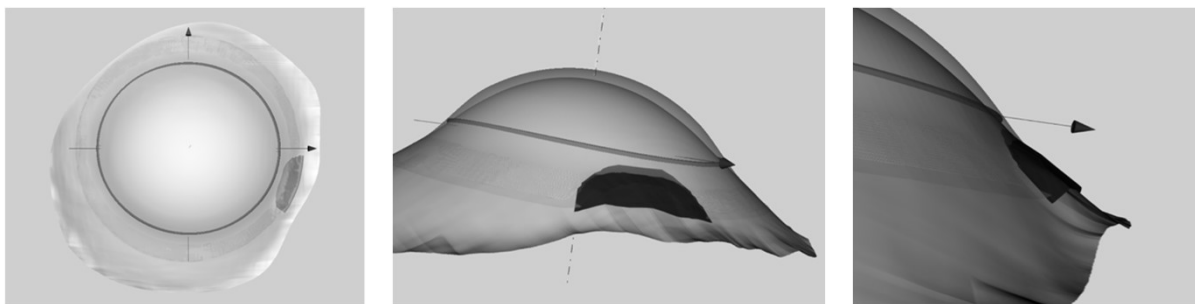


With optic zone decentration

Best-Fit CL Option(s) For Your KCN Patients Case "Idiopathic" Diplopia: Automatic Bump Detection



Best-Fit CL Option(s) For Your KCN Patients Case "Idiopathic" Diplopia: Automatic Bump Detection



Edit Bump

Approximate Bump Area (mm²): 2.68

Vertical Clearance (μm): 150 or Anti-Bump

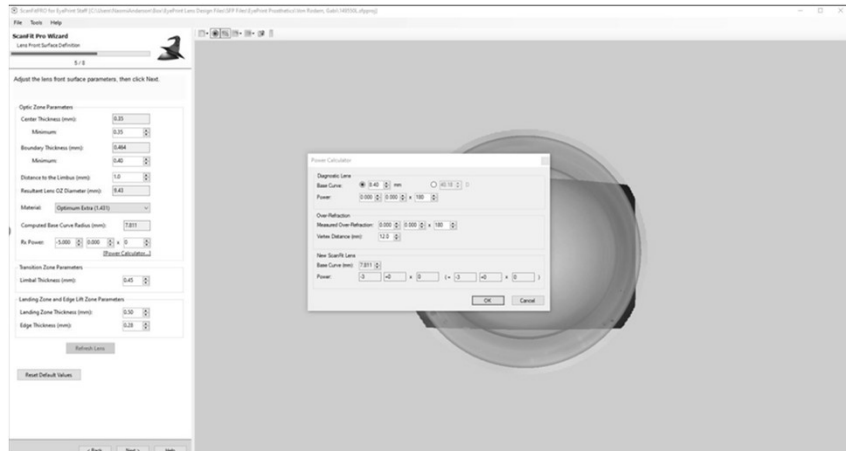
Bump Transition Zone: Medium (Horizontal Clearance = 750 μm)

Delete Bump

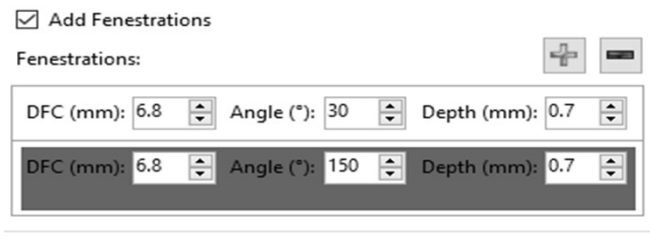
- Bumping
- Anti-Bumping
- Negative Bumps

Best-Fit CL Option(s) For Your KCN Patients Case "Idiopathic" Diplopia: Front Surface

- Material
- Center thickness
- Optic zone size
- Power
 - multifocal

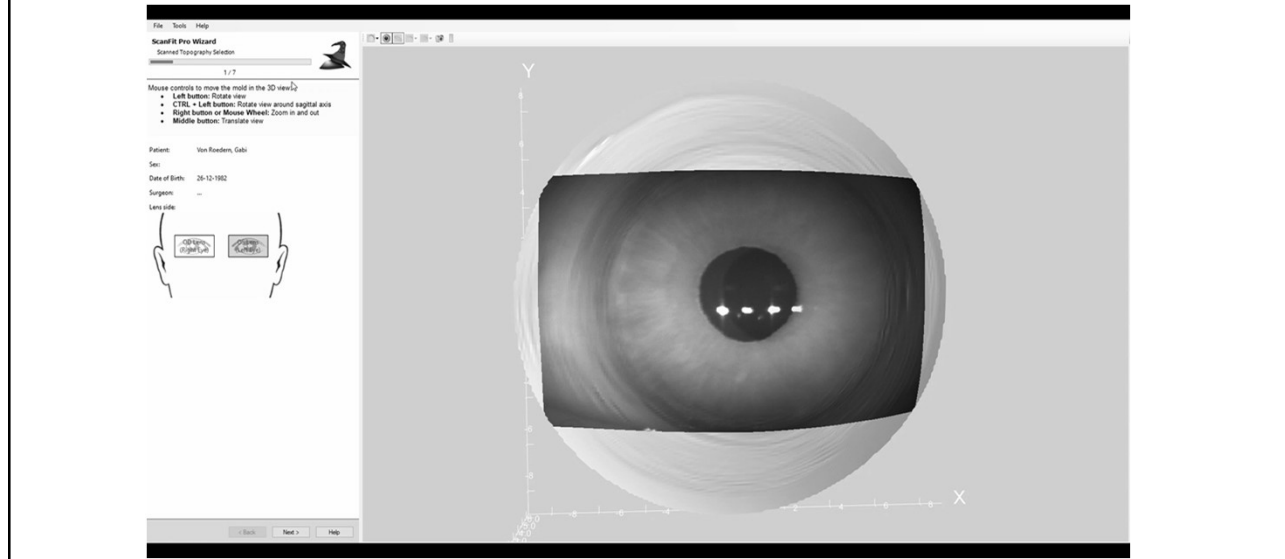


Best-Fit CL Option(s) For Your KCN Patients Case "Idiopathic" Diplopia: Fenestrations

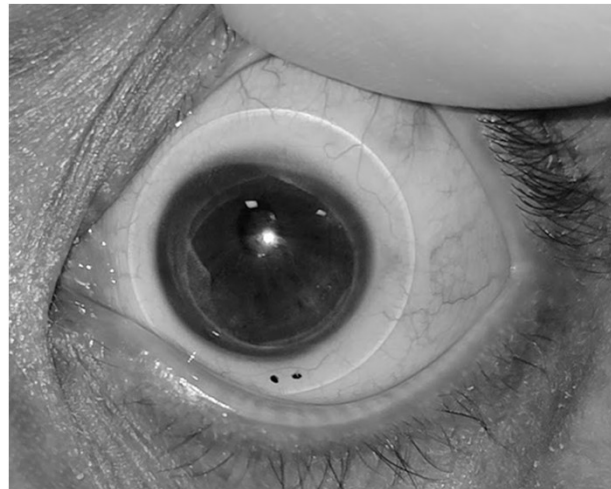
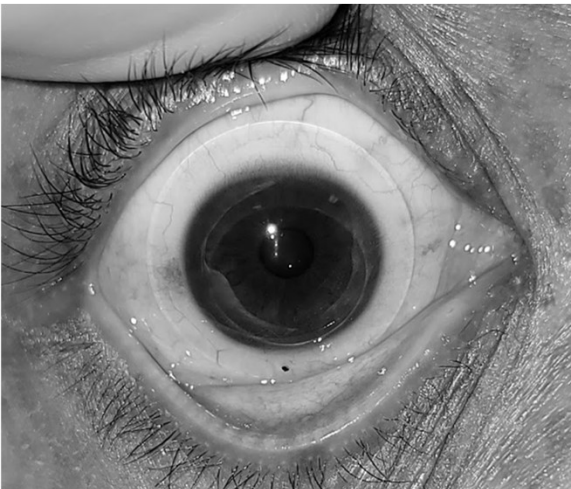


- The ScanFitPRO software allows the consultant to incorporate fenestrations in the software directly before exporting the files for manufacturing.
- Quantity, angle, distance from center & depth of fenestration can be customized

Best-Fit CL Option(s) For Your KCN Patients Case "Idiopathic" Diplopia: Scan-guided Designing process



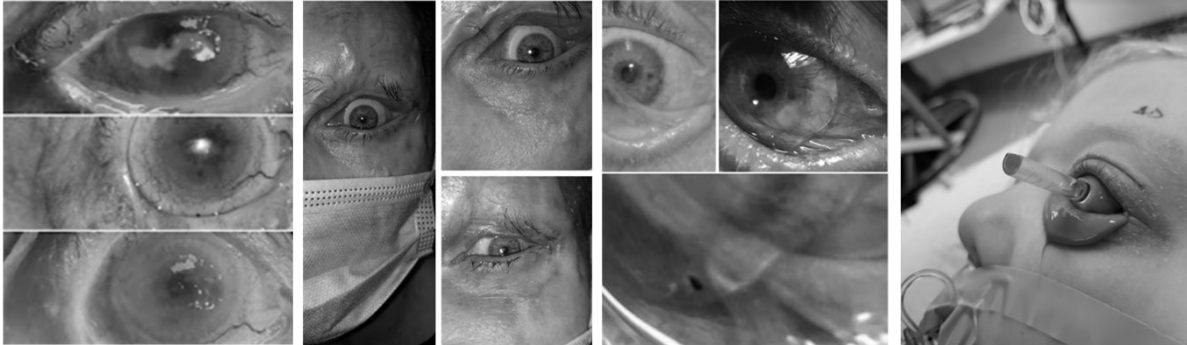
Best-Fit CL Option(s) For Your KCN Patients Case "Idiopathic" Diplopia: Scan-guided Designing process



Best-Fit CL Option(s) For Your KCN Patients ***Other Scleral Shape Assessment Method***

But....

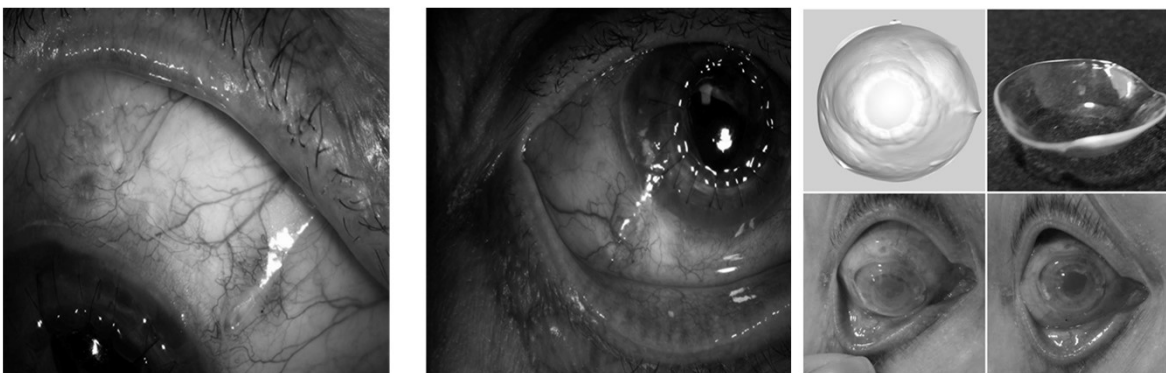
Sometimes scans are difficult or not appropriate



Best-Fit CL Option(s) For Your KCN Patients ***Other Scleral Shape Assessment Method***

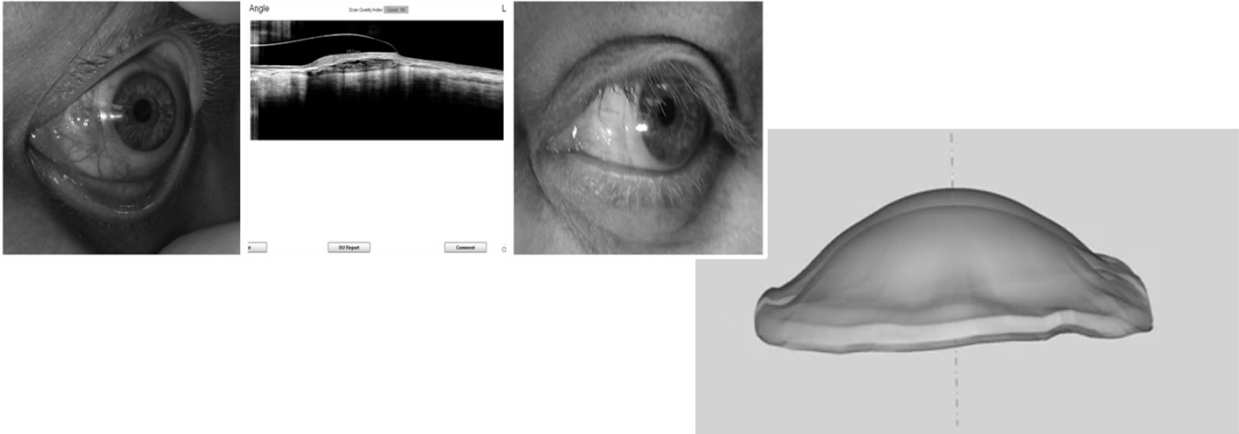
But....

Sometimes we can't afford to misalign from the start



Best-Fit CL Option(s) For Your KCN Patients ***Other Scleral Shape Assessment Method***

Extreme Ocular surface changes



Best-Fit CL Option(s) For Your KCN Patients ***Other Scleral Shape Assessment Method***

Ocular Surface Impression Method

- Captures precise curvatures of the corneal and scleral surface
- 1-2 micron accuracy
- Gentle and comfortable – no anesthetic necessary!
- Only takes a few minutes
 - 40 seconds for catalyst reaction
 - Stays on the eye for 30- 60 seconds
 - Depends on temperature and humidity in room



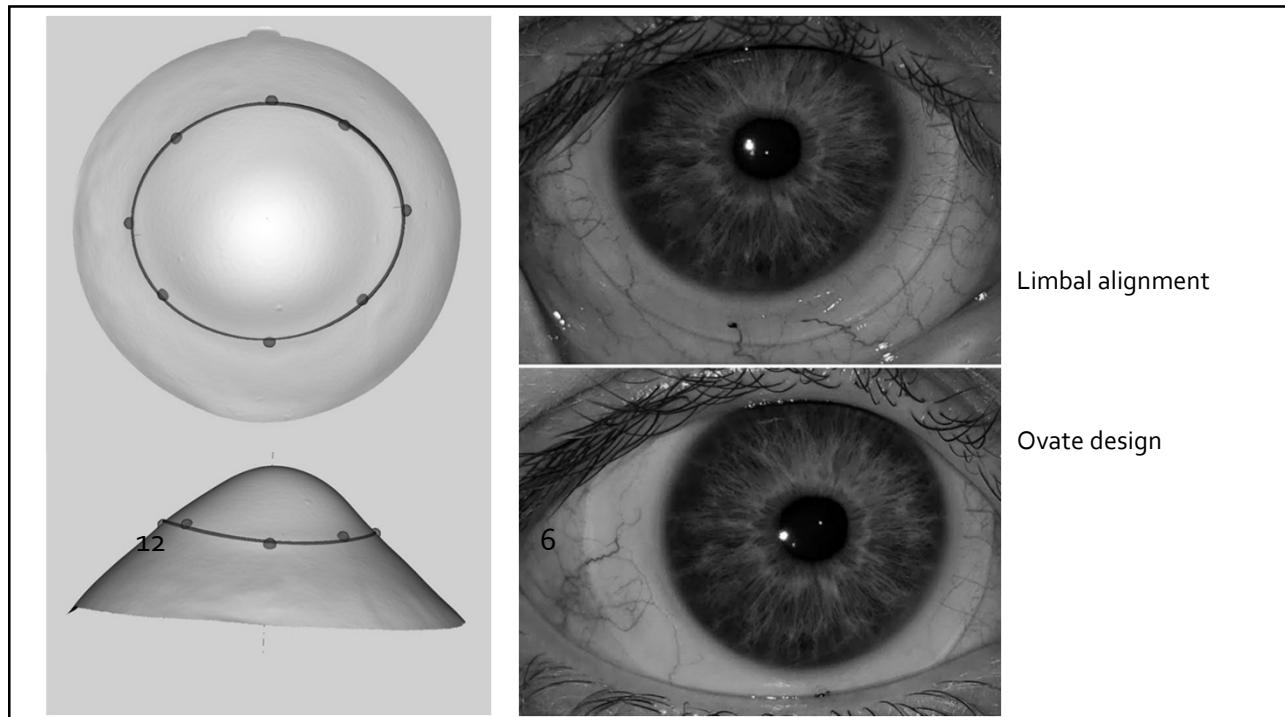
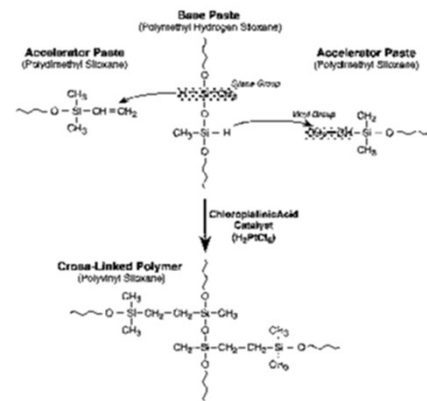
Best-Fit CL Option(s) For Your KCN Patients

Other Scleral Shape Assessment: Chemistry of Impression

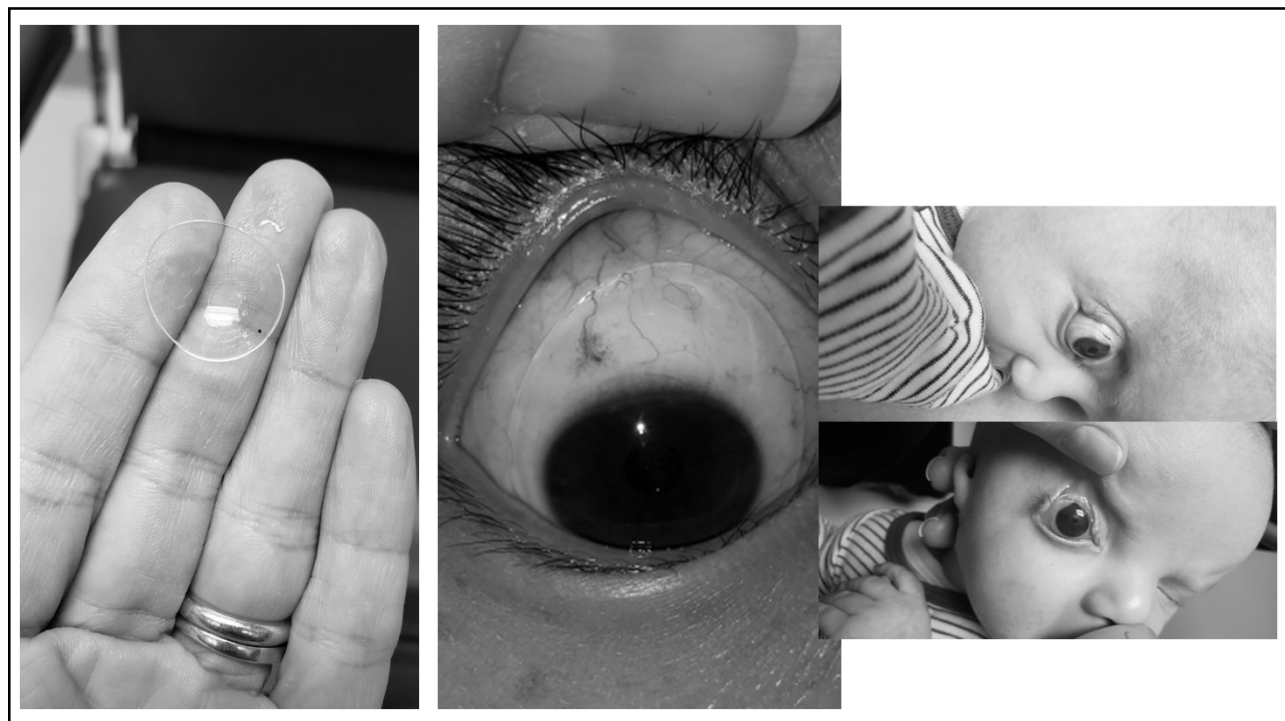
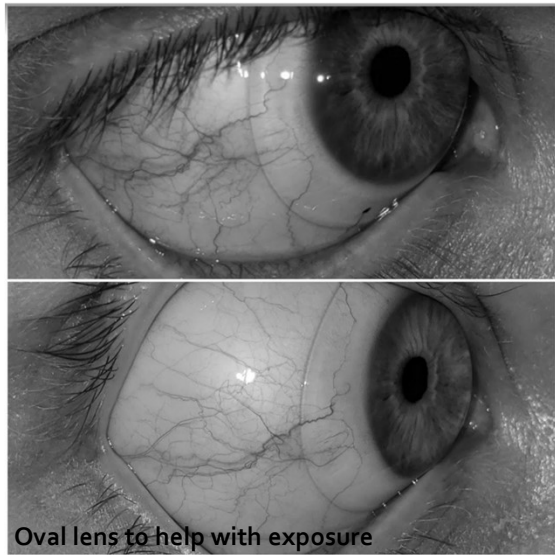
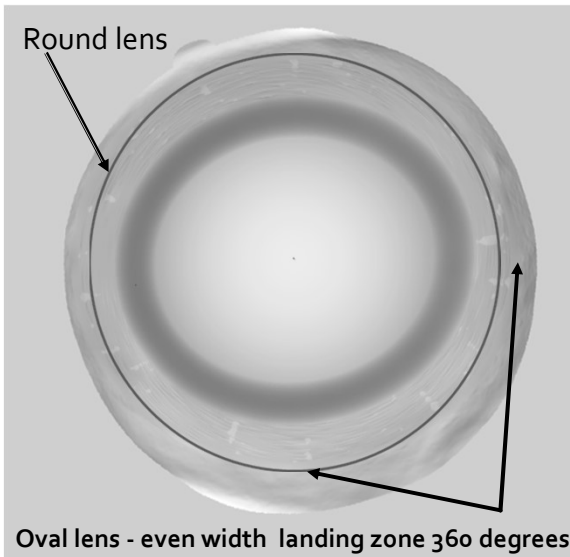
- EyePrint Impression Compound features unique properties to allow a working time to safely form to the eye and a setup time to obtain a usable impression
- The accelerator polymer is terminated with vinyl groups which cross-link to the silicone terminal groups on the base polymer when activated by a platinum salt catalyst.

*NOTE: this is an addition reaction & there are no by-products

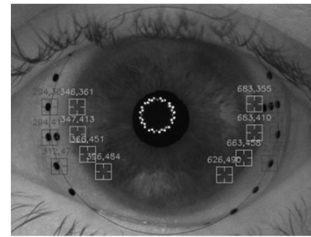
High grade platinum is extremely important



Best-Fit CL Option(s) For Your KCN Patients ***Other Scleral Shape Assessment Method: Non-Round Design***



Dynamic Position

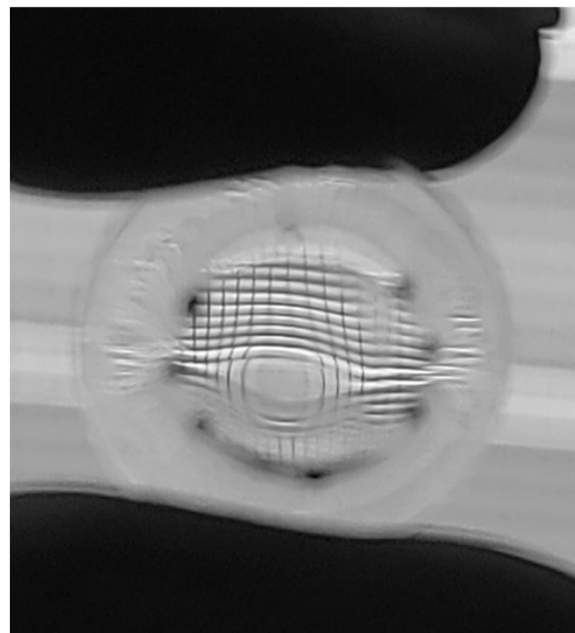
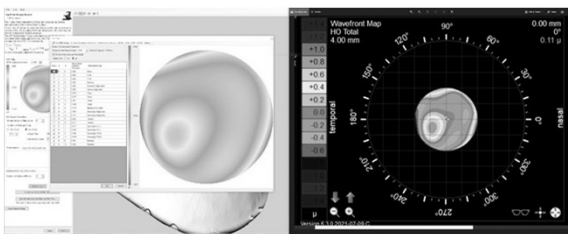


	Average	SD	Range
Horizontal Range	11.28 μm	3.87 μm	7.2 – 19.0 μm
Vertical Range	15.24 μm	5.19 μm	6.2 – 23.6 μm
Rotation Range	0.18 $^\circ$	0.06 $^\circ$	0.08 $^\circ$ – 0.31 $^\circ$
Time to average position	0.12 seconds	0.037 seconds	0.04 – 0.18 sec.

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HOA OPTICS



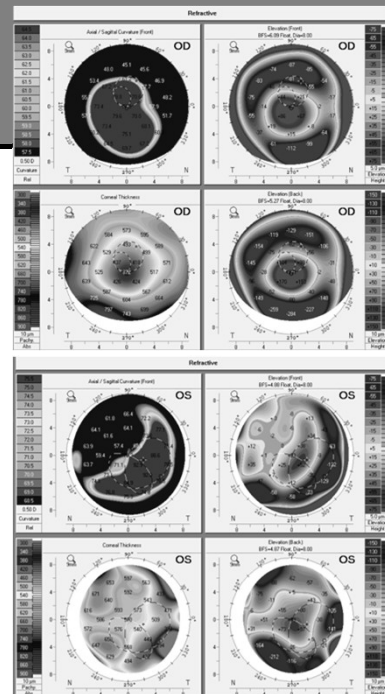
Best-Fit CL Option(s) For KCN Case: Still Seeing Double with Scleral Lens

- 50 yo Caucasian female presents for annual CL eval
 - Occ Hx: OU (dx 1999) & PK OS (2004) due to OS GP intolerance
 - Now wearing scleral lenses (CSE) - *"These scleral lenses are incredibly comfortable, and my vision has drastically improved. I can wear these all day long without any issues."*

- Entering VA w/ CSE sclerals
 - OD 20/30, OR Plano & PHNI
 - OS 20/40, OR Plano & PHNI

- "When I read the vision chart, I get ghosting and shadowing of images, mostly or only in my right eye."

Case Courtesy, Kevin Feng O.D.



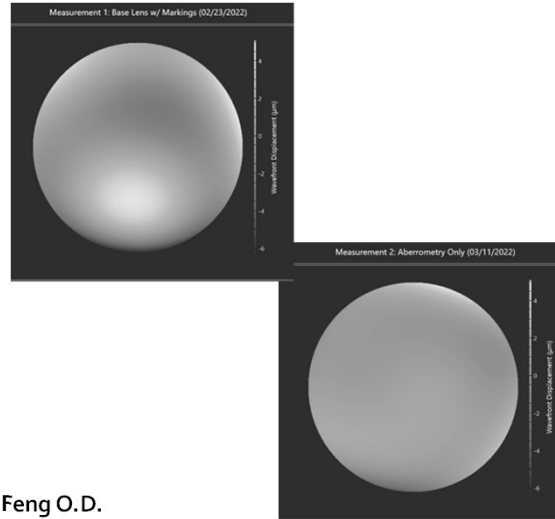
Best-Fit CL Option(s) For Your KCN Patients Case Still Seeing Double: Over-CL Aberrometry



Case Courtesy, Kevin Feng O.D.

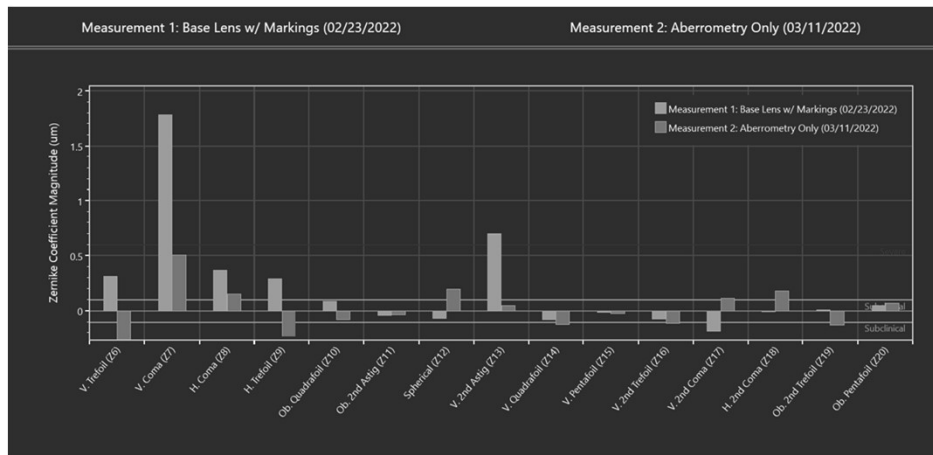
Best-Fit CL Option(s) For Your KCN Patients Case Still Seeing Double: HOA-Correcting Optics

- Habitual LOA scleral lenses
 - BCVA 20/30
 - Pt complains of "ghosting/shadowing"
- New HOA scleral lens
 - BCVA 20/25+
 - No more complaints of "ghosting/shadowing"
- ~1.5 lines of visual acuity improvement
 - Substantial improvement in subjective VA quality!



Case Courtesy, Kevin Feng O.D.

Best-Fit CL Option(s) For Your KCN Patients Case Still Seeing Double: Zernike Plot



Case Courtesy, Kevin Feng O.D.



Pre-Scleral Lens Fitting Eval

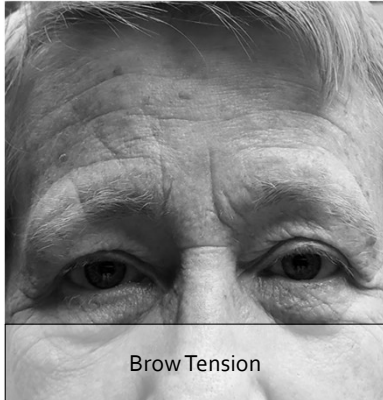
- Discuss patient goals, expectations, and Symptoms
- Assess facial asymmetry
- Look for brow / eyelid/ eyelash ptosis
- Evaluate Meibomian gland function
- Note presence of Bell's phenomenon
- Note lid margin positions
 - Entropion/ extropion
 - Springback test for lower lids
 - exposure
- Pre-Fitting photos



How to examine for brow affecting fit



Combo Tx: Brow & Blepharoptosis



Thank You!

Clark Chang OD, MS, FAAO
Christine Sindt, OD, FAAO