



SCLERAL LENSES 101

Stephanie L. Woo, OD, FAAO, FSLs

FINANCIAL DISCLOSURES

○ Dr. Stephanie Woo

- Alcon
- Art Optical
- Bausch and Lomb
- Blanchard Contact Lenses
- Essilor Contacts
- X-cel Contacts
- Specialeyes
- Biotissue
- Katena
- Visionary optics
- Shire
- GPLI
- STAPLE program
- Scleral Lens Education Society
- Contamac
- Synergeyes

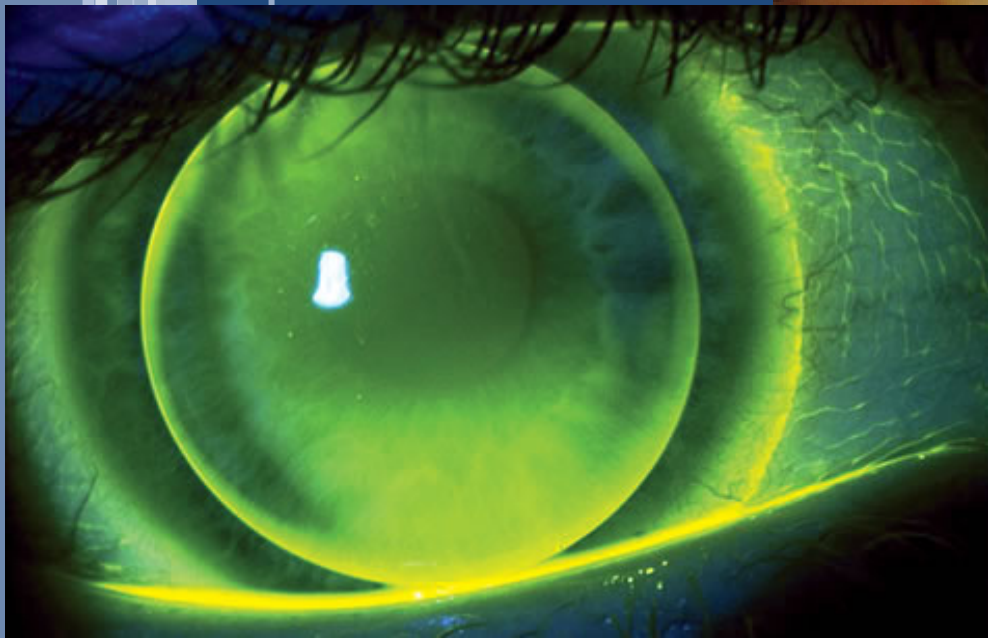
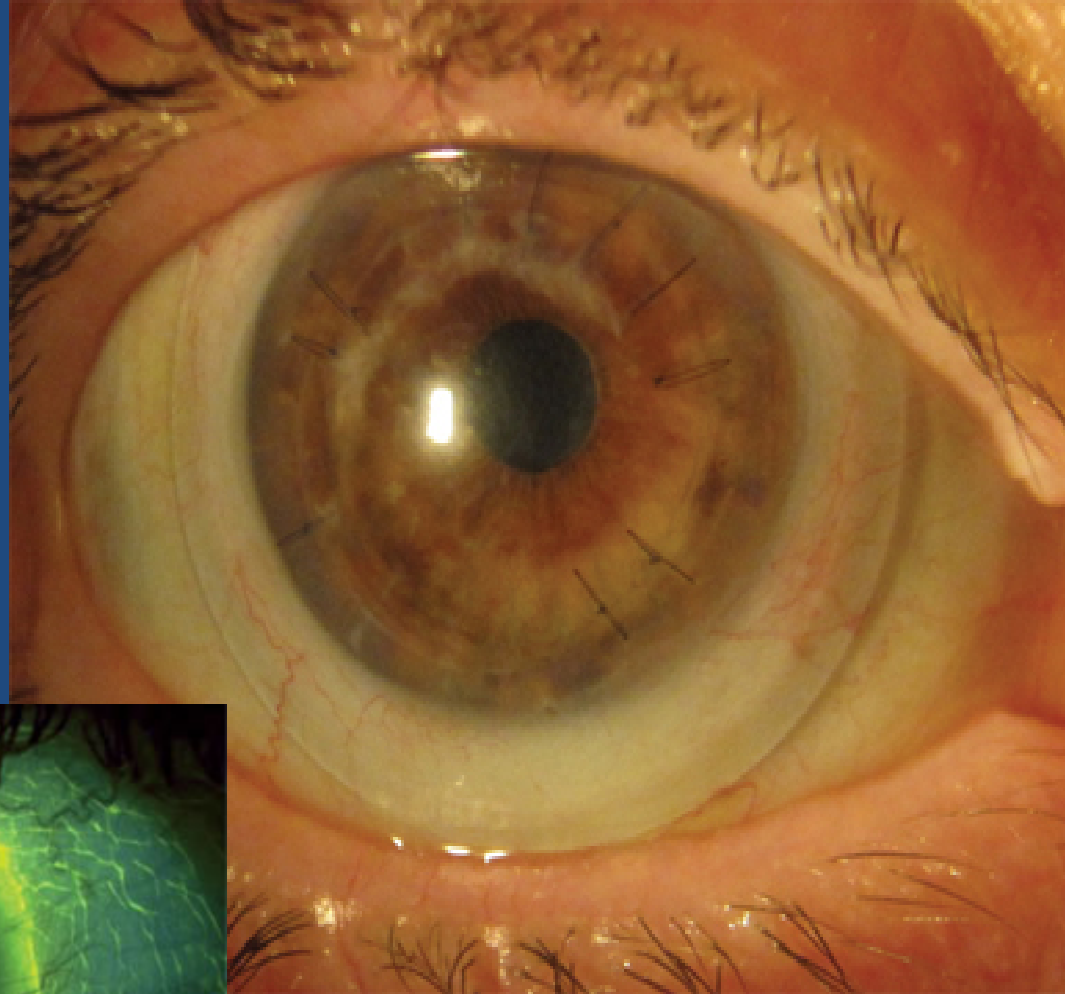


Stephanie L. Woo, OD, FAAO, FSLs

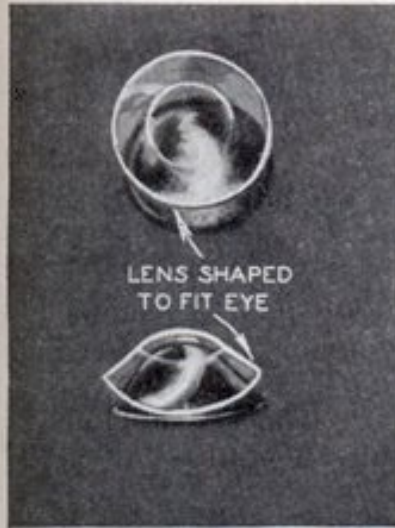
- Graduated from SCCO, completed a Cornea and Contact Lens Residency from UMSL
- Owned 3 private practices in AZ and CA – grew specialty lens population from 0 to 1000 in 5 years
- Presented 100+ hours of CE on the topic of specialty contact lenses
- Successfully managed over 2,000+ specialty lens patients to date
- Founder – Contact Lens Institute of Nevada
- Founder – Woo University and Stephanie Woo, PLLC - Optometry coaching and consulting

WHAT ARE SCLERAL LENSES?

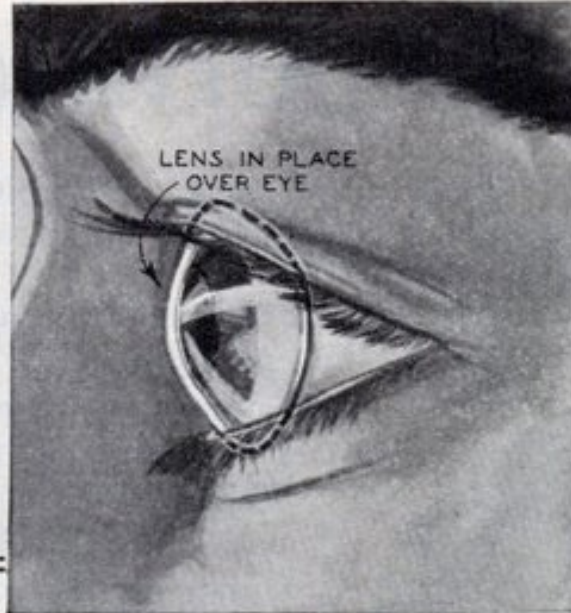
- Larger than corneal GPs (>14.0 mm)
- Most designs vault the cornea completely
- Must fill the lens bowl with non-preserved saline
- Minimal movement and decreased lid interaction = COMFORT
- Remarkable stability and centration
- Ability to fit very IRREGULAR corneas



Clumsy Specs Eliminated by Small Invisible Eye Glass



The concave curvature of the lens permits it to rest without irritation over the eyeball.



The eyeglass, worn as shown above, fits snugly under the eyelid and is easily inserted or removed by the user.



Invisibility is the glasses' chief feature. They cannot be seen on the man in the photo above.

AWKWARD and all-too-conspicuous spectacles may in time go the way of ear trumpets and bustles when the diminutive and invisible eyeglasses shown in the photos above, an invention of Prof. Dr. L.

Heine of Kiel, Germany, come into widespread use. The glass is a thin curved lens that is worn monocle fashion beneath the eyelid in the horny coat of the eye. It can be inserted or extracted by the patient.

POLYMETHYLMETHACRYLATE (PMMA)

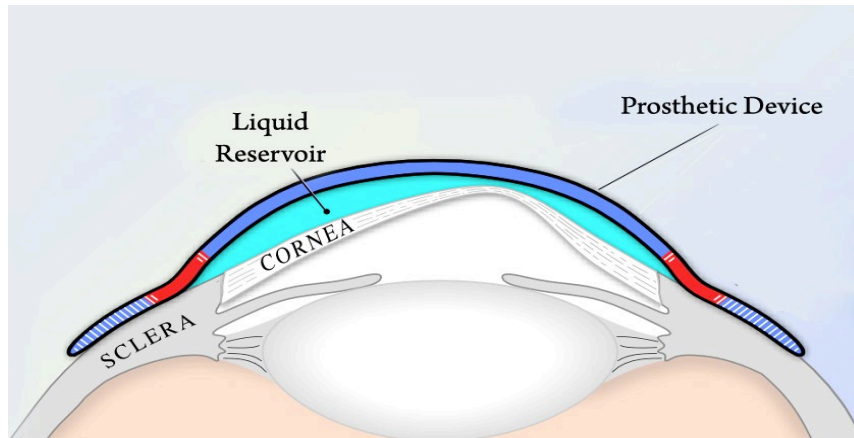
EARLY 1900s

- Made from impression mold of eye
- Difficult to make
- Problem with hypoxia



SCLERAL LENSES

- First used in late 1800s and early 1900s
- Manufacturing process now more reproducible



- Modern scleral lenses

- Don Ezekiel, O.D.
- Ken Pullum, O.D.
- Perry Rosenthal, M.D. Boston Scleral Lens



PATIENT ADVANTAGES OVER TRADITIONAL LENSES

Comfort

- Edges tuck under lids
- No rubbing on the cornea
- Minimal movement

Large Diameter

- Centration and Stability
 - Can't pop out/dislodge
- No entrapment of foreign bodies
- Large optic zone (8.00mm+)

Dryness

- Fluid reservoir holds moisture over eye
- Vision does not fluctuate
- Comfortable wearing time

**Improved vision and
visual quality**

SCLERAL LENS: INDICATIONS

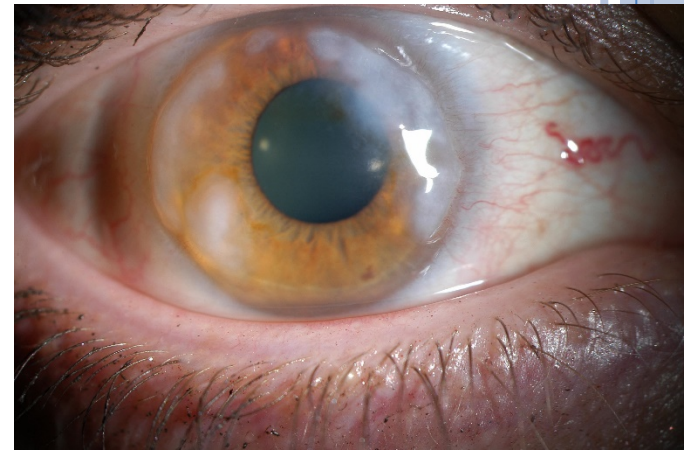
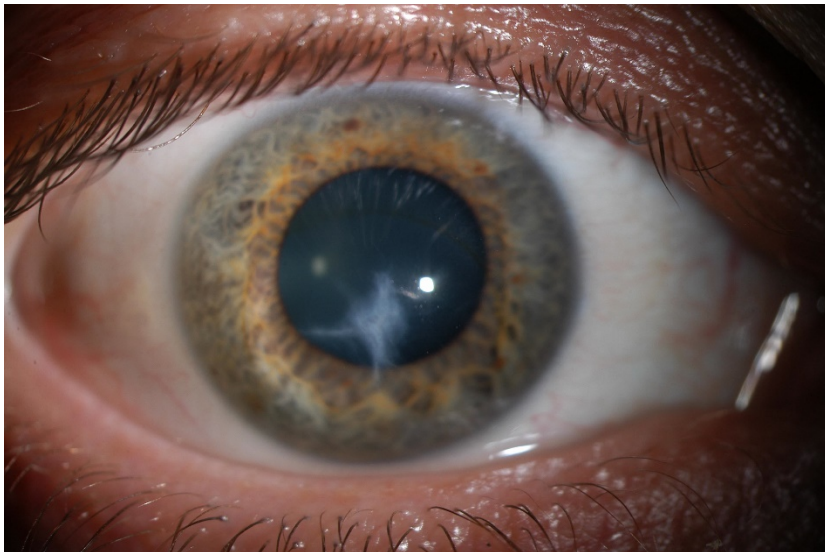
○ Corneal ectasias

- Primary corneal ectasias
- Advanced (notably decentered) keratoconus
- Keratoglobus
- Pellucid marginal degeneration
- Secondary corneal ectasias
- Post-LASIK
- Post-PRK
- Post-RK



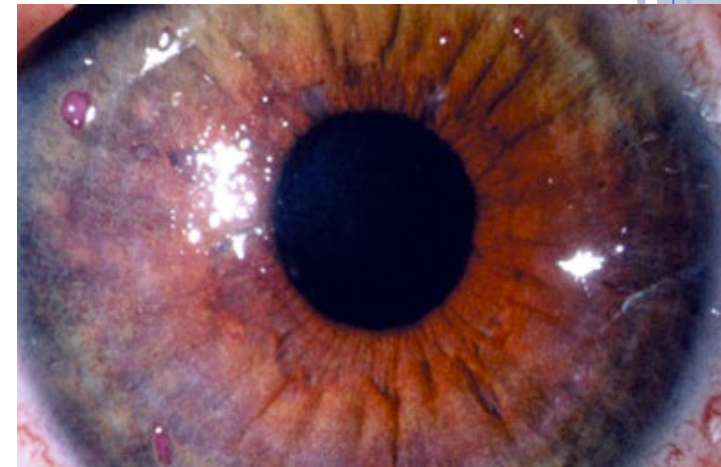
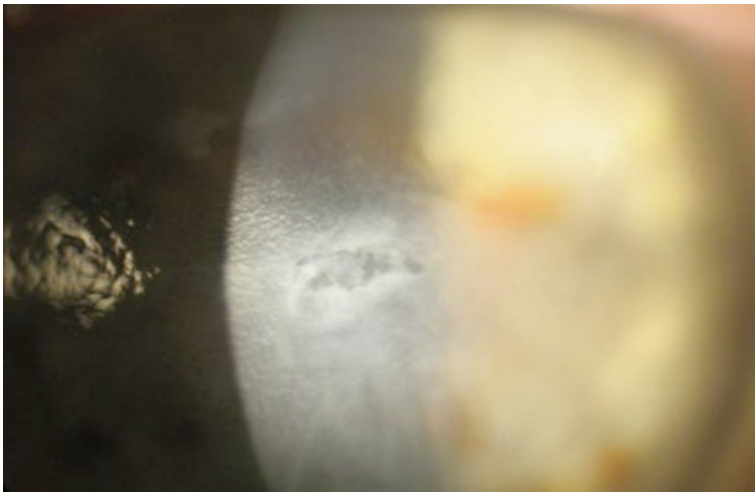
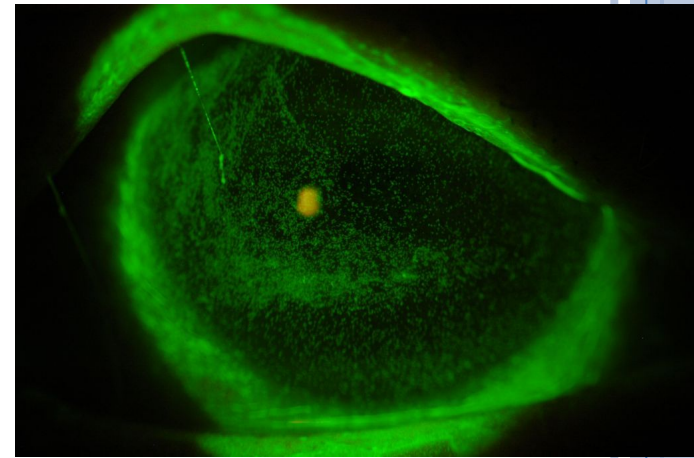
SCLERAL LENS: INDICATIONS

- Corneal transplants
- Trauma
- Corneal scars
- Corneal degenerations or dystrophies
 - Salzmann's nodular degeneration
 - Terrien's marginal degeneration



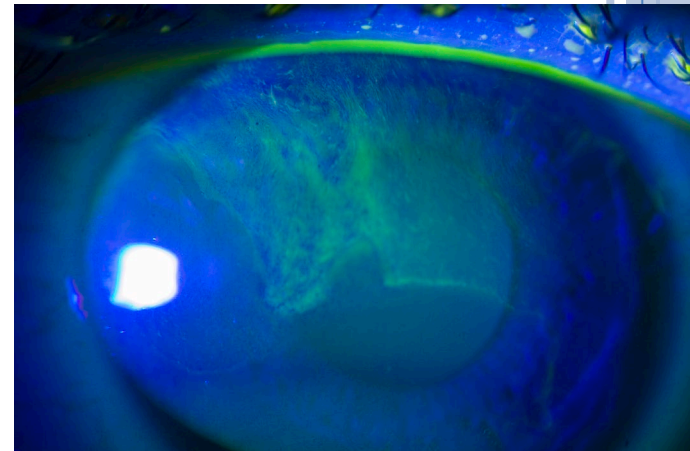
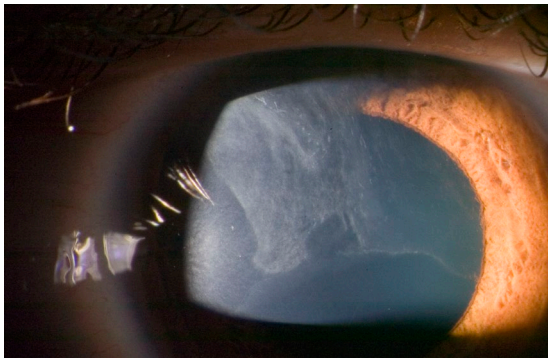
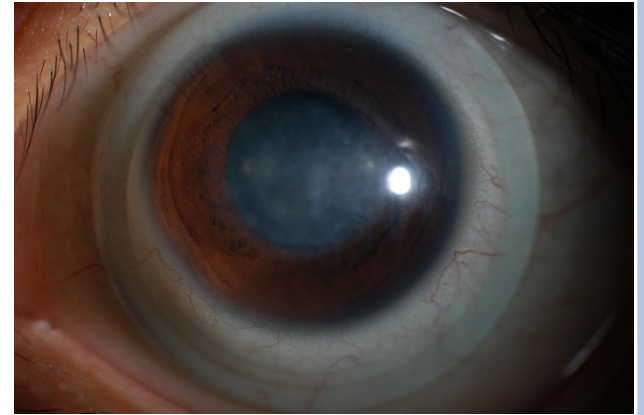
SCLERAL LENS: INDICATIONS

- Severe dry eyes
 - Graft versus host disease
 - Sjögren's syndrome
 - Stevens Johnson syndrome
 - Neurotrophic keratopathy



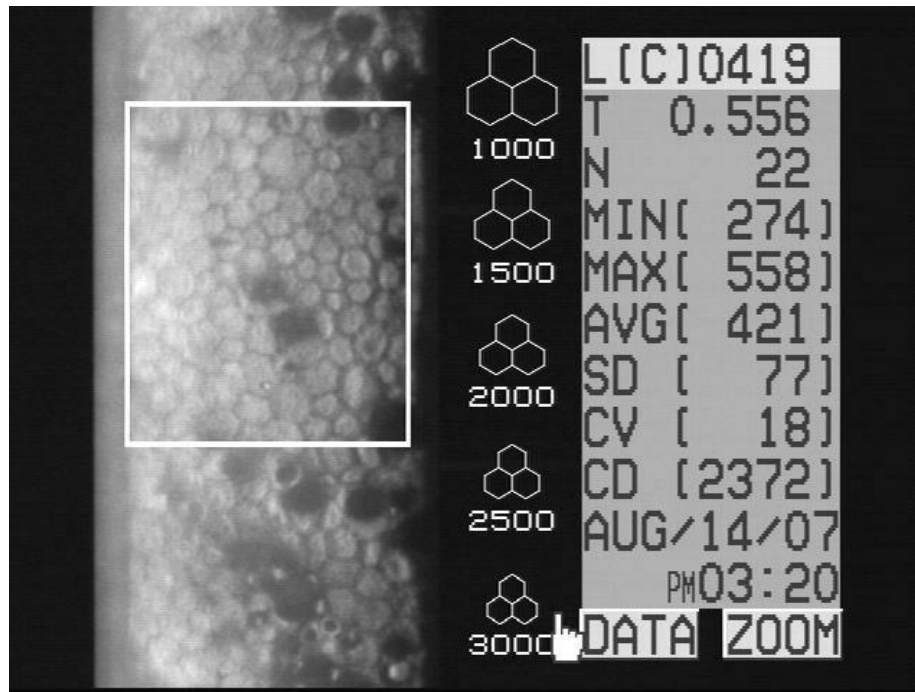
SCLERAL LENS: INDICATIONS

- Inflammatory conditions
 - Limbal stem cell deficiency
 - Ocular cicatricial pemphigoid
- Neovascularization with hybrid lens designs
- Poor comfort with traditional gas permeable designs
- Persistent epithelial defects



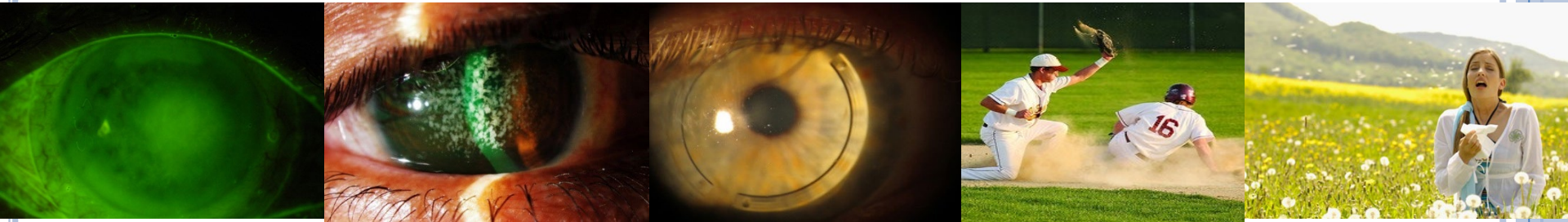
SCLERAL LENSES: CONTRAINDICATIONS

- Corneas with significant edema from reduced endothelial cell count
- Fuch's corneal dystrophy?



If scleral lenses are great for irregular cornea patients, can they be an option for regular cornea ones?



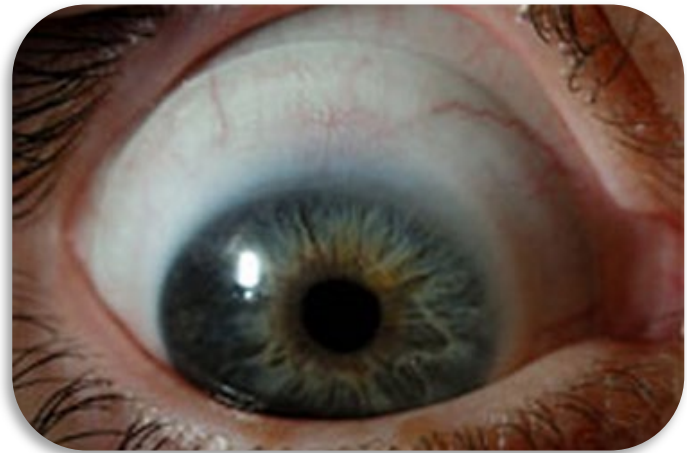


Toward a New Consensus

- Irregular corneas
 - Diseased eyes
 - Normal corneas
- } Established applications
- Soft lens wearers experiencing discomfort/fluctuating vision
 - High refractive errors, astigmatism
 - Presbyopia (especially with astigmatism)
 - Sports
 - Allergy control
- } Emerging

Patient Expectations and Education

- Advantages of scleral lenses
 - Vision: similar or enhanced vs. corneal GP lenses
 - Lens stability
 - No lens ejection
 - Comfortable
 - Improvement in dry eye
 - Protection



<http://www.eyeworld.org/article-taking-a-second-look-at-scleral-lenses>

HOW TO FIT SCLERAL LENSES

- Prepare the lens
- Fill with Preservative-free saline and NaFl
- Insert lens
- Assess lens fit
- Remove lens
- Order



APPLICATION

- Many different ways to apply a scleral lens
- Filling the lens – **COMPLETELY!**
 - Preservative free is essential

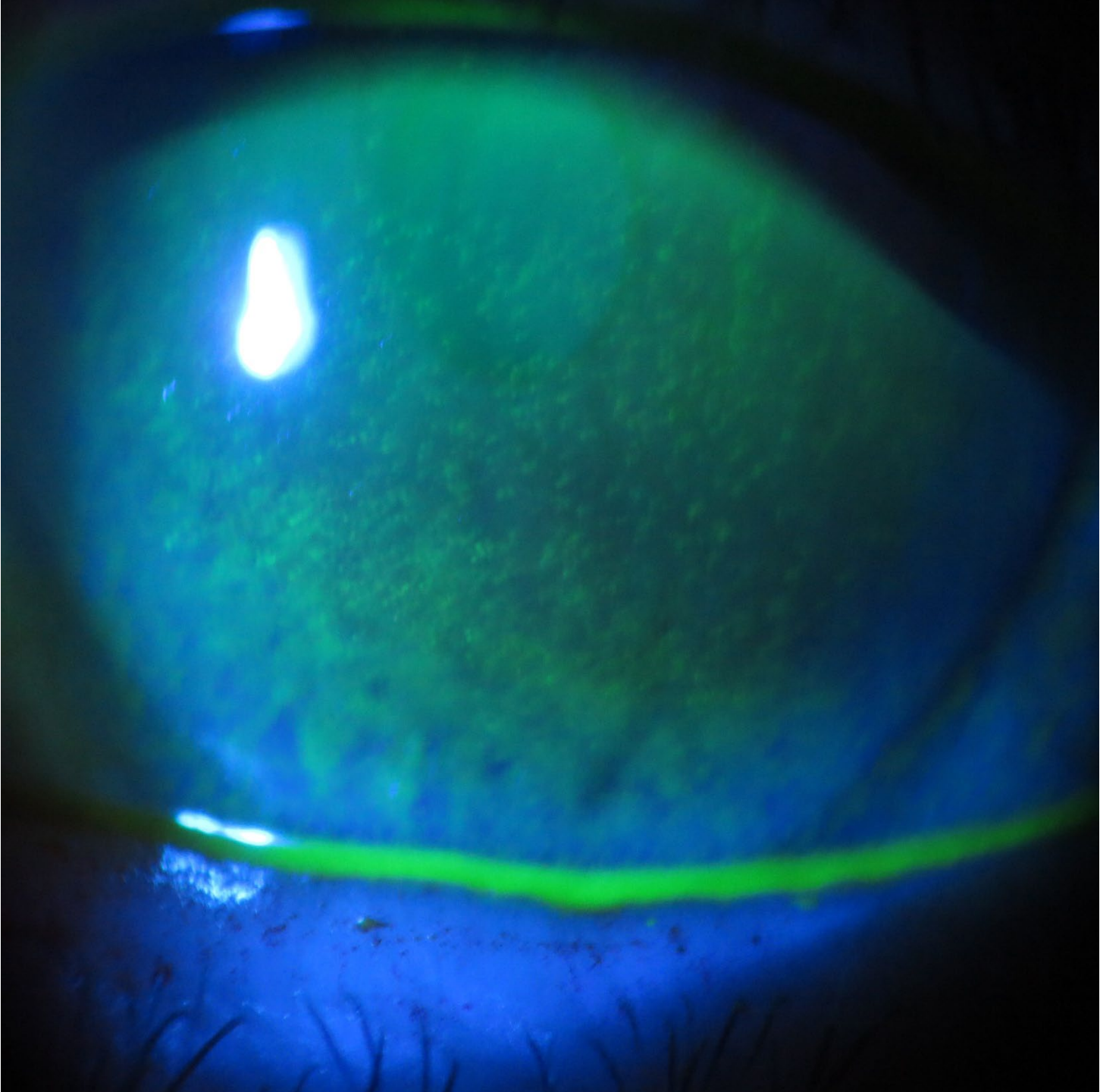


0.9% sodium chloride inhalation solution
3 mL vials, tray of 100

Sig: fill ocular prosthetic device
Completely before insertion

NDC: 0378-6985-01





SCLERAL LENS INSERTION



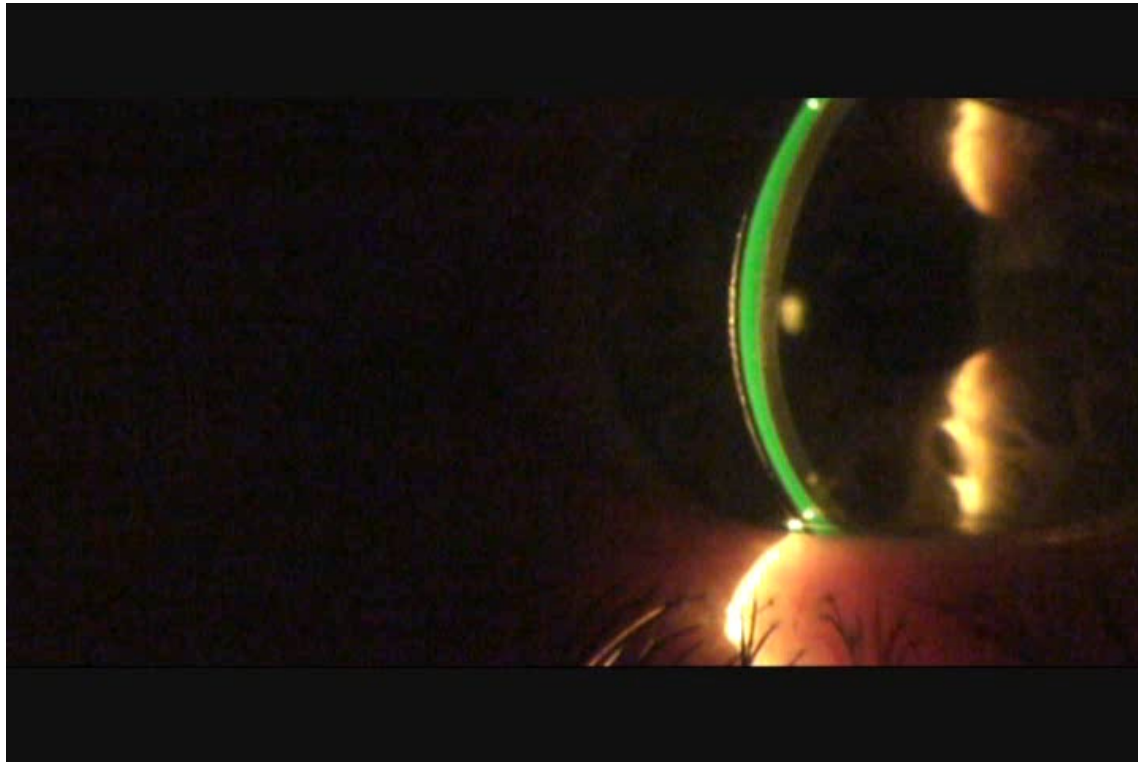
CON
INST
NEVADA



Dalsey Adaptives
"See Green"

CHECK FIT OF LENS QUICKLY WITH SLIT LAMP
AND REMOVE AND REAPPLY LENSES UNTIL AN
ACCEPTABLE VAULT IS ACHIEVED

AN OPTIC SECTION EVALUATION WITH FLOURESCCEIN



SETTLING

- Allow the scleral lens to settle 20-30 minutes (or longer) for accurate evaluation and over-refraction

SCLERAL LENS EVALUATION

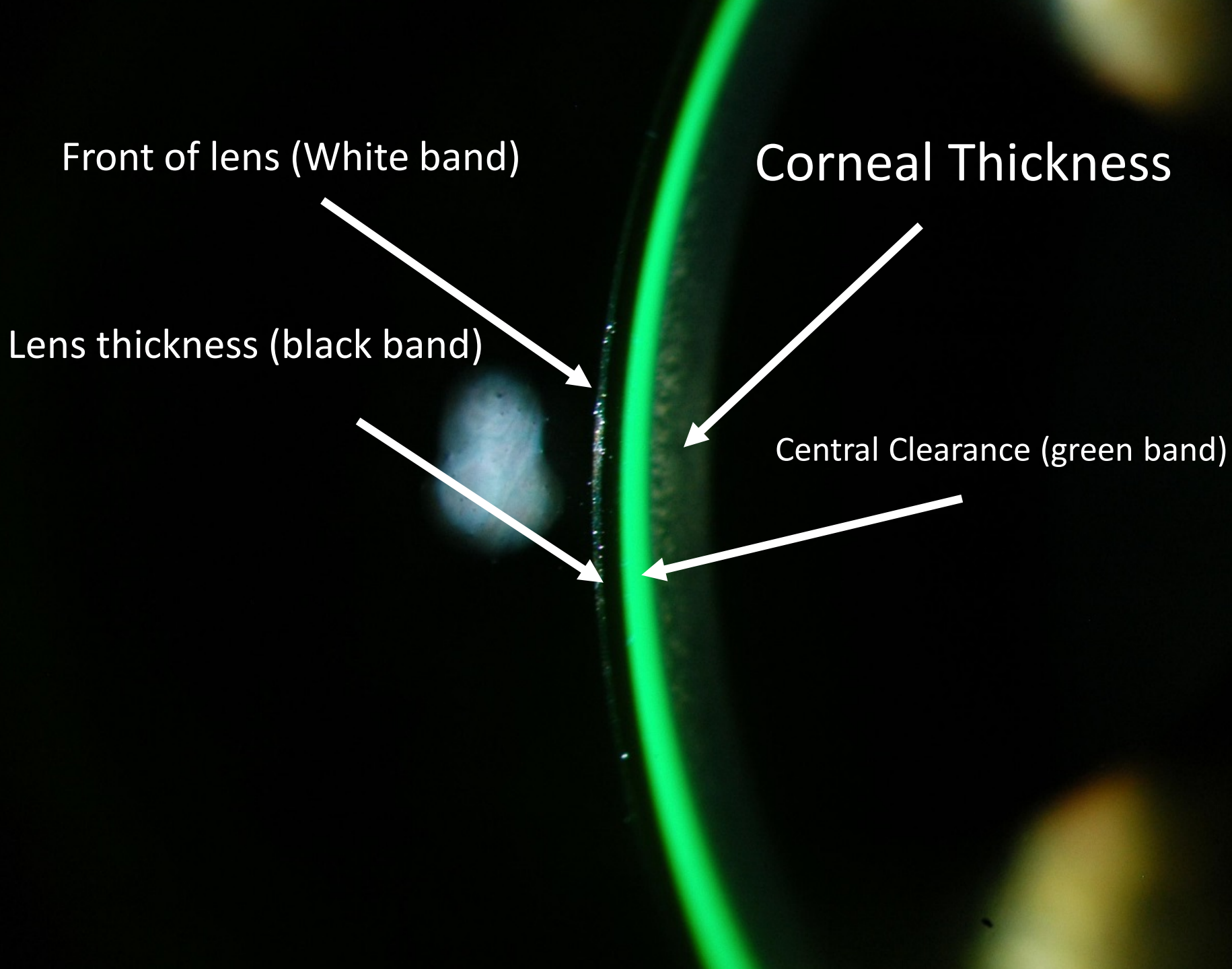
- Scleral lens fits can be evaluated with a slit lamp, an OCT or both
- Follow fitting guide instructions
- Best method is to evaluate “inside-out”

Front of lens (White band)

Corneal Thickness

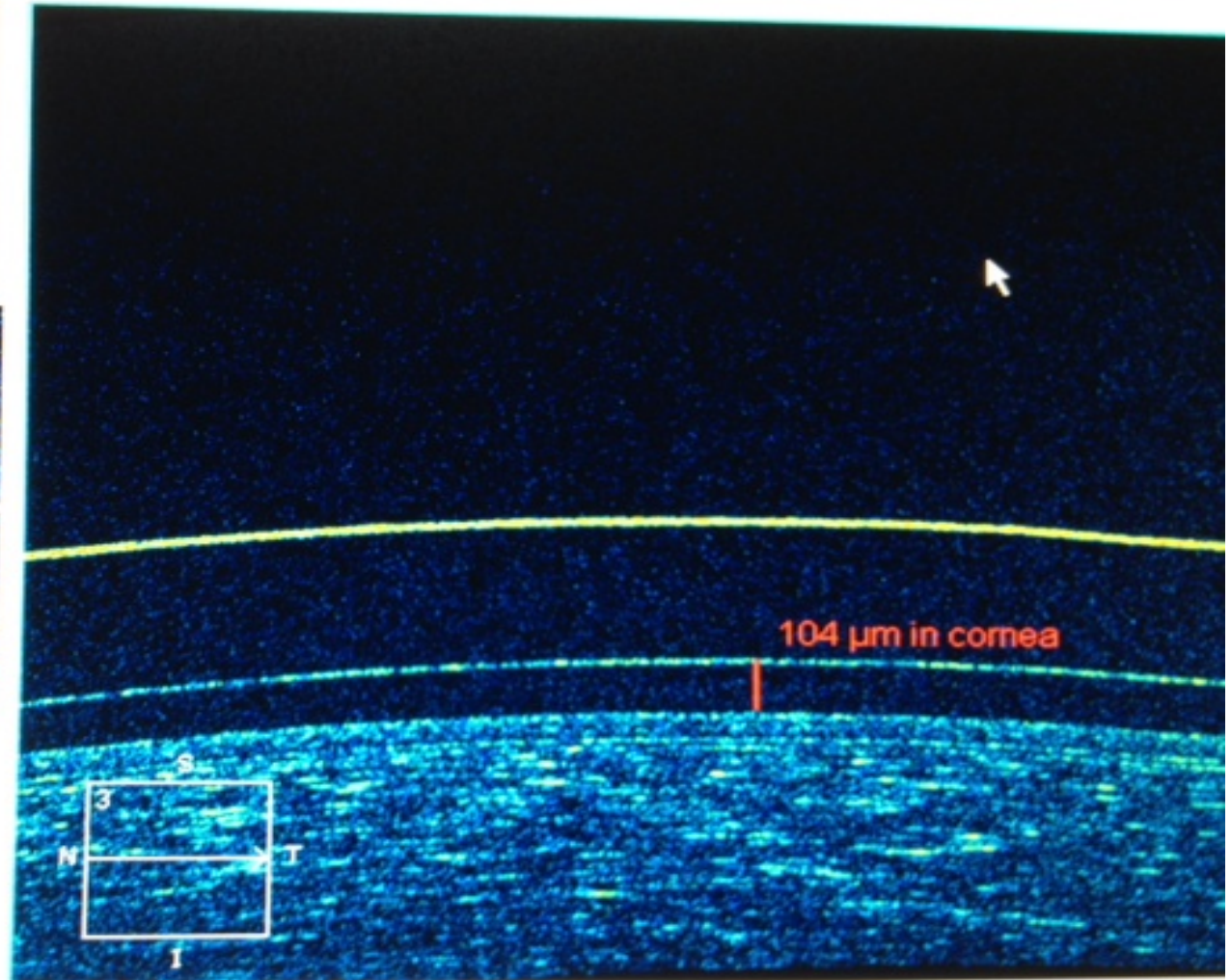
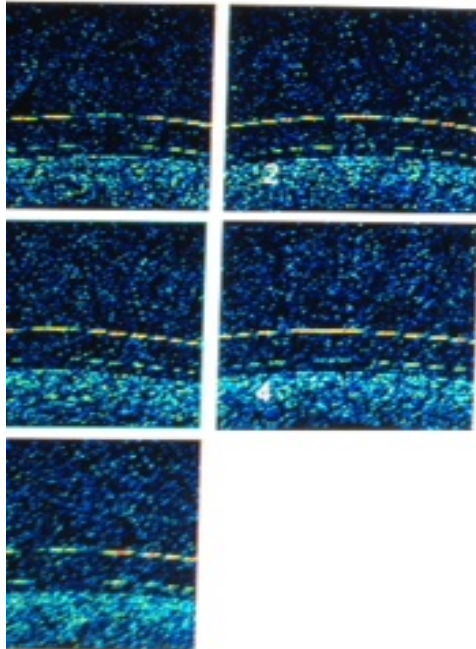
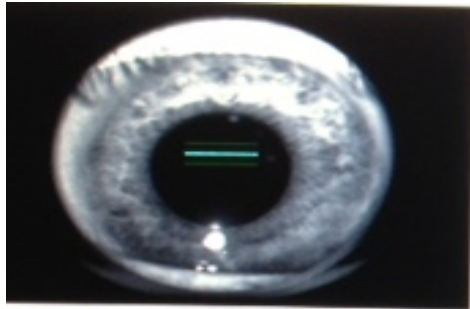
Lens thickness (black band)

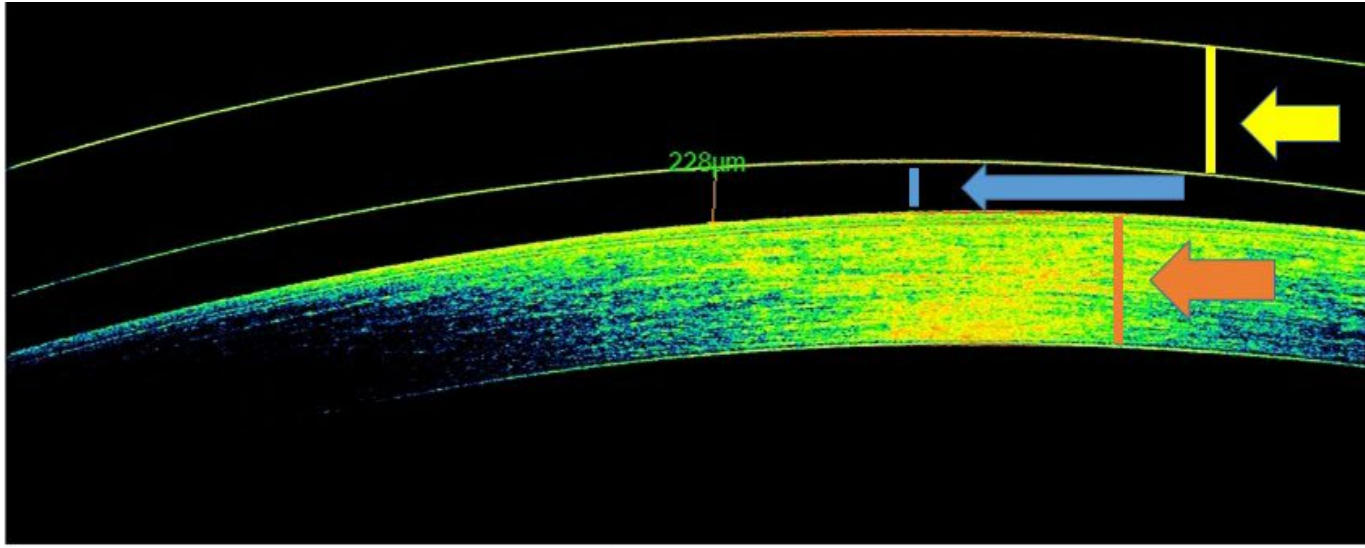
Central Clearance (green band)



EVALUATE APICAL CLEARANCE AT STEEPEST POINT

Can utilize Anterior Seg OCT to evaluate clearance, but this is NOT necessary

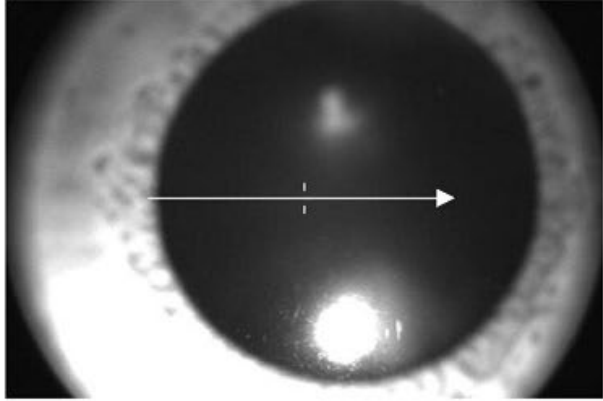




Scleral lens thickness

Central clearance (tear layer between scleral lens and cornea)

Corneal thickness



NO CLEARANCE!

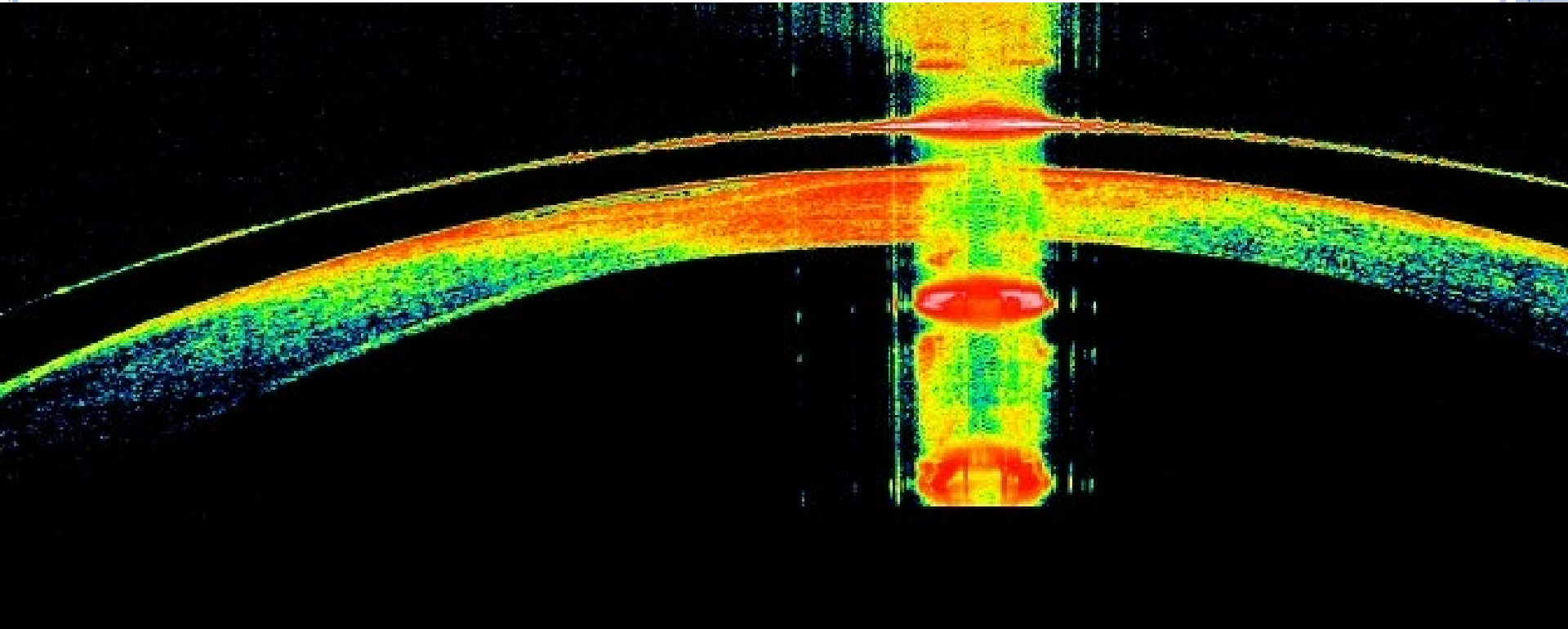




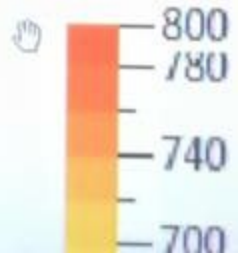
Photo courtesy of Dr. Lars Carlson

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parison within 5mm zone

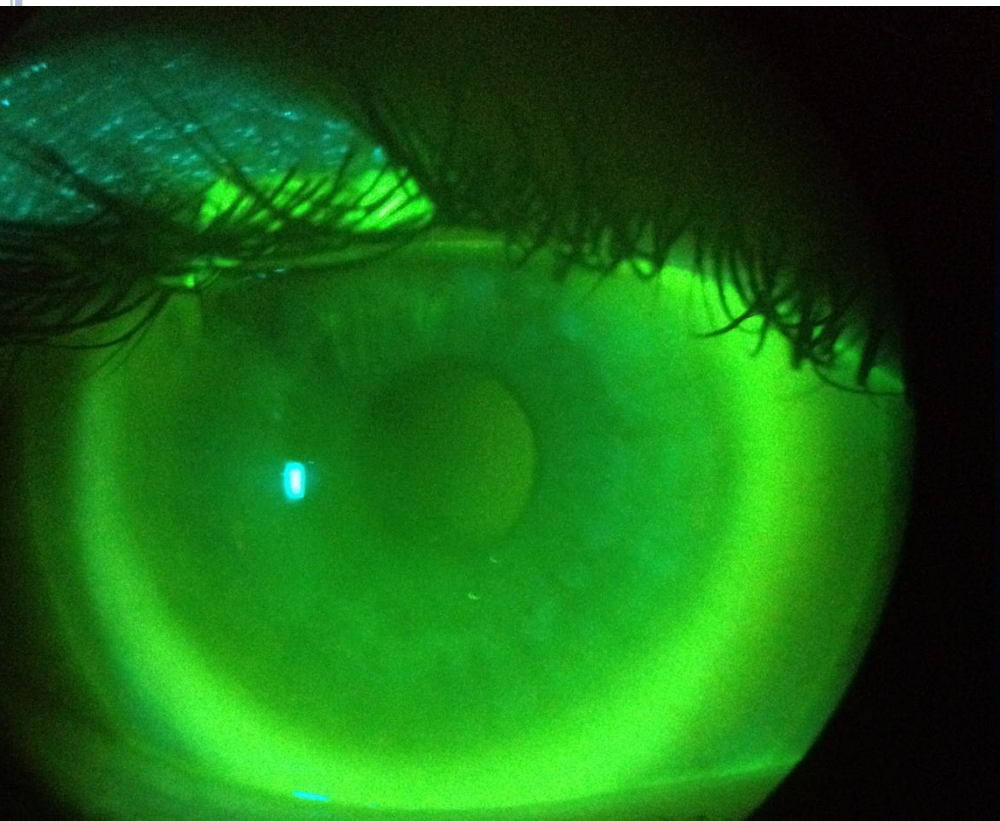
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S-I(2-5mm): N/A

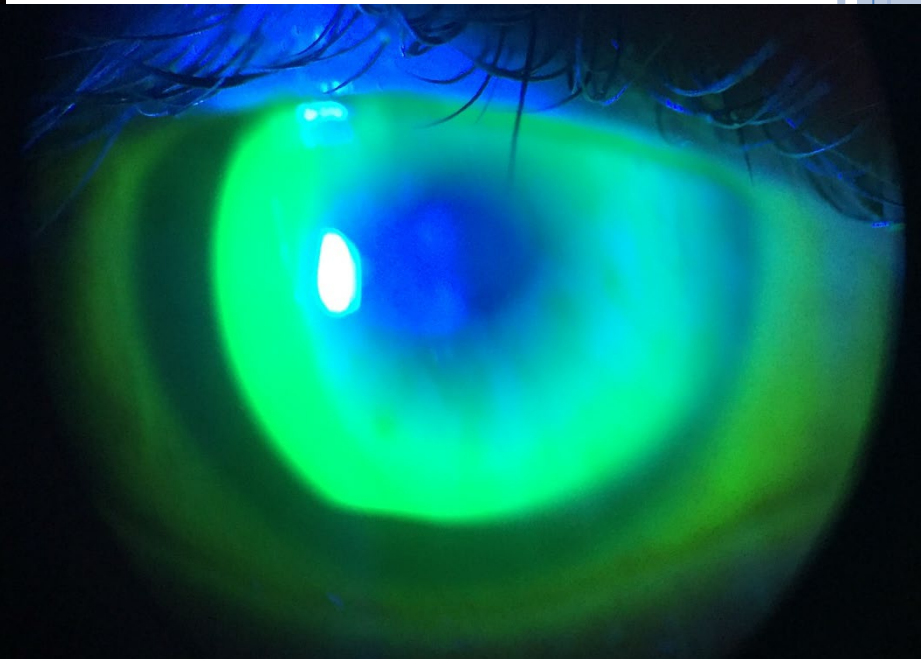


CENTRAL CLEARANCE

- Complete central clearance

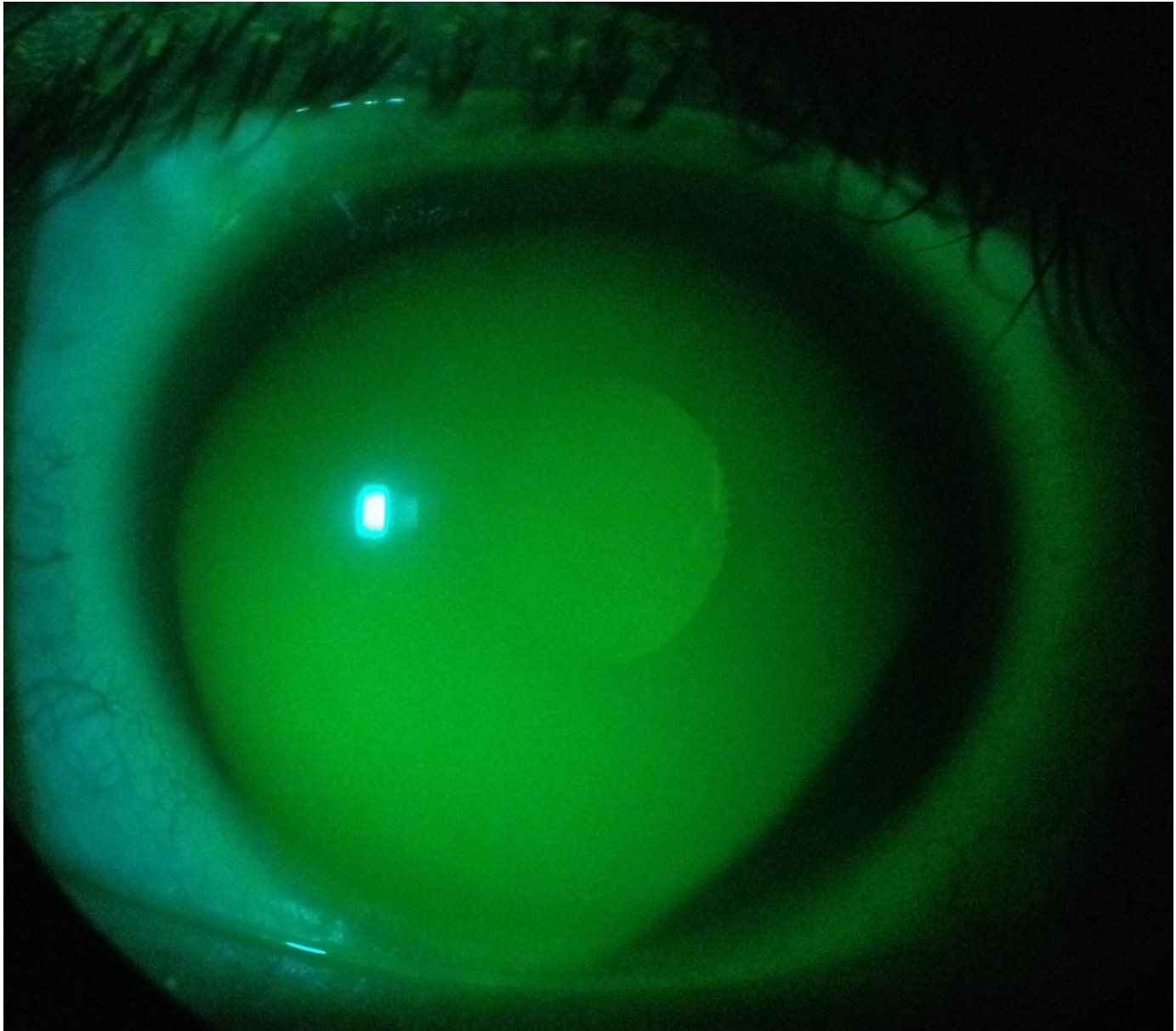


Central Touch



LIMBUS

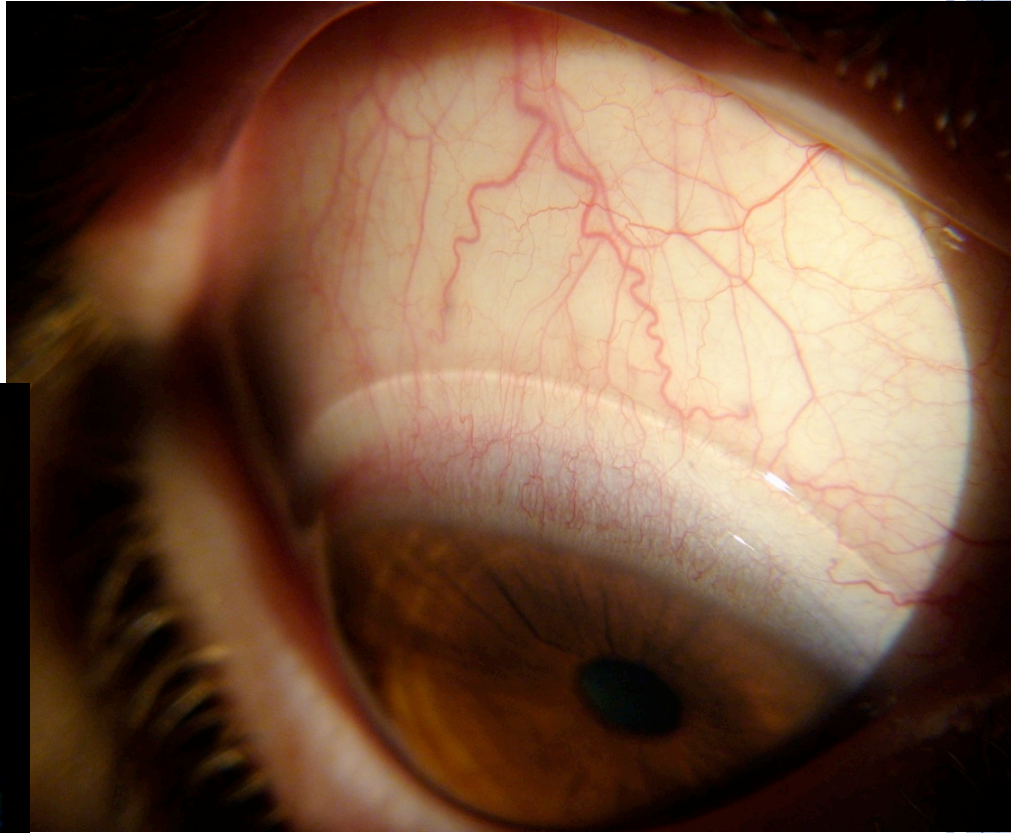
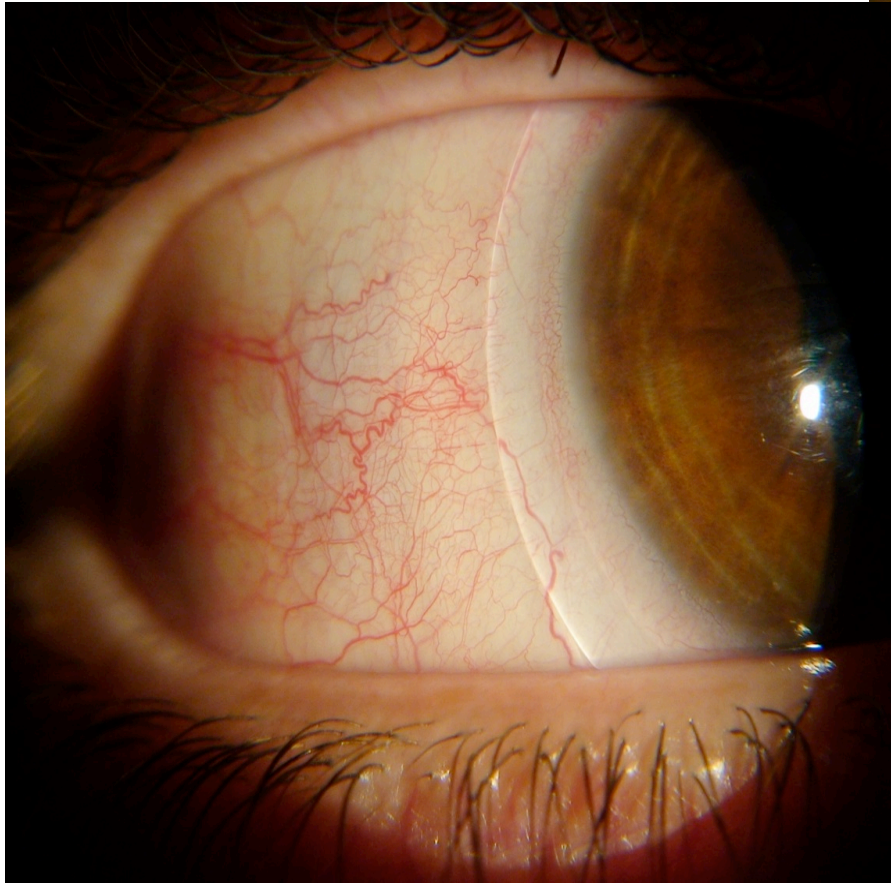
- Compression at the limbus could damage delicate stem cells
- View with optic section and fluorescein
- Full limbal clearance!

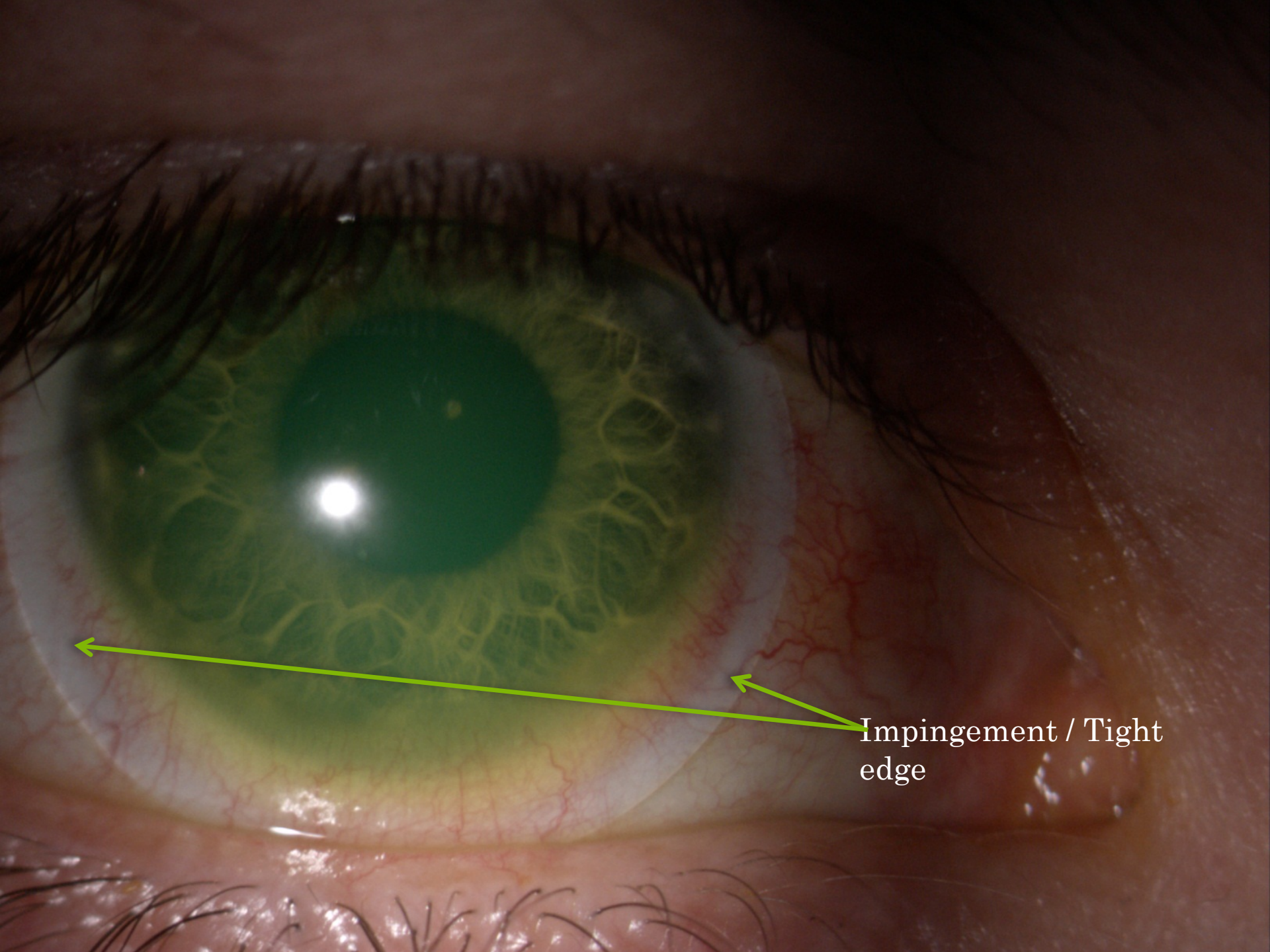


CONJUNCTIVA

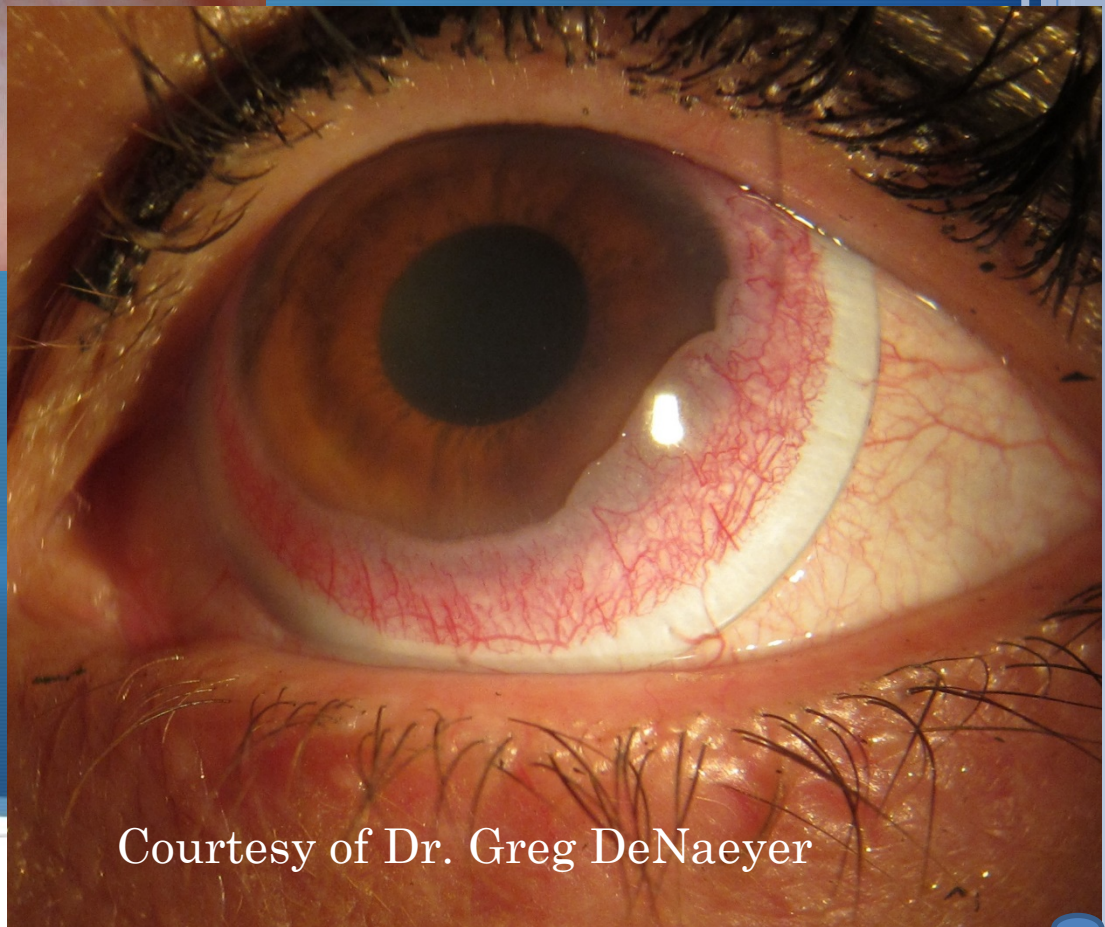
- Should look like a well fit soft lens
- Vessels
 - No drag or blanch
 - High mag should show bloodflow in the conjunctival vessels
- Indirect view of edge
 - Assess for shadows that may indicate lift off
- No impingement
 - Meaning the lens should not compress or dig in to the conjunctiva
 - This is easily seen with the OCT on raw image

GOOD EDGE ALIGNMENT

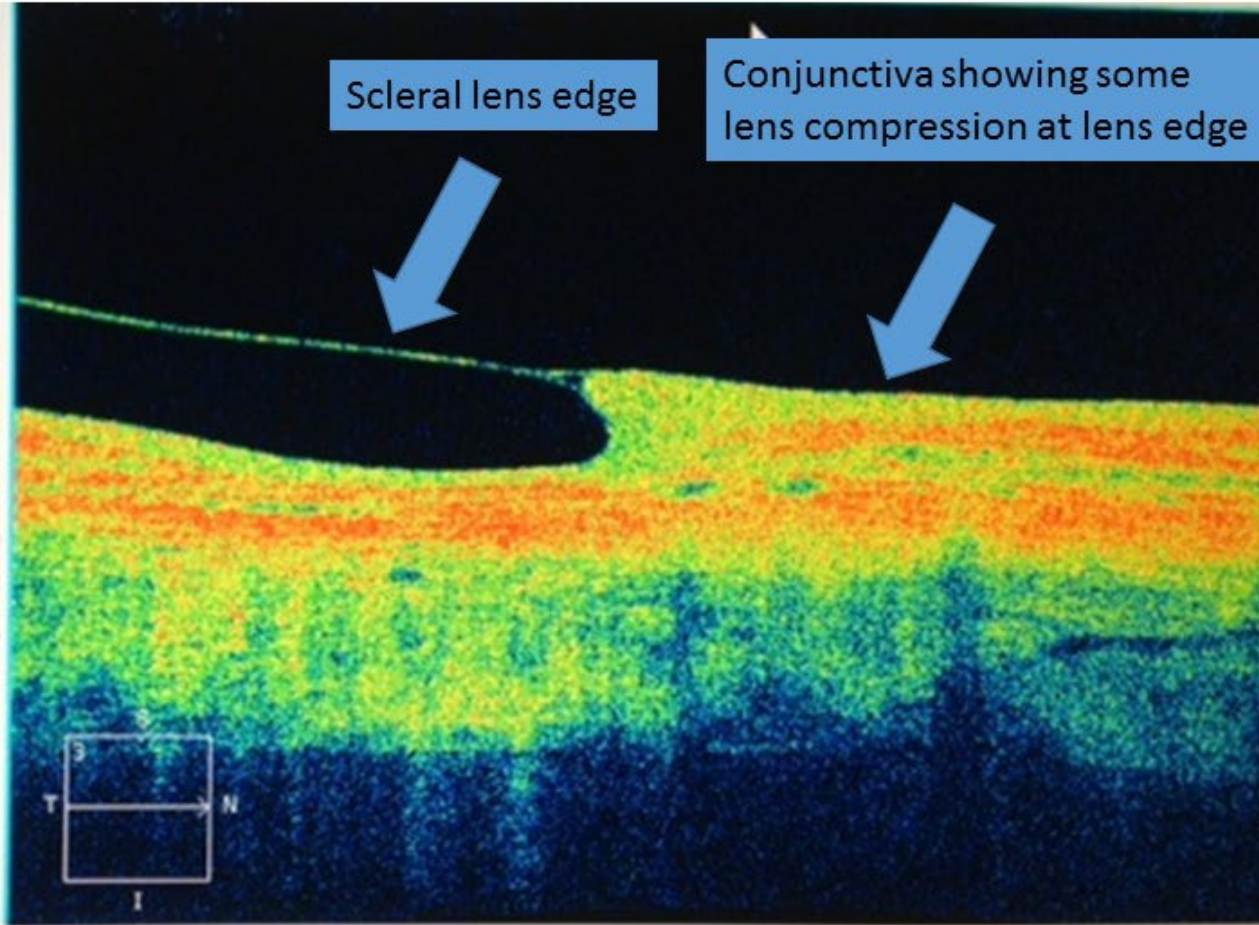
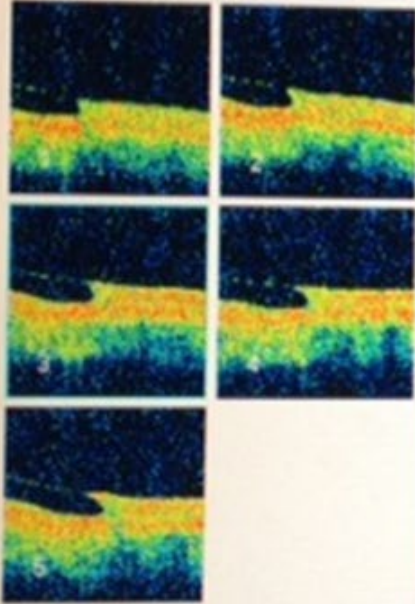
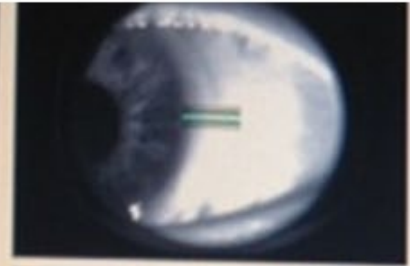




Impingement / Tight edge



Courtesy of Dr. Greg DeNaeyer



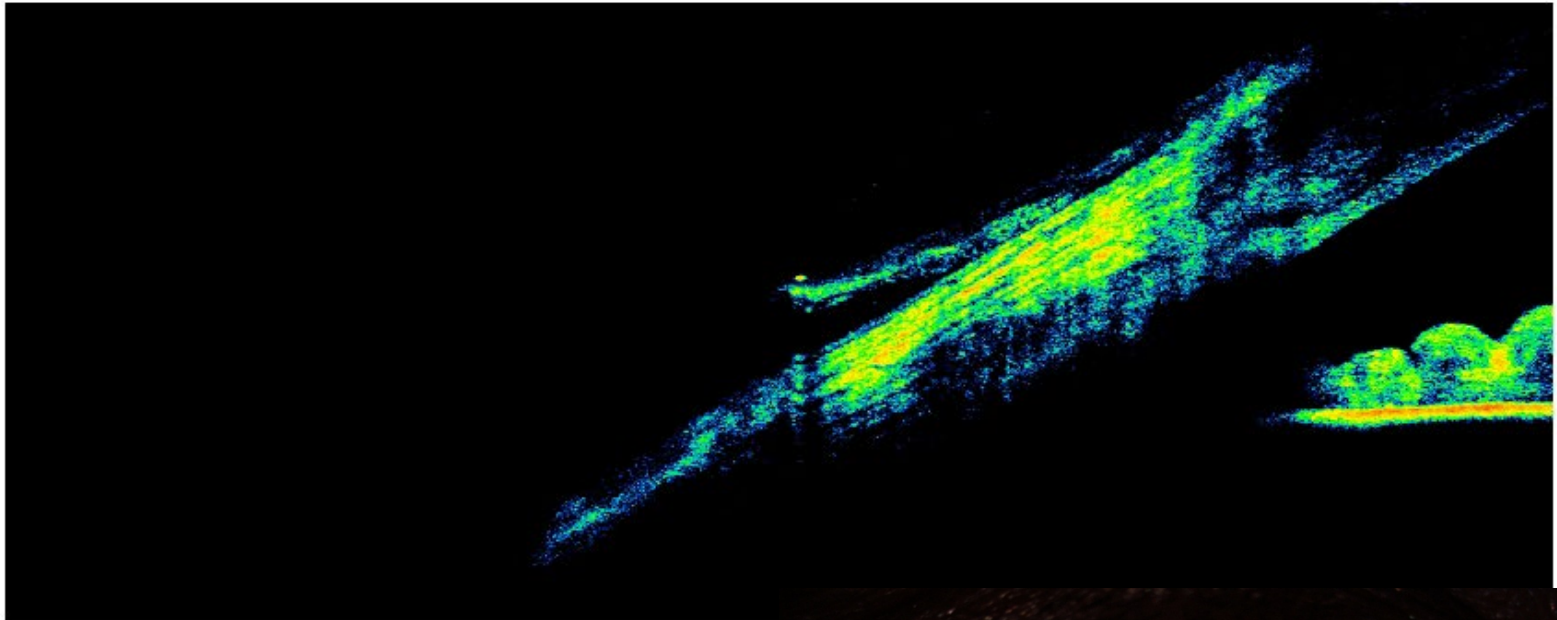
Scleral lens edge

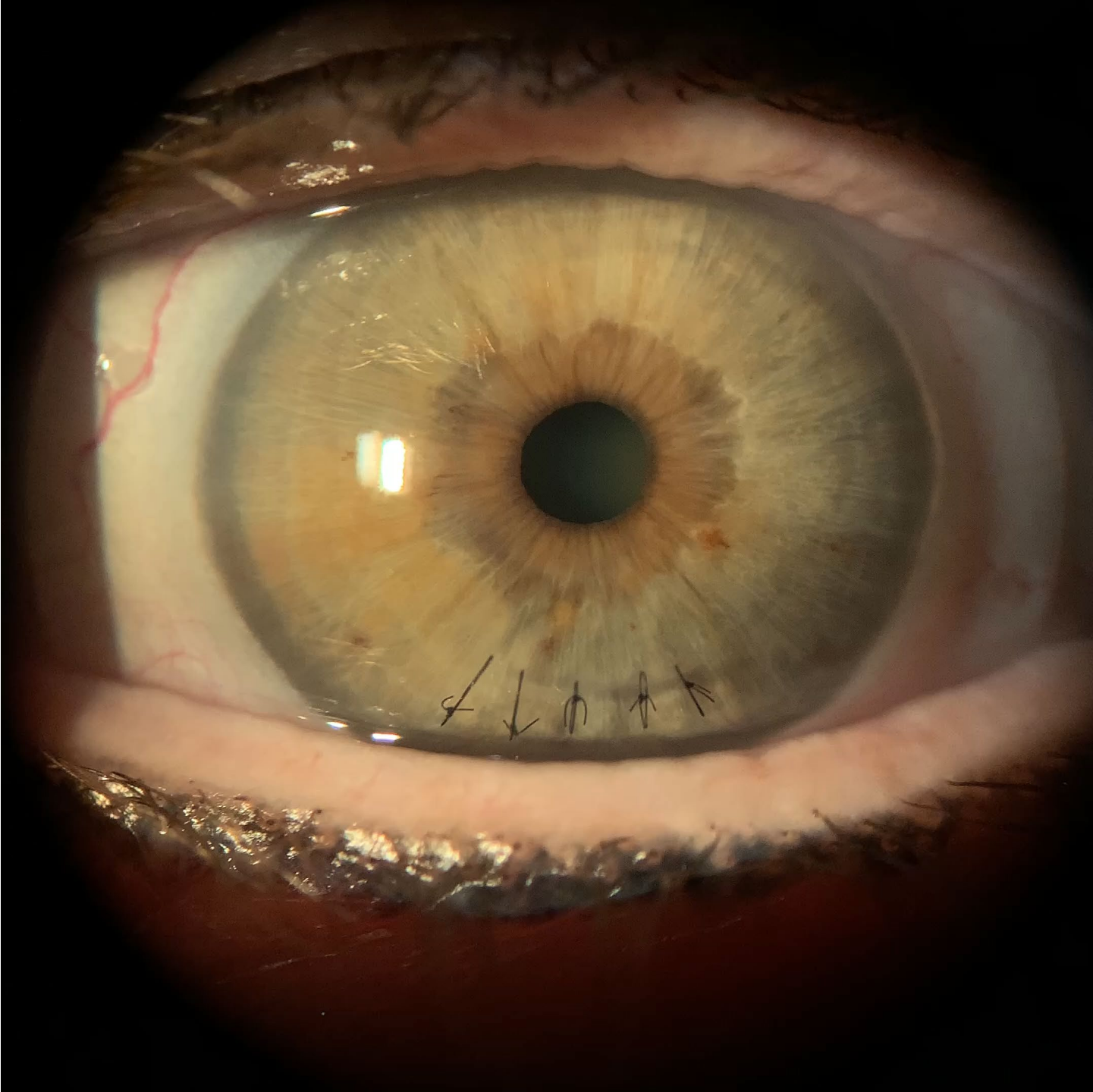
Conjunctiva showing some lens compression at lens edge

Cornea Angle

Scan Quality Index **Poor 6**

Right / OD





OVER-REFRACT AND ORDER!

SCLERAL LENS REMOVAL VIDEO



CONTACT LENS
INSTITUTE OF
NEVADA

HELP YOUR SCLERAL LENS PATIENTS SUCCEED!

Scleral Lenses are BIG NEWS
Larger Lenses Offer the Crisp Vision of a GP Lens Combined with More Comfort

Havasu Eye Center
383 S. Lake Havasu Ave.
Lake Havasu, AZ 86406
(T) 928-690-9141
(F) 928-690-8639

Parlier Vision Care
115 W. Riverside Dr.
Parlier, AZ 85344
(T) 928-669-2497
(F) 928-669-8424

Blythe Vision Care
110 N. Spring St.
Blythe, CA 92225
(T) 760-922-3951
(F) 760-922-2202

Timothy R. Port, O.D. Stuart B. Adams, O.D., F.A.A.O. Stephanie L. Woo, O.D., F.A.A.O.

Scleral lens instructions

Directions: **Use. Rinse VERY WELL with saline solution or contact lens multisoak.**


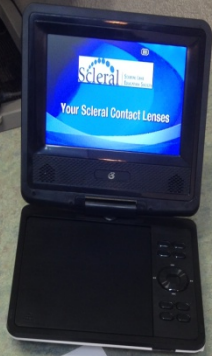
TIMOTHY R. PORT, O.D. CA8925T / AZ8319 / AZ TPA #93564
STUART B. ADAMS, O.D., F.A.A.O. CA99189T / AZ TPA #11
STEPHANIE L. WOO, O.D., F.A.A.O. CA1418T9G / AZ TPA #1162

383 S. Lake Havasu Ave. • Lake Havasu City, AZ 86403 • (928) 680-1144 / Fax: 680-8639
115 W. Riverside Dr. • Parlier, AZ 85344 • (928) 669-2497 / Fax: 669-8424
110 N. Spring St. • Blythe, CA 92225 • (760) 922-3951 / Fax: 922-2202

PATIENT NAME: _____ DATE: _____
ADDRESS: _____

RX: 0.9% sodium chloride inhalation sol'n
3mL Tray of 100
SIG: Fill lens completely before insertion
REFILL 05 TIMES NDC.0378-6985-01
O.D. _____ O.D. _____
DISPENSE AS WRITTEN SUBSTITUTION PERMISSIBLE

BAUSCH + LOMB
BOSTON SIMPLUS
Start Kit

Scleral Lenses are BIG NEWS
Larger Lenses Offer the Crisp Vision of a GP Lens Combined with More Comfort

Scleral Lenses
Your Scleral Contact Lenses

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Video



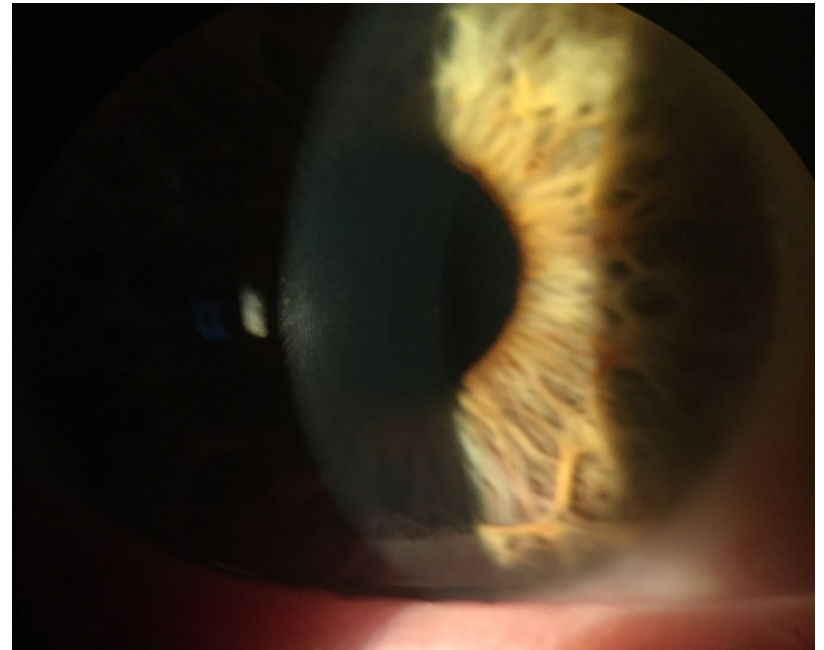
Scleral Contact Lens Insertion, Removal, Troubleshooting and Lens Care

SQ 52 YOWF

- Presents to the clinic for CEE.
- H/O Keratoconus OU x >20 years
- Wears corneal GPs, but complains the OS dislodges frequently
- States her OS “sees double” even with habitual GP lens
- Lost her GP lenses 1 week ago, and has been wearing specs
- Wants to know what her options are

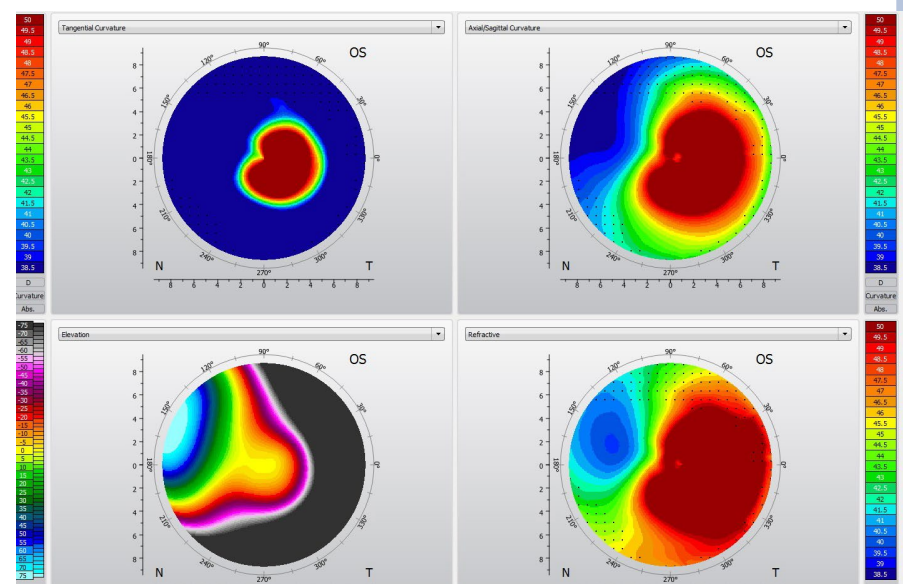
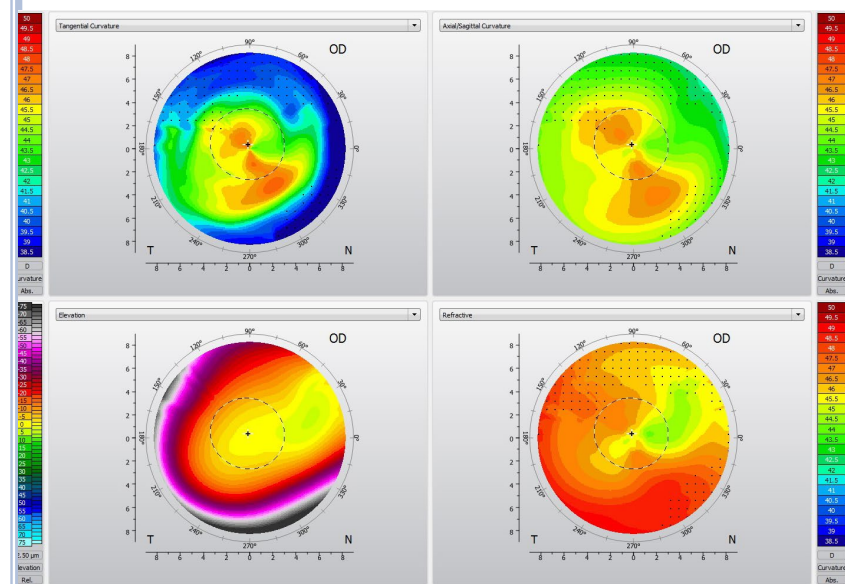
EXAM

- Distance VA with current glasses:
 - OD: -12.50+2.00x105 (20/60)
 - OS: -17.25+5.25x107 (20/400)
- MRx:
 - OD: -12.00+2.50 x 100 20/50)
 - OS: -16.50+6.75x099 (20/400)
- Slit lamp:
 - Eyelids/lashes clean and clear OU
 - Cornea – no scarring/stria OD, +scarring OS
 - Lens 1+NS
 - Posterior segment: WNL OU



OD topography

OS topography



ASSESSMENT AND PLAN


- Keratoconus OD and Keratoconus OS
- Discussed treatment options at length:
 - Corneal GP
 - Spectacles
 - Hybrid lenses
 - Scleral lenses
- SQ opted for scleral fit OS only (due to monetary reasons)

Diagnosis:

RMD OS

Initial BCVA: OD: _____ OS: _____

Plan: 1 hour fitting today. Diagnostic lenses are trialed until appropriate central clearance, limbal clearance, and edge alignment are achieved. Lenses then settle for 20-30 minutes and then central clearance, limbal clearance, and edge alignment are reassessed. Vision is also evaluated through the diagnostic lenses.

	OD trial 1	OD trial 2	OS trial 1	OS trial 2
Manufacturer	Amplify		Amplify	
Design	Amplify		ART OPTICAL	
Base Curve			8.04	
Limbal Curve				
Scleral Zone (edge)				
Diameter			14.50	
Power			-4.00	
Sagittal Depth			44,000	
Misc.				
Initial Central (um)				
Initial Limbal				
Initial Edge				
Assessment of fit			 "sees double"	
Final Central (um)			340um	
Final Limbal			Full	
Final Edge			blanch 3+9	
Over-refraction			-1.50	
Vision with OR			20/100+2	

Plan: Ordered lenses via (email) phone/ internet/ on 11/7/16 Rep name: Enik

	OD				OS Art Optical
Brand		Art Optical Contact Lens, Inc.			Ampleye Tonic PC
Power	OS only!!!	Ampleye Tonic PC OPXTRA 17	R- BC 8.04 -L		-5.50
Base Curve			RX -5.50		8.04
Diameter			CT 0.30	Lot #	16.50
			DIA 16.50		Optimum Extra LD/Lite Blue
		Inv.# 2404686200	R		
		Patient QUAS, SUSAN	L N003312		
		R:			
		L: ROFLUFOCON-D			

Entering Lens Parameters:

	OD	OS
Manufacturer		Amplify Optics
Design	OS	ART OPTICAL
Base Curve		8.04
Limbal Curve		
Scleral Zone (edge)	only!	
Diameter	OS	16.50
Power	OS	-5.50
Sagittal Depth		
Misc.		Optimum extra LD/light blue

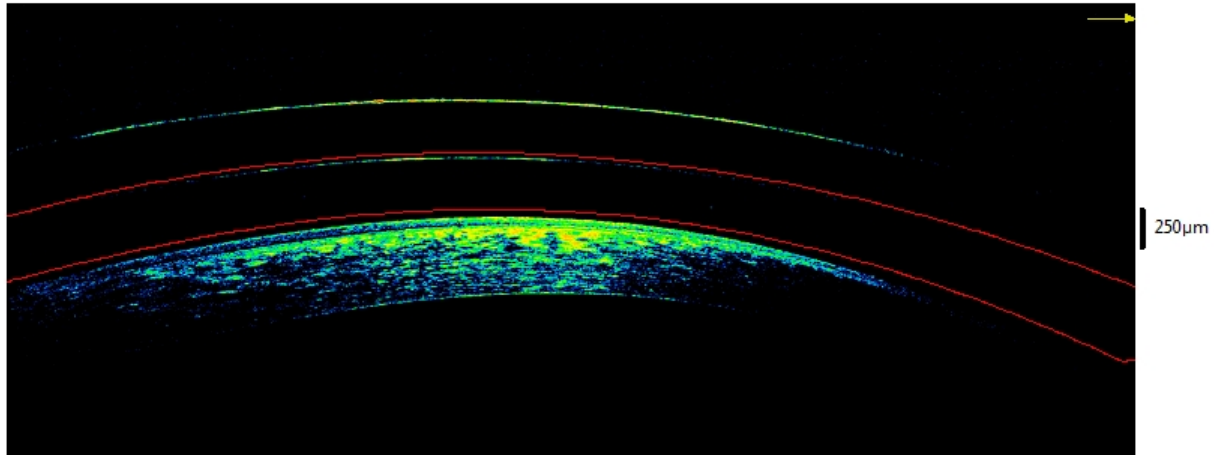
Lenses inserted by Dr. Woo. After setting 10-20 minutes:

	OD	OS	OU
DVA		20/70	20/60
NVA	OS	20/63	20/50-
Central clearance um	only!	319 um	
Edges	OS		
AR over CLs	OS	-0.50 +1.50 x 032	
SCOR			
VA with SCOR			

Lens Fitting

Scan Quality Index **Poor 25**

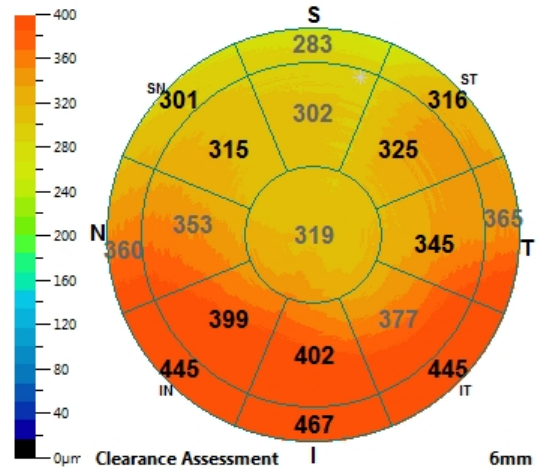
Left / OS



Clearance Assessment (refractive index 1.50)
Clearance Assessment statistics within central 5 mm

SN-IT(2-5mm):	<input type="text" value="-62"/>	S-I(2-5mm):	<input type="text" value="-100"/>
Min:	<input type="text" value="295"/>	Location Y:	<input type="text" value="2273"/>
Min-Median:	<input type="text" value="-50"/>	Min-Max:	<input type="text" value="-147"/>

Min thickness (x, y) 0.691mm, 2.273mm shown as *



deg

Print

Change Analysis

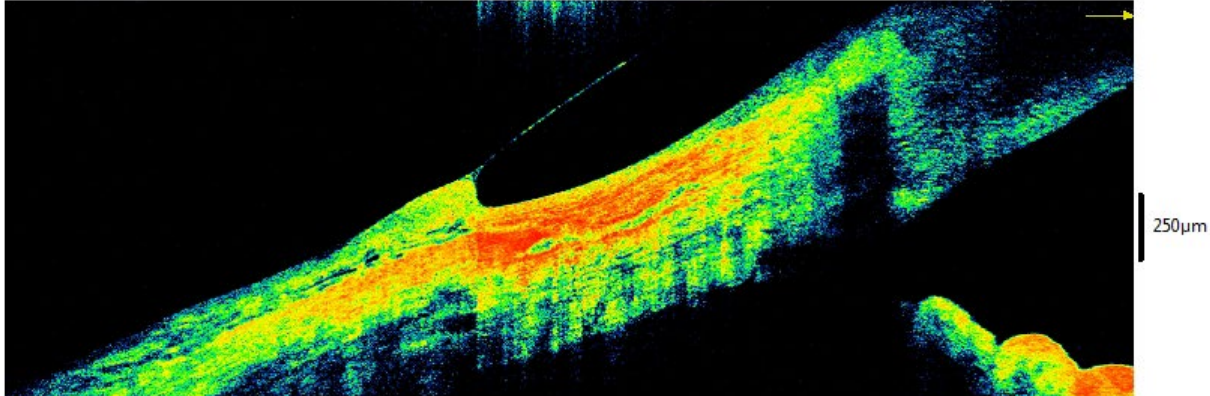
Comment



Lens Fitting

Scan Quality Index **Good 58**

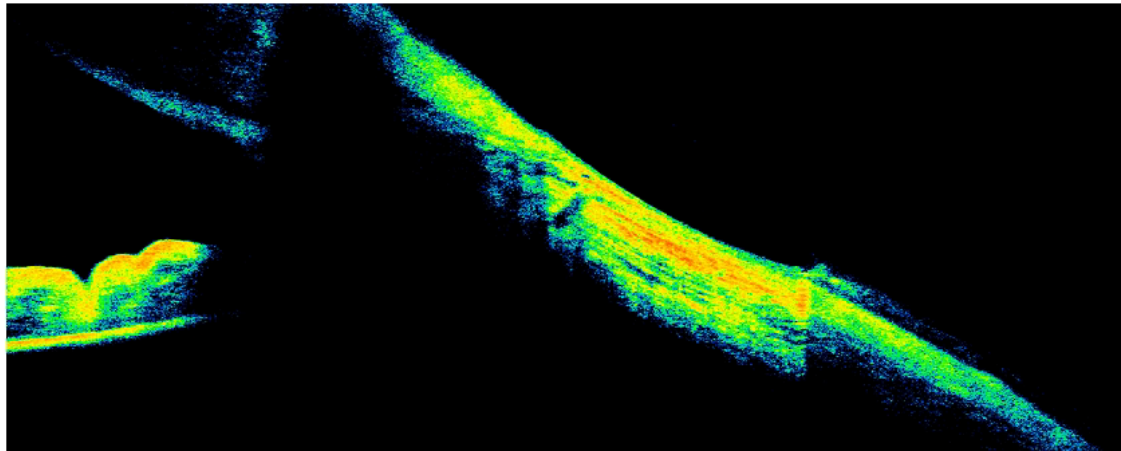
Left / OS



Cornea Angle

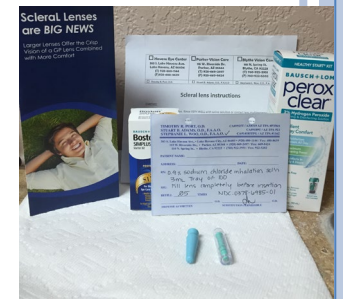
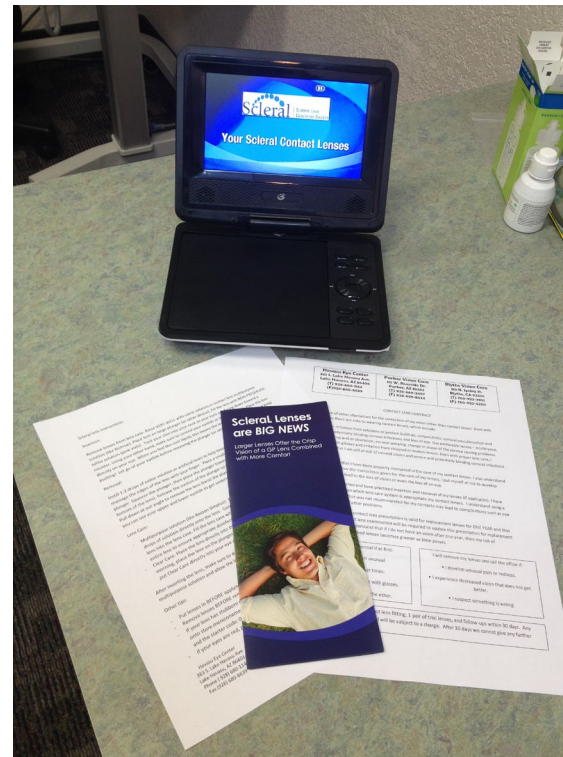
Scan Quality Index **Good 41**

Left / OS



ASSESSMENT AND PLAN

- VA OS significantly improved (20/400 to 20/70)
- Insertion/removal training today in office
- RTC 1 week for follow up
- Why did I not make any changes to the power of the lens?

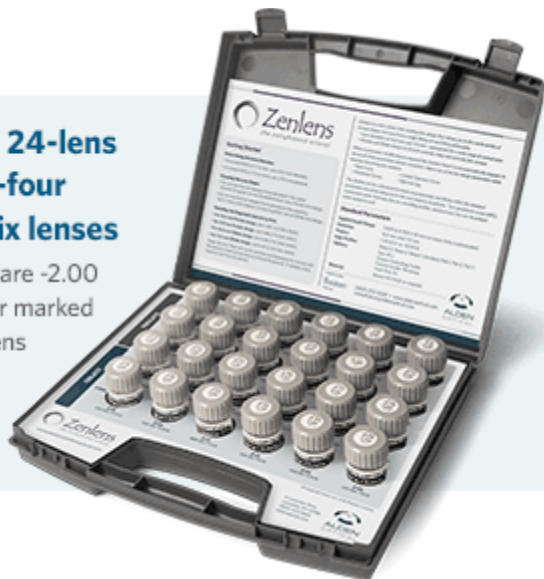


WHAT FITTING SET DO I USE?

- Each company's design is somewhat different in the curves fitting method.
- Highly recommended to use the fitting set, follow the fitting guide for the specific lens design, and utilize consultants to fully understand the specific lens design.

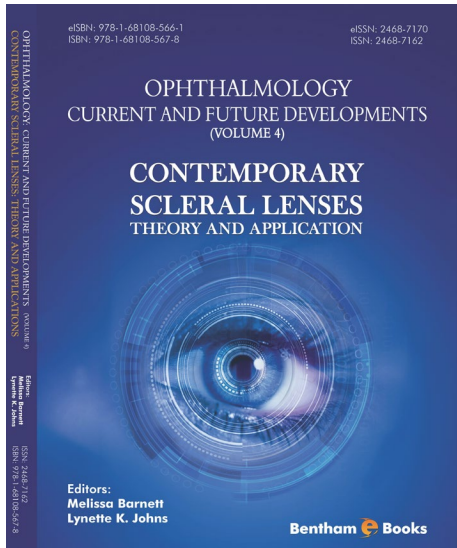
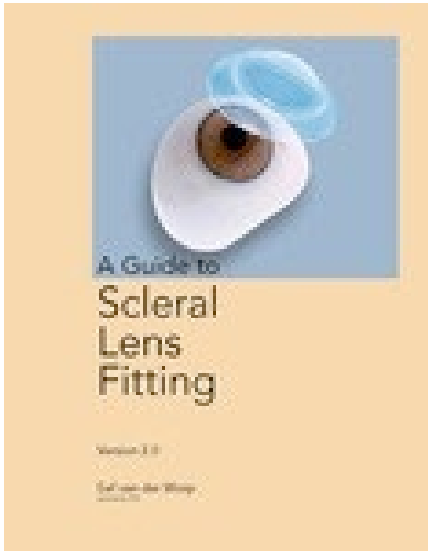
Comprehensive 24-lens diagnostic set—four "mini sets" of six lenses

All diagnostic lenses are -2.00 diopters and are laser marked with the diagnostic lens number



HOW DO I SELECT A LENS DIAMETER?

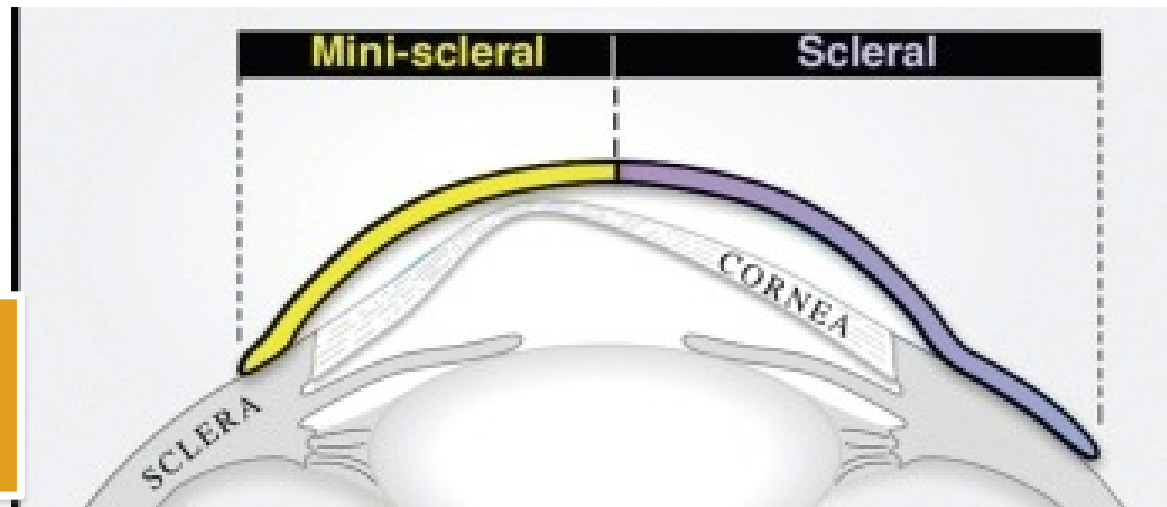
Lens Type	Description	Definition of Bearing Area
Corneal		Lens rests entirely on the cornea
Corneo-scleral		Lens rests partly on the cornea, partly on the sclera
Scleral	<p>Mini-Scleral</p> <p><i>Lens is up to 6mm larger than HVID</i></p>	Lens rests entirely on the sclera
	<p>Large Scleral</p> <p><i>Lens is more than 6mm larger than HVID</i></p>	



Scleral | SCLERAL LENS
EDUCATION SOCIETY

www.sclerallens.org

Usually 14-16.5mm ish



>18mm

<http://www.clspectrum.com/articleviewer.aspx?articleid=104748>

- Supported by conjunctiva and tear layer (water bed)
- Requires less clearance
- 1st 16.5mm of sclera is spherical

- Supported by conjunctiva alone
- Usually requires more clearance
- Scleral beyond 16.5mm has more toricity due to muscle insertions

CONCLUSION

- Scleral lenses are a great option for regular and irregular corneas
- Scleral lenses are very comfortable, and provide crisp optics and stable vision
- Scleral lenses allow us to fit highly irregular corneas
- New technology has helped us fit scleral lenses more efficiently and accurately
- Scleral lenses rule!

QUESTIONS?