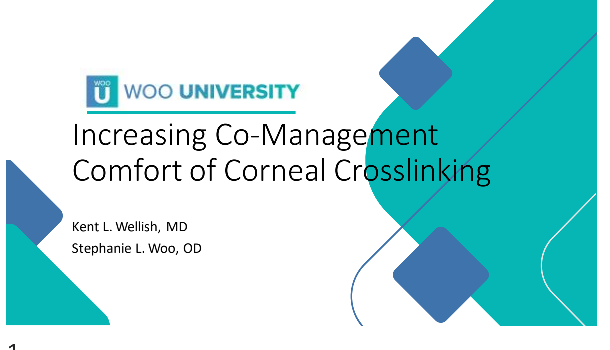

Increasing Co-Management Comfort of Corneal Crosslinking

Kent L. Wellish, MD
Stephanie L. Woo, OD

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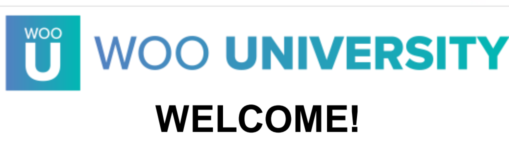

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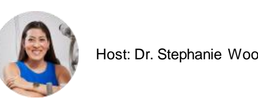

Host: Dr. Stephanie Woo

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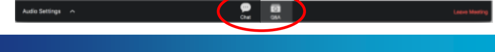
WELCOME!

This event is supported with an unrestricted educational grant from Glaukos, Art Optical and Wellish Vision Institute

3

- For a 1.5 hour webinar attendees must be online for a minimum of 75 minutes
- For a COPE certificate, please fill out the survey link in the chat. Also, the survey link will appear when the webinar ends.
- CE certificates will be delivered by email and sent to ARBO with OE tracker numbers
- Ask questions using the zoom on-screen floating panel



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In person attendees

- Please keep voices and noise to a minimum
- Please see Taylor if you have need anything during the event or after the event

Taylor Twete
Woo University Administrator

5

Increasing Co-Management Comfort for Corneal Collagen Crosslinking (CXL)

Co-Management Update May 2021

Kent L. Wellish, M.D.
Stephanie Woo, O.D., FAAO, FSLS

Clinical Faculty, SCCO & Western College of Optometry
Clinical Directors, Wellish Vision Institute

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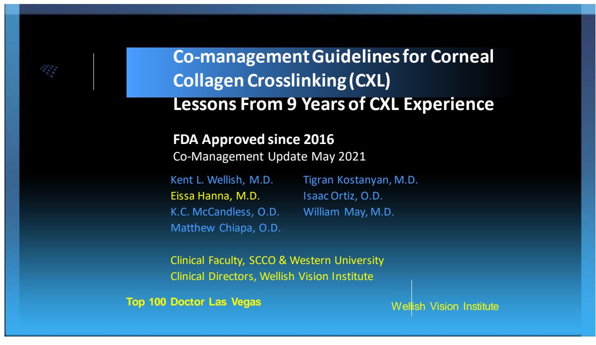

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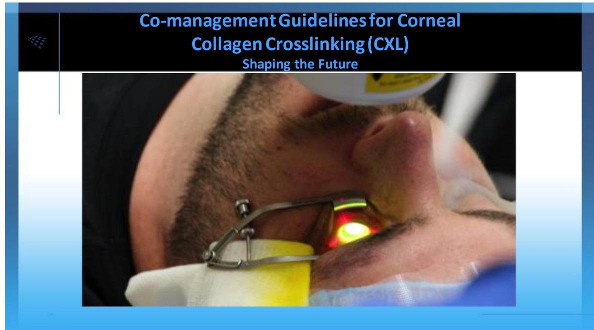

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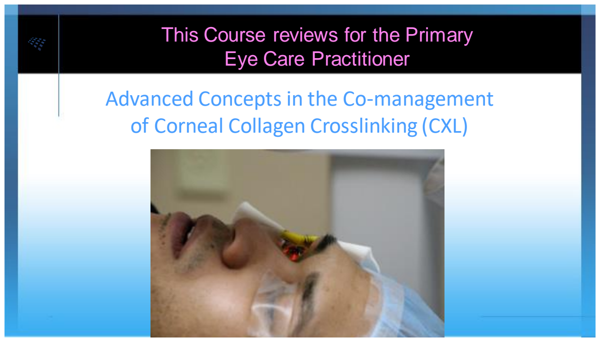

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Course Learning Objectives

- To review the pre- and post-op care for patients being treated with Corneal Collagen Crosslinking (CXL)
- To share clinical pearls for targeted diagnosis and treatment, including Indications
- To review Evaluation by the Primary Eye Care Physician

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Course Learning Objectives

- To review Evaluation for Corneal Collagen Crosslinking (CXL)
- Role of the OD
- Role of the Consulting Surgeon
- Case Study Reviews
- To provide an opportunity for Questions and Answers

11

Keratoconus vs. Pseudo KC

- KC
  - Elevated posterior cornea
  - Epithelial Thinning Over Apex of Cone
- Pseudo KC
  - No elevation of Posterior Cornea
  - Epithelial Thickening of Apex of Cornea

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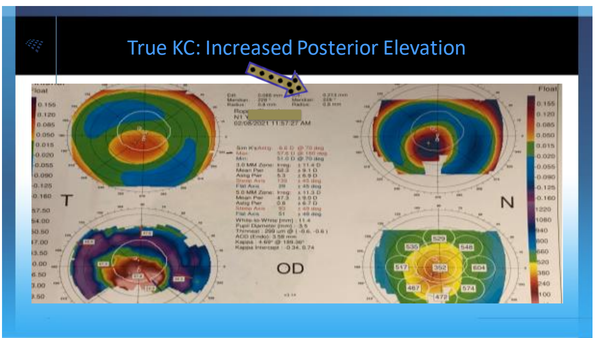

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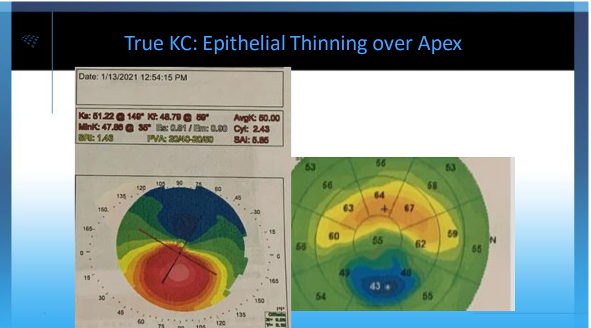

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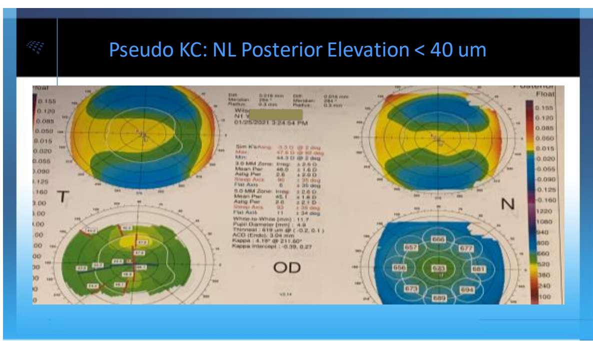

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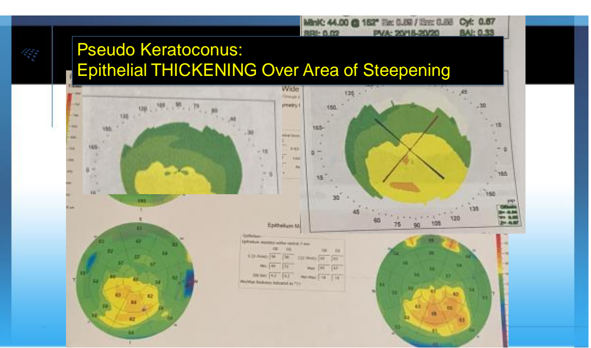

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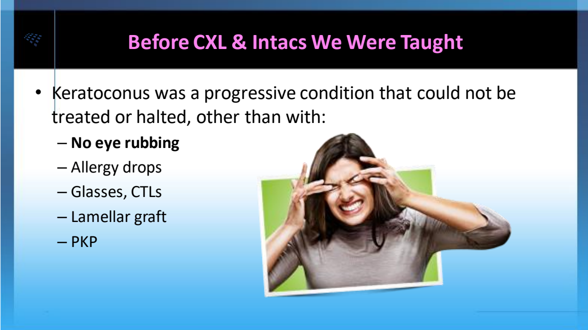

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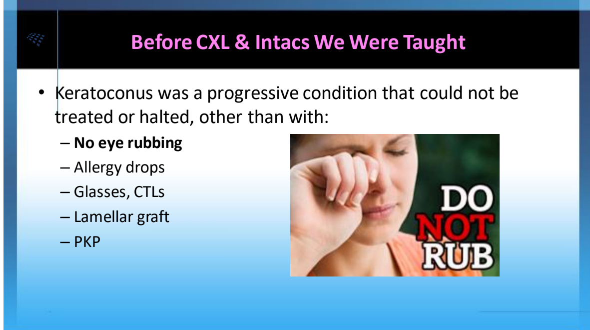

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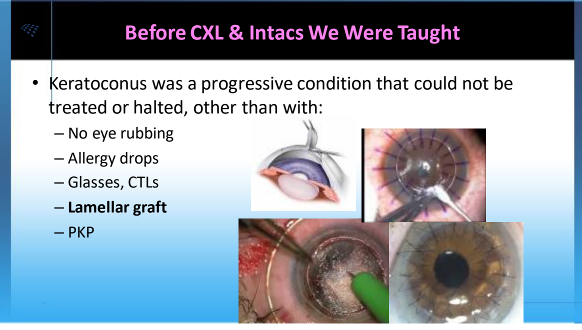

21

Before CXL & Intacs We Were Taught

- Keratoconus was a progressive condition that could not be treated or halted, other than with:
  - No eye rubbing
  - Allergy drops
  - Glasses, CTLs
  - **Lamellar graft**
  - PKP

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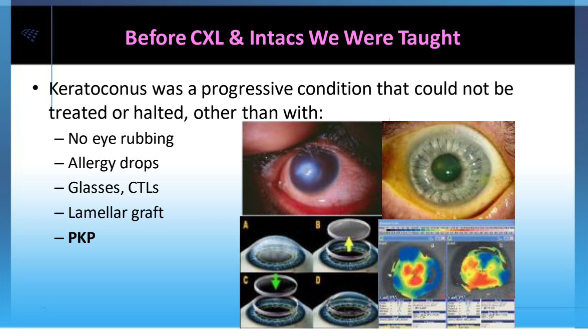

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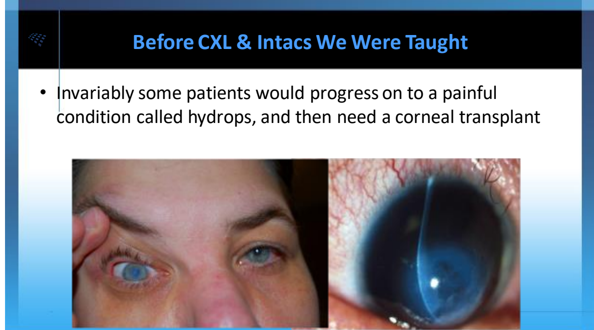

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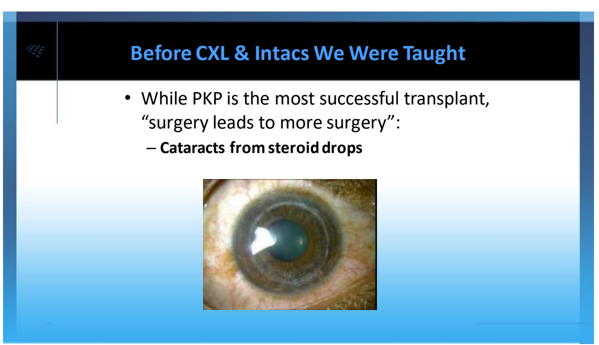

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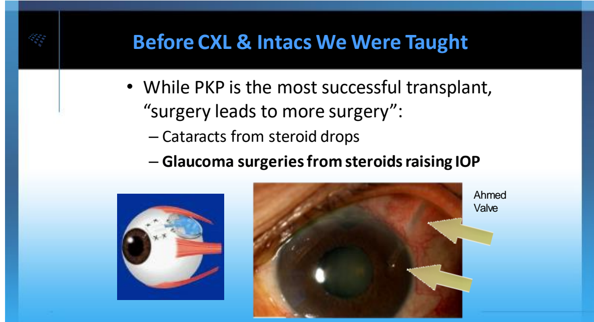

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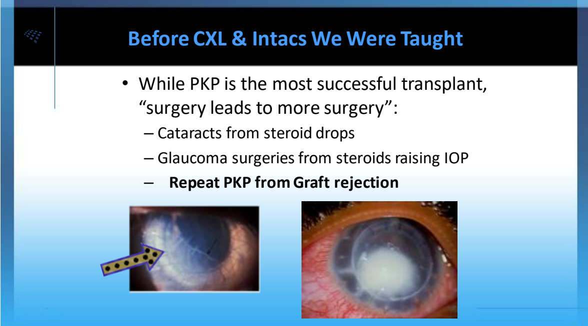

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Before CXL & Intacs We Were Taught

- While PKP is the most successful transplant, "surgery leads to more surgery":
  - Cataracts from steroid drops
  - Glaucoma surgeries from steroids raising IOP
  - **Repeat PKP from infections, etc.**

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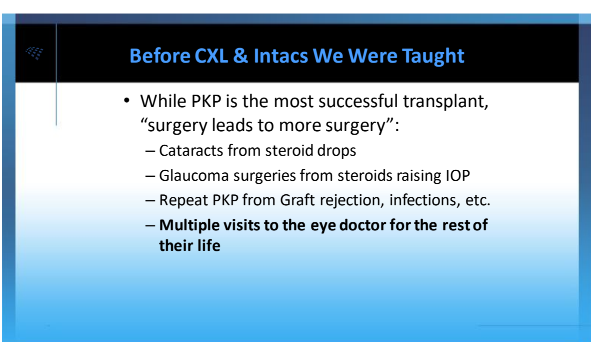

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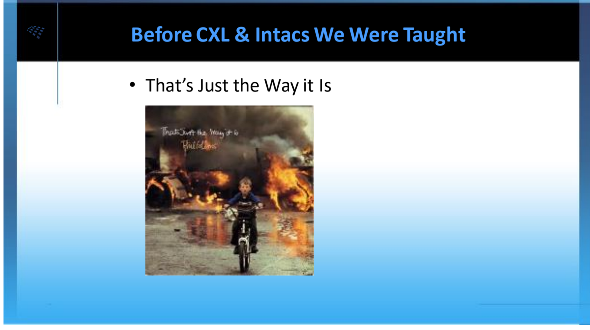

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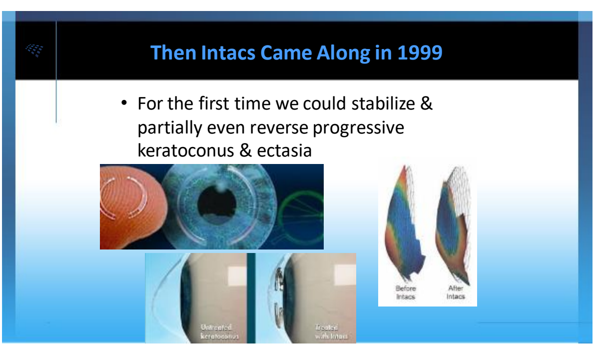

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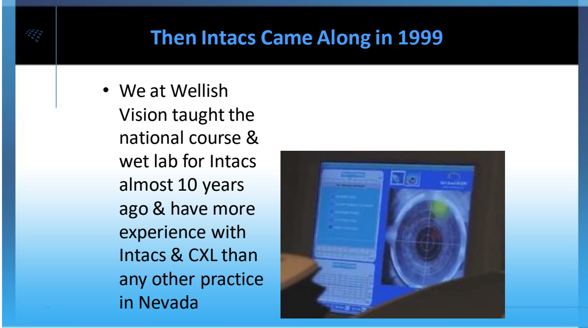

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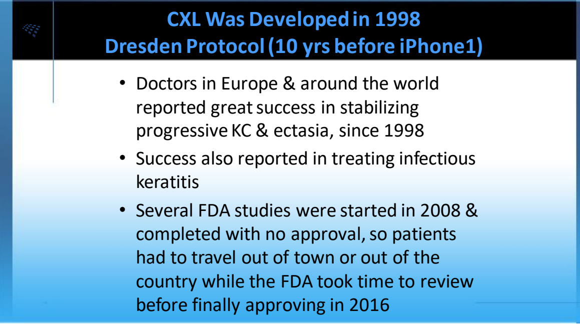

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Then CXL Was Developed in 1998 Dresden Protocol –> LV Use in 2012

- In 2012 Wellish Vision Institute was one of 90 sites around the country invited to serve as an FDA Study site for the Avedro KXL treatment for KC & Corneal Ectasia

Introducing the
Avedro KXL™
avedro

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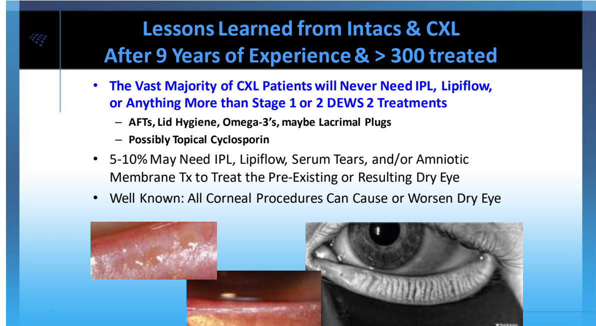

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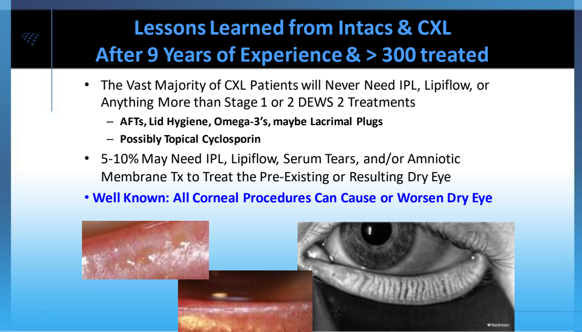

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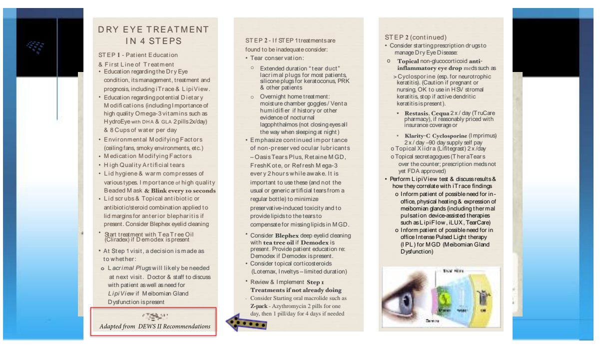

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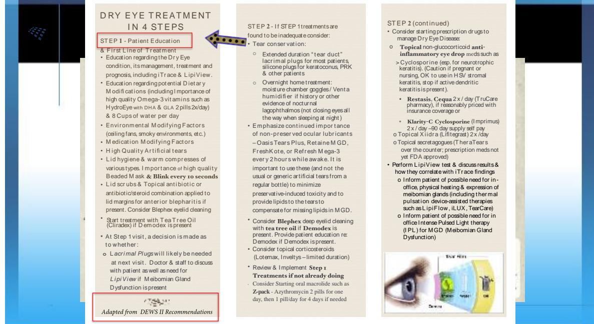

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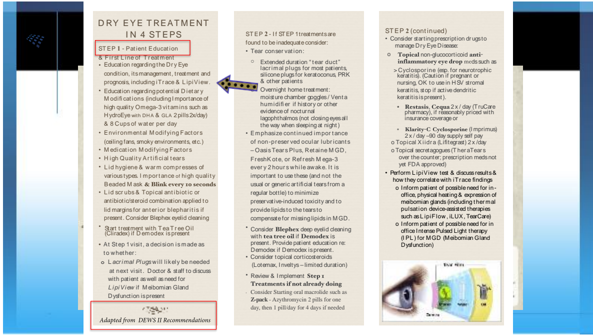

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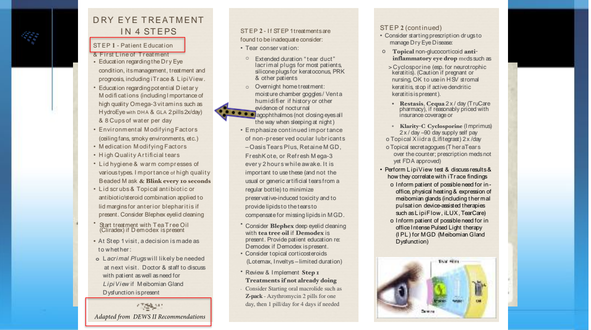

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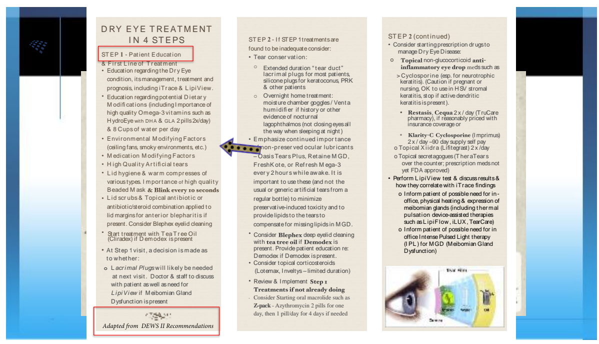

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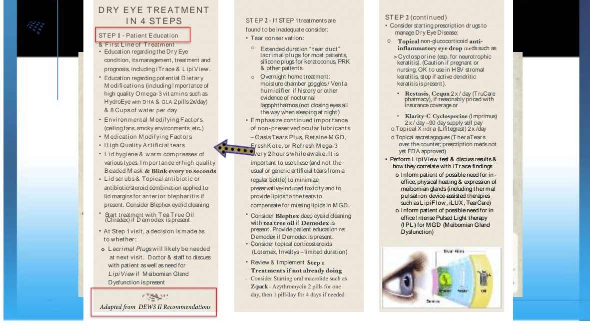

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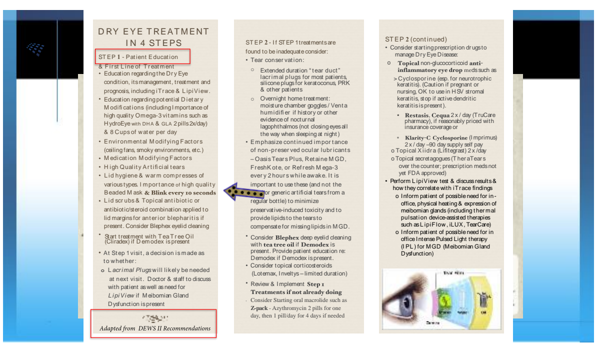

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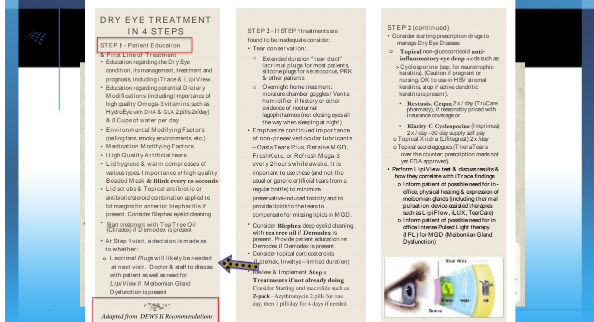

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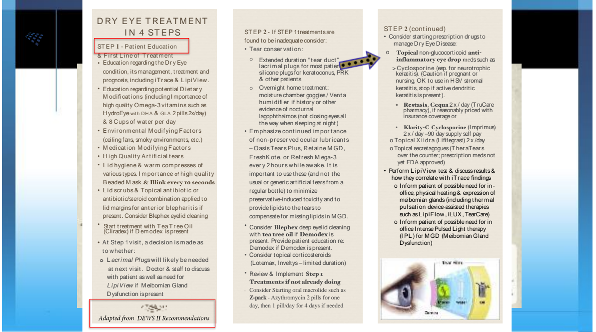

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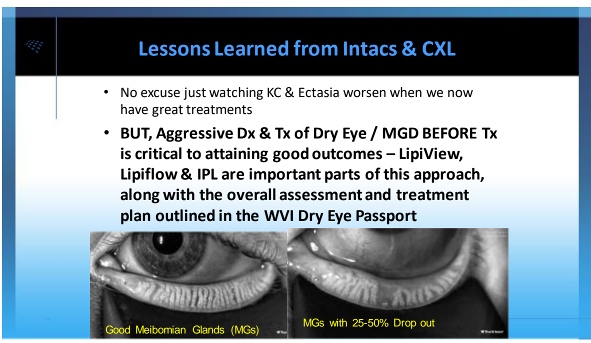

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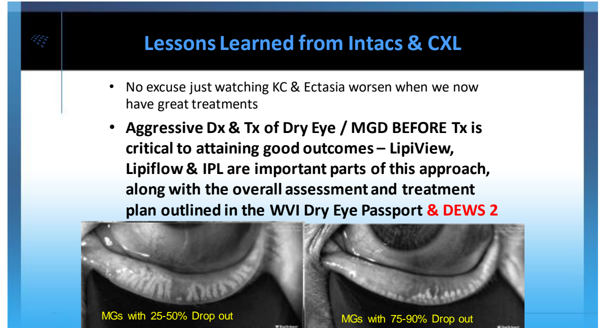

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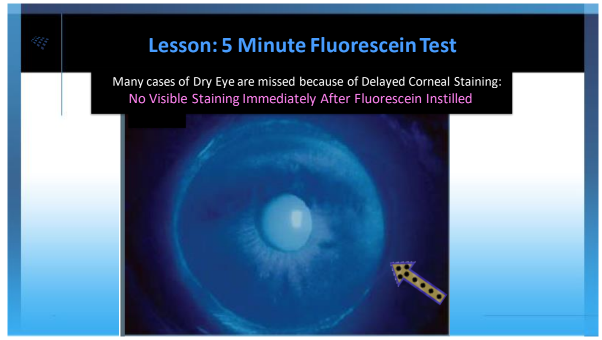

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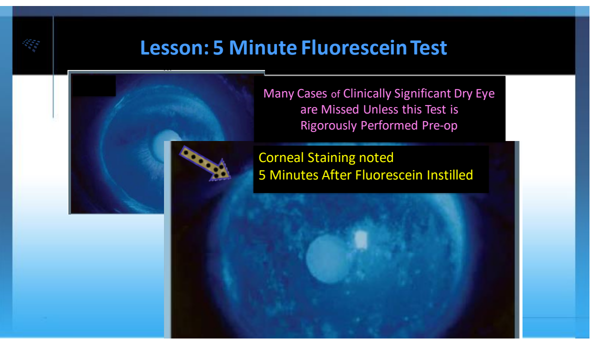

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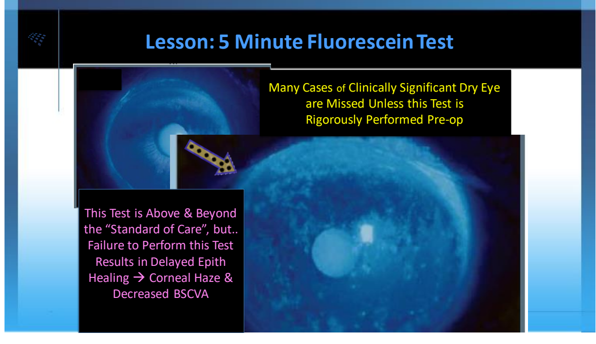

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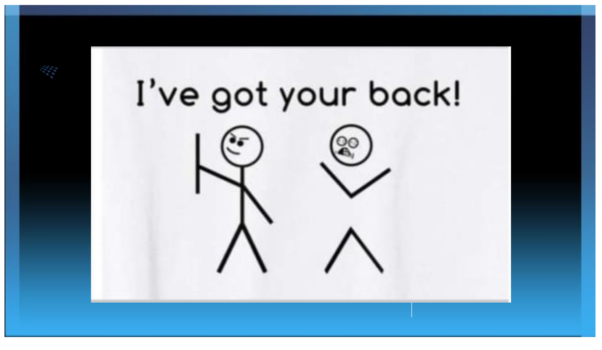

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FDA Avedro Study - Lessons Learned: 8-10% of Patients Lost >= 1 Line of BSCVA

- In the FDA Avedro study, although the results were good enough to gain approval, we felt that loss of BSCVA was an unexpected disappointment
- In looking at our data, we saw that this occurred in those with delayed epithelial healing

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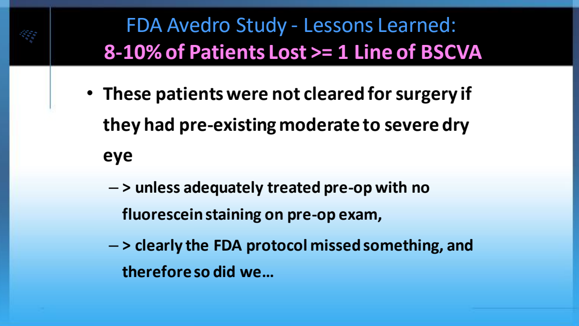

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FDA Avedro Study - Lessons Learned: 8-10% of Patients Lost >= 1 Line of BSCVA

- Shortly after starting this FDA study in 2012, we were invited to be an FDA study site for a Dry Eye treatment that was later called Xiidra
- In the Xiidra study, the protocol required judging corneal staining immediately after instilling fluorescein and than again 5 minutes after instilling fluorescein

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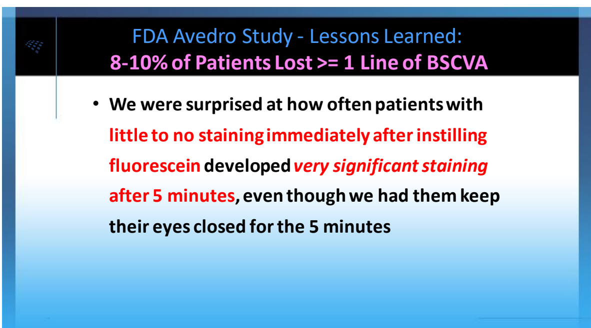

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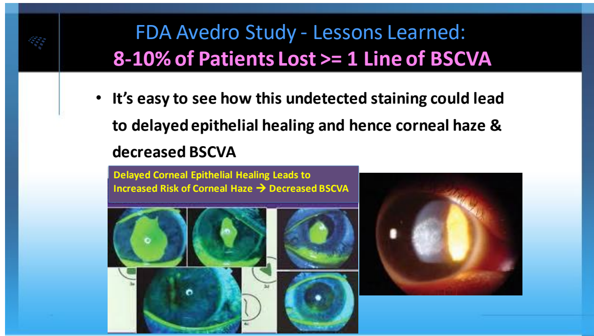

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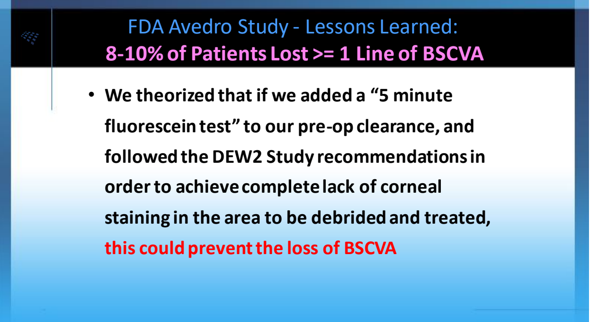

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FDA Avedro Study - Lessons Learned:
8-10% of Patients Lost >= 1 Line of BSCVA

- Today, after treating over 300 Eyes with our protocol (and a few other surgical pearls I developed & adopted based on my observations), we do not have a single patient with any loss of BSCVA.
- If there are 1 or 2 we don't know about, we are still at <1% vs. 8-10% in the FDA Trial, following the "on label" FDA Protocol

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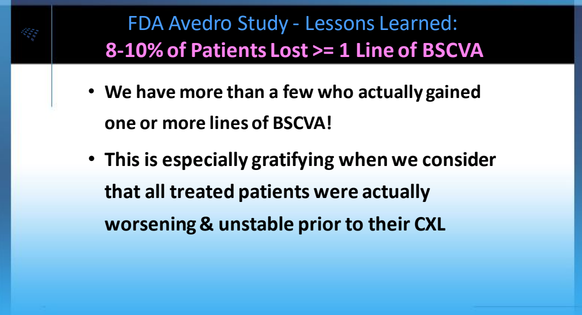

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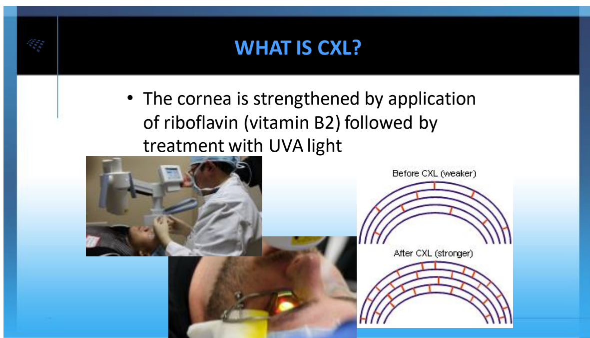

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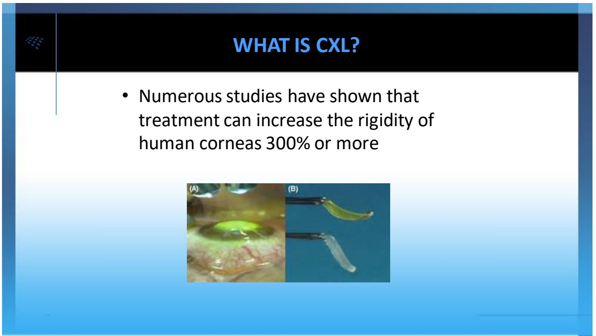

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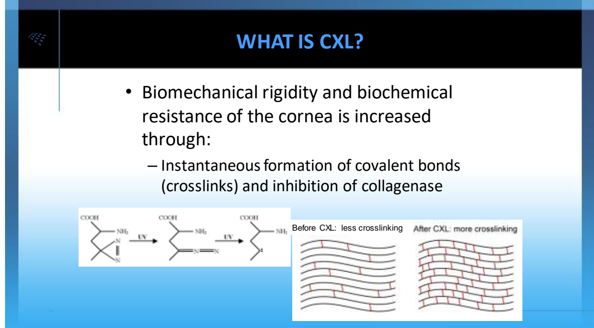

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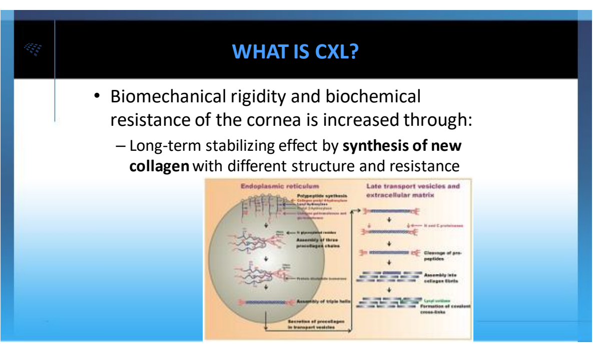

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PURPOSE of CXL?

- To halt progressive corneal ectasia
- Prevent disease progression through corneal stabilization
  - Early disease – prevent necessity for rigid contact lens wear → glasses only
  - Moderate disease with rigid lens wear → stabilizes the cornea to prevent the need for corneal transplantation

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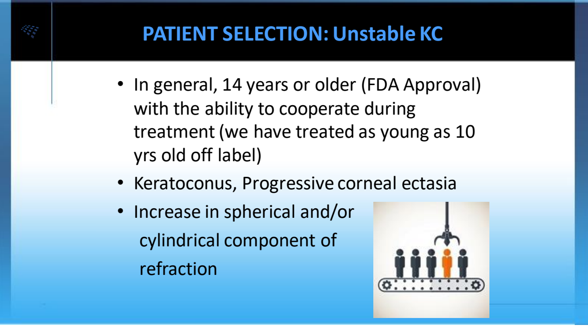

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PATIENT SELECTION: Unstable KC

- Topography showing alteration in corneal shape and disease progression
- Significant corneal scarring and/or the inability for RGPs to provide reasonable vision are indications the patient cannot be successfully visually rehabilitated with CXL alone, since CXL does not reverse the steepness nearly as well as Intacs

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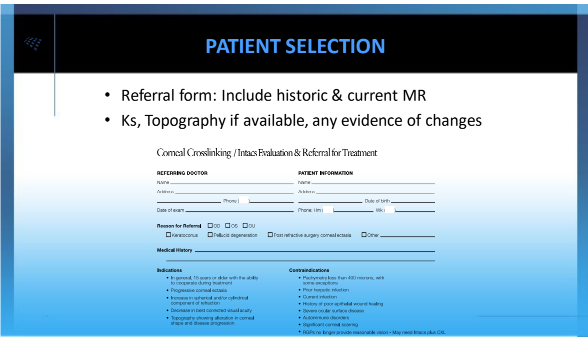
PATIENT SELECTION

- Referral form: Include historic & current MR
- Ks, Topography if available, any evidence of changes

Corneal Crosslinking / Intacs Evaluation & Referral for Treatment

REFERRING DOCTOR
Name ______
Address ______
______ Phone ( ) ______
Date of exam ______

PATIENT INFORMATION
Name ______
Address ______
______ Date of birth ______
Phone: Hm ( ) ______ Wk ( ) ______

Reason for Referral ☐ OD ☐ OS ☐ OU
☐ Keratoconus ☐ Pellucid degeneration ☐ Post refractive surgery corneal ectasia ☐ Other ______

Medical History ______

Indications
- In general, 15 years or older with the ability to cooperate during treatment
- Progressive corneal ectasia
- Increase in spherical and/or cylindrical component of refraction
- Decrease in best corrected visual acuity
- Topography showing alteration in corneal shape and disease progression

Contraindications
- Pachymetry less than 400 microns, with some exceptions
- Prior herpetic infection
- Current infection
- History of poor epithelial wound healing
- Severe ocular surface disease
- Autoimmune disorders
- Significant corneal scarring
- RGPs no longer provide reasonable vision - May need Intacs plus CXL

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EVALUATION FOR TREATMENT

- Topography with CTLs left out 2 weeks prior
- K readings
- Manifest refraction with BCVA
- Pachymetry (want pach >= 400 um at time of uv Tx → now able to increase pach with hypotonic riboflavin drops and/or SCL)
- Please send refraction & BCVA with glasses & w/ RGP lenses on referral
- Comprehensive eye evaluation

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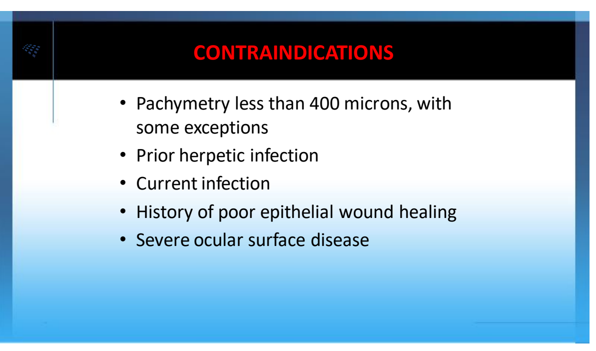

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CONTRAINDICATIONS

- Autoimmune disorders
- Significant corneal scarring
- RGPs no longer provide functional vision or otherwise contact lens intolerant
- Severe dry eye
- Unrealistic expectations

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PROPER PREPARATION PREVENTS POOR PERFORMANCE

- Identify & Treat Dry Eye Pre-op to point of No Stain on 5 Minute Fluorescein Test
- No Vitamin C from 1 week pre-op until 1 day post-op
- Patient needs to be prepared to miss work, stay home in clean environment for 4-7 days post-op to avoid delay in epithelial healing

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TREATMENT

- Assess and Decide Tx Based on Severity
  - **Mild KC, glasses and/or CTL tolerant → CXL**
  - **Moderate KC, CTL intolerant → Intacs + CXL**
- Patient Education & Informed Consent
- Day of Procedure
  - Remove Corneal Epithelium
    →(9mm = FDA "on label" vs "Base of Cone")
  - Saturate Cornea w/ Riboflavin → UV Tx
  - Post-op Meds & BSCL

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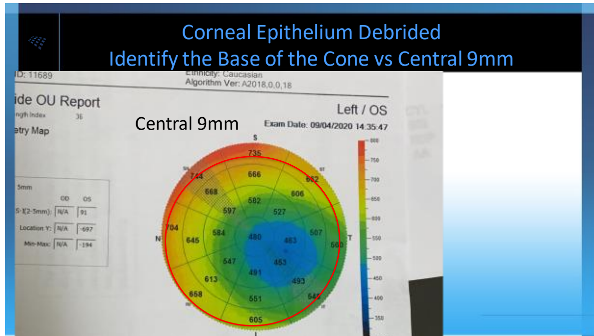

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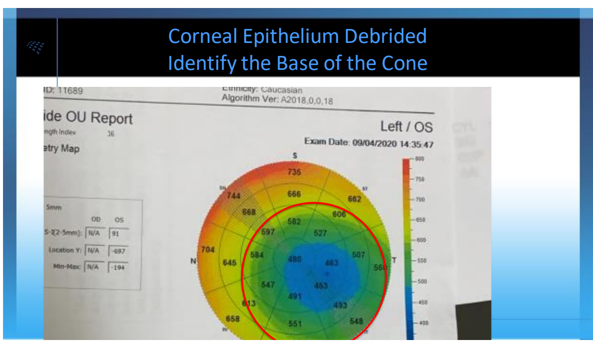

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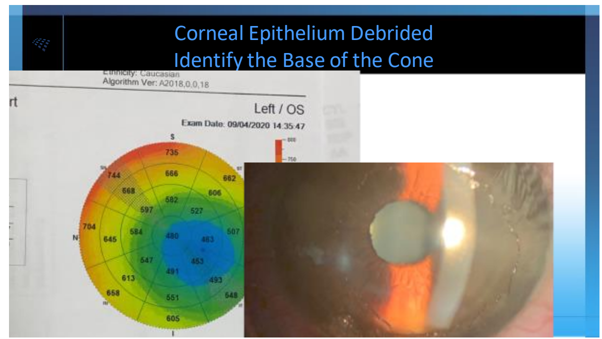

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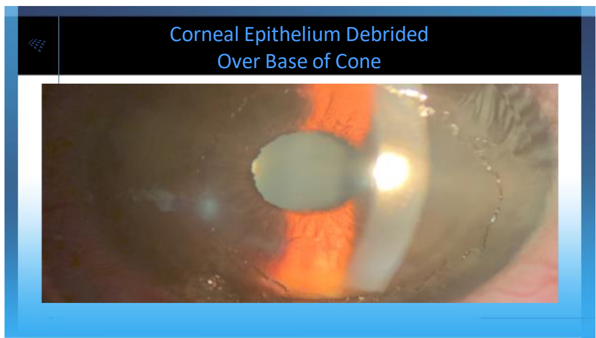

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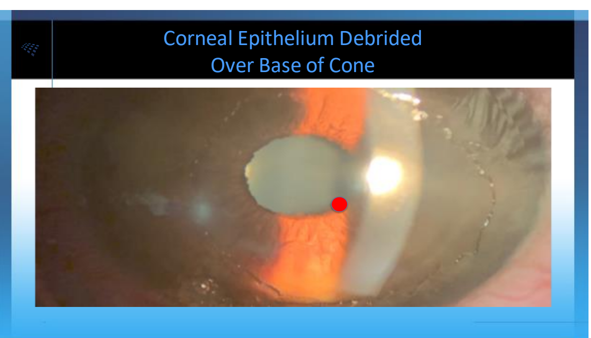

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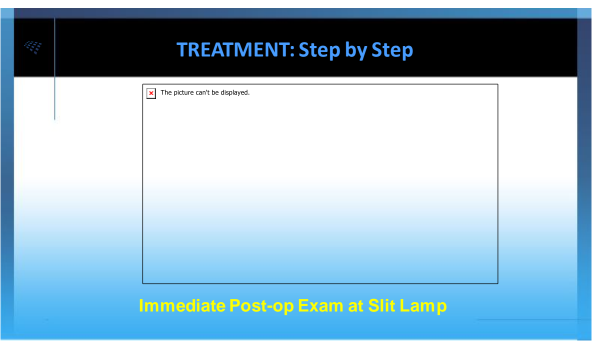

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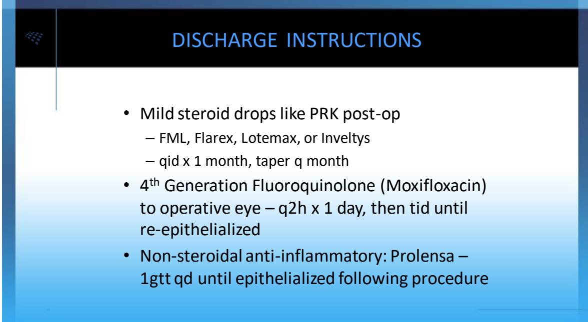

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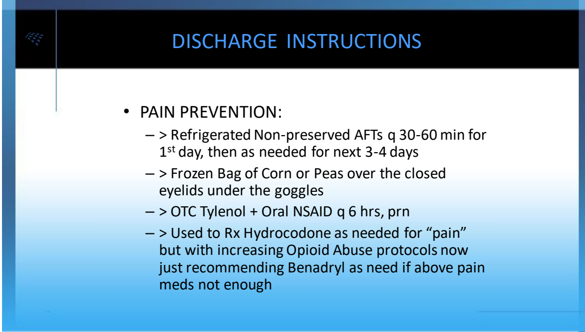

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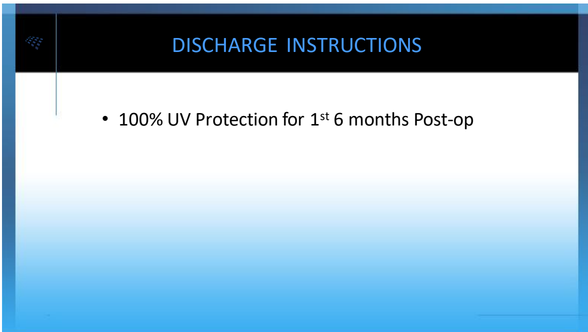

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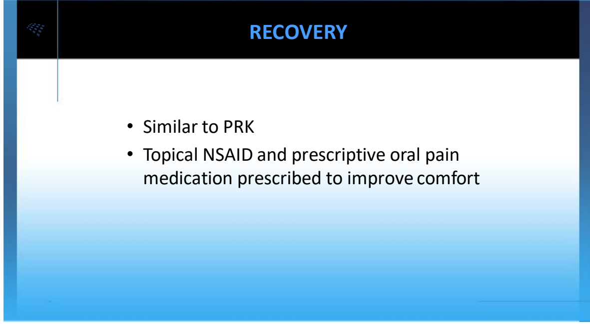
DISCHARGE INSTRUCTIONS

- Frequent use of preservative free artificial tears
- Patients are educated to avoid exposure to sunlight for a minimum of 24 hours
- If riboflavin is still evident during the 1 day post-op slit lamp exam (yellow tinged corneal tissue), UV protection should be continued
- Patients are instructed to be out of their contact lenses for 2 weeks post-operatively
- Vitamin C in foods OK starting 1 day post-op

101



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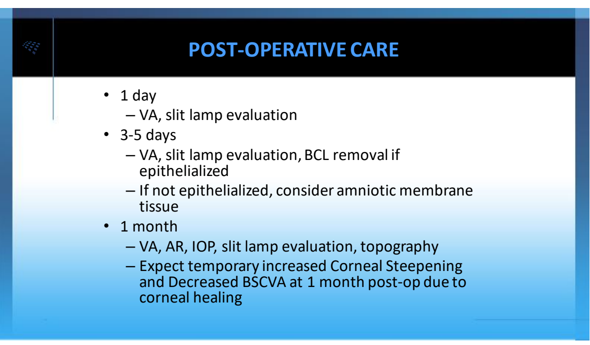

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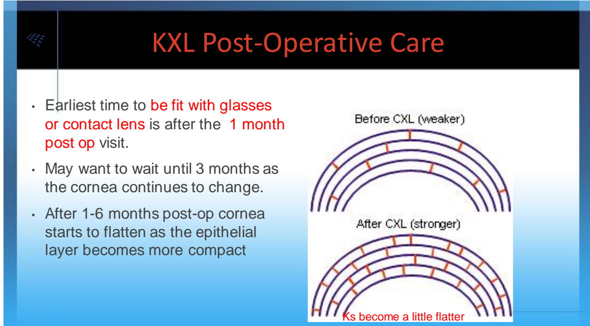

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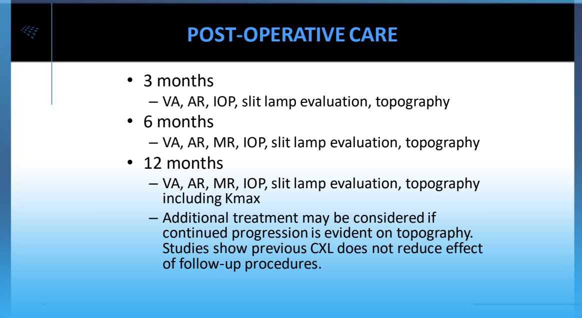

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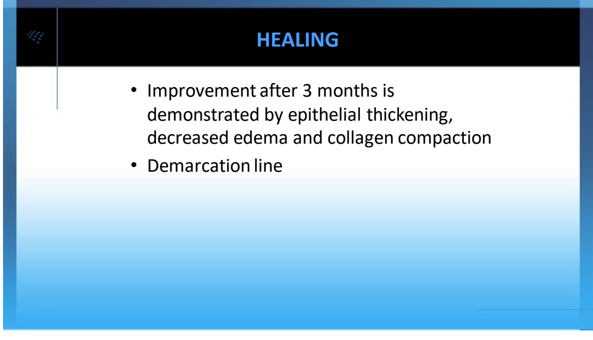

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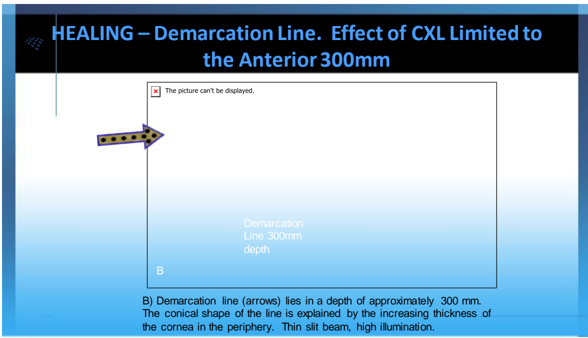

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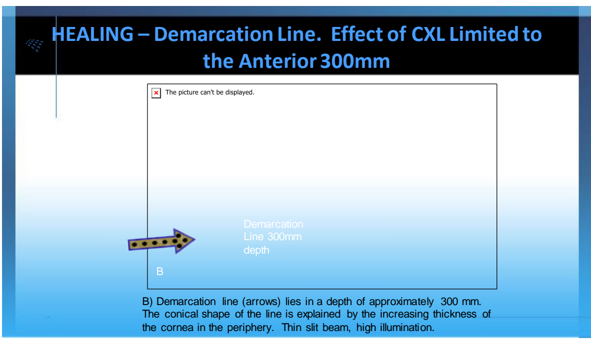

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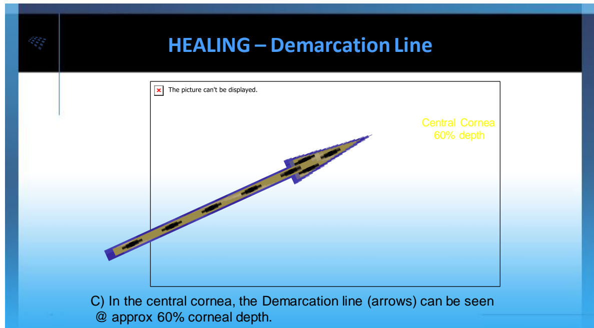

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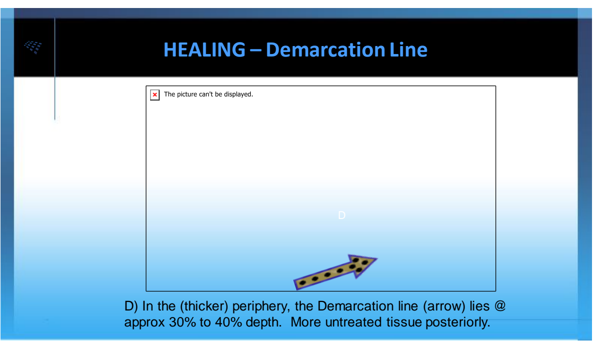

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INCREASED RISK OF COMPLICATIONS

- Pre-op BSCVA better than 20/25
- High pre-op maximum K reading
- Under-detected, undertreated pre-existing dry eye / MGD
- Delayed healing of epithelial defect
- When accompanied by PRK (more haze)
- Premature return to work or other activities leading to infection if patient not careful

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POTENTIAL COMPLICATIONS

- Delayed corneal re-epithelialization
- Corneal haze
- Inflammation
- Infection
- Increased IOP from steroid response
- Endothelial issues
- Treatment failure to stabilize cornea

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CONCLUSION

- We all waited many years of waiting for FDA approval
- Now that CXL has been approved and available for the past 5 Years
- There is no excuse to delay diagnosis and treatment!
- We thank Avedro for bring this technology to the U.S. and making it available to our patients!

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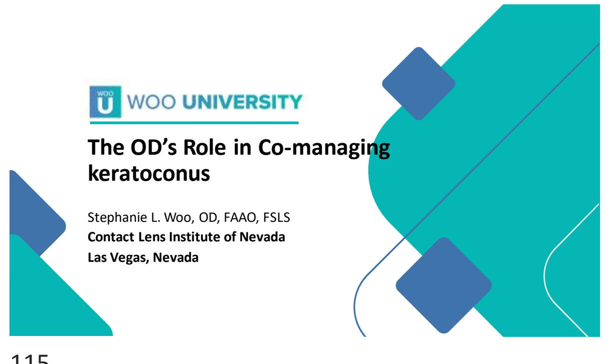

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Financial disclosures

- Alcon
- Art Optical
- Bausch and Lomb
- Blanchard Contact Lenses
- Essilor Contacts
- X-cel Contacts
- Specialeyes
- Biotissue
- Katena
- Visionary optics
- Shire
- Avellino
- GPLI
- STAPLE program
- Scleral Lens Education Society
- Contamac
- Synergeyes
- Triad ophthalmics
- Ophthalogix
- ABB
- Ovitz
- Tarsus
- Woo University
- Kala

116

Dr. Stephanie Woo

- Graduated from SCCO
- Cornea/Contact Lens Residency at UMSL
- Owned 3 private practices in AZ and CA (traditional optometric care)
- Opened Contact Lens Institute of Nevada in January 2020 – A clinic dedicated entirely to the needs of specialty contact lens patients
- Founder: Woo University

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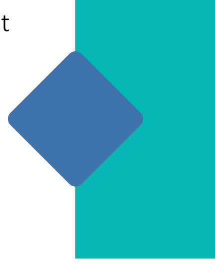
Managing a keratoconus patient

- Initial diagnosis and explanation of disease
- Examination and special testing
- Treatment Options
- Managing a complex fitting process from behind the scenes
  - Contact Lens Options
  - Medical contact lens agreements
  - Patient communication



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NEW! Genetic test for keratoconus NOW AVAILABLE!

- Avellino launched AvaGen
- AvaGen checks genetic risk factors for corneal dystrophies such as keratconus
- Objective polygenic keratoconus risk score - data based on multiple gene clusters that have a high correlation with keratoconus -to inform early and accurate management decisions

120

Good candidates

- Patient with a known diagnosis of keratoconus that wishes to understand family member risk
- Child with unstable or suspicious refraction
- Suspicious topographies
- Patient interested in LASIK/PRK with suspicious corneal or refractive findings

121

Newly Diagnosed Patient

- Explanation of the disease
- Review progressive nature
- Review treatment options
- Provide patient resources
- Answer questions

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Explaining Prognosis

- Keratoconus is a progressive condition, meaning that it will get worse and worse over time.
- If you don't do anything, your vision will continue to decline, and you will be at risk for other eye events.

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Explaining Treatment Options

- Glasses
- Contact Lenses
  - Soft, hybrid, g
- Surgical Option
  - Crosslinking, ir
- Nothing

Journal of Medical Economics

Corneal cross-linking versus conventional management for keratoconus: a lifetime economic model

Richard L Lindstrom , John P Berdahl , Eric D Donnenfeld , Vance Thompson , David Kratochvil , Chiang Wong , Heather Falvey , Grace Lytle , Marc F Botteman & John A Carter

Conclusions

Keratoconus is a progressive and life-altering disease with substantial clinical, economic, and humanistic consequences. The economic value of cross-linking is maximized when applied earlier in the disease process and/or younger age, and extends to improved work productivity, out-of-pocket costs, and quality of life

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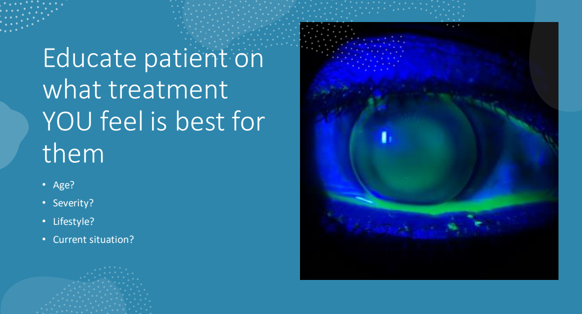

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Patient resources

- National Keratoconus Foundation (NKCF.ORG)
- Livingwithkeratoconus
- Social media forums (good and bad)

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Common Questions

- Why did I get this?
- Is this hereditary?
- Will I go blind?
- What if I don't do anything?
- Can I make it worse?
- Why can't I just wear glasses?

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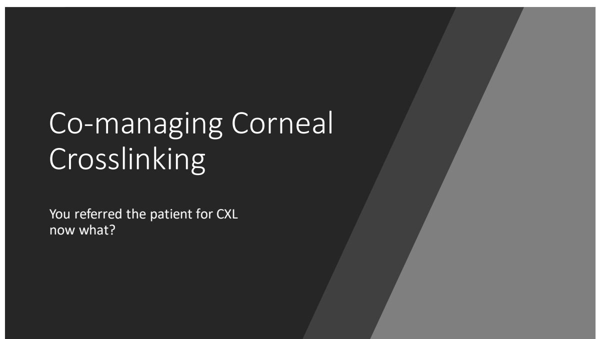

Co-managing Corneal Crosslinking

You referred the patient for CXL now what?

129

Follow-Up Schedule

VISIT	PLAN
Day 1 to 1 Week	• Topical antibiotic, steroid • Frequent lubricants • No eye rubbing • Remove BCL once epithelium heals
Month 1	• OCT Imaging • Tomography / Topography • Vision assessment • Contact lens refitting evaluation
Month 3, 6, 12 *(Follow-ups potentially performed and billed by diagnosing physician depending on practice preference)*	• Continued evaluation utilizing tomography / topography • Vision assessment

No Global Period! Follow-up visits can be billed to insurance.

130

Day 1

- Check Vision
- Review Medications
- Slit lamp exam
- Check Bandage Contact Lens
- Continue topical antibiotics, steroids, lubricants as directed

- Billing Codes:
- 99212/99213 depending on complexity of visit
- 92071 if bandage contact lens needs to be replaced

131

Week 1

- Case history
- Check vision
- Slit lamp exam
- Remove BCL if appropriate
- Continue eye drops as recommended

- Billing:
- 99212/92313 if appropriate
- 92071 if BCL needs to be replaced

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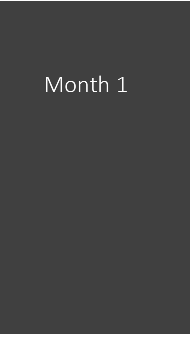

Month 1

- Case history
- Check vision
- Slit lamp exam
- Topography and/or Tomography
- IOP
- Continue medications as directed

- Billing:
- 99212/92313 if appropriate
- 92025: Topography

- If patient stable, ok to refit into specialty contact lenses

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Month 3

- Case history
- Check vision
- Slit lamp exam
- Topography and/or Tomography
- IOP
- Continue medications as directed

- Billing:
- 99212/92313 if appropriate
- 92025: Topography

- If patient stable, ok to refit into specialty contact lenses

134

Treatment Options: Spectacles

- Even if vision is not ideal, glasses are necessary as a back up
  - Provides SOME functional vision
  - Early keratoconics may see ok with glasses
  - Important to have!
- Things to consider
  - Anisometropia – often large amounts
    - May not want to Rx the whole thing!
  - Amount of astigmatism in the prescription
    - How much to prescribe in glasses?
  - Trial frame can save time and money

135

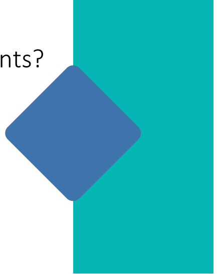
Fitting Specialty Contact Lenses: Prepping your office

- How do you get fitting sets?
- Which fitting sets should I get?
- Tools and Solutions needed around the office
- Should I buy any fancy equipment?
- What does my staff need to know?

136

Poll – What is your go to lens modality for keratoconus patients?

- Soft toric lenses
- Custom soft lenses for keratoconus
- Hybrid lenses
- Corneal GP lenses
- Scleral lenses



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Treatment: Soft lenses

- Early KCN patients may be able to wear standard soft toric lenses
  - Important to inform patient that this is a progressive disease, and Rx will change
- Most KCN patients will need a more custom design
  - Many soft custom lenses available
  - Many soft custom designed specifically for keratoconus
  - Return policies of Custom SCLs

138

Case Report

- 33 year old white female
- Dx with KCN in 2019
- Had CXL in OS early 2020; no plans for CXL in OD
- Complains of strained vision, double vision, headaches
- BCVA with specs 20/40 "double" OD and OS

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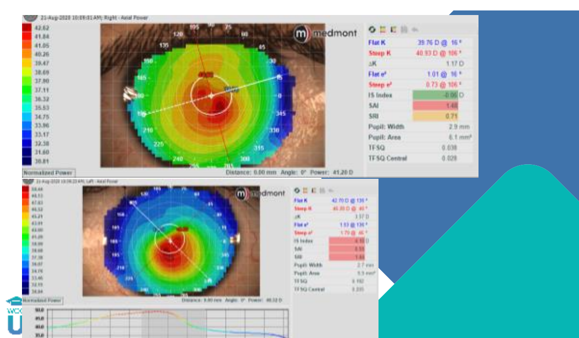

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Brief discussion

- Fit her into scleral lenses
- Constant dryness "wanted to rip them out"
- Added Hydrapeg coating
- Changed materials
- Added Restasis and other lubricants = no effect

141

Poll: What contact lens would you try next?

- Keep trying scleral lenses
- Hybrid lens
- Standard soft toric lens
- Custom soft lens
- Corneal gas permeable lens

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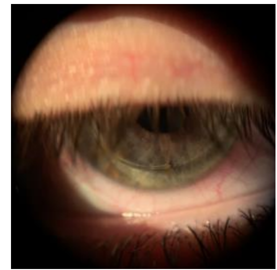
Ultrahealth OD



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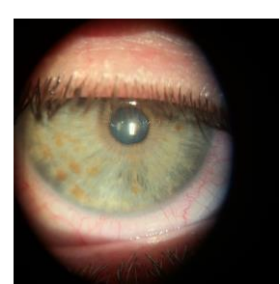
OD: Kerasoft thin/ 8.6 BC/ 14.5 OAD



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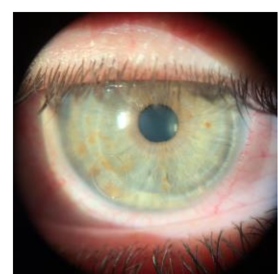
OD: Kerasoft thin/ 8.4 BC/ 14.5 OAD

145

OD: Kerasoft thin/ 8.2 BC/ 14.5 OAD



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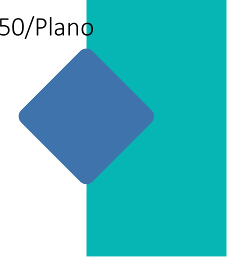
OD Kerasoft Thin/ 8.4 BC/ 14.50/Plano

- SCOR: +0.50-2.25x051 (20/20-)
- Lens order:
- Kerasoft thin
- 8.40 BC
- 14.50 diameter
- +0.50-2.25x051
- ct 0.24
- Discussion



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Treatment: Corneal Gas Permeable Lenses

- GP lenses offer very good vision for early to advanced KCN
- Lens bears entirely on cornea
- Good candidates:
  - Nipple or oval cones
  - Patients wanting a lower cost o
  - Patient who've tried and failed
- Risks:
  - Apical touch can lead to scar tis
  - Lost follow up

ORIGINAL ARTICLE

Comparison of Flat and Steep Rigid Contact Lens Fitting Methods in Keratoconus

KARLA ZADNIK, OD, PhD, FAAO, JOSEPH T. BARR, OD, MS, FAAO, KAREN STEGER-MAY, MA, TIMOTHY B. EDRINGTON, OD, MS, FAAO, TIMOTHY T. McMAHON, OD, FAAO, and MAE O. GORDON, PhD, THE COLLABORATIVE LONGITUDINAL EVALUATION OF KERATOCONUS (CLEK) STUDY GROUP

The Ohio State University College of Optometry, Columbus, Ohio (KZ, JTB), the Department of Ophthalmology & Visual Sciences, Washington University Medical School, St. Louis, Missouri (KSM, MOG), the Southern California College of Optometry, Fullerton, California (TBE), and the Department of Ophthalmology and Visual Sciences, University of Illinois at Chicago, Chicago, Illinois (TTM)

148

Case Report

149

BW

- 34 year old BF
- Keratoconus
- CXL epi off OD May 2020 and OS August 2020
- Uses Systane tears and oasis tears PRN
- Complains of photophobia, blurry vision, and double vision
- Has not used specs or CLs at all in 3 years
- UCVA OD 20/50 and OS 20/100

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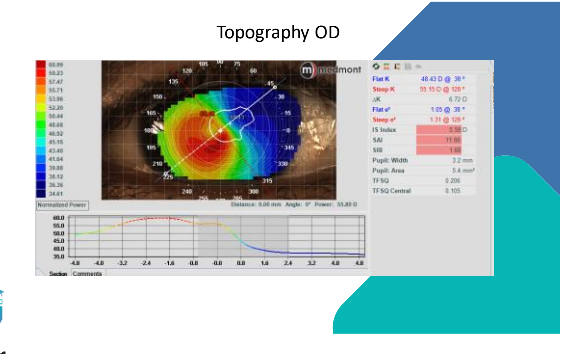

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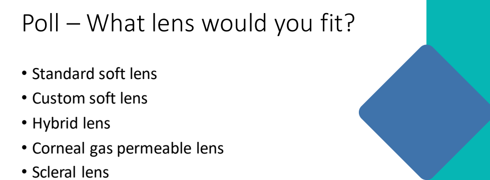

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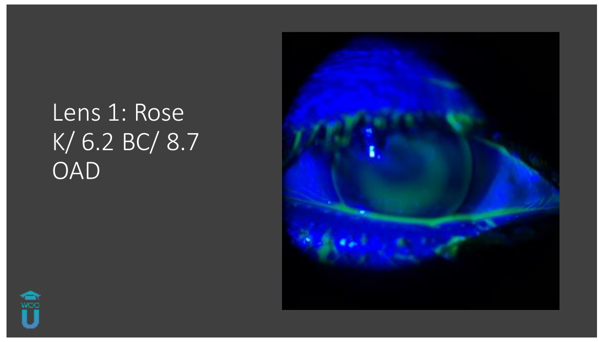

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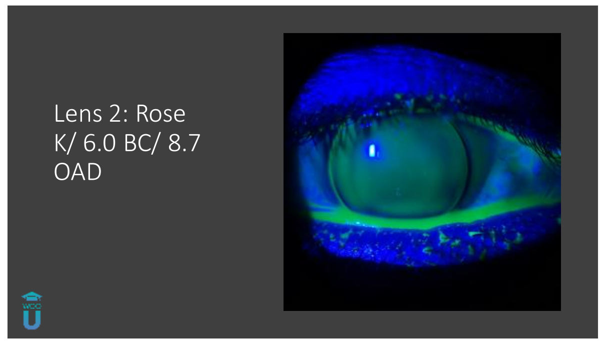

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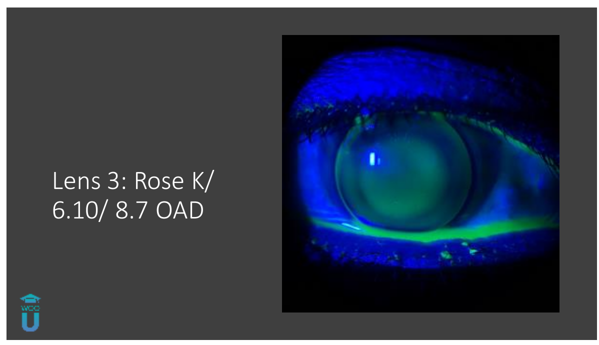

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Treatment option: Scleral Lenses

- Great co
- Easier to
- No lens (
- No foreig
- Fluid res
- Ability tc

Am J Ophthalmol. 2018 Jan;185:43-47. doi: 10.1016/j.ajo.2017.10.022. Epub 2017 Nov 16.

Scleral Lenses Reduce the Need for Corneal Transplants in Severe Keratoconus

Carina Koppen [1], Elke O Kreps [2], Lieselotte Anthonissen [3], Maarten Van Hoey [3], Sorcha Ni Dhubhghaill [4], Louise Vermeulen [4]

Affiliations + expand

PMID: 29103959 DOI: 10.1016/j.ajo.2017.10.022

Free article

Abstract

Purpose: To investigate the success and failure rates of scleral lens correction in severe keratoconus.

Design: Retrospective case series.

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158

17 year old WM

- Diagnosed with keratoconus 2 years ago
- Had CXL in OD 1 year ago. Intacs in OS 1 year ago
- Has not tried any glasses or contacts since eye surgeries
- Complains of decreased vision, blurred vision, issues with glare
- BCVA (20/200 OD and 20/200 OD)

159

Right Eye

Left Eye

160

Discussion

- Reviewed pros and cons of each lens design, patient's father opts for scleral lens
- OD: Ampleye/ 4200 sag/ 16.50 OAD/ 8.04 BC/ -2.00
- SCOR: -6.00 = vision 20/20!
- OS: Ampleye/ 4400 sag/ 16.50 OAD/ 8.04 BC/ -4.00
- SCOR:-4.50 = vision 20/20!

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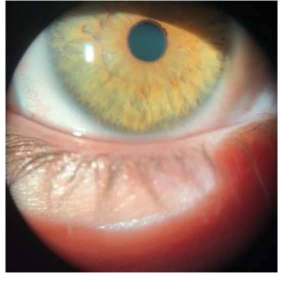

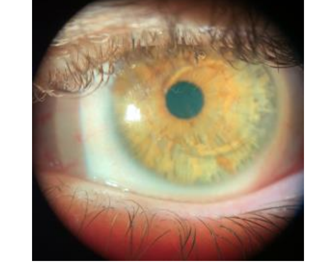

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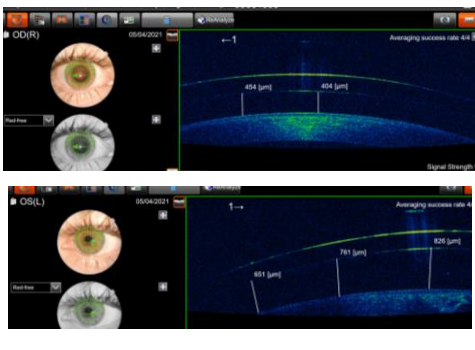

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Plan

- Decrease sagittal depth in each eye
- Ordered lenses and will dispense this week

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165

TM – 38 year old Hispanic male

- Referred by OMD for contact lens consult OS only
- History of KCN
- Wore GP lenses for 10+ years but complains of discomfort with lenses and frequent dislodgement
- Wants to see if there are other options
- BCVA 20/80
- Corneal scar

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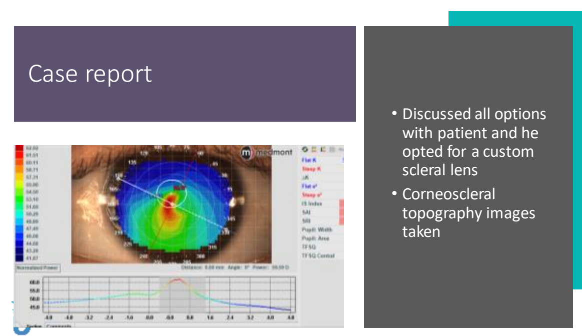

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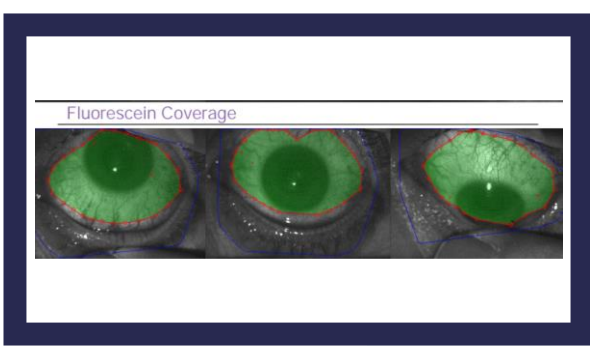

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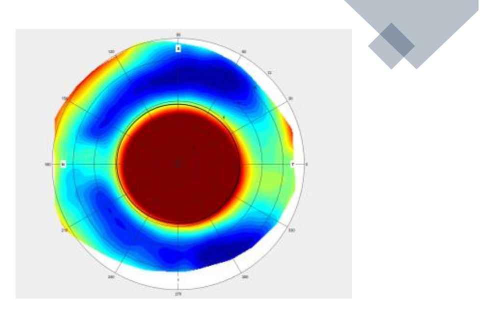

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Lens Fit

- Diagnostic lens:
- Europa OS: 47 BC/ 4750 sag/ -2.50/ 16.50 OAD
- SCOR was -2.00-1.50x014 (20/30-2)

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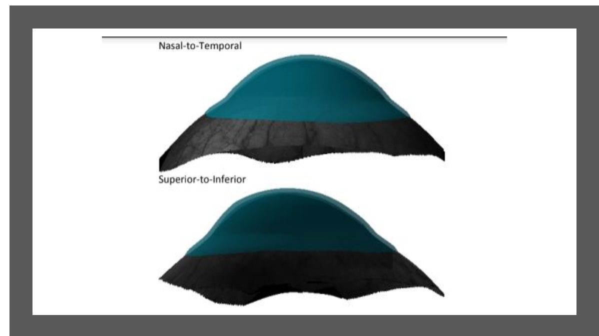

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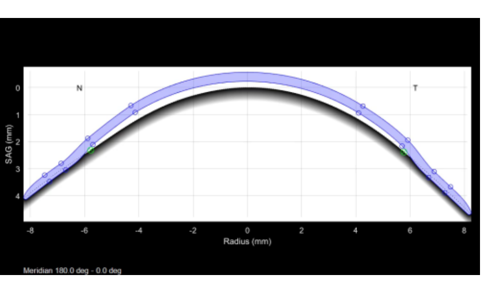

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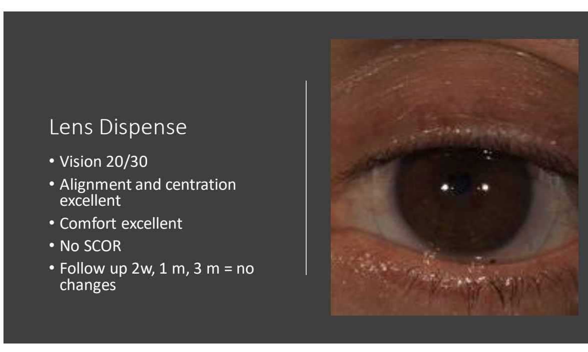

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SJ – 66 year old WF

- Referred from Dr. Wellish for consultation on the OD
- OD had LASIK years ago and developed post-lasik ectasia
- Nieces and nephews have keratoconus
- Had 2 Intacs OD – inferior Intac developed issues and had to be removed.
- Wondering if corneal transplant is an option

175

SJ

- Also suffers from dry eye syndrome.
- Uses Restasis BID, Oasis tears PRN, Systane gel at night. Lipiflow once per year.
- BCVA OD: Count Fingers
- Discussed pros and cons of each lens design and patient opted for EyePrint Prosthetic

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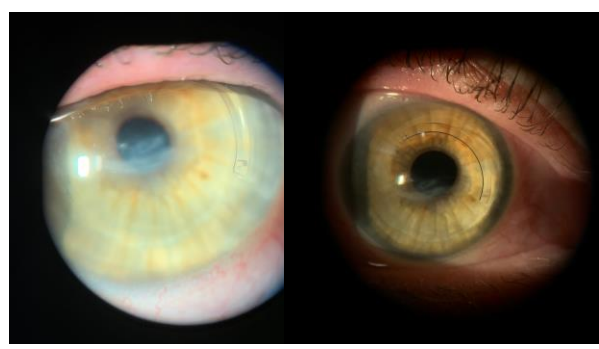

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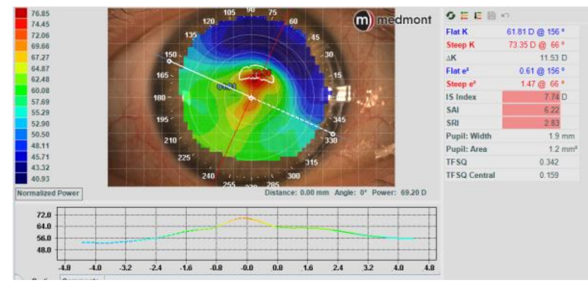

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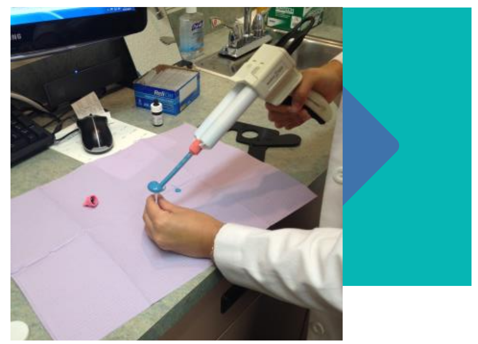

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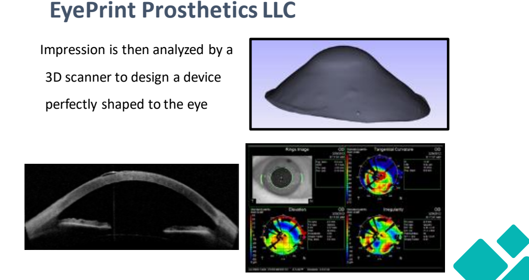
EyePrint Prosthetics LLC

Impression is then analyzed by a 3D scanner to design a device perfectly shaped to the eye



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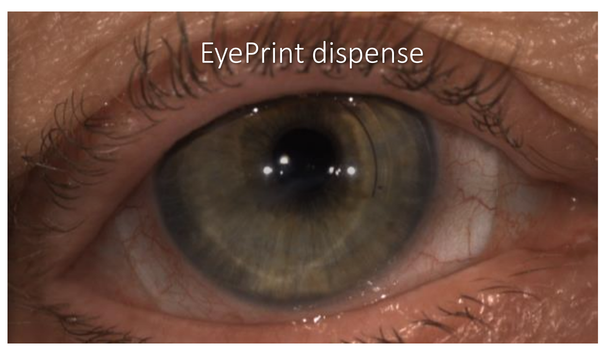

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EyePrint dispense

- Vision = 20/20!
- Patient stated comfort was great
- Wishes she would have come in sooner, wants to tell her nieces and nephews about this technology

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Clinical Pearls

- Develop a plan for patients needing specialty lenses BEFORE you see them
- Consider a CL agreement to outline the fitting process and fees involved
- Review all treatment options with the patient
- If contact lenses are the treatment pursued, make sure you select the appropriate lens to avoid multiple fittings, follow ups, and re-orders
- If patients know how complex the process is, they will appreciate your time and skills and can be a huge asset to your practice.

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Questions?

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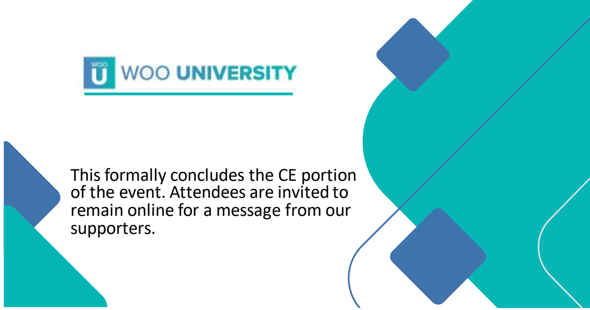

This formally concludes the CE portion of the event. Attendees are invited to remain online for a message from our supporters.

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