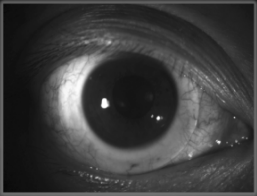


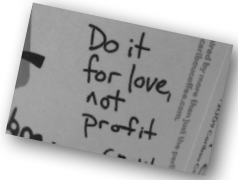
## Essential Scleral Lens Knowledge



**Brooke Messer, OD, FAAO, FSLs**  
Cornea and Contact Lens Institute of Minnesota

## DISCLOSURES

- ◉ Precilens consultant
- ◉ Bausch and Lomb research
- ◉ Contact Lens Residents Forum Director for Alden Optical



## HOT TOPICS TODAY'S AGENDA

- ◉ History of scleral contact lenses
- ◉ Indications
- ◉ Classifying scleral lenses
- ◉ Basic fitting technique

## HOT TOPICS TODAY'S AGENDA

- ◉ Speak the scleral language
- ◉ Customize
- ◉ Care of scleral lenses
- ◉ Trouble shooting

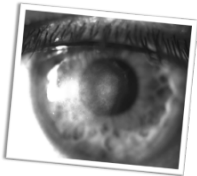
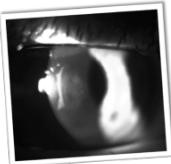
## HISTORY REPEATS ITSELF

- ◉ A long, long time ago...
  - Visual and ocular surface indications
- ◉ Why we stepped away ☹
  - Materials: Glass, PMMA, Low Dk
  - Reproducibility: Poor
- ◉ Why we are back at it ☺
  - Materials: Hyperpermeable to oxygen
    - BXO, Optimum Xtra and Extreme
  - Reproducibility: Much improved!
  - Improved fitting and vision correction options

Pallum K, Cornea, 2005  
Visser E, Opt Vis Sci, 2006  
Ye, Eye and Contact Lens, 2007

## WHAT'S IN IT FOR ME? BENEFITS OF SCLERAL LENSES

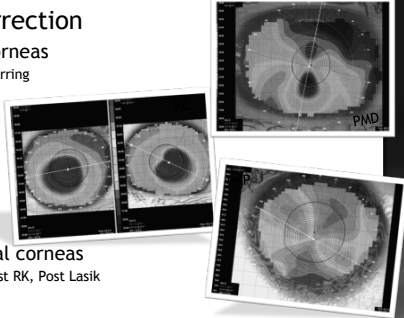
- ◉ Vision correction
  - Vision of a traditional gas permeable lens
- ◉ Comfort of a soft lens!
  - It's about size, not material
- ◉ Corneal protection
  - Fluid filled reservoir
  - Oxygen

## WHO AND WHY?

### INDICATIONS FOR SCLERAL LENSES

- Vision correction
  - Irregular corneas
    - KC, PMD, scarring
- Post surgical corneas
  - Post PKP, Post RK, Post Lasik



Tappen MJ, Eye, 2001

## WHO AND WHY?

### INDICATIONS FOR SCLERAL LENSES

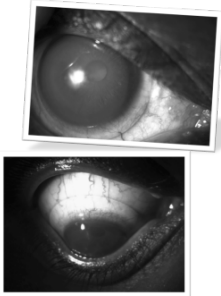
- Ocular manifestations of systemic disease
  - Steven Johnson's Syndrome, Sjogren's Syndrome, Pemphigoid, Graft vs. Host Disease, eyelid paralysis
- Dry eye and Ocular surface disease
- Active lifestyles
  - Sports
- When all else fails...
  - Complex Rx's

Van der Worp, A Guide to Scleral Len Fitting, 2010  
Schornack, M. Eye and Contact Lens, 2008

## A SIZE FOR ALL!

### TYPES OF SCLERAL GP LENSES

- Corneo-Scleral lenses
  - Which Patients?
  - OAD: 14.5-16.0mm
  - "Shared bearing"
  - Limitations
- Scleral lenses
  - Which patients?
  - OAD: 16.0+ mm
  - Scleral bearing only
  - Limitations



KEY: Classification of large diameter lenses is based on FIT, not DIAMETER

## SCLERAL LENS FITTING

- To understand the fitting of scleral lenses, we must review two topics:
  - 1) How does scleral lens fitting differ from corneal GPs? Can I use the same thought process?
  - 2) What have we learned about scleral lenses in the last 10-15 years? How can I best manage my patients based on new research?

## GP VS SCLERAL LENS FITTING

### "IT'S THE SAME, BUT ONLY DIFFERENT"

<p style="text-align: center; font-weight: bold; font-size: small;">Gas Perm</p> <p style="text-align: center; font-weight: bold; font-size: small;">Keratometry</p> <p style="text-align: center; font-size: small;">Alignment to Cornea (+)Tear Exchange Movement is essential Topography helps Choose lenses on BC</p>	<p style="text-align: center; font-weight: bold; font-size: small;">Scleral</p> <p style="text-align: center; font-size: small;">Sagittal Depth Complete vault Little/no TX No movement Ant Seg OCT helps BC is just a number</p>
---	---

## CHOOSING DIAGNOSTIC DESIGN


### 3 THOUGHTS

- Diameter Selection
  - Based on corneal size
  - Consider depth of cornea
  - Consider condition of eye
- Design
  - Prolate vs Oblate
  - Special customizations needed?
- Now we have our set... but which diagnostic lens?
  - Remember, sclerals are based on depth, not BC

## LET'S GET STARTED!

### BASIC FITTING TECHNIQUE


- ⦿ Diagnostic lens selection
  - Minimal correspondence to topography
  - "Just look at it"
- ⦿ Retinoscopy
- ⦿ Over refraction
  - Spherical vs Sphero-cylindrical
- ⦿ Over keratometry / topo
  - Dealing with lens flexure and/or internal astigmatism
- ⦿ Evaluation of lens: Inside-Out vs Outside-In?
  - When is the right time to evaluate?



## LET'S GET STARTED!

### BASIC FITTING TECHNIQUE

- ⦿ Insertion and Removal
  - Easier than you think!



## LET'S GET STARTED!

### BASIC FITTING TECHNIQUE


- ⦿ Insertion and Removal



## LET'S GET STARTED!

### BASIC FITTING TECHNIQUE


- ⦿ Insertion and Removal



## LET'S GET STARTED!

### BASIC FITTING TECHNIQUE

- ⦿ Insertion and Removal



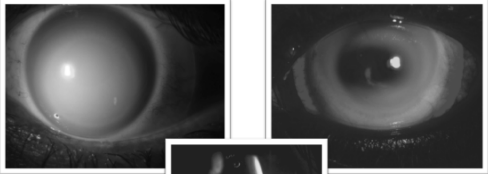
Application and removal images courtesy of the Scleral Lens Education Society

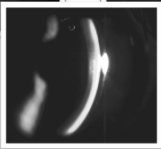
## SPEAK THE LANGUAGE

- ⦿ Apical clearance and apical bearing
- ⦿ Limbal clearance
- ⦿ Landing curves and scleral alignment
- ⦿ Blanching, impingement, edge lift
- ⦿ Tear Exchange
- ⦿ Documentation

## DOES THIS MAKE MY CORNEA LOOK BIG?

- ⦿ Apical relationship





How many microns?

## WHAT'S THE IDEAL VAULT?

**We think it's about 250ish microns.**

Irregular corneas	Diseased Corneas
<ul style="list-style-type: none"> <li>⦿ Less critical as long as we're vaulting what we need to vault at the end of the day</li> <li>⦿ Settling on average 150 microns</li> </ul>	<ul style="list-style-type: none"> <li>⦿ Maybe we want more for plenty of cushion</li> <li>⦿ Maybe we want less space for debris to accumulate                             <ul style="list-style-type: none"> <li>■ Conjunctival mucin</li> <li>■ Cell sloughing</li> <li>■ Personal tip: Limbal clearance is essential to reduce debris production</li> </ul> </li> </ul>

Measure the vault from the cornea's tallest point!

## SPEAK THE LANGUAGE

- ⦿ Apical clearance and apical bearing ✓
- ⦿ Limbal clearance
- ⦿ Landing curves and scleral alignment
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- ⦿ Tear Exchange
- ⦿ Documentation

## DOES THIS MAKE MY CORNEA LOOK BIG?

- ⦿ Limbal clearance

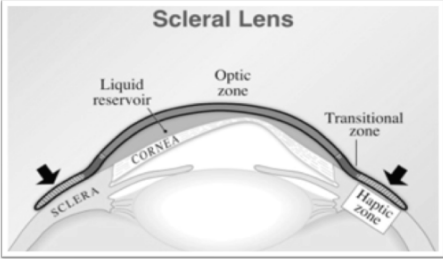


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- ⦿ Apical clearance and apical bearing ✓
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## DOES THIS MAKE MY CORNEA LOOK BIG?

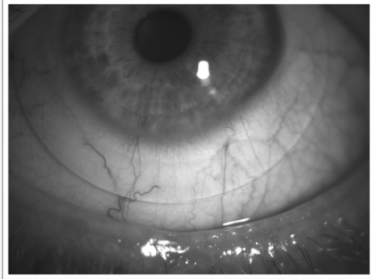
- ⦿ Landing curves / lens haptics / peripheral curves



Rosenthal, P. Contact Lens Spectrum. December 2009.

## THE PERFECT FIT... CAN IT BE TOO PERFECT?

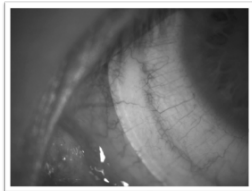
- ◉ Scleral alignment



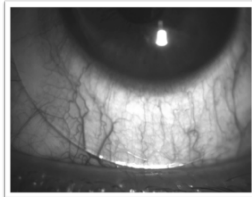
## SPEAK THE LANGUAGE

- ◉ Apical clearance and apical bearing ✓
- ◉ Limbal clearance ✓
- ◉ Landing curves and scleral alignment ✓
- ◉ Blanching, impingement, edge lift
- ◉ Tear Exchange
- ◉ Documentation

## PERIPHERAL CURVES



- ◉ Blanching



- ◉ Edge lift

## SPEAK THE LANGUAGE

- ◉ Apical clearance and apical bearing ✓
- ◉ Limbal clearance ✓
- ◉ Landing curves and scleral alignment ✓
- ◉ Blanching, impingement, edge lift ✓
- ◉ Tear Exchange
- ◉ Documentation

## PUMP IT UP!

- ◉ Tear exchange is no longer from the movement of the contact lens with blinking
- ◉ Does it even happen?

## SPEAK THE LANGUAGE

- ◉ Apical clearance and apical bearing ✓
- ◉ Limbal clearance ✓
- ◉ Landing curves and scleral alignment ✓
- ◉ Blanching, impingement, edge lift ✓
- ◉ Tear Exchange ✓
- ◉ Documentation

## RECOMMENDED DOCUMENTATION

**Examples of fitting notes:**

- AC - 300 / min LC / moderate blanch N-T @ PC3
- Heavy AT / LC / edge lift sup-inf / align n-t / + TX

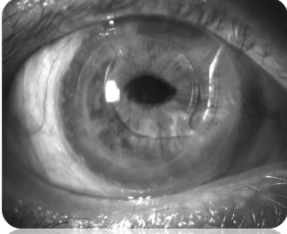
<b>Noteworthy items</b>	<b>Acceptable findings</b>
Apical relationship	Apical clearance
Limbal relationship	Limbal clearance
Lens movement	Minimal to none
Lens rocking	Minimal, no bubbles
PC relationship	Aligned nearly 360°
Patient remarks	Slight awareness to very comfortable!

## SPEAK THE LANGUAGE

- ⊙ Apical clearance and apical bearing ✓
- ⊙ Limbal clearance ✓
- ⊙ Landing curves and scleral alignment ✓
- ⊙ Blanching, impingement, edge lift ✓
- ⊙ Tear Exchange ✓
- ⊙ Documentation ✓

## WHEN WOULD WE NOT FIT SCLERAL LENSES?

- ▶ Scleral lenses are not for everyone
  - Happy with corneal GPs or currently modality? Leave it be... but remember you are the doctor.
  - Patients will get frustrated about the change in their daily routine and addition of an extra solution
  - Discuss needed change if current lenses are causing corneal problems or potential scarring.
- Difficulties with dexterity? Sclerals will be hard to apply and remove. Only Rx if you enjoy house calls.
- Endothelial cell count

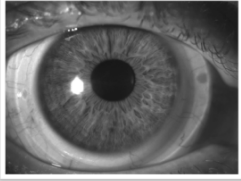


## WHEN THE SPECIALTY LENS IS NOT SPECIAL ENOUGH... CUSTOMIZING A SCLERAL LENS (AKA... WOW FACTORS)

## HAVE IT YOUR WAY! ENDLESS POSSIBILITIES...

- ⊙ No ghost images please, and I'll substitute a couple lines of BCVA ...

Front surface toric lenses for internal astigmatism

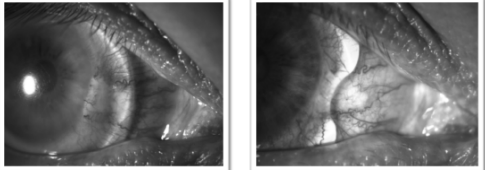


Messer B, Edrington T. CL Spectrum. Apr 2011.

## HAVE IT YOUR WAY! ENDLESS POSSIBILITIES...

- ⊙ Hold the redness, but I'll take extra comfort

Notches and microvaults can be added to contour a pinguecula

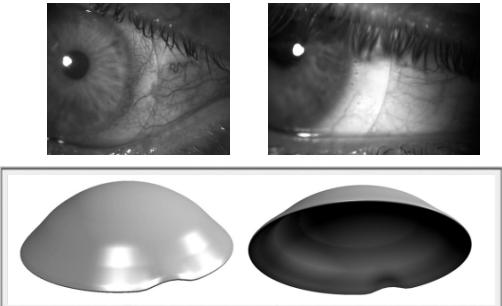


**HAVE IT YOUR WAY!**  
**ENDLESS POSSIBILITIES...**  
 Microvault



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**HAVE IT YOUR WAY!**  
**ENDLESS POSSIBILITIES...**  
 Microvault

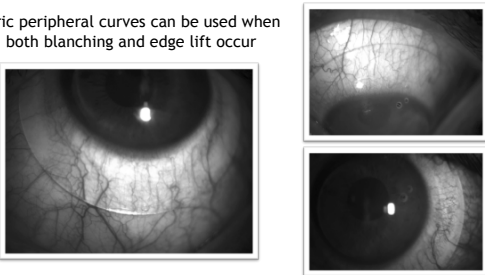


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**HAVE IT YOUR WAY!**  
**ENDLESS POSSIBILITIES...**

⦿ I've been told my eye is shaped like a football

Toric peripheral curves can be used when both blanching and edge lift occur



**HAVE IT YOUR WAY!**  
**ENDLESS POSSIBILITIES...**

⦿ I've been told my eye is shaped like a football

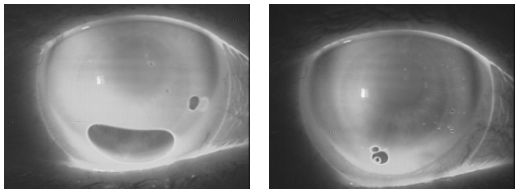
Benefits of toric peripheral curves

- ❖ Can assist in negating lens flexure
- ❖ More contoured to eye giving better lens centration and comfort
- ❖ Lenses "lock" into place, which allows for stable front surface optics, notches and microvaults

**HAVE IT YOUR WAY!**  
**ENDLESS POSSIBILITIES...**

⦿ I just can't get away from the bubbly!

Fenestrations can be used when handling is an issue.  
 (Caveat: Smaller diameters work best here, not great for dry eyes)

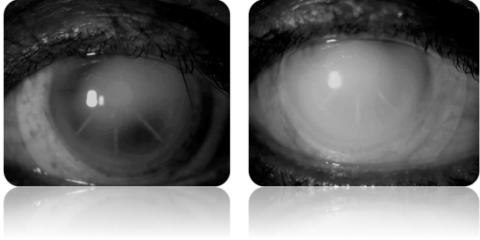


Fenestrations are no longer needed for oxygen purposes  
 Andre and Caroline study from Pacific University

**HAVE IT YOUR WAY!**  
**ENDLESS POSSIBILITIES...**

⦿ I'm not a kono, I'm a plateau.

Reverse geometry designs for contact lenses are great for post PKP and post refractive surgery patients.



## HAVE IT YOUR WAY! ENDLESS POSSIBILITIES...

- ⦿ These contact lenses made my arms too short.

Multifocal designs for scleral lenses are awesome!  
You can specify add power and zone size, too!!




## SCLERAL LENS CARE PROPER HANDLING AND HYGIENE

- ⦿ Solutions
  - High Dk materials need non-abrasive cleaners
  - Boston Simplus, Optimum Lobob, Unique pH
  - Peroxides work well too
- ⦿ Saline
  - Unisol 4 – recently discontinued
  - Sodium Chloride Inhalation Solution 0.9% vials
  - Has to be preservative free!
  - PF artificial tears are OK!

⦿ Tangible Hydra-PEG

## SCLERAL LENS CARE PROPER HANDLING AND HYGIENE

- ⦿ Application and Removal
  - DMV
  - Learn on someone with large palpebral fissures
- ⦿ Learning A & R
  - 64% percent of patients apply correctly the first visit!



Schormack, M. Eye and Contact Lens, 2008

## WHEN TO FOLLOW UP

- ⦿ Follow up schedule recommendations
  - 2 weeks
  - 1-2 months
  - 6 months
  - 1 year
  - Whenever you feel like it
- ⦿ Thoughts:
  - Worried about lens settling and revealing apical touch?
  - Worried about compliance with contact lens wear?
  - Worried about corneal neovascularization?

## IS IT PRACTICAL FOR ME? FOR MY PATIENTS?

- ⦿ Chair time
  - Average number of follow up visits
  - Talk to your patients at the FIRST visit
  - Medical CL agreement is so valuable
- ⦿ Fees
  - ⦿ Comprehensive eye examination
  - ⦿ Complex fitting
  - ⦿ Cost per lens
  - ⦿ Other services during the CL fitting period

## PATIENTS ARE RAVING!

*Did you not put it in? No wait, yes you did! I can see!*

*Mom, you have freckles?*

*I drove at night for the first time in years yesterday!!*

*My jump shot has never been better!*

*I'm going straight to the DMV!*

*I can look both ways and my lenses don't pop out!*

*Can I give you a hug?                      I am so happy with these lenses.*