

On behalf of Vision Expo, we sincerely thank you for being with us this year.

Vision Expo Has Gone Green!

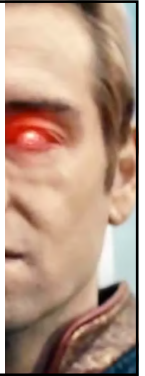
We have eliminated all paper session evaluation forms. Please be sure to complete your electronic session evaluations online when you login to request your CE Letter for each course you attended! Your feedback is important to us as our Conference Advisory Board considers content and speakers for future meetings to provide you with the best education possible.



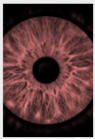
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Seeing Red: Practical Problem-Solving of CL Red Eye

Sheila Morrison, OD, MS, FRAO
Jason Compton, OD, FAAO
Melanie Frogozo, OD, FAAO
Thomas Quinn, OD, MS, FAAO



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Sheila Morrison, OD, MSC, FSLs
Contact Lens Related Red Eye,
Safety Risk & Management:
Specialty Lens Focus

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Financial Disclosures

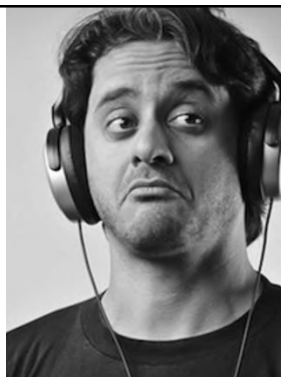
BostonSight
CooperVision
Eaglet
Gaudi
Paragon
Vistakon
Wave



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The privilege for
ECPs to prescribe
contact lenses
could be
threatened by
unsafe use...

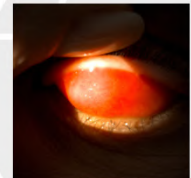
DO NOT IGNORE A RED EYE!
PREVENT, FOLLOW-UP, TREAT!



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What does the literature say?

- Most common CL complications are discomfort, dry eye, corneal infiltrates, and giant papillary conjunctivitis.
- Serious complications that are less common but may threaten vision include corneal neovascularization (d/t hypoxia), corneal abrasion, and infectious keratitis.^{1,2}



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MK Risk Associated to Lens Modality

- Incidence (per 10,000 wearers) of severe CL related microbial keratitis (MK):
 - RGP < hydrogel < Silicone hydrogel⁴
- Soft lenses:
 - Hydrogel safer than Silicone hydrogel⁴
 - Daily safer than extended wear
- OrthoK lenses:
 - Historically MK associated with orthoK was primarily in children; poor lens care procedures, noncompliance, and persisting in lens wear despite discomfort were identified as potential risk factors.⁵
 - New data shows an incidence of serious adverse events with orthokeratology is low when used as directed, likely attributed to improved lens designs with emphasis on safety and compliance. Recent safety studies have shown the risk of microbial keratitis with orthoK to be similar to that of daily soft lenses.^{6,7}
- Scleral lenses:
 - Publications looking at safety and AE with scleral lenses are limited, however no significant adverse events or impacts from wearing SCL were reported in 8 papers assessing safety.
 - SCL are considered safe. Like other lens modalities, non-compliance with handwashing, solutions, and/or lens care was associated with microbial keratitis.^{8,9}

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MK Risk Associated to Age

- Depending on modality, age has different associated risk factors⁴
- Teens and college aged (those aged 15–25 years) have been associated with lower contact lens compliance and with higher risk for corneal inflammatory events¹⁰

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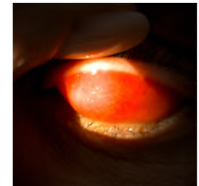
Clinical Insights

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Treatment for GPC

• NO (or minimal) contact lens wear!

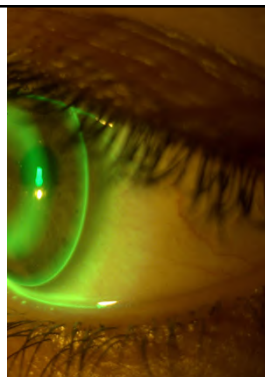
- Antihistamine drops
- Short term high pulse steroid treatment
- Long term cyclosporine drops
- No preservatives, try hydrogen peroxide solutions of daily lenses



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Solving Red Eye In Kids using Orthokeratology

- Redness, irritation/pain, or discharge in any patient but especially kids is an indication to discontinue lens wear immediately and RTC to ECP
- Case: Diagnosis & management
 - History including lens wear and solution use
 - Clinical work-up to differentiate likely red eye causes: bacterial infection, sterile ulcer, lens adhesion staining, injury from application or removal
 - Always rule out non-contact lens related red eye differentials

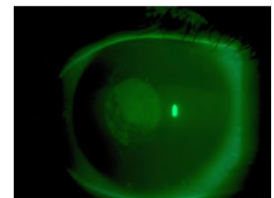


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PRO-TIP: Management of SPK/Adherence

- Warning Sign: RED EYE**
- Issues with SPK/adherence
 - SAFETY**
 - increased risk for MK
 - VISION**
 - poor
 - COMFORT**
 - poor



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PRO-TIP: Management of SPK/Adherence

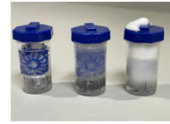
- Recommend
 - Treat dry eye
 - Apply and remove lenses with lubricating drops
 - Saline or pf free
 - Last thing before sleep is lens application
 - Do not take lenses off immediately upon waking... wait 15 min
 - Get lenses moving
 - Pump tears under lens
 - Lid Removal technique
 - Better than plunger



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Solution Mis-use: Red Eye & Burns

- Topical burn on hand of a young patient from Peroxide + MPS solution in the contact lens case: caused chemical reaction
- Foamy bubbles may indicate excessive conversion of H_2O_2 into H_2O by the catalytic disc at bottom of case; residual peroxide may remain after 6 hours and cause burning/red eye with lens application
- Imaging of in-office test of what happens when MPS solution encounters peroxide...
 - Bubbles
 - Mixed solution of MPS + peroxide whitens skin on hand during the chemical reaction with catalytic disc



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Fog Blocker + Contact Lenses



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CONCLUSION
The absence of danger symbol on a product label does not exclude disabling eye damage. The instructions for use should warn the user against the risk for eye damage if the product is not rinsed after application. Labelling according to the new CLP regulation will be more informative but raises the problem of correct interpretation of the corrosive pictogram by consumers.

OBJECTIVE

We present a case of corneal lesions after inappropriate use of an anti-fog on swimming goggles.

CASE REPORT

A 51-year-old man experienced bilateral corneal lesions after accidental prolonged (4-7 hours) exposure to a diluted anti-fog product. The day before taking part to an Ironman (long distance triathlon with 3.8 km swim), he sprayed his swimming goggles with



• 5% anionic and non-ionic surfactants (1-2% docosate sodium and 1% non-ionic surfactant ethoxylated, 0.1-0.2% formaldehyde (as 24%)) and 4-6% propen-2-OL, all classified as eye irritants.

EEC. The manufacturer self-classified the surfactants as irritants.

There is currently no harmonized CLP classification at Community level for Docosate sodium according to the GHS. No search could be

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Neurotrophic Keratitis (NK): Threat to Sight

Degenerative corneal disease

Caused by impairment of trigeminal corneal innervation (decreased sensitivity)

Leads to:

- Epithelial breakdown and compromised healing
- Development of corneal ulceration, melting, and perforation.

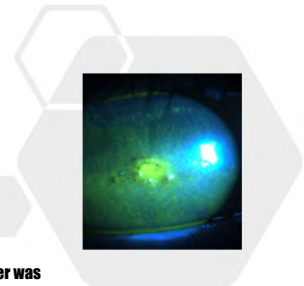


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Neurotrophic Keratitis

- Challenging for ECP to manage and dangerous for patient
 - Patient often does not realize a greater problem because decreased sensitivity of the cornea allows tolerance of epithelial defects
- May be caused by systemic diseases such as diabetes or herpetic infections; contact lens wear, corneal injury or surgery may trigger NK

Case presentation for severe central ulcer was red eye, blurry vision, and only mild discomfort



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Neurotrophic Keratitis Guidelines

- Case Diagnosis & management
 - History including systemic disease, prior ophthalmic surgical history, and contact lens wear
 - Clinical work-up to differentiate likely red eye causes: uveitis/iritis, contact lens wear or solution induced, ulcer (bacterial or sterile), HSV (herpetic), foreign body
- Lens fit evaluation
 - In GP use ensure there is no corneal touch causing epithelial defects that may manifest into NK
- Treatment
 - Ocular Surface Rehabilitation
 - Protection
 - Pharmaceuticals
- Follow-up schedule needs to be conservative and educate patient about other warning signs besides pain - red eye, blurry vision

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Amniotic Membrane Therapy for NK

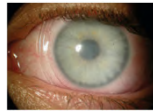
- **What:** Robust tissue that comes from inner lining of placenta
 - Used by Ophthalmology for decades, though they used to be stitched to the cornea
 - Today technology allows for the creation of a 'bandage' tissue application
- **When:** Ocular surface rehabilitation
- **Why:** Beneficial properties in treating the ocular surface
 - Anti-scarring, anti-inflammatory, anti-neovascular, pain reducing, regenerative healing
- **Inflammation = 'take-home'**
 - Chronic inflammation reduces healing and regeneration of tissues
 - Anti-inflammatory effects of amniotic membranes are powerful but do not replace other therapies

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Amniotic Membrane Therapy

- 1. Cryopressed (hydrated)
- 2. Dehydrated



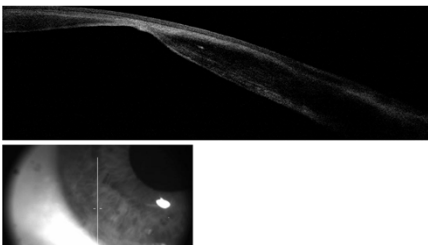
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Lens Application & Removal

- Chronic lens dragging of GP lenses or mechanical insult with any lens modality can induce CL related red eye and complications
- Abrasions from uncontrolled or forceful application of any contact lens
- Extreme Case: Perforated cornea from harsh suction upon removal of a scleral lens
 - Red eye was the warning sign in this case prior to discomfort and prior to corneal perforation
 - Post-surgically was re-fit with glasses and a soft lens
- Fellow eye was re-fit into a scleral lens with safety features to reduce lens suction
 - Channel
 - Fenestrations
 - Non-aligned fit; smallest diameter possible to clear limbus to keep lens sagittal depth minimized

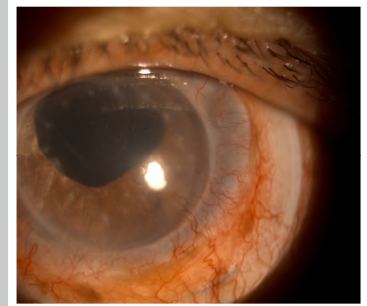
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Warning Sign: RED EYE



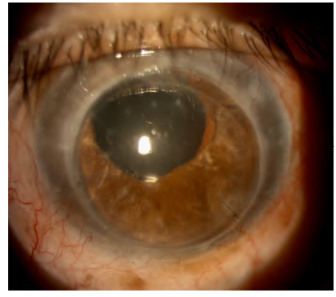
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Suction Induced Red Eye



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Resolution of Suction Induced Red Eye



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Education is Key

- Safety & handling compliance education is key for all contact lens wearers to avoid red eye
 - Training Staff
 - Training Patients



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References

1. <https://jamanetwork.com/journals/jama/fullarticle/2779826>
2. <https://pubmed.ncbi.nlm.nih.gov/33771951/>
3. https://www.cdc.gov/mmwr/volumes/68/wr/mm6832a2.htm?s_cid=mm6832a2_w
4. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8075116/>
5. <https://pubmed.ncbi.nlm.nih.gov/28514244/>
6. <https://pubmed.ncbi.nlm.nih.gov/16163011/>
7. https://journals.lww.com/ciaojournal/Fulltext/2021/07000/Pediatric_Microbial_Keratitis_With_Overnight.7.aspx
8. [https://www.contactlensjournal.com/article/S1367-0484\(20\)30061-8/fulltext](https://www.contactlensjournal.com/article/S1367-0484(20)30061-8/fulltext)
9. <https://www.revieweducationgroup.com/c/scleral-lens-fitting-once-rare>
10. <https://pubmed.ncbi.nlm.nih.gov/32932400/>

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Jason Compton, OD, FAAO

No Financial Disclosures

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Patient Information



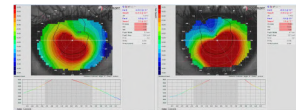
Diane S.

- Demographics
 - 37 yo Dominican Female
- Chief Complaint
 - Intermittent Red Eye
- History of Present Illness
 - Keratoconus
- Past Medical / Ocular History
 - Keratoconus
- Medication List
 - Sodium Chloride Insertion / Boston Simplus
- Social History
 - Smoker
- Family History
 - Unremarkable

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Current Treatment

- Keratoconus



- Scleral Lenses

OD: OneFit MED w/ Hydropeg SAG 4300 / M Standard / L Standard / Edge -0.75/+0.75
Power: -0.50 -1.00 x 180 — 20/20
OS: OneFit MED w/ Hydropeg SAG 4200 / M Standard / L -100 / Edge -0.75/+0.75
Power: -0.50 -1.00 x 180 — 20/20

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Clinical Course

- Timeframe
 - Patient of Dr. Compton since 2008
- Presentation
 - "Complaints" of Red Eye
- Problem

"I cannot keep my lenses in for more than a few hours... they get cloudy and very uncomfortable"

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Treatment Course

- Lid Hygiene
 - Implement Lid Scrubs and Warm Compresses
 - *Thought process: Underlying MGD – Stabilize tear film*
- Adjusting the lens fit
 - Flattening the landing zone
 - *Thought process: Increase tear exchange*
- Adjusting the oxygen permeability
 - Increase the Dk / Decrease vault
 - *Thought process: Reduce risk of hypoxia*

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Outcome



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Fitting Challenge

Hypersensitivity Reaction

"The most common non-infectious inflammatory reaction to contact lenses is hypersensitivity. A reaction that might be caused by contact lens care solutions and/or protein, lipid and other compound deposits on the inner surface of the lens."

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How Did I Miss It?



- **My Fault: I assumed too much**
 - Wearing lenses since 2008
 - Considered to be a "pro" CL wearer



- **Patients Fault: Tried to cut corners**
 - Thought she could save a few bucks
 - Got lazy with her process

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What Are The Potential Complications

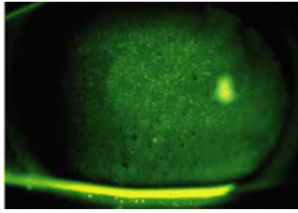
- Hypoxic
- Infectious
- **Inflammatory**
- Osmotic
- Mechanical

Inflammatory complications that result from contact lens use occur frequently

- Peripheral corneal ulcers
- Contact lens acute red eye
- Contact lens-associated superior limbic keratoconjunctivitis
- Giant papillary conjunctivitis
- Preservative hypersensitivity and toxicity reactions

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Hypersensitivity Reactions

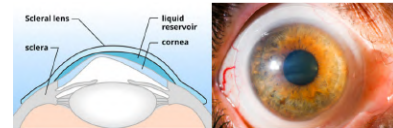


Treatment: Remove the bad habits

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Filling Solutions

- The lens has to be filled with a solution that takes up the space between the lens and the ocular surface.
- It is accepted that there is little to no tear exchange of the fluid.
- Must avoid solutions that contain preservatives and can cause toxic or hypersensitivity reactions resulting in redness and irritation.



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Recommended Filling Solutions



- Solution used to fill lens bowl must be preservative free to avoid toxicity.
- **LacriPure** (Menicon), **ScleralFil** (Bausch + Lomb), and **Nutrifill** (Contamac) are FDA approved for scleral use.
- **Addipak 0.9% NaCl** and **Purilens Plus** are off-label, but acceptable for scleral use.
- Saline vials should be discarded daily and bottles should be discarded as recommended on bottle.

Scleral
SCLERAL LENS
EDUCATION SOCIETY

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SCOPE
Scleral Lenses in Current
Ophthalmic Practice Evaluation

Question: Specify products that you recommended to fill the bowl of the lens

60%

Nonpreserved saline products

33%

Nonpreserved artificial tears

Hartman, J, Nau CB, Barr J, et al. Scleral Lens Prescription and Management Practices: The SCOPE Study. Eye and Contact Lenses. 2017 Apr 6.

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Hypersensitivity Reactions



- Out of convenience patients may switch solutions without telling you.
- Solutions should always be considered as a possible source of patient symptoms.
- Take a careful history every visit, as they may have switched solutions from what was originally prescribed.

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Summary

- **Do not assume anything**
 - Practitioners should regularly educate patients on how to correctly care for their lenses
- **Train your staff**
 - Educated staff can go catch things that we might not be able to pick up
- **Be patient**
 - Reactions can be delayed – Makes dx difficult

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Effective Methods of Patient Education

- Exam room conversations
- Insertion and Removal Training
- Take home material
- Follow Up Evaluations
- Telemedicine Evaluations



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Patient Information



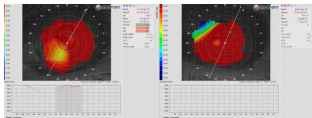
Sean W.

- Demographics
 - 56 yo African American Male
- Chief Complaint
 - Redness
- History of Present Illness
 - Keratoconus s/p PK OD only
- Past Medical / Ocular History
 - Unremarkable
- Medication List
 - Nutrifill Insertion / Boston Simplus
- Social History
 - Unremarkable
- Family History
 - Unremarkable

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Current Treatment

- Keratoconus



- Scleral Lenses

OD: OneFit MED w/ Hydrogel SAG 5450 / M Standard / L Standard / Edge -1.50/+0.00
 Power: -7.50 --- 20/20
 OS: OneFit MED w/ Hydrogel SAG 5900 / M Standard / L Standard / Edge -1.50/+0.00
 Power: -10.00 --- 20/20

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Clinical Course

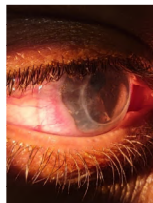
- Timeframe
 - Patient of Dr. Compton since 2021
- Presentation
 - "Red Eye"
- Problem

"My lenses feel fine... They just seem to keep getting red throughout the day"

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Evaluation / Diagnosis

- Slit Lamp Evaluation
 - Transition Zone
 - Thought process: Need to make an adjustment in the limbal area



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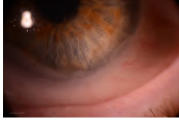
Fitting Challenge

Conjunctival Prolapse

"Loose conjunctival tissue adjacent to the limbus is pulled within the fluid chamber of the scleral lens where there is limbal clearance."

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Conjunctival Prolapse



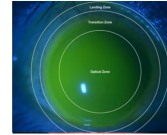
- **SYMPTOMS:**
 - Patients with conjunctival prolapse may be asymptomatic; others may notice pink tissue at the boundary of the iris.
 - Scleral lenses can adhere to the ocular surface and become very difficult to remove.

Miller D, Carroll JM, Holmberg A. Scleral lens fitting measurement. Am J Ophthalmol 1968;65(6):929-30.
Walker M, Bergmann JP, Marack JD, et al. Complications and fitting challenges associated with scleral contact lenses: a review. Contact Lens Anterior Eye. 2016;39(2):88-96.

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Lens Adjustments

What Do We Modify?



- Optic Zone
- Transition Zone
- Landing Zone



Scleral | Scleral Lens
Essence Society

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Conjunctival Prolapse

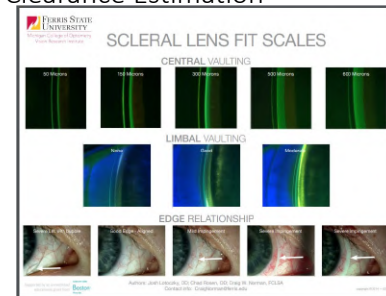
REASONS:

- Prolapse occurs when loose perlimbal conjunctival tissue is pulled between the scleral lens and the corneal limbus.
 - Both compression and suction forces contribute to conjunctival prolapse
- Observed in the region of the thickest fluid reservoir.
- Has everything to do with our estimation of limbal clearance.

Miller D, Carroll JM, Holmberg A. Scleral lens fitting measurement. Am J Ophthalmol 1968;65(6):929-30.
Walker M, Bergmann JP, Marack JD, et al. Complications and fitting challenges associated with scleral contact lenses: a review. Contact Lens Anterior Eye. 2016;39(2):88-96.

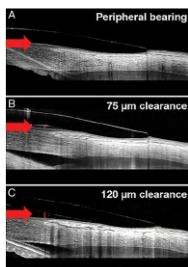
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Limbal Clearance Estimation



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Limbal Clearance Estimation



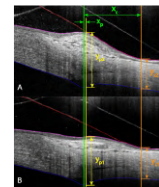
Must clear the limbus by 10-80μm

Fluorescein-stained tear layer doesn't become visible until 20μm to 30μm

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Conjunctival Prolapse

- **DIAGNOSING:**
 - Conjunctival prolapse is simple to detect and diagnose with a slit lamp evaluation.
 - Commonly in the inferior quadrant where the lens is the greatest vault in the limbal area.
 - Generally occurs within of 1 or 2 quadrants
 - It is possible to have 360 degrees of conjunctival prolapse.

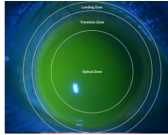


Walker MK, Caroline P, Lampa M, Kinoshita B, Andre MP, Kojima B. Proposed mechanism of scleral lens induced conjunctival prolapse. In: Global Specialty Lens Symposium; 2014.
Fisher D, Collins MJ, Vincent SJ. Conjunctival prolapse during open eye scleral lens wear. Contact Lens Anterior Eye 2020;44(2):115-9.

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Lens Adjustments

What Do We Modify?



- Optic Zone
- Transition Zone
- Landing Zone



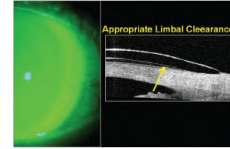
Scleral Lens
Encourages Success

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Conjunctival Prolapse

• HOW DO YOU FIX IT:

- Reducing limbal reservoir thickness
 - $\leq 100 \mu\text{m}$ of limbal clearance
- Improving landing zone alignment
 - centering the lens
- Incorporating a fenestration to relieve suction forces.



Walker MK, Caroline P, Lampa M, Kinoshita B, Andre MP, Kojima R. Proposed mechanism of scleral lens induced conjunctival prolapse. In: Global Specialty Lens Symposium 2014.
Fisher D, Collins MJ, Vincent SJ. Conjunctival prolapse during open eye scleral lens wear. Contact Lens Anterior Eye 2020;44(1):115-9.

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Melanie Frogozo, OD, FAAO, FSLs
Diplomate Cornea Contact Lens and Refractive Technologies
Alamo Eye Care, San Antonio TX

- Disclosures
 - CooperVision
 - LenTechs



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Case

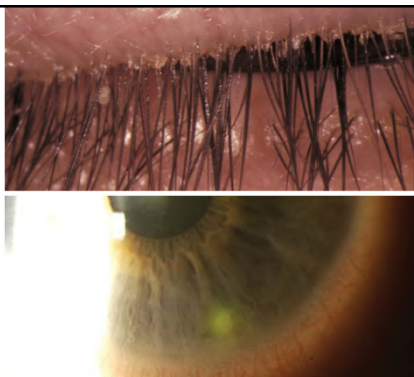
- 40-year-old
- Long time history of monthly disposable lenses
 - Multipurpose solution
 - Rubs lenses sometimes
 - Compliant with clean solution and change in case
- Reports redness, pain, and light sensitivity with or without contact lens on OS for the last 24 hours
- Healthy, taking no medications

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Differential Diagnosis ?

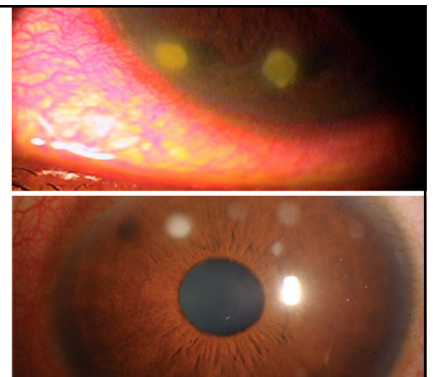
- All peripheral stromal keratitis
 - Moore's Ulcer
 - Peripheral ulcerative keratitis
 - Herpetic stromal keratitis



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Staph Marginal Keratitis



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Staph Marginal Keratitis

- An inflammatory disease of the peripheral cornea
- peripheral stromal infiltrates which are often associated with epithelium break down and ulceration
 - Stromal edema first before epi defect
- blepharoconjunctivitis
- inflammatory response against *S. aureus* antigens

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Etiology and pathophysiology

- inflammatory reaction against staphylococcal antigens
- bacterial antigens in the peripheral cornea possibly triggers a type III hypersensitivity reaction
- immunocomplexes are formed and deposited in the peripheral corneal stroma
 - Possible epithelial damage, forming a marginal ulcer
 - direct contact between the peripheral cornea and the eyelid margin

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Risk Factors and Primary Prevention

- longstanding blepharitis, conjunctivitis, or meibomitis
 - Primarily associated with Staphylococcal blepharoconjunctivitis
 - *Haemophilus*, *Moraxella* or *Streptococcus*
- Management of the underlying blepharitis for prevention



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Physical examination

- stromal infiltrates in the peripheral cornea, between the eyelid margin and the limbus.
 - 1-2mm parallel to the limbus
 - there can be an epithelial lesion, leading to marginal ulcer
- related to symptomatic blepharoconjunctivitis
- Erythema and edema of the eyelid margin associated with telangiectasias
- madarosis, poliosis, trichiasis
- presence of hard scales in the base of eyelashes
 - *S. aureus* blepharitis



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Management

- reduce local inflammation by reducing staphylococcal antigens at the eyelid margins and corneal surface
- Topical corticosteroids
 - peripheral stromal infiltrates without epithelial defects
- epithelial defect
 - steroids cautiously
 - combined with a broad-spectrum antibiotic
- Blepharitis treatment
- hygiene, topical antibiotic ointments, oral antibiotics if necessary (doxycycline, tetracyclines, or azithromycin)
- steroids can be useful to control underlying blepharitis



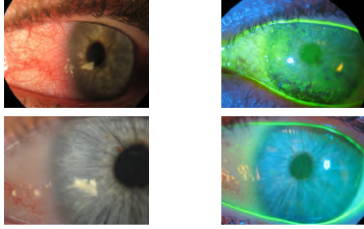
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Treatment for patient

- Switched to daily disposable silicone hydrogel lens
- Started on loteprednol
- Dispensed lid hygiene wipes

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Staph Marginal Keratitis



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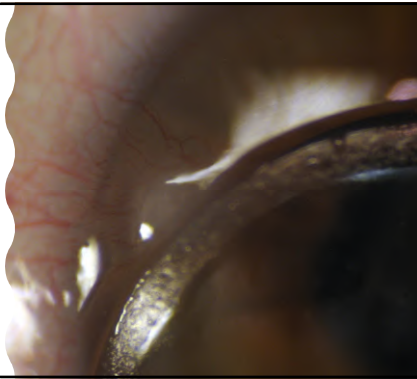
Case

- 5-year-old Hispanic female
- Congenital cataract removed at 1 months of age
- History of long-time corneal GP wear due to correct for unilateral aphakia OD
 - Lens power 7.50/+18.00/9.30
- History of aphakic glaucoma OD
 - Combigan
 - Latanoprost
- RET, vision 20/200 since she was not patching
- No complaints, eye appeared white and quiet on gross inspection
- No systemic medications, born healthy otherwise

68

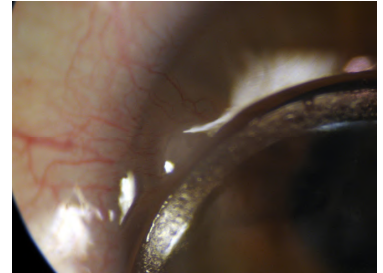
Differential Diagnosis ?

- Staph Marginal Keratitis
- Corneal Dellen
- Conjunctival Xerosis
 - Bitots Spots



69

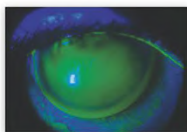
Vascularized Limbal Keratitis (VLK)



70

Etiology

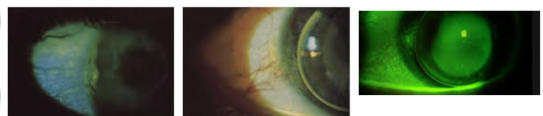
- heaping of hyperplastic corneal tissue secondary to lateral lens movement
- conjunctival hyperemia and corneal infiltration
 - Vascularization from conjunctiva leads to the elevated epithelial mass
 - erosions with significant corneal staining and hyperemia.
- related primarily to large lens diameters with minimal peripheral clearance



71

SIGNS OF VLK

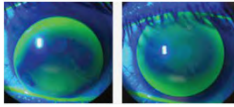
- elevated, opaque limbal mass
- horizontal axis at 3 and 9 o'clock or at 4 and 8 o'clock
- extensive corneal staining at the lesion site
- superficial and deep vascularization may be present, especially in the more advanced stages.
- complain of increased lens awareness and reduced wearing time.
- 'white spot' on the cornea with localized conjunctival injection



72

TREATING VLK

- improving the peripheral lens-to-cornea fit
- In more advanced stages discontinue lens wear and initiate antibiotic/steroid therapy



Treatment for patient

- Decentration causing poor ret Reflex
- Limitation of lens to corneal fit due to keratometry values and power/weight of the lens
- Scleral contact lens refit – Yes! Kids can wear scleral lenses!



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Case

- 38-year-old male
- History of keratoconus and crosslinking and intrastromal ring segments OU
- History of red painful area exacerbated with scleral contact lens wear OD

Differential Diagnosis

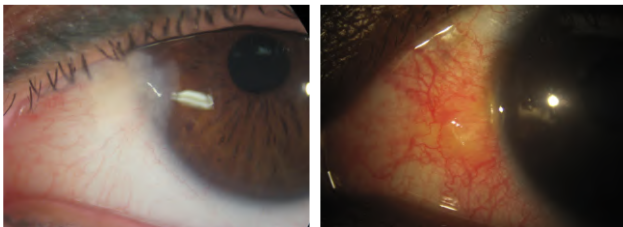
Conjunctival Nevus
Subconjunctival Foreign Body
Phlyctenule
Nodular Scleritis



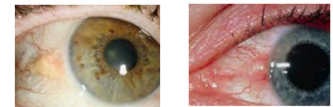
75

76

Pterygium
Pinguecula (Pingueculitis)



Pinguecula

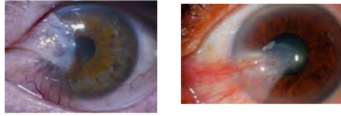


- are yellow-white, subepithelial conjunctival deposits that are typically found in the nasal or temporal anterior bulbar conjunctiva
- occasionally become pigmented or calcified
- benign and often the result of ultraviolet light exposure

77

78

Pterygium

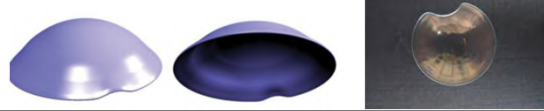


- wing-shaped folds of conjunctiva and fibrovascular tissue that invade the superficial corneal layers
- can result in corneal astigmatism or occlusion of the visual axis.
- preceded by pingueculae
- often associated with ultraviolet light exposure

79

Treatment for Pinguecula or Pingueculitis

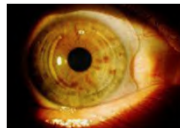
- artificial tears and/or mild topical steroids
- topical nonsteroidal anti-inflammatory ophthalmic solutions
- surgically excised for cosmetic reasons, if a lesion causes chronic irritation, or if an elevated lesion interferes with contact lenses
- Contact Lens Induced Pingueculitis
 - Change lens to conjunctival/scleral fit



80

Treatment for patient

- Topical Steroids
- Notched Scleral Contact Lens



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mfrogozood@gmail.com

- Thanks!

82

Disclosures* Thomas Quinn, OD, MS, FAAO

- Bausch + Lomb
- CLMA (GPLI)
- CooperVision
- Essilor/Vision Source
- Lentechs
- STAPLE Program

*Speaking/Clinical Research/Consultant

83

Red = Inflammation

- A protective response
- If persists, can *contribute* to disease
- A **red** flag that something is amiss!



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Red Eye: Potential Causes

- Contact lens wear
- Non-CL related conjunctivitis
 - Bacterial
 - Viral
 - Allergic
- Dryness
- Other irritants
 - Smoke
 - Dust
 - Pool Chlorine



85

First Step: A Good History

- *While modern medical technology has greatly enhanced our ability to diagnose and treat disease, it has also promoted laziness—especially mental laziness—among many physicians. Habitual reliance on sophisticated medical gadgetry for diagnosis prevents physicians from using the most sophisticated, intricate machine they'll ever and always have—the brain.*

Herbert L. Fred, MD
Professor, Department of Internal Med.
The University of Texas

86

A Good History

- 442 consecutive patients
- Compared experience: **Correct Dx**
 - Senior Resident 80.1%
 - (4 yrs)
 - Experience Clinician 84.4%
 - (>20 yrs)

Paley L, et al. **Utility of Clinical Examination in the Diagnosis of Emergency Department Patients Admitted to the Department of Medicine of an Academic Hospital** *Arch Intern Med.* 2011;171(15):1393-1400

87

A Good History

- Most valuable tools?

	Res.	Physn
History alone	19.8	19.3%
Physical examination alone	0.8	0.5%
Basic tests (BT) alone	1.1	1.3%
Hx + Physical examination	39.5	38.6%
Hx + BT	14.7	14.7%
Hx + Physical exam +BT	16.9	18.5%
Imaging studies	6.5	6.1%

Paley L, et al. **Utility of Clinical Examination in the Diagnosis of Emergency Department Patients Admitted to the Department of Medicine of an Academic Hospital** *Arch Intern Med.* 2011;171(15):1393-1400

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HPI

ELEMENT	EXPLANATION	EXAMPLE
1. Location	Where is the problem?	Arm, leg, low back
2. Duration	How long is the problem been there?	2 days, months, years
3. Severity	Is the pain sharp, moderate, or severe? How would you rate it on a pain scale?	Sharp pain or 3 of 10
4. Quality	Describe the quality of the symptom.	Sharp, dull, burning, throbbing, etc.
5. Context	New patient: How did the symptoms begin? Established patient or problem: Are your symptoms better or worse than the last visit?	Gradually over time Suddenly after a fall Getting better, worse or unchanged?
6. Modifying factors	What makes it better?	Rest, ice, rest, elevation, medication
7. Associated signs and symptoms	Are there other signs or symptoms associated with your primary (main) problem?	Numbness, swelling, limited movement
8. Timing	When do the symptoms occur?	At night, walking stairs, after work, at rest, after exercise

Problem-focused and expanded problem-focused histories require documentation of at least three elements; limited and comprehensive histories require documentation of four or more elements.

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Location

- Where's the red?
 - One or both eyes?
 - Overall?
 - Paralimbal?

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"My eye is red"

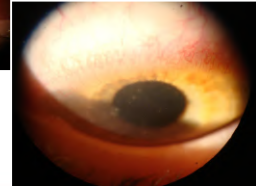


91

"My eye is red"



- 22 year old college student
- SCL wearer/DW/Reusable
- MPS
- corneal infiltrates OD



92

"My eye is red"

- OS:
 - minimal injection
 - 1+ infiltrates superior cornea

What To Do?

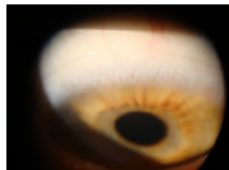
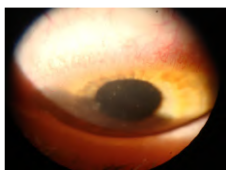
93

"My eye is red"

- What we did...
 - Switched her to Hydrogen Peroxide-based care system
 - Asked to return in 2 weeks

94

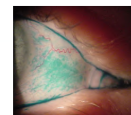
"My eye is red"



95

Location

- Where's the red?
 - One or both eyes?
 - Paralimbal?
 - Sectoral?
 - Overall?
 - In the aperture? **Dryness**
 - At the eyelid margin? **Blepharitis/MGD**



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98

HPI		
TABLE 1 ELEMENTS IN THE HISTORY OF PRESENT ILLNESS		
ELEMENT	EXPLANATION	EXAMPLE
1. Location	Where is the problem?	Low leg, low back
2. Duration	How long is the problem here?	2 days, months, years
3. Severity	Is the pain minor, moderate, or severe? How would you rate it on a pain scale?	Mild pain or 3 of 10
4. Quality	Describe the quality of the symptom.	Sharp, dull, burning, shooting, etc.
5. Context	How patient: How did the symptoms begin? Established pattern or problem: Are your symptoms better or worse than the last visit?	Gradually over time, suddenly after a fall, getting better, worse or unchanged
6. Modifying factors	What makes it better?	Rest, ice, rest, elevation, medication
7. Associated signs and symptoms	Are there other signs or symptoms associated with your primary (main) problem?	Numbness, swelling, limited movement
8. Timing	When do the symptoms occur?	In night, waking stairs, after work, at rest, after exercise

Problem-focused and expanded problem-focused histories require documentation of at least three elements; detailed and comprehensive histories require documentation of four or more elements.

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Quality	
How do your eyes feel?	
Itch	→ Allergy?
Burn	→ Dryness?

100

Quality: Itch	
Where?	
Both eyes?	Allergy
Nasal canthus?	Allergy
Eyelid margins?	Blepharitis

101

Quality: Itch	
Where?	
Both eyes?	Allergy
Nasal canthus?	Allergy
Eyelid margins?	Blepharitis
When?	
Seasonal?	Allergy
After computer use?	Dryness
Modifying factors?	
Rubbing?	Does it help? Worse → Allergy Better → Dryness

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Quality: Burn

- Where?
 - Both eyes? **Dryness**
 - One eye? **Host of possibilities**
- When?
 - After reading/computer use? **Dryness**
 - After CL application? **Soln/Hands?/Lotion**
- Modifying factors?
 - Rubbing? **Dryness: helps comfort and vision**

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HPI

ELEMENT	EXPLANATION	EXAMPLE
1. Location	Where is the problem?	Arm, leg, low back
2. Duration	How long as the problem been there?	2 days, months, years
3. Severity	Is the pain minor, moderate, or severe? How would you rate it on a pain scale?	Near pain or 3 of 10
4. Quality	Describe the quality of the symptom	Sting, dull, burning, throbbing, etc.
5. Context	How patient: How did the symptoms begin? Established patient or problem: Are your symptoms better or worse than the last visit?	Gradually over time, suddenly, after a fall Getting better, worse or unchanged
6. Modifying factors	What makes it better?	Rest, ice, rest, elevation, medication
7. Associated signs and symptoms	Are there other signs or symptoms associated with your primary (main) problem?	Numbness, swelling, limited movement
8. Timing	When do the symptoms occur?	At night, waking times, after work, at rest, after exercise

Problem-focused and expanded problem-focused histories require documentation of all four items; extended and comprehensive histories require documentation of five or more elements.

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Associated symptoms

- Produce matter?
 - Stringy vs globular **Allergy vs Infection**
 - White vs green **Allergy vs Infection**
 - Matted shut in am? **Conjunctivitis or Blepharitis?**
- Watery? **Viral? Dryness?**
- Photophobia? **Uveitis/Cornea?**

105

Red Eye: Potential Causes

- Contact lens wear**
- Treat**
 - Non-CL related conjunctivitis**
 - Bacterial
 - Viral
 - Allergic
 - Dryness**
- Remove**
 - Other irritants**
 - Smoke
 - Dust
 - Pool Chlorine



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Causes of CL Red Eye

- Hypoxia
 - More likely if:
 - Long hours of wear
 - Higher prescription (lower Dk/t)
 - High corneal oxygen demand?

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Corneal Oxygen Demand

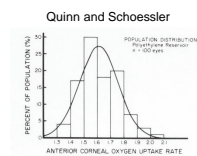


Fig. 1. Distribution of anterior corneal oxygen uptake rates for a population of 100 human eyes.

- Mueller N, Caroline P, Smythe J, Mei-Le K and Bergenske G. A comparison of overnight swelling response with two High Dk silicone hydrogel contact lenses. *Optom Vis Sci* 2001; 78(suppl.):199.
- Quinn TG, Schoessler JP. Human corneal epithelial oxygen demand: population characteristics. *Am J Optom Physiol* 1984; 61(6): 366-368.
- Larke JR, Parriah, ST and Wigham, CG. Apparent human corneal oxygen uptake rate. *Am J Optom Physiol* 1981; 58(10): 803-5.

108

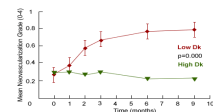
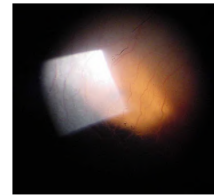
Causes of CL Red Eye

- Hypoxia
 - More likely if:
 - Long hours of wear
 - Higher prescription (thicker lens)
 - High corneal oxygen demand?
 - Other signs to look for

109

Signs of Hypoxia

- Limbal redness
- Neovascularization
 - 18% with hydrogel EW



Dumbleton KA, Chalmers RL, Richter DB, Fonn D. Vascular response to extended wear of hydrogel lenses with high and low oxygen permeability. *Optom Vis Sci* 2001; 78(3): 147-151.

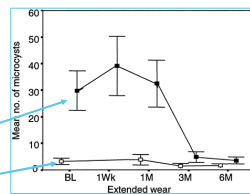
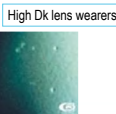
American Optometric Association
Contact Lens and Cornea Section

110

Signs of Hypoxia

- Limbal redness
- Neovascularization
- Corneal microcysts
 - 90-100% in hyd EW

Low Dk lens wearers switched to high Dk lens



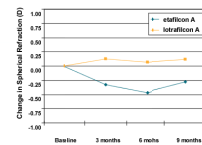
Keay L, Sweeney D, Jalbert, I et al. Microcyst Response to High Dk/t Silicone Hydrogel Contact Lenses. *Optom Vis Sci* 2000; 77(11):582-585.

American Optometric Association
Contact Lens and Cornea Section

111

Signs of Hypoxia

- Limbal redness
- Neovascularization
- Corneal microcysts
- Myopic creep
 - 49% of EW Hyd wearers



Dumbleton KA, Chalmers RL, Richter DB, Fonn D. Changes in myopic refractive error with nine months' extended wear of hydrogel lenses with high and low oxygen permeability. *Optom Vis Sci* 1999; 76:845-9.

American Optometric Association
Contact Lens and Cornea Section

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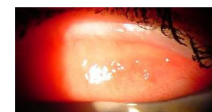
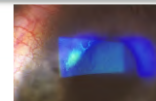
Causes of CL Red Eye

- Hypoxia
- Mechanical/Allergic

113

Silicone Hydrogels

- Mechanical issues
 - SEALS
 - Contact lens-induced papillary conjunctivitis (CLPC)
 - Higher rate of local CLPC with SiHy lenses (4.6%)



Skotnitsky C, et al. The incidence of local and general contact lens induced papillary conjunctivitis in silicone hydrogel contact lenses. *Invest Ophthalmol Vis Sci* 2005 46: E-Abstract 2064.

American Optometric Association
Contact Lens and Cornea Section

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GPC (CLPC)

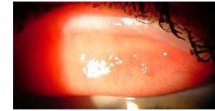
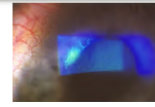
- Symptoms:
 - Itchy/ mucous
 - Len decentration/ intolerance
- Onset:
 - Variable/ allergy season?
- Treatment:
 - D/C CL wear
 - Steroids/antihistamine/ mast cell stabilizer
 - Refit → DD



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Silicone Hydrogels

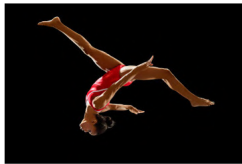
- Mechanical issues
 - SEALS
 - Contact lens-induced papillary conjunctivitis (CLPC)
 - Higher rate of local CLPC with SiHy lenses (4.6%)
 - DD SiHy: rate significantly reduced



Skotnitsky C, et al. The incidence of local and general contact lens induced papillary conjunctivitis in silicone hydrogel contact lenses. *Invest Ophthalmol Vis Sci* 2005 46: E-Abstract 2064.

116

- A (Lid) Flip Should Be Part of Every CL Exam!



Gabby Douglas, US Olympian

117

Causes of CL Red Eye

- Hypoxia
- Mechanical/Allergic
- Corneal Infection/ Inflammation

118

Silicone Hydrogels

- To the Rescue?
- MK rates unchanged with EW (~5xDW)
 - 1989¹ (Hyd): 20.9/10,000
 - 2005² (SiHy): 18.0/10,000
 - 2008³(SiHy): 25.4/10,000

1. Poggio EC, Glynn RJ, Schein OD, et al. The incidence of ulcerative keratitis among users of daily-wear and extended-wear soft contact lenses. *N Engl J Med* 1989 Sep 21; 321(12):779-83.

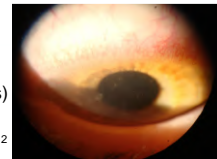
2. Schein OD, McNally JJ, Katz J et al. The Incidence of microbial keratitis among wearers of a 30-day silicone hydrogel extended-wear contact lens. *Ophthalmology* 2005 Dec; 112(12): 2172-9

3. Stapleton F et al. The incidence of contact lens-related Microbial keratitis in Australia. *Ophthalmology* 2008 Oct; 115(10):1655-62.

119

Silicone Hydrogels

- MK rates unchanged
 - (~5xDW)
- Concern about corneal inflammatory events (CIEs)
 - 26.7% incidence¹
 - 2x increase vs hydrogel ^{1,2}



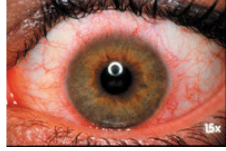
1. Szczotka-Flynn L, Diaz M, *Optom & Vis Sci* April 2007;84(4):247-256

2. Radford CF, et al. *Ophthalmology* 2009 Mar;116(3):385-92.

120

CLARE (Contact Lens Associated Red Eye)

- Symptoms
 - Watery, painful eye
- Onset
 - On waking with EW
- Etiology
 - Gram neg bacteria
- Treatment
 - D/C CL Wear; Meds?
 - 1/3 will recur¹

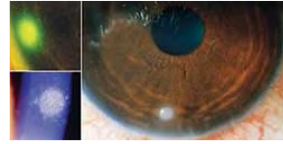


1. Fonn, D and Sivak, A.
CL Spectrum, Feb 2005.

121

CLPU (Contact Lens Peripheral Ulcer)

- CLPU

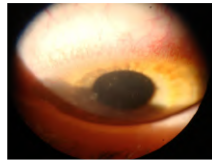


(Courtesy: CCLRUI/LVPEI Guide to Corneal Infiltrative Conditions)

122

Silicone Hydrogels

- MK rates unchanged
 - (~5x DW)
- Concern about corneal inflammatory events (CIEs)
 - 26.7% incidence¹
 - 2x increase vs hydrogel^{1,2}
 - Material/wear sch/other?



1. Szczotka-Flynn L, Diaz M, *Optom & Vis Sci* April 2007;84(4):247-256

2. Radford CF, et al. *Ophthalmology* 2009 Mar;116(3):385-92.

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Contact Lens and Cornea Section

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Risk factors for CIEs

- Bacteria bind in higher levels to SiHy lenses
 - Related to increase in CIEs?



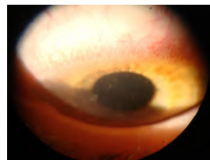
Pseudomonas aeruginosa
Source: CDC

Subbaraman LN, et al. **Influence of protein deposition on bacterial adhesion to contact lenses.**
Optom Vis Sci Aug 2011;88(8):959-966

124

Contact Lens Safety

- Incidence of CIEs:
 - **DD vs Reusable:**
12.5 X less likely with DD¹
 - **DD SiHy vs DD Hyd:**
SiHy DD: 0.4%
Hyd DD: 0%



1. Chalmers, Robin L, et al. **Multicenter Case-Control Study of the Role of Lens Materials and Care Products on the Development of Corneal Infiltrates.** *Optometry & Vision Science.* 89(3):316-325, March 2012.

2. Chalmers RL, et al. **Rates of Adverse Events With Hydrogel and Silicone Hydrogel Daily Disposable Lenses in a Large Post Market Surveillance Registry: The TEMPO Registry.** *Invest Ophthalmol Vis Sci.* 2015 Jan 8;56(1):654-63

American Optometric Association
Contact Lens and Cornea Section

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HPI

ELEMENT	EXPLANATION	EXAMPLE
1. Location	Where is the problem?	Area, leg, low back
2. Duration	How long is the problem been there?	3 days, months, years
3. Severity	Is the pain minor, moderate, or severe? How would you rate it on a pain scale?	More pain at 3 of 10
4. Quality	Describe the quality of the symptom.	Sharp, dull, burning, throbbing, etc.
5. Course	How patient: How did the symptoms begin? Established pattern or problem: Are your symptoms better or worse than the last visit?	Gradually over time Suddenly after a fall Getting better, worse or unchanged
6. Relieving factors	What makes it better?	Rest, ice, rest, elevation, medication
7. Associated signs and symptoms	Are there other signs or symptoms associated with your primary (main) problem?	Numbness, swelling, lateral movement
8. Timing	When do the symptoms occur?	At night, waking start, after work, at rest, after exercise

Problem-focused and expanded problem-focused histories require documentation of at least three elements. Detailed and comprehensive histories require documentation of four or more elements.

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Is redness associated with CL wear?

- Modifying factors (What helps?)
 - Removing CL's!!!



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Is redness associated with CL wear?

- Do symptoms get worse when you wear your CL's?
- Do symptoms get better when you remove your CL's?
- Do you wake up with red eyes?
 - DW?
 - EW?

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Take-Aways

- **Detailed History:** is a powerful tool: give time to it
- **Where's** the redness?
- **Itch** doesn't necessarily mean **allergy** (though it might!)
- **Burn** doesn't necessarily mean **dryness** (it might!)
- **Key Indicators** that CL's are contributory to redness:
 - Improvement with contact lens removal
 - Worsening with contact lens application
- **Clean Lenses and Clean Hands!**

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