1

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 Education Planning Committee considers content and speakers for future meetings to provide you with the best education possible.

vision expo

2

Financial disclosure

- Shana Barrett Zeitlin, O.D. has no financial interests to disclose.

3

4

CL stats

- Approximately **45 million** Americans wear contact lenses
- Soft lenses are the most popular type
  - Over **90%** of all contact lenses used are soft CL

5

Materials: Hydrogel

- Introduced in the1980s
- High water content (38-75%) = moist lens
- Lower oxygen permeability
  - Water occupies space that could allow for oxygen transmission

6

Materials: Silicone hydrogel (SiHy)

- Early 2000s
- Made from a combination of silicone and hydrogel
- Hydrogel = moisture retention and flexibility
- Silicone = superior oxygen permeability
- **High oxygen permeability (Dk/t)**: up to 5x more oxygen thru lens to cornea
  - ↓ corneal hypoxia
- Lower water content than hydrogel lenses
- Silicone allows more oxygen through the lens without relying on water
- Tend to collect more debris, deposits

7

Modalities of soft contact lenses

- **Daily Disposable:** Convenient, no cleaning required, less risk of complications
- **Biweekly:** Requires regular cleaning, balance of cost and comfort
- **Monthly:** Requires regular cleaning, balance of cost and comfort
- **Quarterly:** Worn for 3 months, less common
- **Extended Wear:** Can (theoretically) be worn overnight, higher risk of complications, requires careful monitoring

8

Choosing modality

- **Convenience**
- **Cost**
- **Safety and Hygiene**

9

Modalities of soft contact lenses

- Globally, there is a growing shift towards daily disposable lenses due to their **convenience** and **reduced risk of infection**
- Especially true in Asia and Western Europe

	Daily disposable	Biweekly	Monthly	Extended Wear
USA	40-45%	15-20%	30-35%	5%
Europe	50-60%	10-15%	25-30%	<5%
Asia	70-80%	10-15%	10-15%	uncommon

10

COMMON COMPLICATIONS

11

INFECTIOUS KERATITIS

12

Bacterial keratitis: Symptoms

- **Rapid onset of symptoms**
- Severe pain, often localized to the affected eye
- Redness and swelling
- Watery or mucopurulent discharge
- Blurred vision or sudden vision loss
- Photophobia
- Foreign body sensation

13

Bacterial keratitis: Clinical signs

- **Epithelial defects**: NaFl staining, ulceration
- **Stromal infiltration:**
  - WBC and edema within the stroma
  - Appear as dense focal white areas
  - Can be central or paracentral, depending on ulcer location
- **Conjunctival hyperemia**: intense redness
- **Severe cases:**
  - Hypopyon: layer of pus in the anterior chamber (severe cases)
  - Corneal perforation or melt

14

Bacterial keratitis: Management

- **Discontinue lens use immediately**
- **Empirical treatment:** broad-spectrum topical abx
  - Fortified aminoglycosides (e.g., tobramycin)
  - Fortified cephalosporins or fluoroquinolones (e.g., moxifloxacin, levofloxacin)
- **Frequent dosing**: every hour, even overnight
  - Systemic antibiotics if severe
- **Tailored antibiotic therapy** after culture results
- **Steroids** (caution): reduce inflammation after the infection is under control
- **Follow-Up**: Daily follow-up, adjust based on response

15

Bacterial keratitis: Complications

- **Corneal scarring**: permanent visual impairment
- **Corneal perforation**: emergency corneal transplant
- **Secondary glaucoma**: inflammation → increased IOP
- **Endophthalmitis**: infection spreads inside the eye

16

Pseudomonas keratitis

- *Pseudomonas aeruginosa*
- Rapidly progressing infection
- Associated with poor CL hygiene or EW
- **Symptoms**: severe pain, redness, watery or mucopurulent discharge, blurred vision, photophobia
- **Signs**:
  - Corneal ulceration with a gray or yellowish central infiltrate
  - Dense stromal edema
  - Extreme hyperemia
  - Hypopyon
  - Rapid corneal destruction if untreated

17

Pseudomonas keratitis

- **Emergency intervention required**
- Discontinue lens use immediately
- Intensive topical abx (fortified aminoglycosides or fluoroquinolones)
- Often combination
- Frequent dosing (every hour) initially, then taper as infection resolves
- Severe: hospitalization, IV abx
- Corneal transplant if extensive damage

18

Acanthamoeba keratitis

- Parasite, most commonly *A. castellanii or A polyphaga*
- Exposure to contaminated water (e.g., swimming, hot tubs, tap water)
- Risk Factors:
  - Swimming or showering while wearing contact lenses
  - Non-sterile cleaning solutions or tap water
  - Trauma to the cornea (small abrasions)
- Symptoms:
  - **Severe pain out of proportion to clinical signs**
  - Blurred vision, redness and tearing, photophobia, FBS
  - Symptoms may wax and wane over time

19

Acanthamoeba keratitis

- **Early Signs**: often nonspecific!
  - Epithelial irregularities, NaFl staining
  - Epithelial or anterior stromal infiltrates
  - Pseudodendrites
- **Late Signs**:
  - Dense ring-shaped corneal infiltrate
  - Corneal stromal opacification and thickening
  - Severe anterior chamber inflammation, hypopyon
  - Satellite lesions, persistent epithelial defects, radial keratoneuritis
  - Stromal thinning, perforation

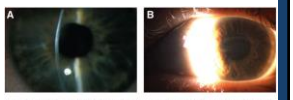


Figure 3. Early *Acanthamoeba* infection showing epithelial pseudodendrites (A) and non-specific subepithelial infiltrates (B).

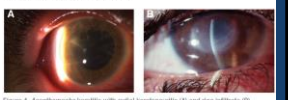
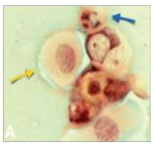


Figure 4. *Acanthamoeba* keratitis with radial keratoneuritis (A) and ring infiltrate (B).

20

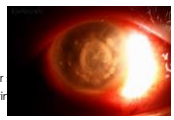
Acanthamoeba keratitis

- *Acanthamoeba* exist in two forms: trophozoites and **cysts**
  - Cystic form of *Acanthamoeba* is notoriously difficult to treat
- Diagnosis: corneal scrapings, PCR, biopsy
- Treat early and aggressively
  - Topical: combination therapy (biguanides, diamidines, antifungal)
  - Corneal debridement
  - Treat pain and inflammation
  - Transplant for perforation or scarring
- Often >6m treatment
- Risk of recurrence from cyst awakening

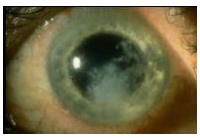


21

Fungal keratitis



- Associated with trauma/contact with organic matter, ocular
- Symptoms: Gradual onset of pain, redness, blurry vision, tearir
- Signs:
  - Early: may look like a corneal abrasion
  - Feathery, white-gray lesions
  - Develops thicker infiltrates, fuzzy margins
  - Satellite lesions
  - Erythema and periocular edema
- Treatment:
  - Often delayed dx– history is key!
  - Topical antifungals, but difficult penetration to stroma
  - Systemic antifungals
  - Antibiotic prophylaxis
  - Corneal debridement



22

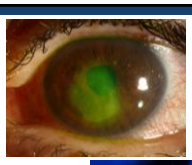
23

Corneal abrasion

- Superficial injury to the corneal epithelium
- Mechanical trauma
  - Inserting or removing lenses improperly
  - Foreign object trapped under the lens can scratch the corneal surface
- Poor lens hygiene
  - Dirty lenses: protein or debris buildup can create friction
  - Improper cleaning: failure to properly disinfect or rinse lenses can introduce irritants
- Poorly fitting lenses: microtrauma or abrasions over time
- Overwearing lenses: overnight wear, dryness

24

Symptoms

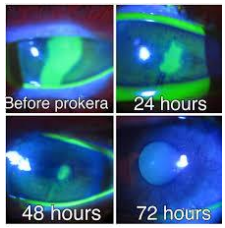


- Symptoms:
  - Sudden onset of sharp pain or discomfort
  - FBS, epiphora
  - Redness and irritation
  - Blurred vision, photophobia
  - Difficulty keeping the eye open
- Signs:
  - Epithelial defect: often an irregular or linear corneal defect
  - Fluorescein staining
  - No stromal damage
  - Immediate relief on instillation of topical anesthetic

25

Management

- Discontinue contact lens use
- Artificial tears and lubricants: promote healing
- Prophylactic antibiotics: prevent infection
- Patching or bandage contact lens*
- Amniotic membrane
- Pain relief: oral analgesics, topical NSAIDs
- Close follow-up
  - Ensure expected healing
  - Many other conditions can mimic a mild abrasion!



26

Prognosis and complications

- **Prognosis:**
  - Most corneal abrasions heal within 24-72 hours with proper treatment
  - Rapid relief of symptoms once the epithelial layer regenerates
- **Complications:**
  - **Recurrent Corneal Erosion (RCE)**:
    - New epithelium fails to adhere properly to the underlying tissue
    - Most RCEs occur on awakening
    - Encourage lubrication, especially overnight
  - **Infection**:
    - Antibiotic prophylaxis until re-epithelialized

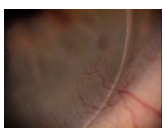
27

CORNEAL NEOVASCULARIZATION

28

Corneal neovascularization ("neo")

- Abnormal growth of new blood vessels from the limbus into the normally avascular cornea
- Primary cause in contact lens wearers: **hypoxia**
  - Prolonged hypoxia → release of VEGF → promotes new blood vessel growth
- Risk Factors:
  - Long-term wear of hydrogel lenses (low oxygen transmission)
  - Overuse of lenses (e.g., wearing longer than prescribed, sleeping in non-extended wear lenses)
  - Poor contact lens hygiene and improper replacement

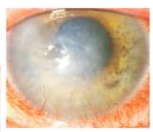


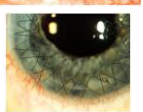
29

Other causes of corneal neo

The body attempts to heal damaged tissue = **Inflammation**

- Chronic infections
- Chronic inflammation
- Ulcers
- Trauma
- Chemical injuries
- Post-surgical healing (e.g. transplant)
- Abrasions, RCE
- Severe dry eye syndrome





30

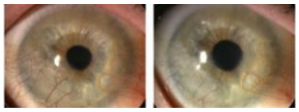
Treatment and management

- **Patients may be asymptomatic in early stages**
  - Education with slit lamp photos can improve compliance
- **Improve oxygen permeability:** switch to SiHy, reduce wearing time
- **Switch to daily disposables:** Less debris/deposit accumulation = less inflammation
- **Discontinue** or limit contact lens wear
- **Artificial tears and lubricants:** reduce dryness and irritation
- **Topical steroids**: reduce inflammation and limit the growth of new vessels

31

Treatment and management

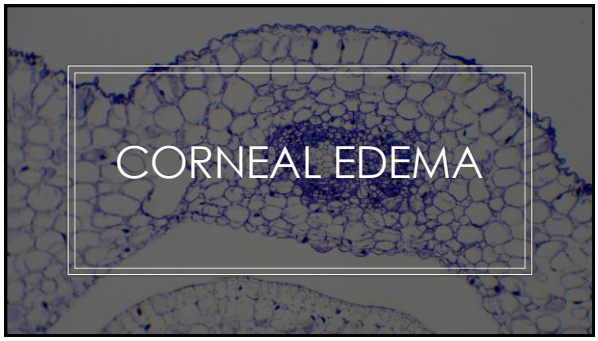
- **Anti-VEGF therapy:** topical and/or injections-- early intervention needed
- **Argon laser photocoagulation**: prevent further vessel growth and minimize the risk of scarring (effective only for superficial neo)
- **Corneal transplant (keratoplasty)**: severe corneal scarring or opacification
  - However, neovascularization increases the risk of graft rejection
- **Limbal stem cell transplantation**: for cases of limbal stem cell deficiency



63F with chronic keratoconjunctivitis and rheumatoid arthritis

6 month post-subconjunctival injection of bevacizumab

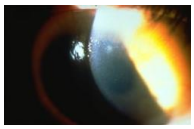
32



33

Hypoxia-induced corneal edema

- The accumulation of excess fluid in the corneal stroma
- Risk factors:
  - Sleeping in lenses not approved for overnight wear
  - Wearing lenses for longer periods than recommended
  - Overuse of low-Dk/t (low oxygen transmission) lenses
  - Tight lenses: restrict oxygen flow to the cornea and impede tear exchange



34

Symptoms and signs

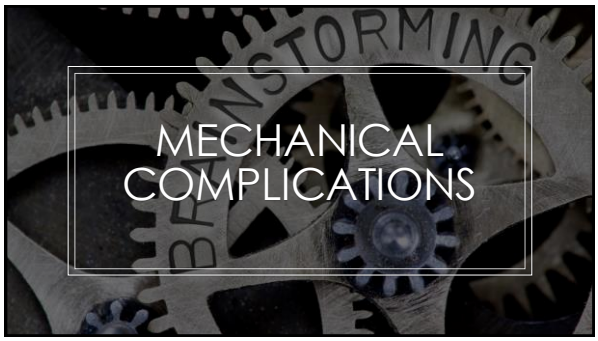
- Mild corneal edema:
  - Blurred or hazy vision
  - Rainbow halos around lights (light scatter)
  - Discomfort or irritation, especially in the morning after EW
- Moderate to severe edema:
  - Significant visual disturbance
  - Redness, photophobia
  - Eye pain or FBS
  - Difficulty keeping the eye open
- Slit lamp exam: cloudy, thickened cornea

35

Treatment

- Discontinue or reduce contact lens wear
- Limit wearing time
- Switch to higher oxygen permeable lenses
  - Silicone hydrogel, daily disposable lenses
- Improve lens fit
- Hypertonic saline drops or ointments (5% NaCl)
  - Help to draw excess fluid out of the cornea
- Address Underlying Causes
  - Systemic conditions (e.g. Fuchs' endothelial dystrophy)
  - Allergic reactions (lens solutions, lens materials)

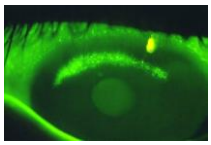
36



37

Superior Epithelial Arcuate Lesion (SEAL)

- Crescent-shaped break in the superficial corneal layers near the limbus, just beneath the eyelid
- Epithelial break, may have mild surrounding inflammation
- Stains with NaFl in a bright arc
- Early Stages: Often asymptomatic
- Advanced:
  - Irritation/FBS, **particularly under the upper eyelid**
  - Mild tearing or dryness
  - Photophobia
  - Blurred vision, if severe



38

Superior Epithelial Arcuate Lesion (SEAL)

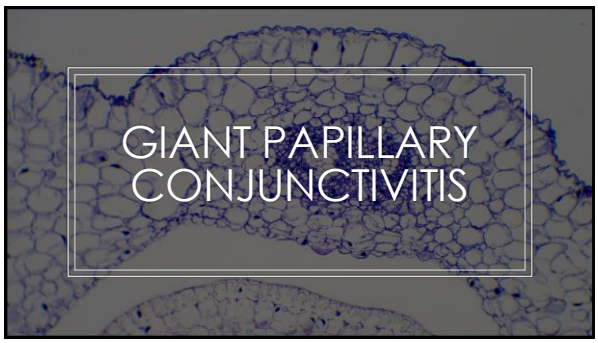
- Lenses that create excessive pressure on the superior cornea:
  - Lenses with thicker edges
  - High modulus lenses: Stiffer material, increased mechanical stress, especially during blinking
  - Tight Lenses: increased friction between the lens edge and the corneal surface
- Overwearing Lenses:
  - Constant mechanical stress on the cornea
  - Sleeping in lenses, long daily wear times
- Lens Deposits:
  - Surface deposits can increase surface roughness, irritating of the cornea

39

Management

- **Discontinue or reduce contact lens wear**
- **Avoid sleeping in lenses**
- **Monitor for Secondary Infections:**
  - Epithelial break = entry point for infection
  - Prophylactic use of topical antibiotics
- **Refitting the contact lens**
  - **Material**: lower modulus = softer lenses, more flexible, less mechanical stress
  - **Design:** thinner edges to minimize contact between the lens and the superior cornea
  - **Modality:** daily disposable lenses to reduce the buildup of deposits

40



41

Giant papillary conjunctivitis (GPC)

- Inflammatory condition of the inner eyelid characterized by large papillae
- Not a true allergy, but is immune-mediated
- Associated with overnight wear and SiHy material
- Symptoms:
  - Itching, irritation
  - Excessive CL movement
  - CL intolerance

42

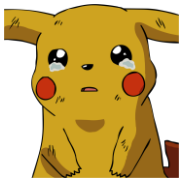
Causes

- **Mechanical irritation:** constant friction = inflammatory response
- **Lens deposits:** roughened surface of CL interacting with tarsal conjunctiva
- **Allergic response:** exacerbated by environmental allergies
- **Lens material:** SiHy allergy or protein buildup
- **Extended wear lenses:** pronged mechanical friction, reduced tear exchange
- **Lens care solutions:** hypersensitivity can create more inflammation

43

Management

- Discontinue CL wear
  - Remove underlying cause
- Switch to daily disposables
  - Decrease deposits, irritants
- Change material
  - Hydrogel options
- Antihistamines/mast cell stabilizers
  - Topical and likely systemic
- Topical steroids
  - Longer course with slow taper



44

Allergic reactions

- **Lens material allergies**
  - **Symptoms**: itching, redness, discomfort with lens wear
  - **Signs**: conjunctival injection, papillae, punctate epithelial erosions
  - **Treatment**: switch to a different lens material
- **Solution-related allergies**
  - **Symptoms**: itching, burning, redness after using lens solution
  - **Signs**: conjunctival injection, diffuse corneal staining
  - **Treatment**: switch to preservative-free or peroxide-based lens care solutions
- **May need a short course of a topical steroid to treat acute inflammation**

45

INFLAMMATORY REACTIONS

46

Contact lens-induced acute red eye (CLARE)

- Acute, sterile, inflammatory keratitis
- Gram-negative bacterial colonization of a contact lens
  - Not infectious– the bacteria do not invade the cornea
  - They release endotoxins that recruit inflammatory cells
- Inflammatory response to tight fitting, immobile lens
- Toxins, debris, or bacteria become trapped under the lens during wear
- Corneal hypoxia and stagnating tears

47

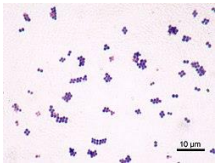
Contact lens-induced acute red eye (CLARE)

- **Symptoms**: sudden onset of unilateral pain, photophobia and redness, usually after sleeping in contact lenses
- **Signs**:
  - Mid-peripheral or peripheral subepithelial corneal infiltrates
  - Little to no epithelial involvement is expected
  - Conjunctival and circumlimbal injection, limbal edema
  - Mild anterior chamber reaction possible
- **Treatment**:
  - Discontinue lens wear
  - Cycloplegic for pain
  - Topical steroids
  - Topical antibiotics (prophylactic)
  - Monitor closely for signs of microbial keratitis

48

Contact lens-induced peripheral ulcer (CLPU)

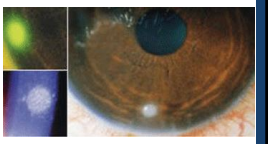
- Inflammatory event associated with colonization on contact lens surfaces by Gram-positive bacteria
  - Usually *Staphylococcus*
- Generally unilateral, associated with sleeping in CL
- Bacterial exotoxins recruit inflammatory cells
- After acute resolution, a round scar remains
  - Gradually fades over 3-6m, leaving a central bulls eye appearance



49

Contact lens-induced peripheral ulcer (CLPU)

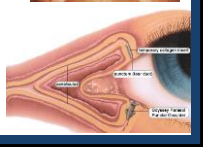
- **Symptoms**: often asymptomatic, mild symptoms of discomfort, FBS, moderate hyperemia and tearing, no blur
- **Signs**:
  - Whitish/gray anterior stromal peripheral or midperipheral infiltrate
  - Infiltrate is round, well defined, and small (0.1mm to 2.0mm)
  - Fluorescein staining of the overlying epithelium
  - Anterior chamber reaction uncommon
- **Treatment**:
  - Discontinue lens wear until all signs of inflammation are resolved



50

Contact lens-associated dry eye

- Symptoms: dryness, irritation, burning, foreign body sensation, blurred vision
- Diagnostic testing:
  - Tear breakup time (TBUT): assess tear film stability
  - Schirmer test: measure tear production
- Early signs: reduced tear film breakup time, conjunctival staining, lens discomfort
- Management: use of artificial tears, switching to lenses designed for dry eyes, reducing lens wear time, comprehensive dry eye treatment
  - Punctal plugs can be useful



51

PATIENT EDUCATION AND COMPLIANCE

Education is key to compliance

52

Education & enhancing compliance

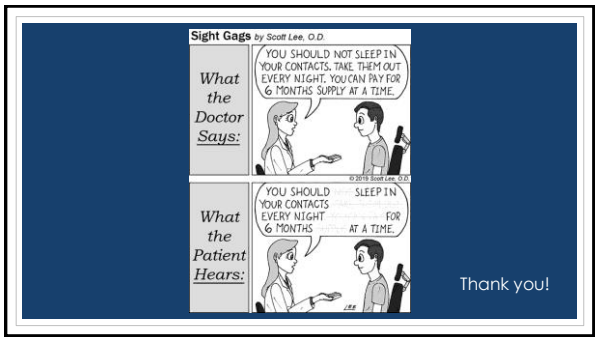
- Simplified care routines
  - Switching to daily disposable
- Reminders about lens replacement schedules
- Preschedule annual exams: early detection

53

Education & enhancing compliance

- Effectively communicating lens care
  - Emphasize the importance of following care instructions
  - Provide **written instructions**
  - Educating patients on risks of noncompliance
    - Patient signature on instructions received
- Emphasizing the importance of hygiene
  - Regular handwashing
  - Avoid sleeping in lenses
  - Avoid water contact

54


Sight Gags by Scott Lee, O.D.
What the Doctor Says:
YOU SHOULD NOT SLEEP IN YOUR CONTACTS. TAKE THEM OUT EVERY NIGHT. YOU CAN PAY FOR 6 MONTHS SUPPLY AT A TIME.
© 2018 Scott Lee, O.D.
What the Patient Hears:
YOU SHOULD SLEEP IN YOUR CONTACTS EVERY NIGHT FOR 6 MONTHS AT A TIME.
LEE
Thank you!

55