

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

**Reminder to Complete Your Session Evaluations!**

Please be sure to complete your digital session evaluations 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.



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## Differentiating Keratitis

Pamela Theriot, OD, FAAO  
Public Awareness Sub-Committee Member  
TFOS Lifestyle Workshop

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**Financial Disclosures**  
Pamela Theriot is on the Speaker or Consultant for the following companies:

**Speaker Bureau:**  
Viatris Pharmaceutical  
Sun Pharma  
Lumenis Be  
Tarsus Pharmaceuticals  
Alcon  
Lenz Therapeutics  
Dompe

**KOL/Consultant:**  
Scope EyeCare  
NuLids  
Tear Film and Ocular Surface Society, Public Awareness Committee Member  
Twenty/Twenty Beauty  
Mallinckrodt Pharmaceuticals  
Bruder Healthcare Company  
EyeDerm  
Macula PM

\*All relevant financial relationships have been mitigated. The content of this COPE-accredited CE activity was planned and prepared independently by Pamela Theriot, OD, FAAO without input from members of an ineligible company.

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## Pam Theriot, OD, FAAO



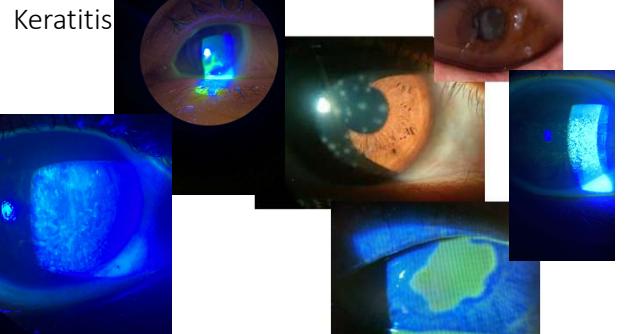
- Lusk Eye Specialists
  - Clinical Director of Dry Eye Relief Center
- TFOS Lifestyle Workshop:
  - Public Awareness Committee Member
- TEDx Grandview Heights – January 2025
- 3 Tips to Preserve your Vision
- 2026 Dry Eye Columnist
  - Optometric Management
- Author
  - Alleviate Dry Eye
- Website / Blog / Courses
  - [www.pamtheriot.com](http://www.pamtheriot.com)

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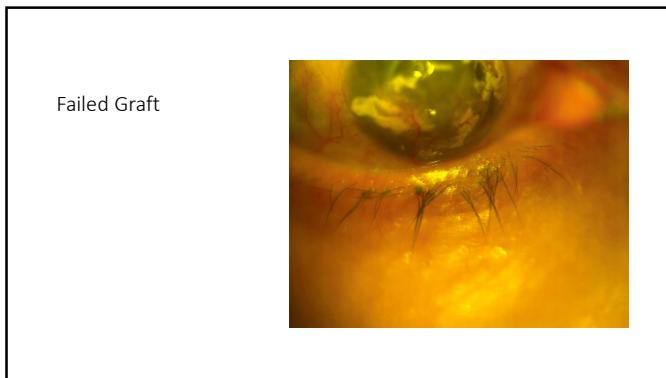
## Learning Objectives

- Keratitis can be hard to differentiate and Diagnose
  - Thygesons Keratitis (TSK), Staph Marginal Keratitis (SMK), Neurotrophic Keratitis (NK), Filamentary Keratitis (FK), Herpes Simplex (HSK), Keratitis Sicca (KCS), Microbial Keratitis
- Learn their causes, signs, and symptoms
- Deep dive into their differential diagnoses
- Explore some newer treatment modalities

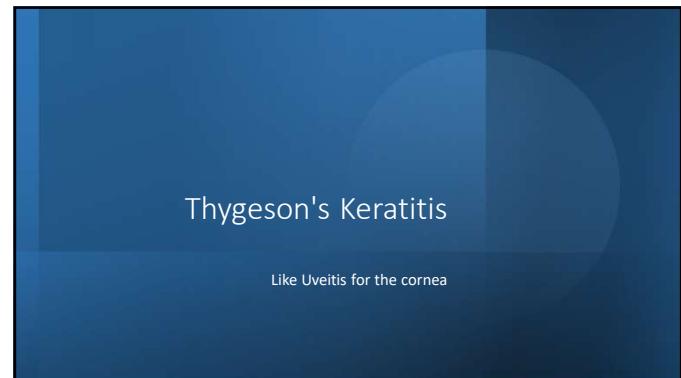
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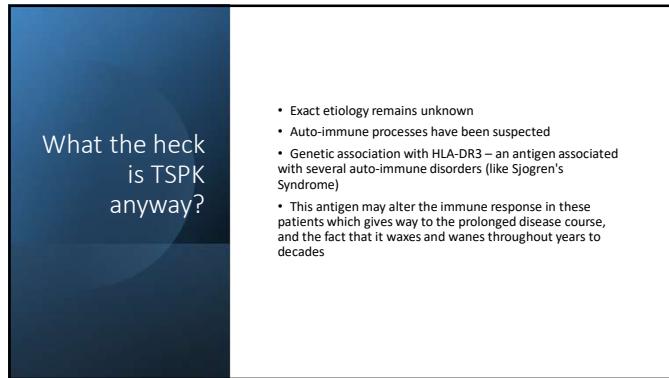
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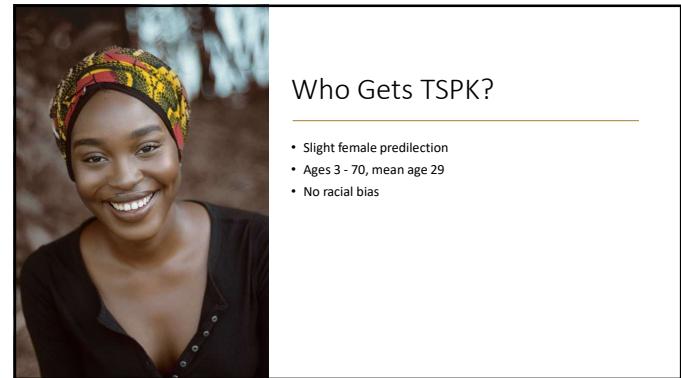
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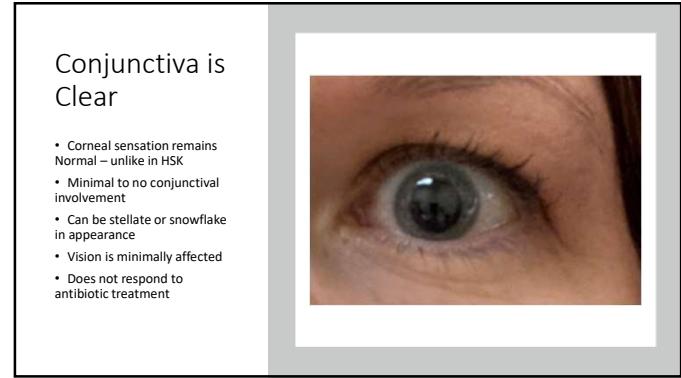
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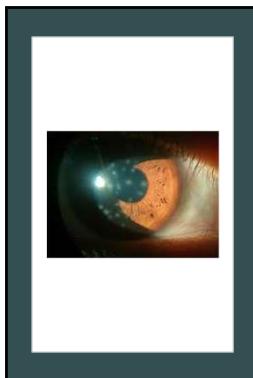
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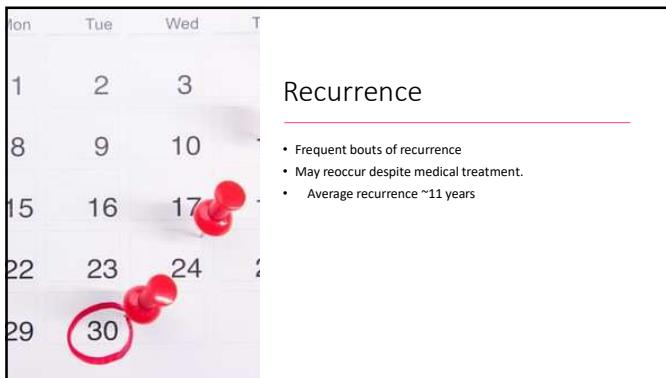
## Symptoms

- Burning
- Irritation / foreign body sensation
- Tearing
- Photophobia



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- Slightly decreased vision
- Minimally affected despite central lesions



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## Recurrence

- Frequent bouts of recurrence
- May reoccur despite medical treatment.
- Average recurrence ~11 years



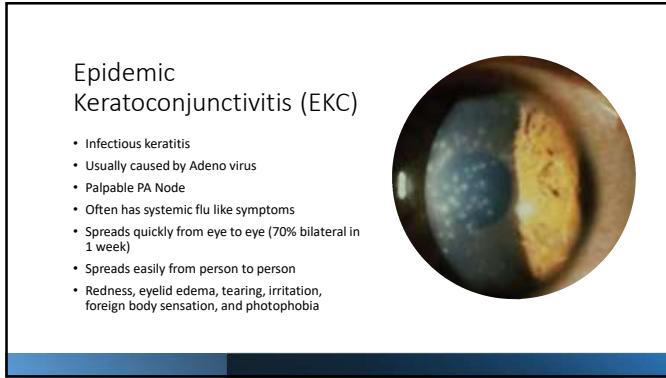
Viral Conjunctivitis

Superficial Punctate Keratitis

Recurrent Corneal Erosion

Staph marginal Keratitis

Herpes Simplex Keratitis



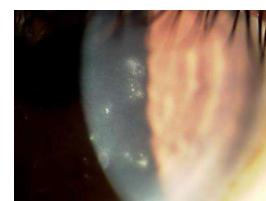
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## Epidemic Keratoconjunctivitis (EKC)

- Infectious keratitis
- Usually caused by Adeno virus
- Palpable PA Node
- Often has systemic flu like symptoms
- Spreads quickly from eye to eye (70% bilateral in 1 week)
- Spreads easily from person to person
- Redness, eyelid edema, tearing, irritation, foreign body sensation, and photophobia

## TSPK vs. EKC

TSPK



EKC



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### Signs of TSPK vs. EKC

#### Similar

- Lesion appearance
- Bilateral lesions
- Photophobia
- FB sensation

#### Different about EKC

- Spreads from one eye to other
- Vision significantly affected
- Can take a long time to respond to steroid treatment
- Conjunctival involvement- SCH
- Systemic flu like symptoms
- Adeno-Plus positive

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### Superficial Punctate Keratitis

Epi defects, FB sensation, redness

Photophobia, irritation and tearing

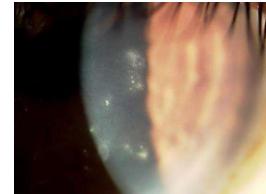
#### Causes:

- Exposure
- Chemical
- KCS
- Medicamentosa
- Allergy
- Infection: viral or bacterial

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### TSPK vs. SPK

TSPK



SPK



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### Signs of TSPK vs. SPK

#### Similar

- Lesion appearance
- Bilateral lesions
- Photophobia
- FB sensation

#### Different about SPK

- Lesion is superficial TSPK is intra-epithelial
- Lesions can be more confluent
- Appear in bands
- Vision may be more affected
- Usually conj involvement

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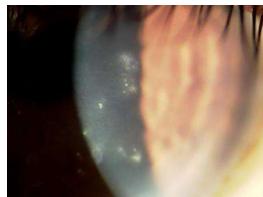
### Recurrent Corneal Erosion

- Symptoms occur most often in the morning or middle of the night
- Usually only one lesion
- Significant sudden onset PAIN
- Sometimes resolve on their own
- May occur months after an initial abrasion

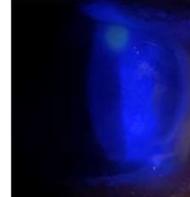
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## TSPK vs. RCE

TSPK



RCE



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## Signs of TSPK vs. RCE

## Similar

- Lesion appearance
- Photophobia
- FB sensation

## Different about RCE

- Usually only one lesion at a time
- Vision may be more affected
- Initial onset is sudden

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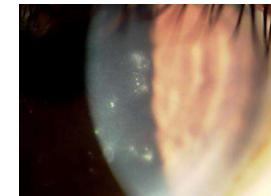
## Staph Marginal Keratitis (SMK)

- Small round infiltrates at limbus
- Can be one or multiple
- Redness
- If untreated, lesions will coalesce into larger areas and stain
- Injection of bulbar conjunctiva adjacent to infiltrate
- Zone of clear cornea between limbus and lesion
- Red, watery, photophobia, FB sensation

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## TSPK vs. SMK

TSPK



SMK



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## Signs of TSPK vs. SMK

## Similar

- Lesion appearance
- Photophobia
- FB sensation
- Vision not significantly affected

## Different about SMK

- Lesions are peripheral
- Presents with blepharitis as well

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## Herpes Simplex Keratitis

- Check corneal sensitivity
- HSK will have decreased sensitivity
- Severe infection that can lead to scarring and blindness
- Worsens with steroid

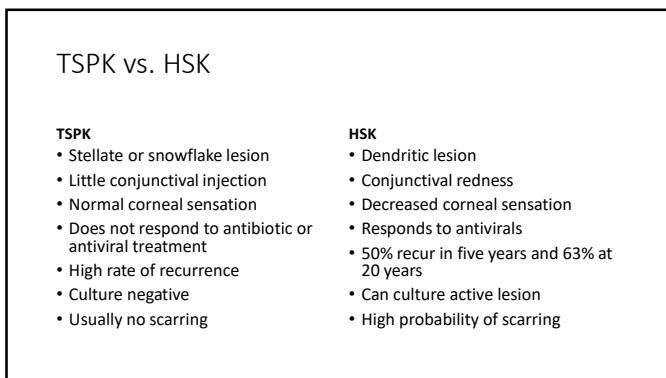
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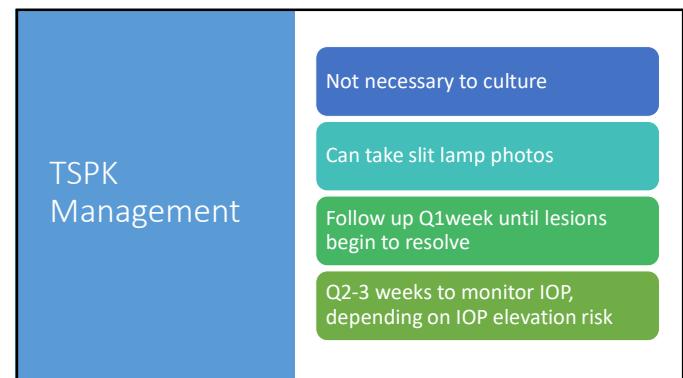
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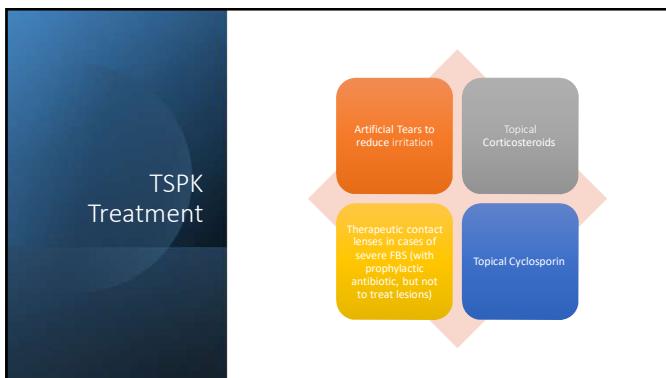
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### TSPK Surgical Intervention?



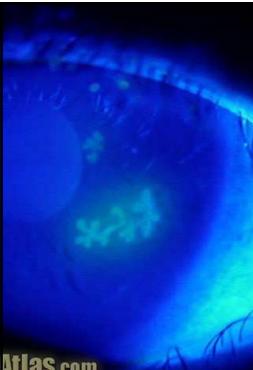
- PRK and epi ebridement have shown to be insufficient in alleviating the inflammation in these patients

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### Case Report JG

- 45 yo Caucasian Male
- Referred in from local optometrist
- Pain, light sensitivity OD X 3 weeks
- VA = 20/30
- Current Medications: Moxifloxacin TID

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### Most Important Differential

- Rule Out Herpes Simplex Keratitis
- History of fever blister
- Previous HSK infection
- Lesions on lids

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### Treatment Plan 1

- Oral Anti-viral
- Review of Dosages:
  - Acyclovir – 400mg 5x/day
  - Valacyclovir – 500mg TID
  - Famciclovir – 250mg TID
- 7 – 10 days

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### Treatment Plan 2

- Pt did not respond to oral Acyclovir
- HSK Ruled Out!
- Now okay to add steroid
  - Pred Forte QID until the deposits resolve
  - Slow taper
  - Can Rx QD or QOD steroid long term to reduce recurrences

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### Filamentary Keratitis

New Treatments



## Filamentary Keratitis

**Key Findings**

- Strands or filaments attached to the cornea
- Increased mucus to aqueous ratio in the tear film
- Schirmer's test shows low aqueous production
- Patient notes foreign body sensation

**Tests for Filamentary Keratitis**

- Slit lamp exam
- Vital dyes (Issamine, fluorescein, rose bengal)

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## Treatment Options



- Topical lubricants (tears/ung)
- N-Acetylcysteine drops
- Bandage Contact lenses
- Biologic Membranes
- Dehydrated AMT Cr  
• Cryopreserved AMT
- Intense Pulsed Light
- Biologic Drops
- Serum Tears
- PRP
- Cytokine Drops
- Steroids
  - Loteprednol
  - Fluoromethalone
- Immunomodulators
  - Cyclosporine
  - Lifitegrast
- Scleral Contact Lenses



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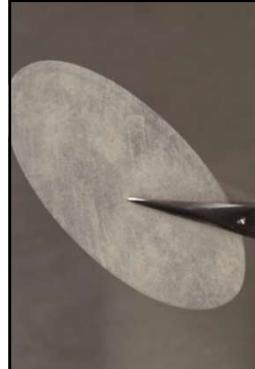
## Cryopreserved Amniotic Membrane

- Approved by the FDA for:
  - Protective
  - wound healing
  - anti-inflammatory effects.
- Why is it so powerful:
  - extracellular matrix components
    - heavy-chain hyaluronic acids
    - growth factors
    - Fibronectin
    - Collagen
  - promote anti-inflammatory effects and healing



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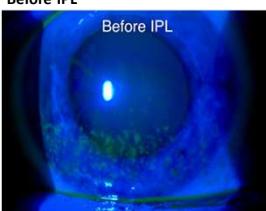
## Dehydrated Amniotic Membrane



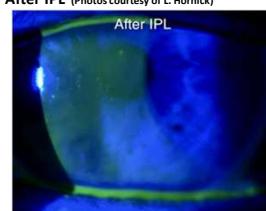
- Room temperature stable allograft derived from human placental tissue collected from consenting donors
- Extra cellular matrix acts as a reservoir of bioactive peptides:
  - Growth factors
  - Cytokines
  - Glycosaminoglycans
- Basement membrane interface acts as a substrate that supports:
  - cellular adhesion
  - transplanar migration
  - proliferation.

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## IPL for Sjogren's Syndrome, Filamentary Keratitis



Before IPL



After IPL (Photos courtesy of L. Hornick)

Huo Y, Wan Q, Hou X, Zhang Z, Zhao J, Wu Z, Jin X. Therapeutic Effect of Intense Pulsed Light in Patients with Sjögren's Syndrome Related Dry Eye. *J Clin Med*. 2022 Mar 2;11(5):1377. doi: 10.3390/jcm11051377. PMID: 35268468; PMCID: PMC8911075.

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## Neurotrophic Keratitis

It's not rare when it's in your chair.



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**Neurotropic Keratitis Definition**



Degenerative corneal disease  
Damage to the trigeminal nerve (cranial nerve V)  
Loss of corneal sensation  
Breakdown of the corneal epithelium  
Impaired corneal healing  
Persistent epithelial defect → corneal ulceration → stromal melting and perforation

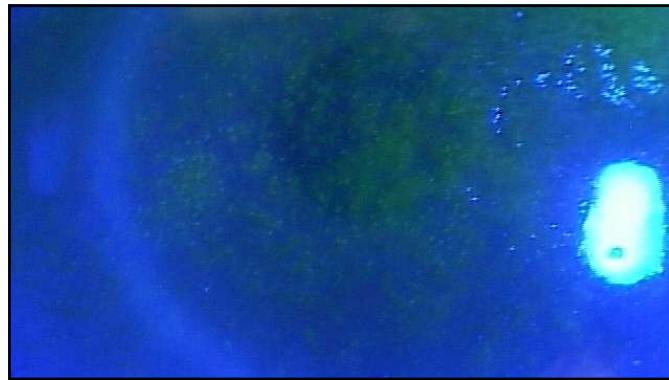
**Hallmark: decreased sensation, decreased or no pain**

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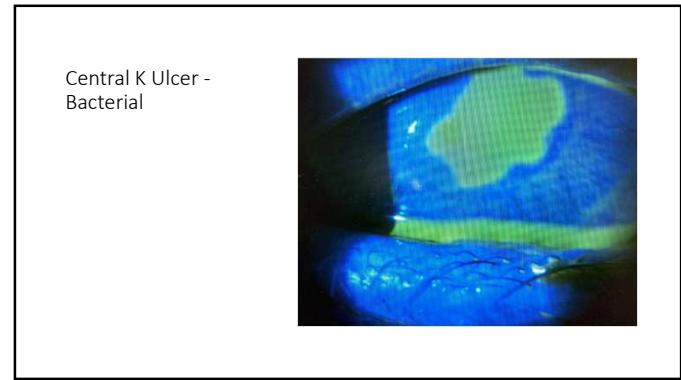
Stage	Therapy
<b>1</b>	<ul style="list-style-type: none"> <li>Preservative-free artificial tears formulations</li> <li>Punctal occlusion</li> <li>Hydrogel contact lens (consider large diameter)</li> <li>Recombinant human NGF (rhNGF, cenergermin)</li> <li>Serum/plasma/platelet rich plasma tears</li> </ul>
<b>2</b>	Supportive therapies plus: <ul style="list-style-type: none"> <li>rhNGF</li> <li>Scleral lens (± serum/plasma/PRP tears)</li> <li>Amniotic membrane</li> <li>Botulinum induced ptosis, Tarsorrhaphy</li> </ul>
<b>3</b>	<ul style="list-style-type: none"> <li>rhNGF</li> <li>Keratoplasty + scleral lens, tarsorrhaphy, neurotization</li> </ul>

Sachetti M, Lambiasi A. Diagnosis and management of neurotrophic keratitis. Clin Ophthalmol. 2014;8:571-579. Shaha H, Tighe S, Hashem O, Hayashida Y. Update on cenergermin eye drops in the treatment of neurotrophic keratitis. Clin Ophthalmol. 2019;13:1973-1980. Published Oct 7, 2019.

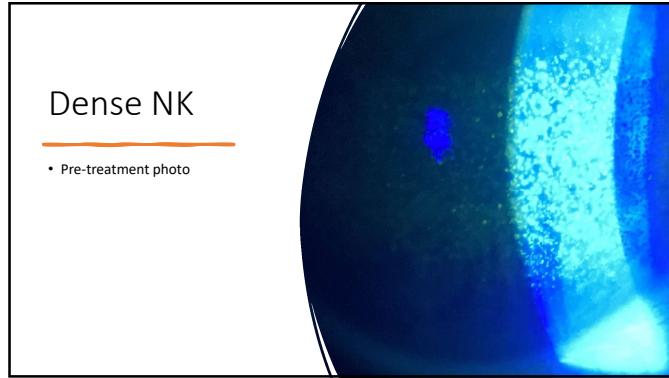
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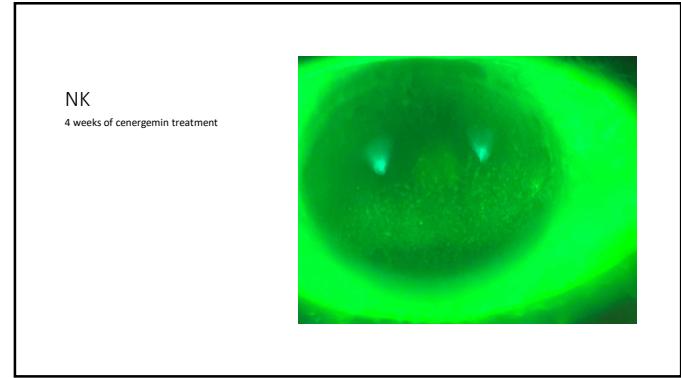
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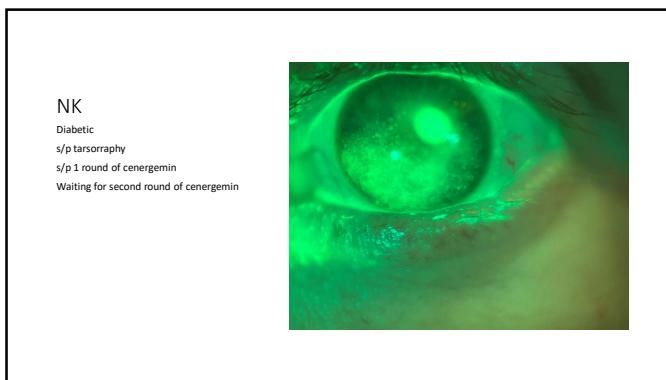
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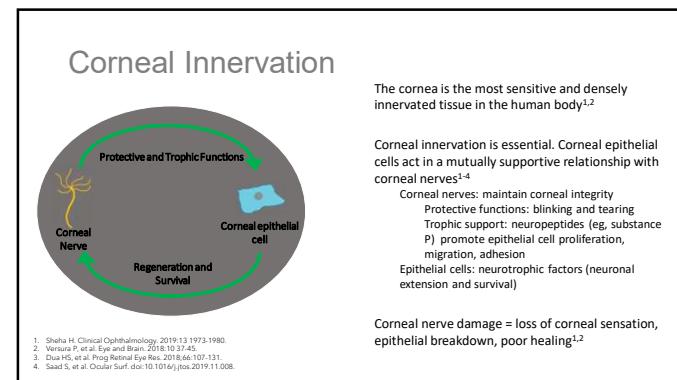
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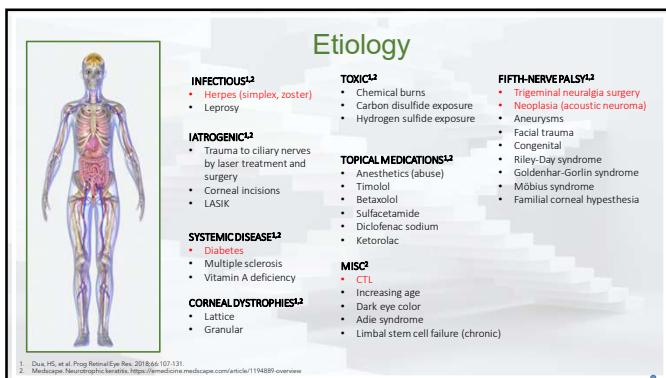
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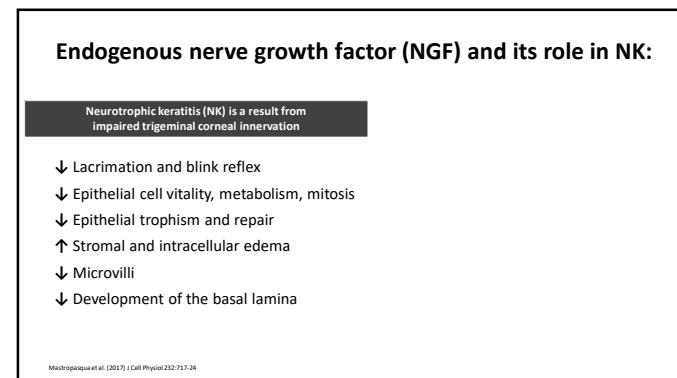
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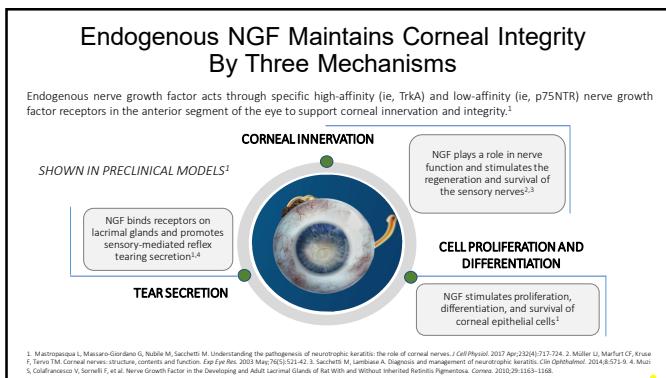
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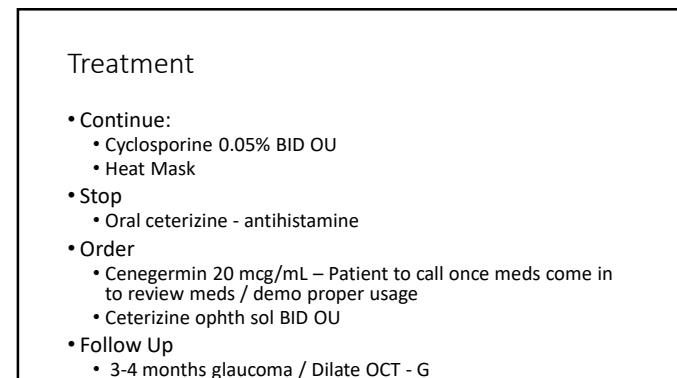
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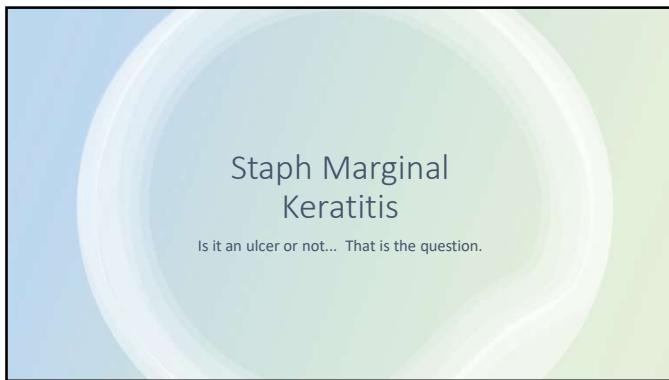


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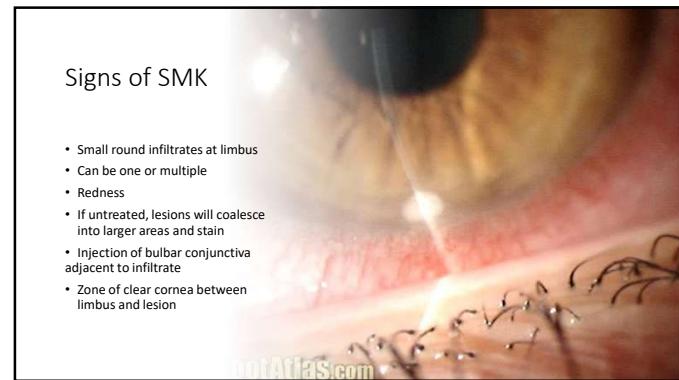


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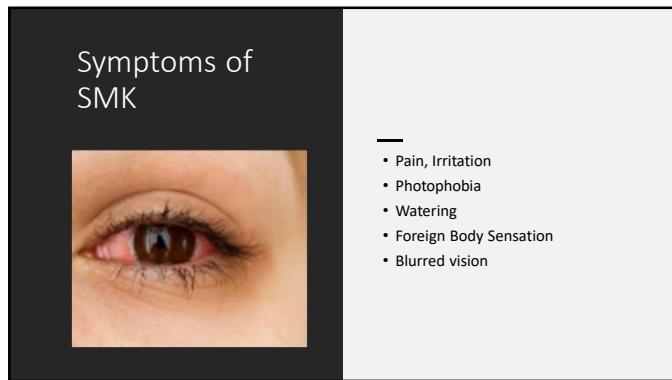
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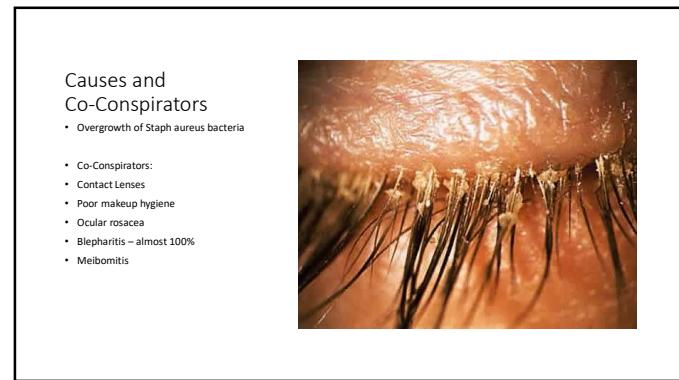
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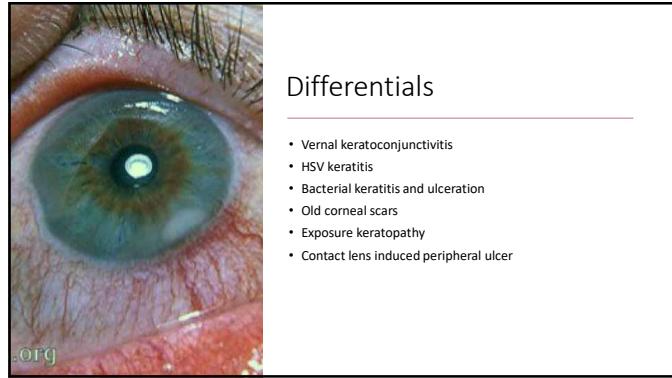
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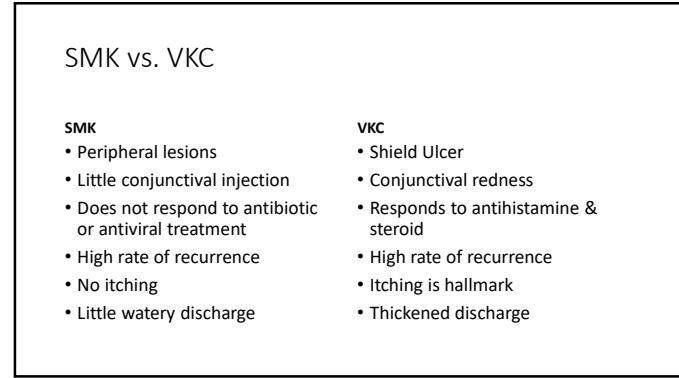
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## SMK vs. Exposure Keratopathy

### SMK

- Lesions scattered on cornea
- Lesions do not stain
- Mild conjunctival injection
- High rate of recurrence
- Symptoms same all day

### Exposure

- Lesions grouped in band
- Band of staining
- May have sig conj Injection
- Recurs until exposure eliminated
- Usually worse in am

## Differentiating an Infiltrate from an Ulcer

### SMK - Sterile Infiltrate

- Small lesion <1mm
- Peripheral location – at limbus
- No mucus discharge
- No A/C reaction
- Foreign body sensation
- Mild photophobia
- Mild to no epi defect

### Infectious Ulcer

- Large Lesion >1mm
- Central >2mm of limbus
- Mucus discharge
- + A/C reaction
- Significant pain
- Significant photophobia
- Large epi defect

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## Differentiating SMK vs CL related Ulcer

<ul style="list-style-type: none"> <li>• Sterile</li> <li>• Localized Conjunctival injection</li> <li>• Always at limbus</li> <li>• Not necessarily a CL wearer</li> <li>• Blepharitis</li> </ul>	<ul style="list-style-type: none"> <li>• Infectious</li> <li>• Overall conjunctival injection</li> <li>• Can be further into cornea</li> <li>• Always related to CL wear</li> <li>• Giant Papillary Conjunctivitis</li> </ul>
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## Contact Lens related Keratitis



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Contact Lens and Anterior Eye  
Available online 20 December 2021, 101543  
In Press, Corrected Proof



## Clinical factors associated with positive corneal culture in suspected microbial keratitis

Matthew Green <sup>a</sup>, Susan Zhang <sup>b</sup>, Thomas Nadivulath <sup>c</sup>, Andrew Apel <sup>d</sup>, Fiona Stapleton <sup>c</sup>

### Conclusions

In this series positive cultures were associated with poor presenting VA contact lens keratitis (CLK), older age, anterior chamber reaction and no prior treatment with antibiotics.

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### Corneal Scrapings

Be certain to remove excess mucous to avoid false negatives (necrotic tissue and PMNs)

**Kimura spatula:** culture the edge and base of the ulcer, serves to debride the lesion

**Gram stain:** only 12-60% accurate at predUseful to use **two solid media** (blood and chocolate). Helps to R/O contaminants and aids in ID if there's sparse growth If only one is used chocolate is preferred. Plate Sabouraud's last!

✓ Add Lowenstein/Jensen, amoeba culture or HSV swab if necessary.

✓ Hold fungal cultures **longer** to assure there is no growth.

✓ If you use non-solid medias such as thioglycolate broth use a cotton-tip applicator that's **plastic, not wood** broken into the tubeicting organism

**Giemsa stain:** provides better morphologic characteristics of organisms and helps to distinguish bacteria from fungi

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### Culture Media

#### STANDARD MEDIA

✓ **Blood:** aerobic organisms, saprophytic fungi

✓ **Chocolate:** Neisseria, Moraxella, Haemophilus

#### SPECIALTY MEDIA

✓ **Sabouraud:** fungi (or Inhibitory Mold Agar)

✓ **Thioglycolate broth:** aerobic and anaerobic bacteria

✓ **Lowenstein-Jensen/slant test or Middlebrook 7H-9:** Nocardia, Mycobacteria species



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### Two Treatment Arms for SMK

#### Resolve Corneal Infiltrate



#### Decrease Bacterial Overgrowth



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### Resolve Corneal Infiltrate

- Antibiotic followed by a steroid if there is significant epi defect
- Antibiotic / Steroid Combo
- Steroid Alone



### Treat Bacterial Overgrowth

- D/C Contact lens wear
- In office Treatment- Microblepharoplasty
- Topical Antibiotic drops or ointment – azithromycin, bacitracin, erythromycin
- Topical Antiparasitic - lotilaner
- Oral Doxycycline 20mg BID
- Lid Cleansers – Daily maintenance
- Makeup Removal
- Makeup Hygiene

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**Treatment Options**

- Prescription medications
- At-home treatments
- In-office treatments

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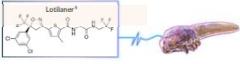
**Prescription Treatments for Blepharitis**

- Antibiotic Drops:**
  - Moxifloxacin 0.5% ophthalmic solution
- Antibiotic /Steroid Combination Drops:**
  - Tobramycin/Dexamethasone suspension
  - Tobramycin/Loteprednol Suspension
  - Neomycin-polymyxin-dexamethasone
- Ointments: antibiotic or antibiotic steroid combination**
  - Erythromycin, Neomycin-polymyxin-dexamethasone, tobramycin-dexamethasone
- Topical Anti-parasitic**
  - Lotilaner 0.25% solution

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**Mechanism of Lotilaner 0.25%**

- Lotilaner functions as a **noncompetitive antagonist** of mite and arachnid GABA-gated chloride channels<sup>1,2</sup>
- Directly paralyzes the mite nervous system through parasite-specific GABA inhibition, leading to death<sup>1,2</sup>
- The lipophilic nature of the drop suggests its ability to flow into the oily sebum of the lash follicle where the mites reside<sup>3</sup>



1. FDA. Food and Drug Administration; GABA, gamma-aminobutyric acid. 2. Liao B, et al. Accepted Article. <https://doi.org/10.1089/jocophth.2021.0272>. Corrales-Salinas R, et al. J Clinophthalmol. 2021;18(2021):8. Liao B, et al. Accepted June 28, 2022. <https://www.globenewswire.com/news-release/2022/07/02/1212418/0/en/Untitled-Partners-Tarso-Pharmaceuticals-Antimite-Protocol-Teignra-Data-from-Second-Pivotal-Trial-of-TP-03-for-the-Treatment-of-Demodex-Blepharitis.html>. 3. Chem3D Lotilaner. Accessed June 28, 2022. [https://www.chem3d.com/cv/1389830-71-0\\_1023279.html](https://www.chem3d.com/cv/1389830-71-0_1023279.html). Yoo S, et al. *Cornea*. 2022; In Press.

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**SATURN-1 and SATURN-2**  
Pivotal Clinical Studies Of Treatment For *Demodex* Blepharitis

 **Consistent cures and responses** demonstrated in **2 pivotal trials**, the largest clinical program for *Demodex* blepharitis, involving **833 patients**

 The primary and all secondary endpoints (collarette cure, mite eradication, lid erythema) met with high statistical significance

 Clinically and statistically significant effects seen as early as **2 weeks**

 Very high responder rate: **96%** of patients improved at least 1 collarette grade; **89%** achieved a clinically meaningful cure

 **FDA Approved July 25, 2023**

1\*, primary; 2\*, secondary; NDA, New Drug Application. Data on file. Tarsus Pharmaceuticals Incorporated, 2022

 **Efficacy goal**  
1\* = collarette cure rate,  
2\* = mite eradication,  
2\* = redness + collarette cure rate

 **Safety goal**  
Well-tolerated safety profile

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**In Office Procedure: Lid Cleansing with Micro Blepharo Exfoliation**

- Easy to use in office procedure
- Out of pocket patient cost
- Removes Biofilm from lashes and inner lid margin
- Great for Contact lens wearers
- Can be repeated Q3-6 months



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**In Office Lid Treatment**

**Eyelid treatment System to treat Blepharitis and Inflammation**

**In office procedure for Blepharitis Treatment**

**Takes <10 minutes to complete**



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Kill the Bacteria / Mites

• At Home OTC Tx: Lid Cleaners

- Prescription Medications:
- Oral Doxycycline 20mg BID
- Topically:
  - Apply (azithromycin, erythromycin, or steroid/antibiotic combo drops) directly to lid margins with clean fingertip
  - QHS OU x 30 nights
  - Lotilaner 0.25% ophthalmic solution
- Hypochlorous Acid Spray
- Foaming Lid Cleanser
- Lid Scrubs Pads:
- NEVER USE BABY SHAMPOO!!!

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Blepharitis: At-Home Cleansing

- Remove Contact lenses
- Makeup Removal
- Lid Cleaners – Daily maintenance
  - Wipes
  - Foams
  - Spray



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Lid and Lash Hypochlorous Acid Cleansing Sprays

- Hypochlorous Acid sprays: naturally produced in the cells of our body
- Natural defense against micro-organisms
- Great for killing staph bacteria around eyes

PROS:

- Great for all skin types
- Found to kill COVID-19 virus
- Can also be applied to face
- Non-drying, Non-irritating
- Can also help to remove dust, dirt and pollens from lashes

CONS:

- Will not effectively eliminate Demodex when used alone
- Some concentrations can be irritating to very sensitive skin

Start with clean face  
Remove makeup or moisturizers  
Spray directly to closed lids  
Allow to air dry

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Foaming Cleanser PROS and CONS

PROS:

- Great to use in the shower
- Can be used after makeup removal to cleanse lids
- Better for oily skin types

CONS:

- Can be drying to the skin as many contain soap
- May Contain Tea Tree Oil



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Eyelid Wipes PROS and CONS

PROS:

- Convenient
- Easy to carry with you

CONS:

- Extra waste products due to individual packaging
- Most still need to be rinsed away
- May Contain Tea Tree Oil



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5 Categories of Makeup Removers

- Micellar
- Oil-Free
- Oil-Based
- Wipes
- Cloths

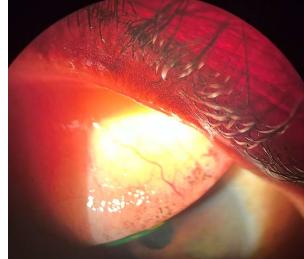
Must Remove Eye Makeup Every Night



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## Makeup Rules for Best Ocular Health

- Always remove makeup nightly
- No water-proof makeup
- No glitter in your eye shadow
- Avoid powdered eye shadow
- Apply primer to lids before shadow and liner
- Pencil eye liners are best
- No water-lining or tight-lining
- Avoid toxic and irritating ingredients
- Toss out your makeup on time
- Never share your eye makeup
- Never Moisten cosmetics with saliva
- Never alter your makeup with heat
- Never apply makeup on the go
- Never put a product not intended for the eye on the eye



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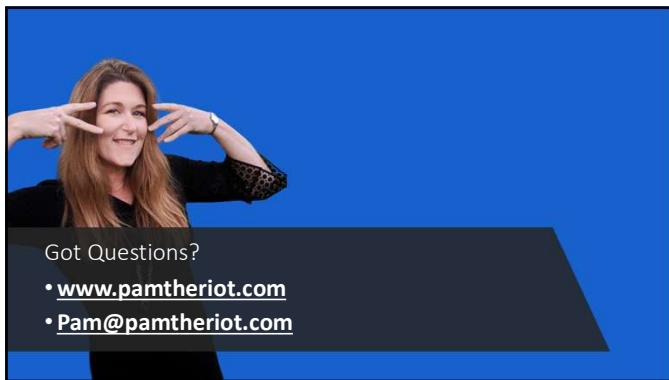
If not you,  
then  
who...



the *never* list™  
WHEN FORMULATING OUR PRODUCTS, WE PROHIBIT THE USE OF OVER 1,300 HARMFUL OR QUESTIONABLE INGREDIENTS.  
Benzalkonium chloride - BHA and BHT - Coal tar - Ethylenediaminetetraacetic acid (EDTA) - Formaldehyde - Hydroquinone - Lead - Mercury - Parabens - Phthalates - Propylene glycol - Resorcinol - SLS - Toluene - Triclosan

## FLAWLESS MAKEUP IN 10 MINS!

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Got Questions?

- [www.pamtheriot.com](http://www.pamtheriot.com)
- [Pam@pamtheriot.com](mailto:Pam@pamtheriot.com)

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Thank You



- Vision Expo
- All of the Meeting Sponsors
- Attendees

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

## Reminder to Complete Your Session Evaluations!

Please be sure to complete your digital session evaluations 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.



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