

# A Modern Approach to Dry Eye

Jessilin Quint, OD, MBA, MS, FAAO

*Best Education for Patient Care and Business Management*

OPTOMETRIC  
Management  
SYMPOSIUM

# Financial Disclosures

- Allergan
- Alcon
- Tarsus
- Eyenovia
- Oyster
- Ocuphire
- Dompe

## Dry Eye Overview

- 30 million Americans suffer from dry eye
- \$3.8 billion spent on dry eye symptom relief annually in USA
- most frequent encountered disease state by eye care providers
- 43% of asymptomatic patients have clinical dry eye
- Nomenclature

# Dry Eye Definition

“**Dry eye** is a multifactorial disease of the ocular surface characterized by a loss of homeostasis of the tear film, and accompanied by ocular symptoms, in which tear film instability and hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities play etiological roles.”-DEWS II

# Previous Dry Eye Treatments

## “Treat the Symptoms”

- Artificial Tears
- Punctal Plugs
- Anti-inflammatory topicals
- Ignore

# Modern Approach

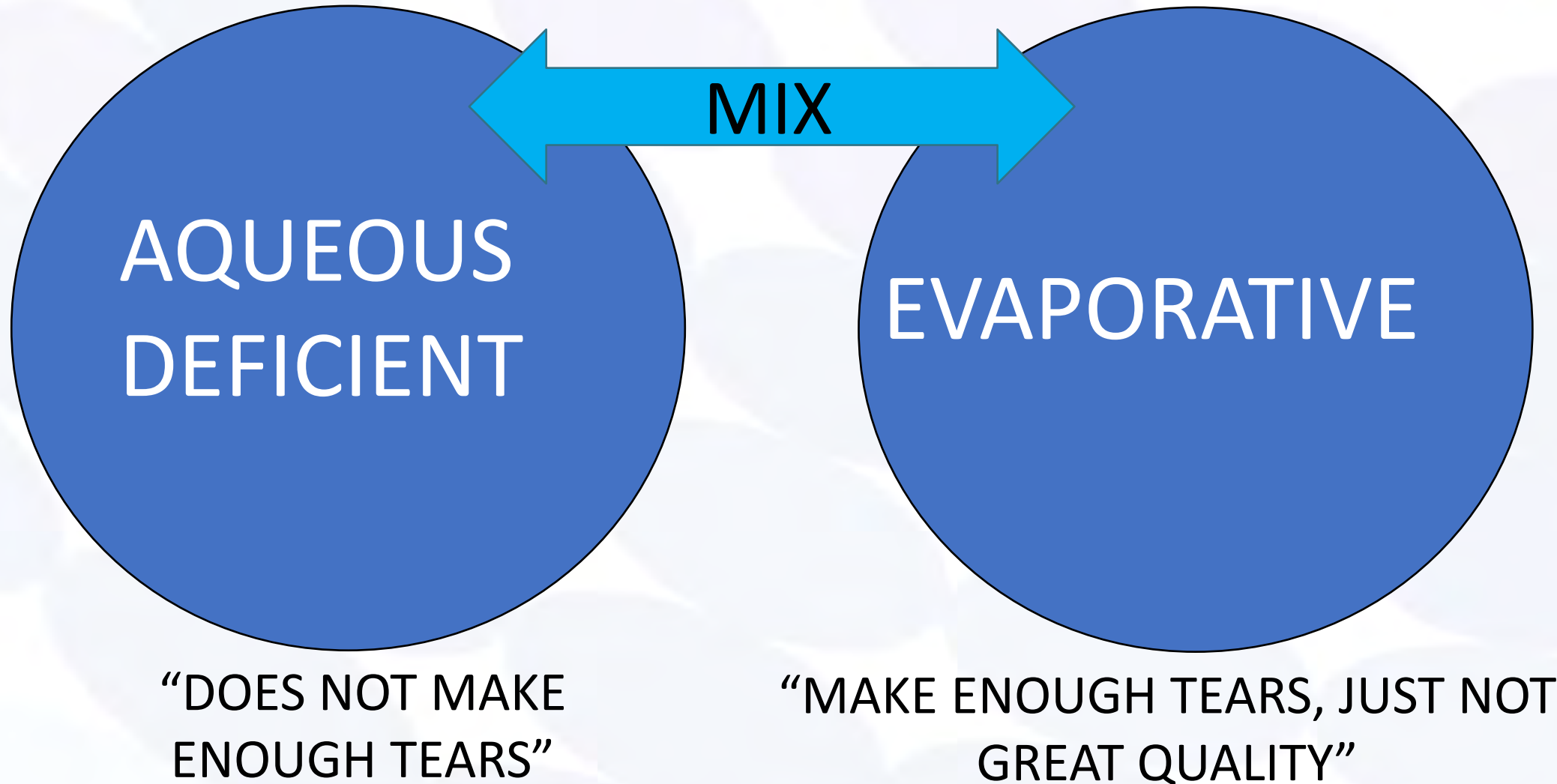
1. Identify underlying cause
2. Address the underlying cause
3. Maintenance



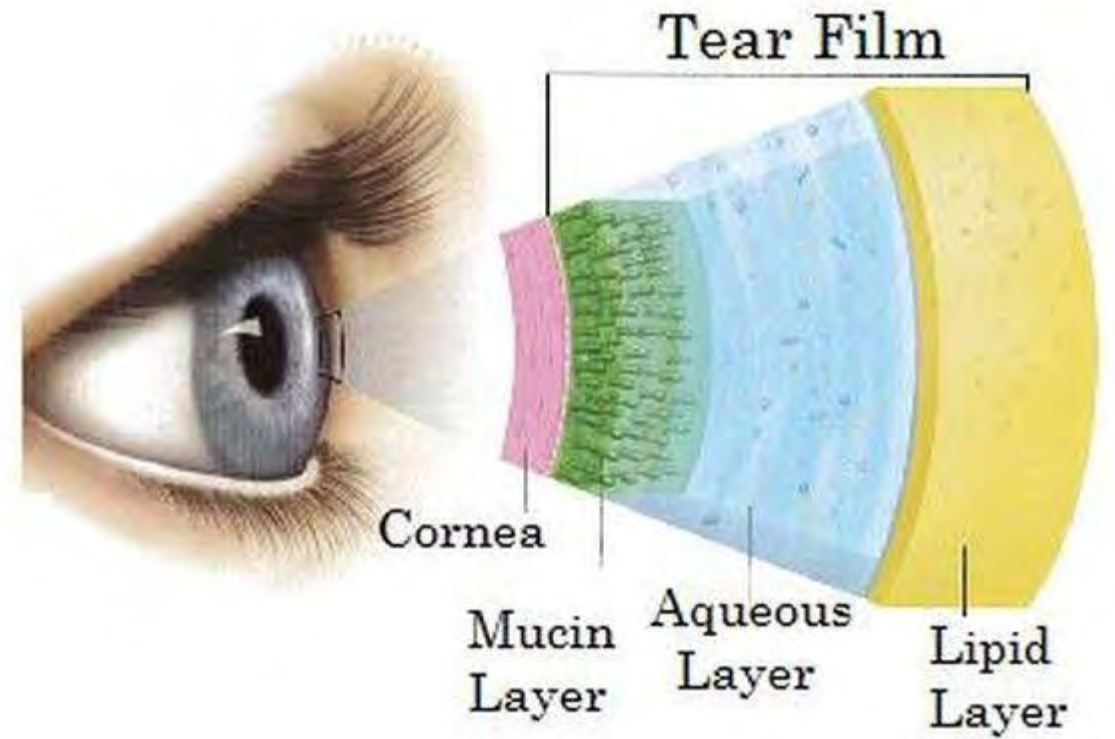
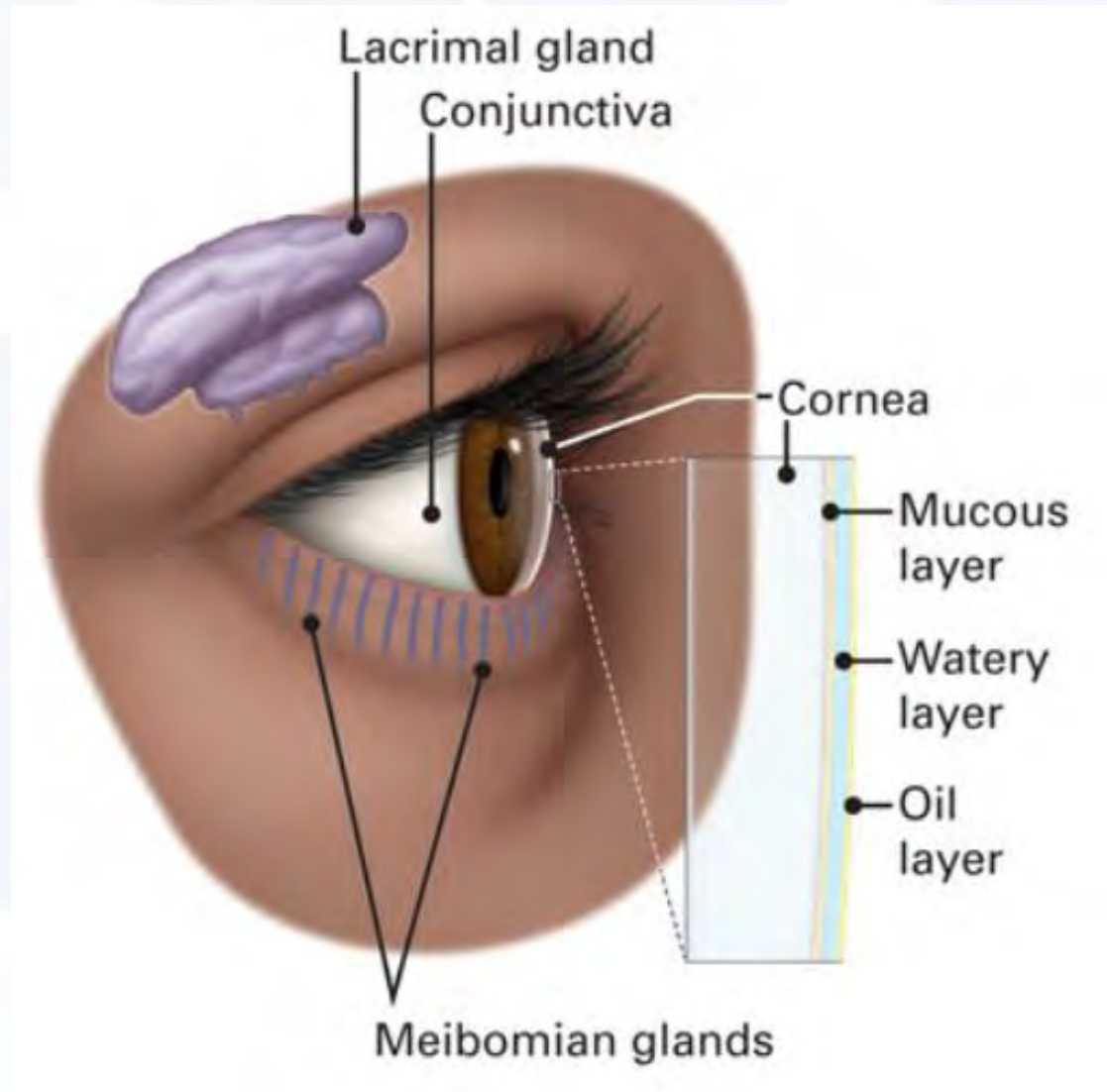
ARTIFICIAL TEARS  
**DO NOT** ADDRESS  
UNDERLYING  
CAUSE OF DRY  
EYE



# Categories of Dry Eye Disease





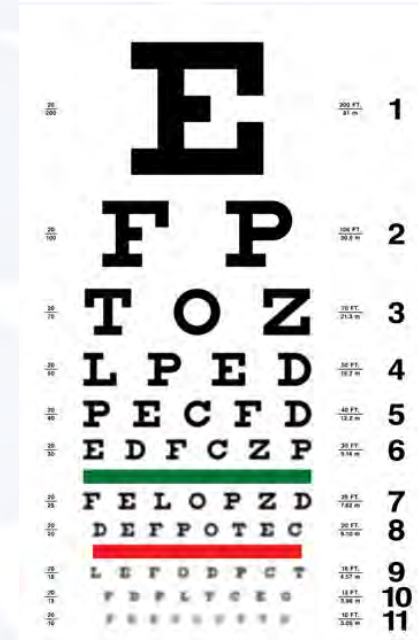


# Symptoms of Dry Eye Disease

- 1) Blurry vision
- 2) Fluctuating Vision
- 3) Comfort
  - burning, watering, gritty, foreign body sensation, redness, itching
- 4) Asymptomatic



ETRIC  
ment  
MPOSIUM



# Risk Factors for Dry Eye Disease

Age (older)

Sex (females)

Medications

Diet

Environment

Ocular  
Surgeries

Digital device  
use

Contact Lens  
Wear

Systemic  
Conditions

## SYSTEMIC CONDITIONS CAUSING DRY EYE DISEASE

OPTOMETRIC  
Management  
SYMPOSIUM

HYPERTENSION

DIABETES

ROSACEA

ATOPY (allergic rhinitis, asthma, eczema)

ANDROGEN DEFICIENCY

SYSTEMIC LUPUS ERYTHEMATOSUS

SJOGREN'S SYNDROME

THYROID

GRAFT VS HOST DISEASE

FIBROMYALGIA

AUTOIMMUNE (RA, ARTHRITIS, AK,  
PSORIASIS)

SLEEP APNEA



Class of drugs	
Adjuncts to anesthesia	Antipyretic agents
Analgesics	Antirheumatic agents
Antiandrogens	Antispasmodics
Antiarrhythmics	Antivirals
Anticholinergics	Anxiolytics
Antidepressants	Bronchodilators
Antiemetics	Chelating agents
Antihistamines	Decongestants
Antihypertensives	Diuretics
Antileprosy agents	Neurotoxins
Antimalarial agents	Opioids
Antimuscarinics	Psychedelic agents
Antineoplastics	Retinoids
Antiparkinsonians	Sedatives and hypnotics
Antipsychotics	

# CONTACT LENSES

- CL wear ACCELERATES dry eye disease
- 60% OF CL WEARERS HAVE eye disease
- CLs can mask 'dry eye symptoms'
- contact lenses → cell damage → inflammation → goblet cell loss → tear film

# OCULAR SURGERIES

Ocular Surgery	Prevalence of DED after
CATARACT	77%
PENETRATING KERATOPLASTY	60%
LASIK	27%
GLAUCOMA SUGERY	78%
BLEPHAROPLASTY	26%

# Eye Anatomy

- Eyelids
- Eyelashes
- Conjunctiva
- Cornea
- Face (V2 area)





# Eyelid Exam

- Looking for
  - Lid architecture (entropion/extropion) & appearance (telangiectasia)
  - Biofilm
  - Eye lashes
  - Opening of the meibomian glands
  - Meibomian glands

# Blepharitis

- “inflammation of the eyelid margin”
- Acute Anterior Blepharitis: caused by variety of bacteria, viruses, fungi, & parasites
  - Ulcerative lesions, alter lid margins, loss of lashes
- Chronic Anterior Blepharitis: overgrowth of normal skin flora
  - *Staphylococcus aureus*

# Anterior Blepharitis

Deposition of biofilms that release inflammation induces exotoxins & lipases along lid margin



Leads to chronic inflammatory responses



Increases telangiectasia, lid hyperkeratinization, folliculitis, MGD

# Anterior Blepharitis

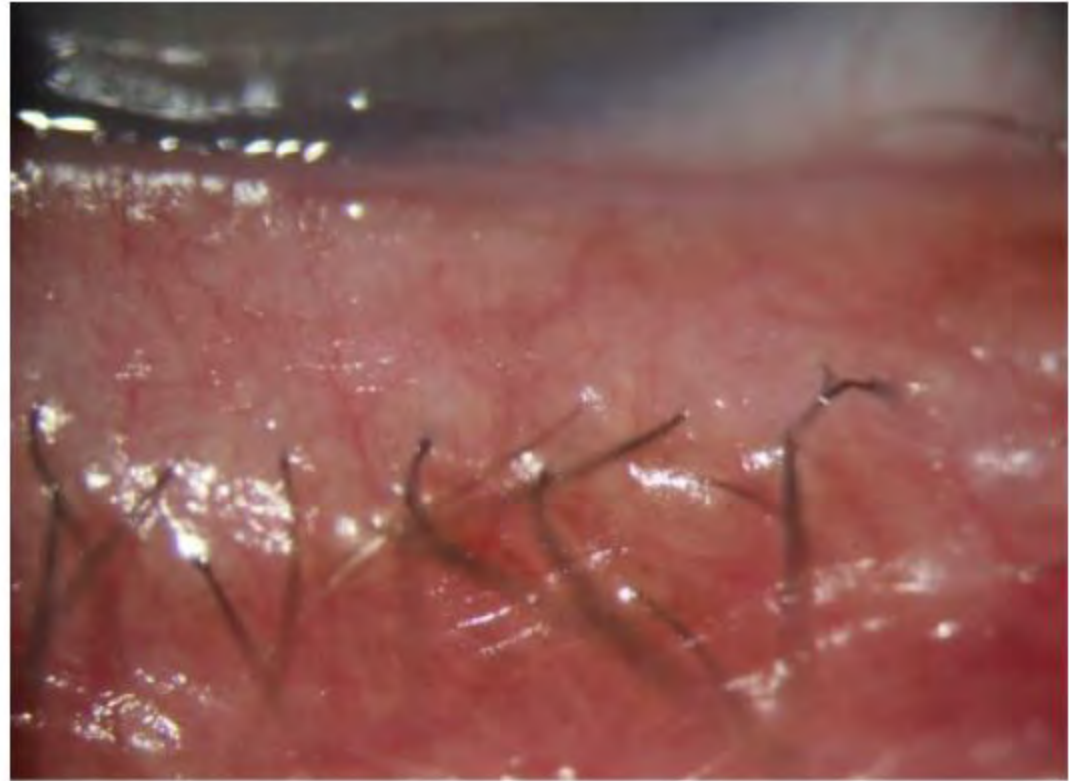
- Further categorized...
  - Staphylococcal (Squamous) form= younger patients
  - Seborrheic Form=older patients
  - Mixed
- Symptoms
  - Dryness, FBS, irritation, itching, burning, loss of lashes, lid erythema



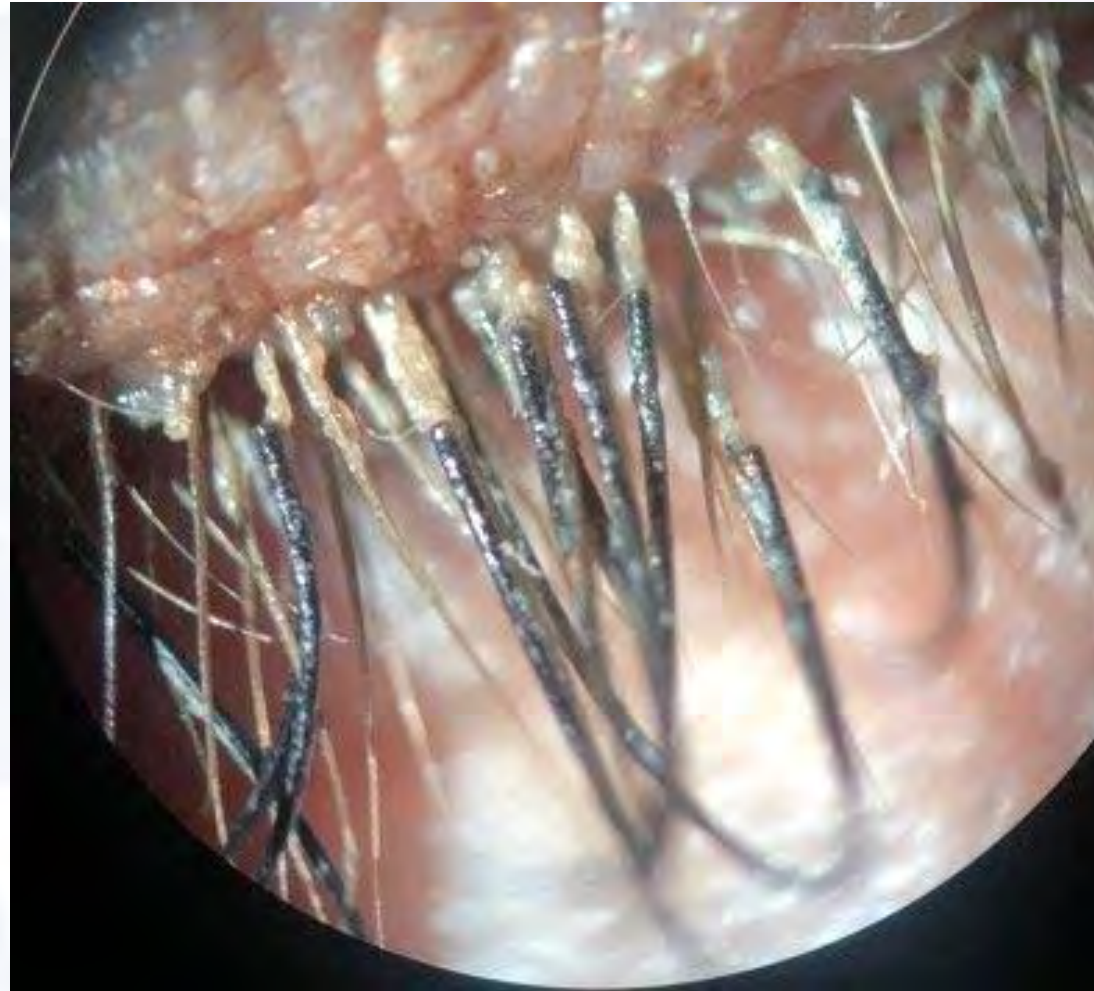
# Blepharitis Biofilm Theory

- NOT eyelid dandruff
- A slimy, sticky film of bacteria that coats a surface
- Needs moisture, nutrients, & a surface





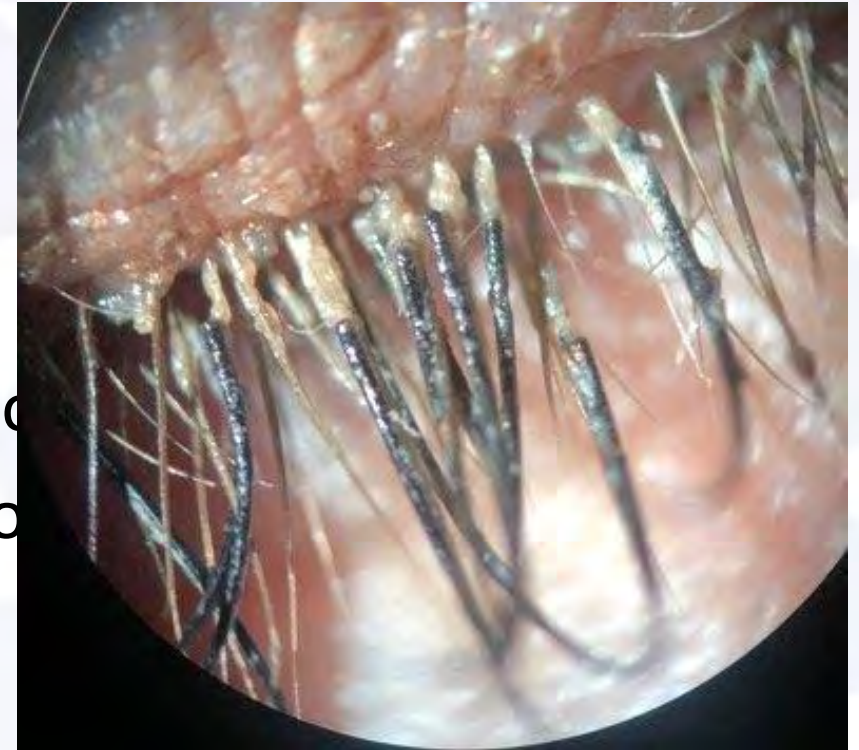
# Collarettes?





# Collarettes?

- Staphylococcal overgrowth
- Demodex
- “Demodex Blepharitis”
- Differentiated with microscopic examination
- Demodex found on 100% of lashes with collarettes





# Demodex

- *Demodex folliculorum* & *Demodex brevis*: saprophytic mites
- Typically harmless but play pathogenic role in high densities (>5 mites per lash)
- 14 day life cycle → lay eggs inside hair follicle or sebaceous gland
- Nourishment comes from epidermis & sebum
- One opening



# Demodex

- Incidence increase with age (73% in age 60+)
- Causes inflammation by:
  - destroying epithelial cells & exudation of digestive waste material when they die
  - 8 legs that scrape the lash/lid margin leads to mechanical damage that triggers inflammation
  - Carry bacteria that contributes to inflammation
- Symptoms: Itching
  - Types of itching



# Demodex

- Resistant to wide range of antiseptic agents including 75% alcohol, 10% povidone-iodine, and erythromycin
  - studies have demonstrated that as low as 5% concentration (when applied to the lids twice daily) and as high as 50% concentration (when applied once weekly) of tea tree oil are effective
  - high concentrations cause irritation, dermatitis, allergy

# Clinical Pearl

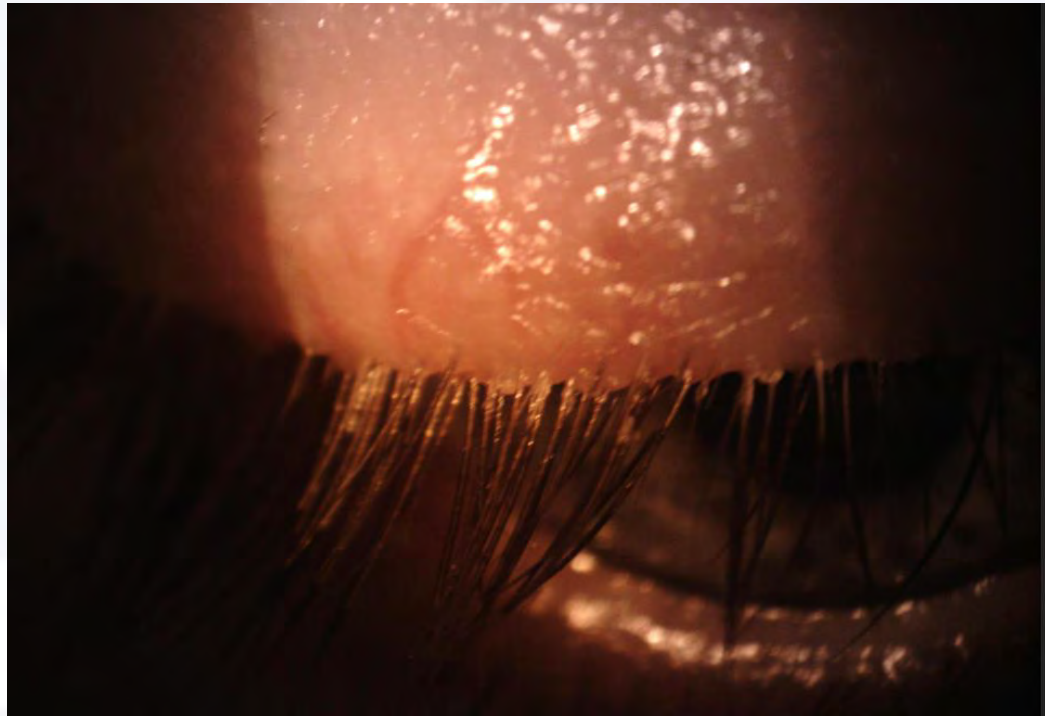
- HAVE PATIENT LOOK DOWN





# Clinical Pearl

- HAVE PATIENT LOOK DOWN



# Eyelash Extensions

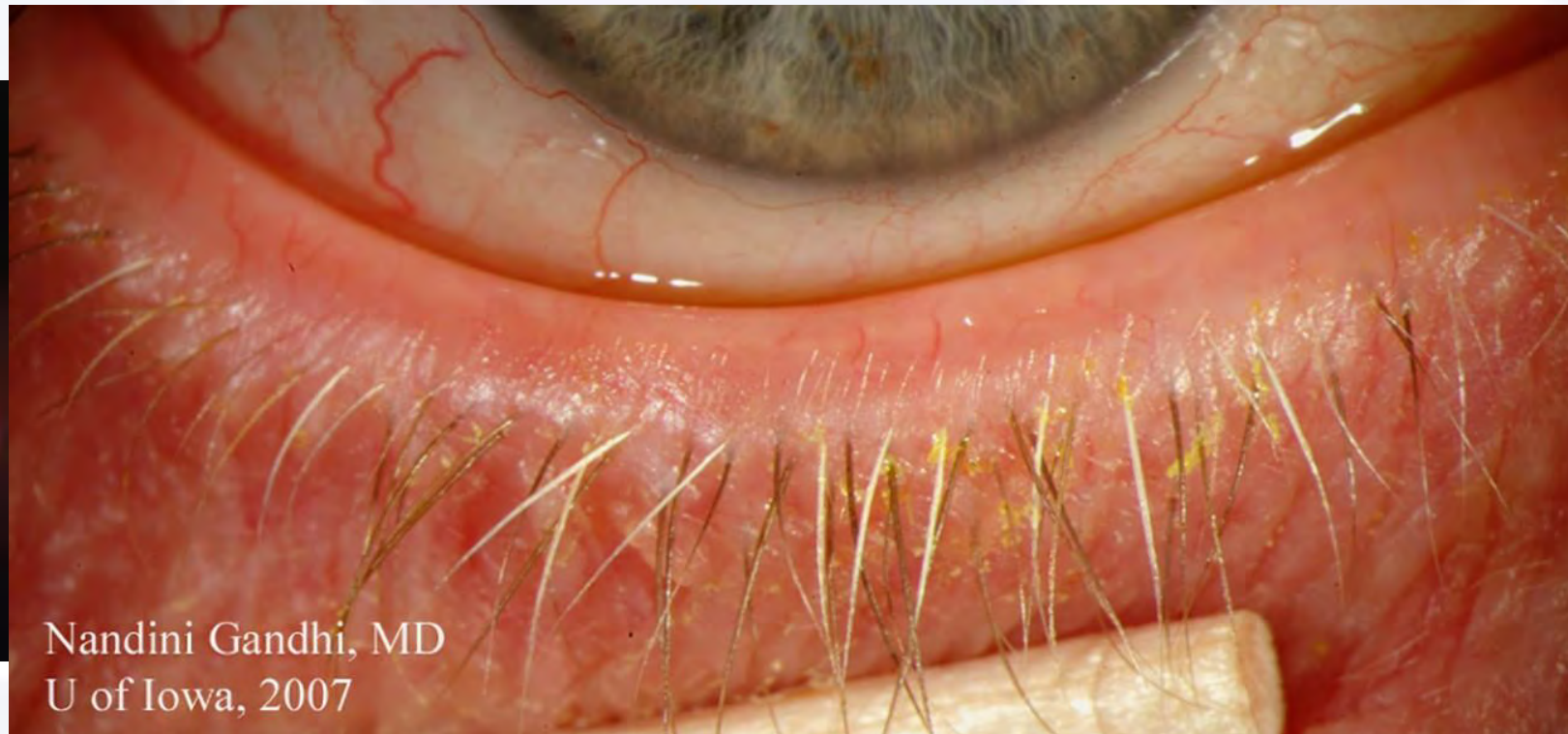
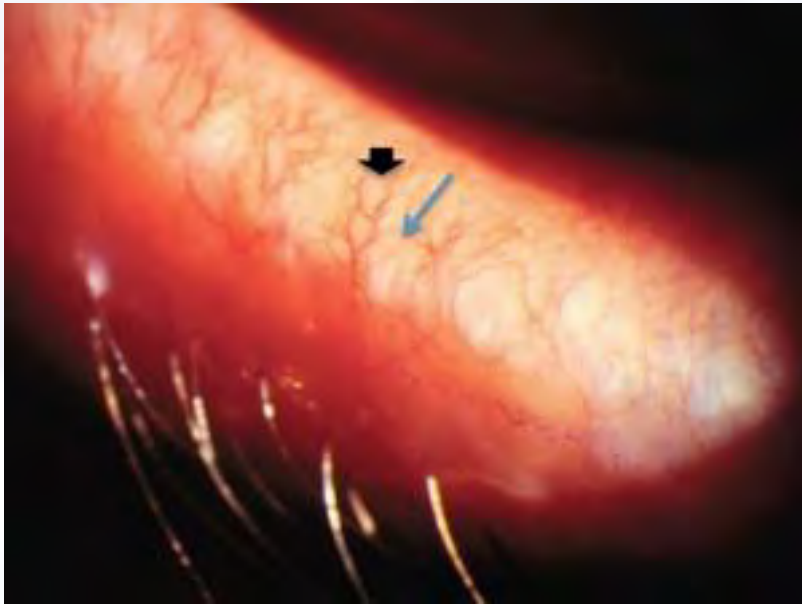
- Patient education





# Ocular Rosacea

- 50% have ocular symptoms: tearing, FBS, itching, photophobia, blurry vision, dry eye



Nandini Gandhi, MD  
U of Iowa, 2007

# Rosacea

- Chronic Inflammatory Skin Disease
- 4 Historical Clinical Subtypes
  - Erythematotelangiectatic
  - Papulopustular
  - Phymatous
  - Ocular
- New Classification system phenotype approach



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agement  
SYMPOSIUM





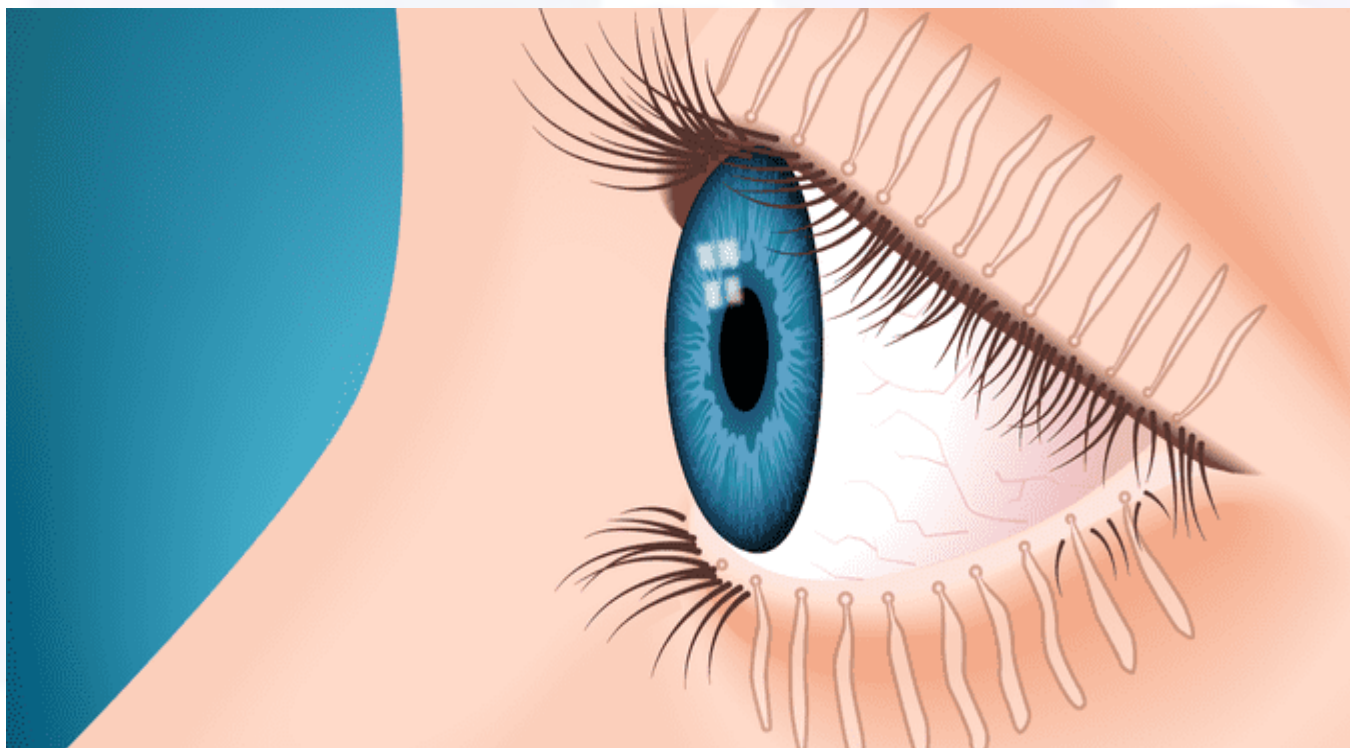
# Rosacea

- Poorly understood etiology & pathophysiology
- 16 million Americans impacted
- “Celtic”/Northern European heritage most common
- Females = Males
- *Demodex* infestation increased in patients with rosacea
  - Eradication of demodex seems to alleviate rosacea symptoms

# Rosacea Triggers

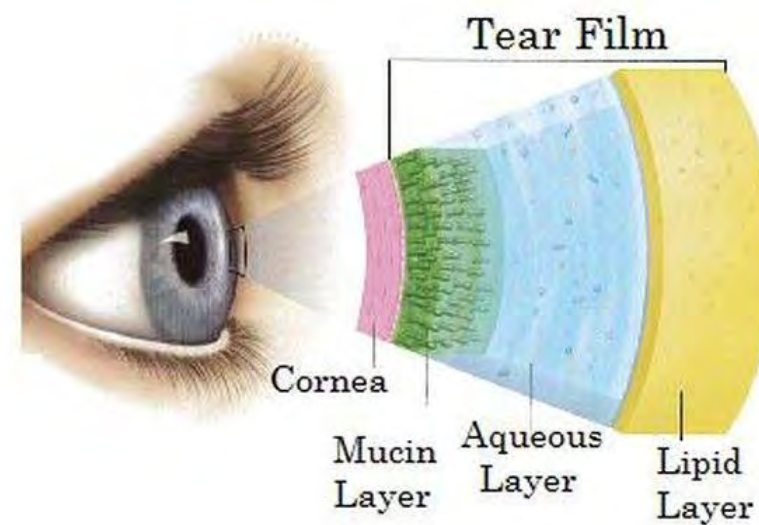
- Heat, noxious cold
- UV radiation
- Alcohol & coffee
- Spicy food
- Any event/ingredient that triggers inflammation
- Clinical Signs: flushing, erythema, telangiectasia, pustules

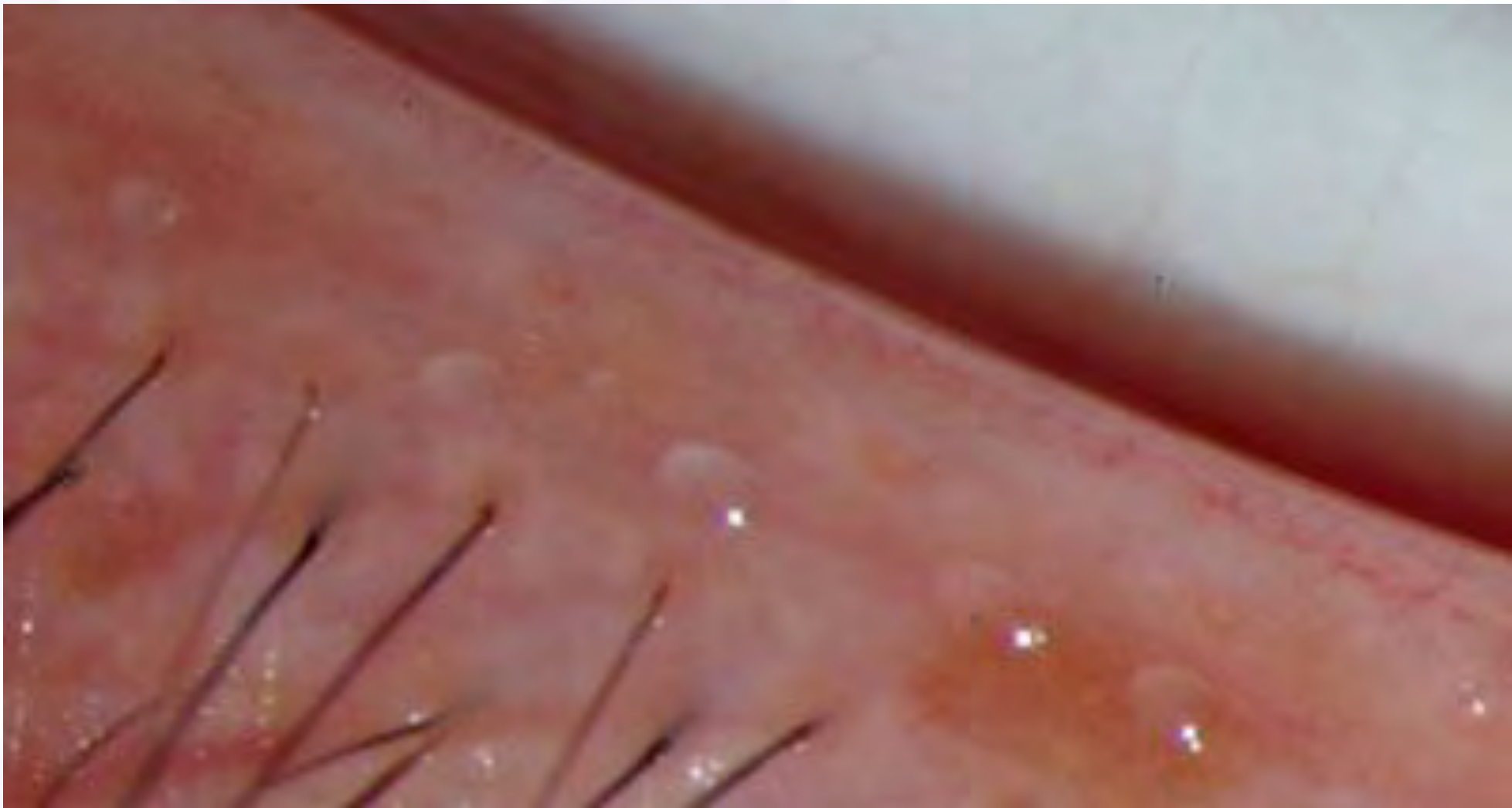
# Meibomian Glands



CREATE THE LIPID LAYER OF THE TEAR FILM

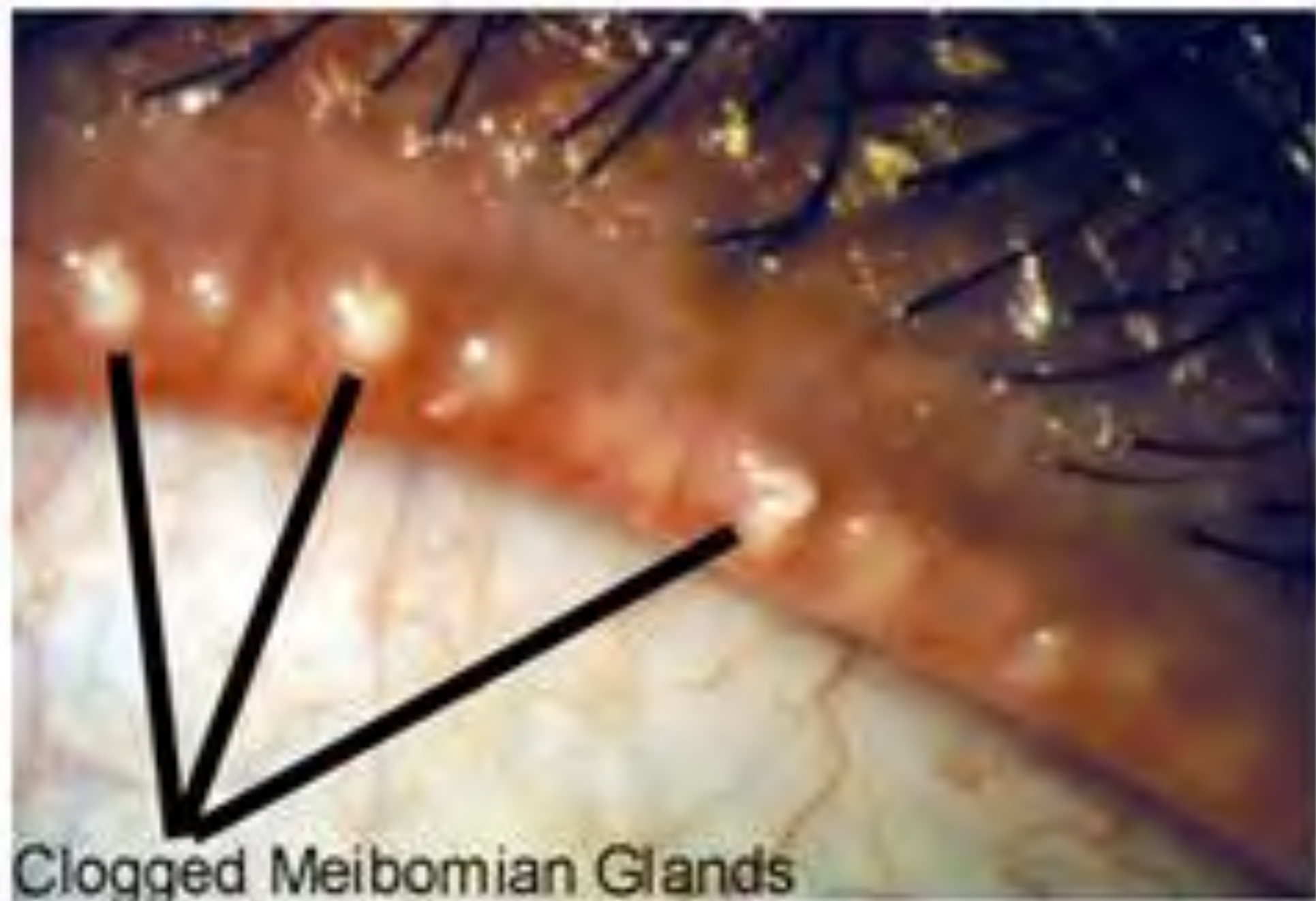
25-40 Upper lid  
20-30 Lower lid





Healthy MG Sebum=olive oil consistency & easily expressed





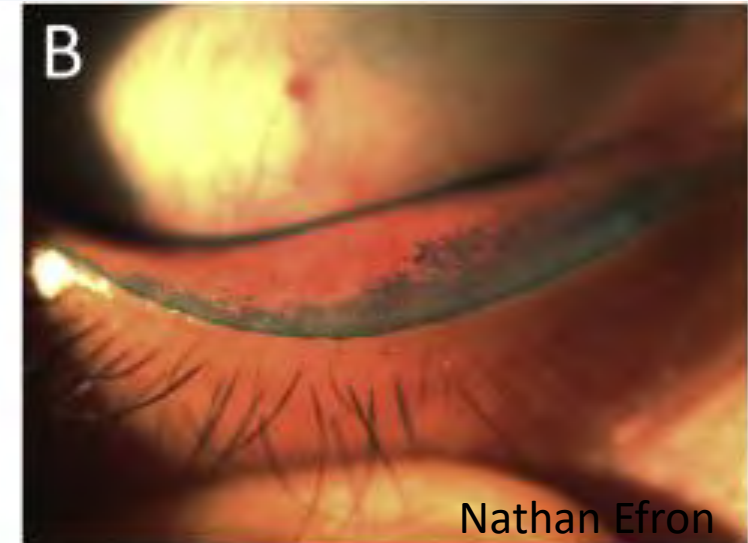
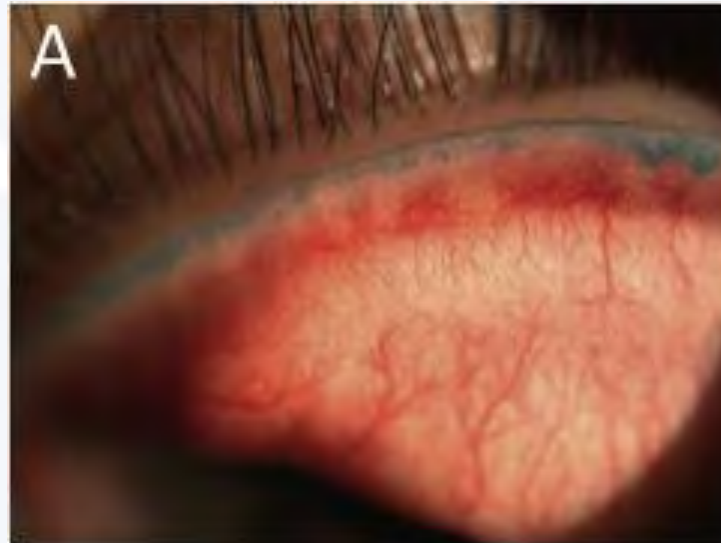
Clogged Meibomian Glands



UM

# Lid Wiper Epitheliopathy

- ◆ Primary Cause: increased friction between the lid wiper & ocular/anterior contact lens surface due to inadequate lubrication
- ◆ -Dry Eye, abnormal blinking patterns, poor CL surface lubricity, environmental influences
- ◆ Linked with sub-clinical inflammation
- ◆ Treatment: steroid, lubricant





# Conjunctiva Exam

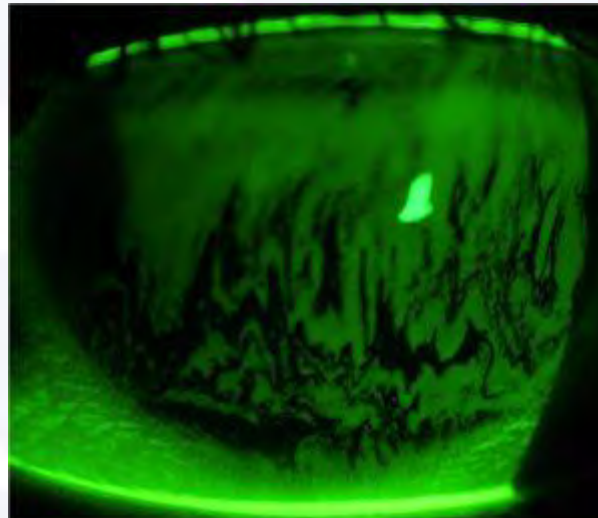
- Conjunctivachalasis
- Lissamine Staining





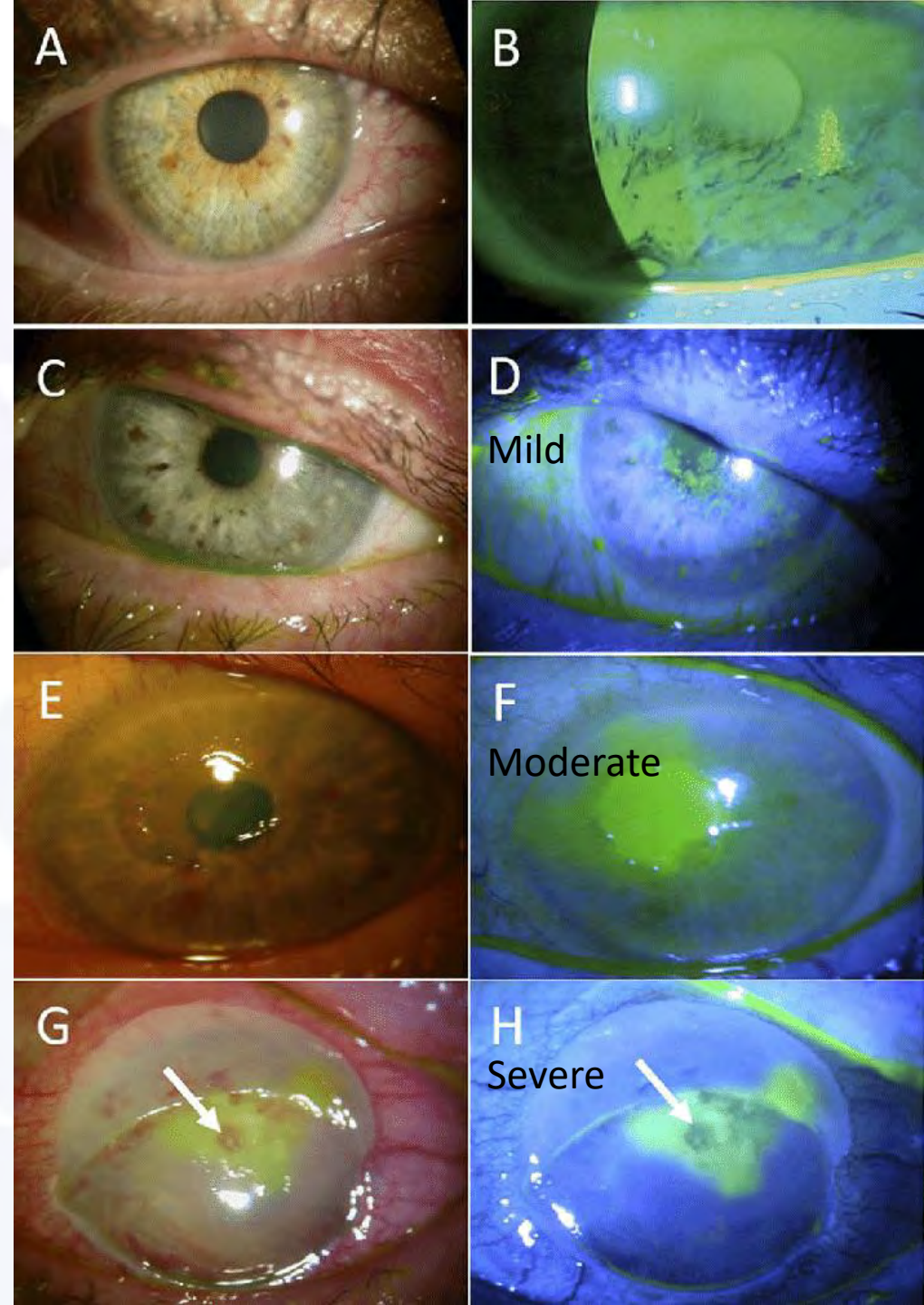
# Cornea Exam

- NaFl & Lissamine
- Tear Break Up Time (TBUT)
  - Goal: >10sec
- Corneal staining
  - Pattern
  - Stain Without Pain



# rotrophic Keratitis

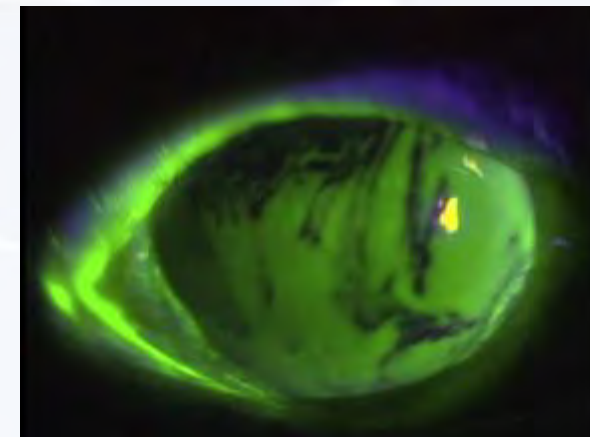
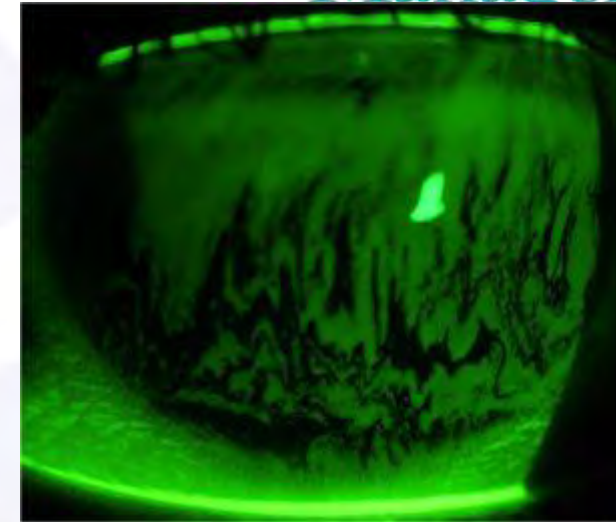
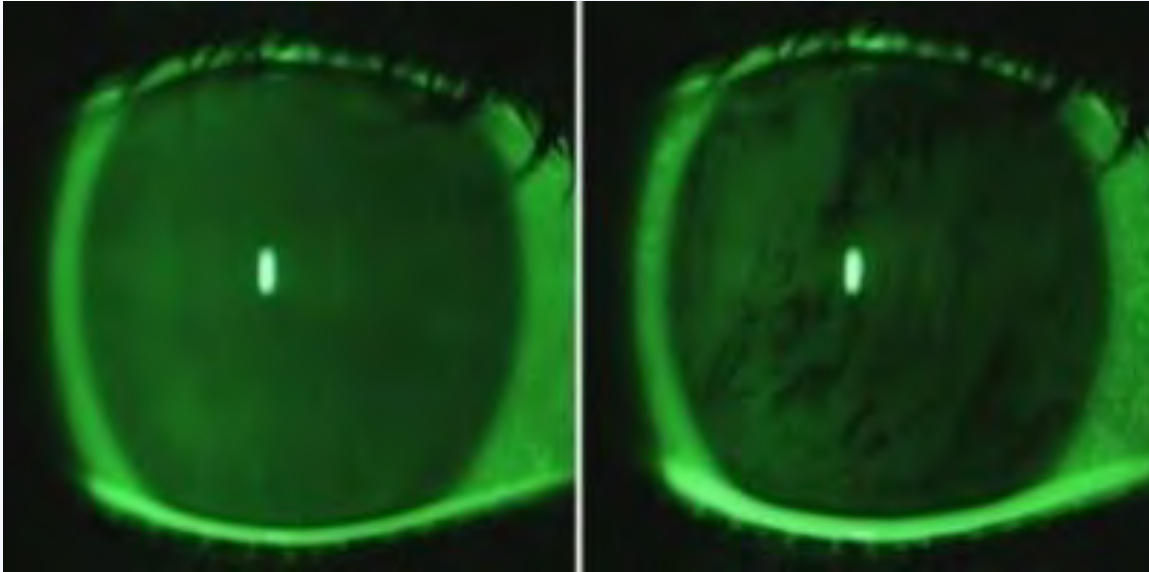
- “Stain without Pain”
  - Corneal Sensitivity Test
    - Dental floss
    - Cotton from cotton tip applicator
- Stages: 1-3
- Treatment
  - Amniotic Membrane
  - OXERVATE™ (cenegermin-bkbj)



# Diagnostic Tools

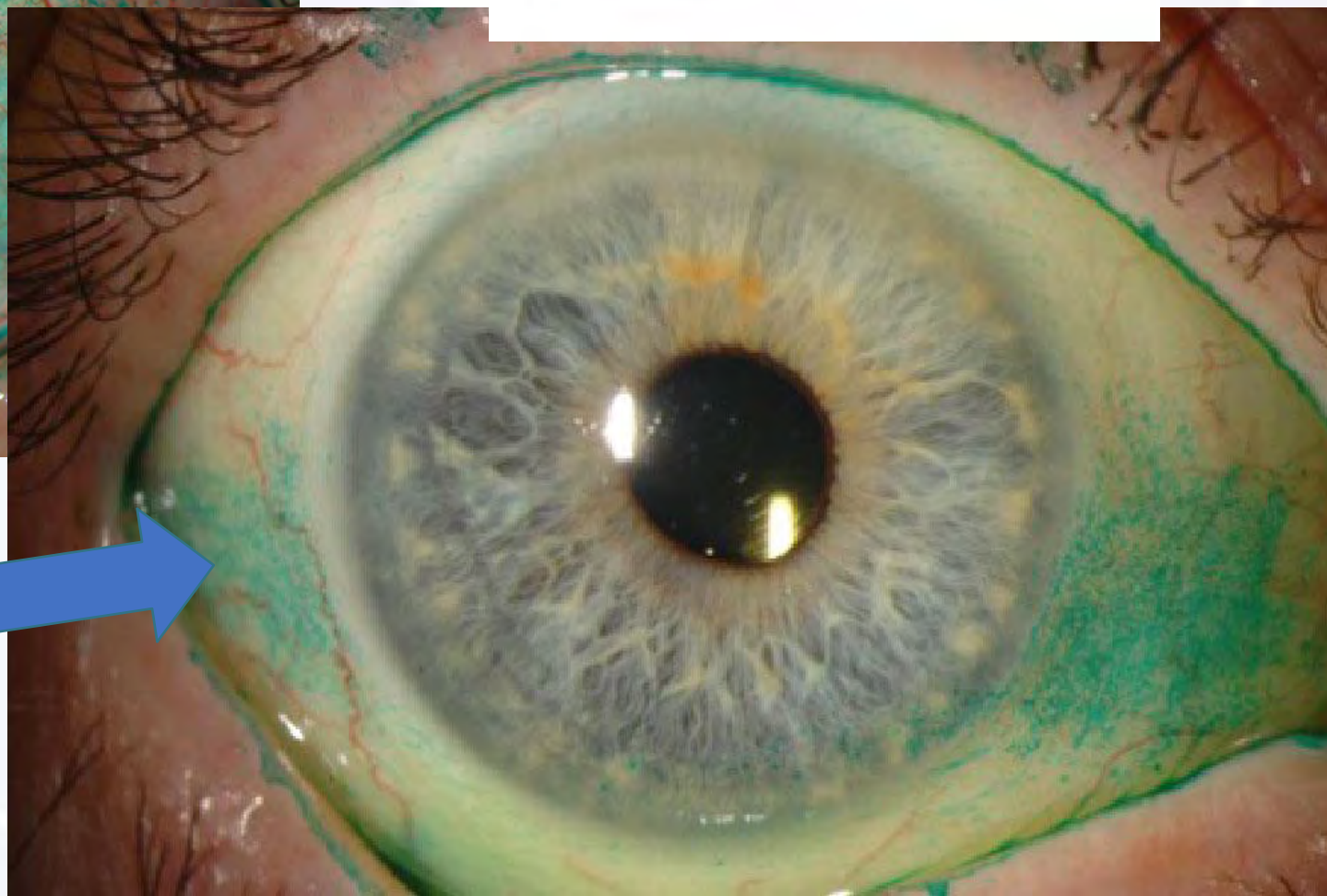
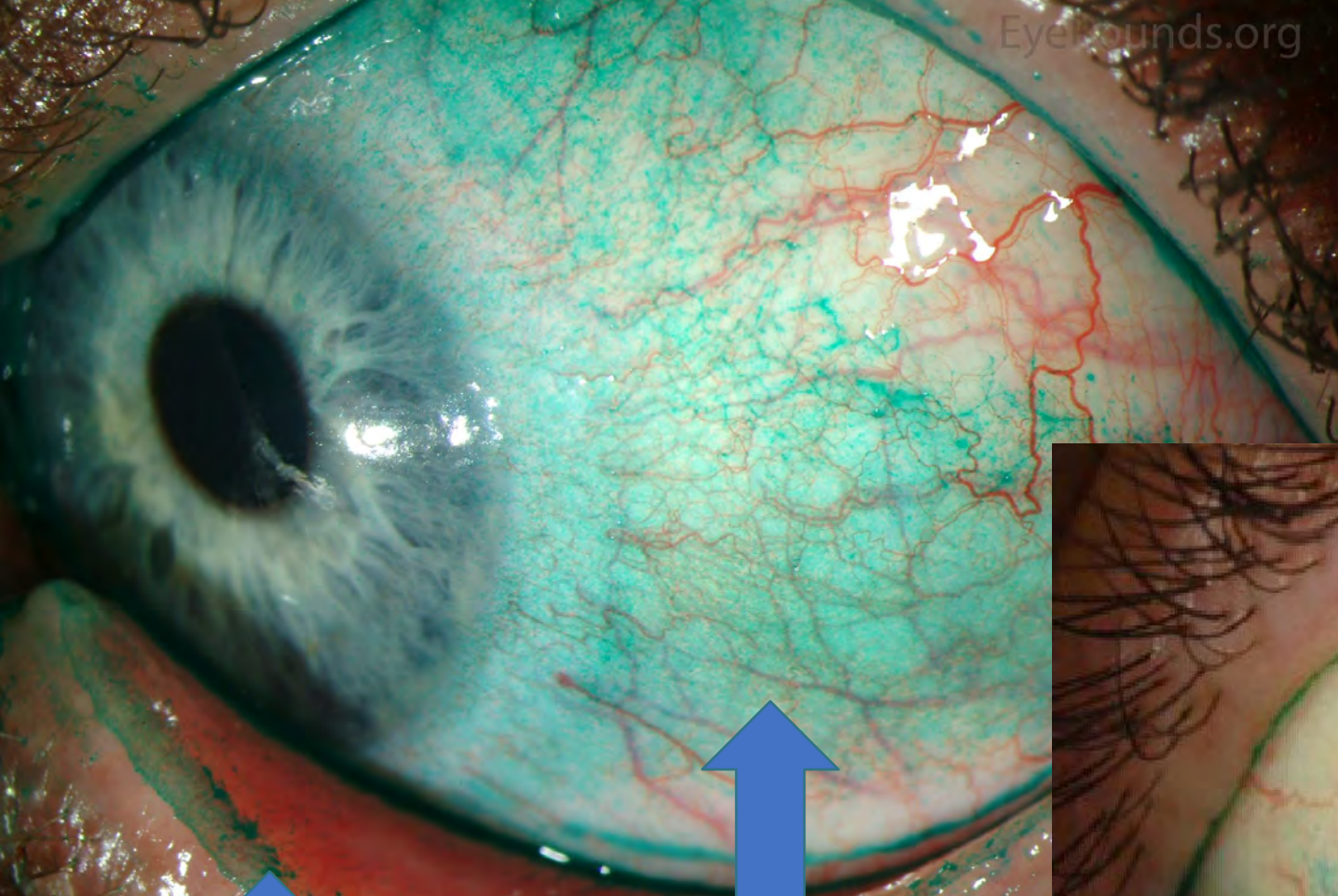
- Slit Lamp & Dyes
- Meibomography
- Tear Osmolarity (TearLab)
- Inflammadry
- Oculus Keratograph





Wait several minutes





# HYPEROSMOLARITY: Tear Lab

- provides a numerical value to the current state of dry eye
- results from aqueous-deficient or evaporative dry eye
- key event in the pathogenesis of dry eye disease





# INFLAMMATION DETECTION: INFLAMMADRY<sup>®</sup>

OPTOMETRIC  
Management  
SYMPOSIUM

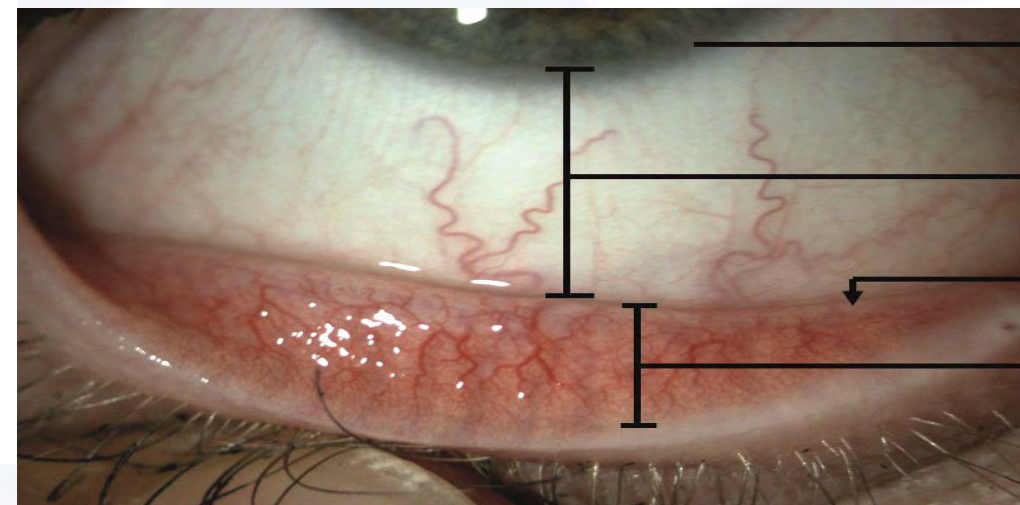
-IDENTIFIES ELEVATED LEVELS OF MMP-9

-85% SENSITIVITY

-94% SPECIFICITY



# MEIBOGRAPHY







No Structural Change  
(could still have issues)



Duct dilation, truncation, & dropout



Severe Truncation & Dropout

# Treatments



# Treatment Goals

- Eradicate Demodex Inflammation
- Clean up the lid margin
- Improve meibomian obstruction
- Decrease Inflammation

# In Office Treatments

# In office treatments: Blephex ZEST



Sponsored

200 PCS Disposable Crystal Eyelash  
Mascara Brushes Wands (Red)

200 Count (Pack of 1)

★★★★★ ~ 11,355

\$6<sup>59</sup> (\$0.03/Count)

# and Band Light (BBL)/ Intense pulsed light (IPL)



Lumenis



Sciton



Cyanosure (Icon)

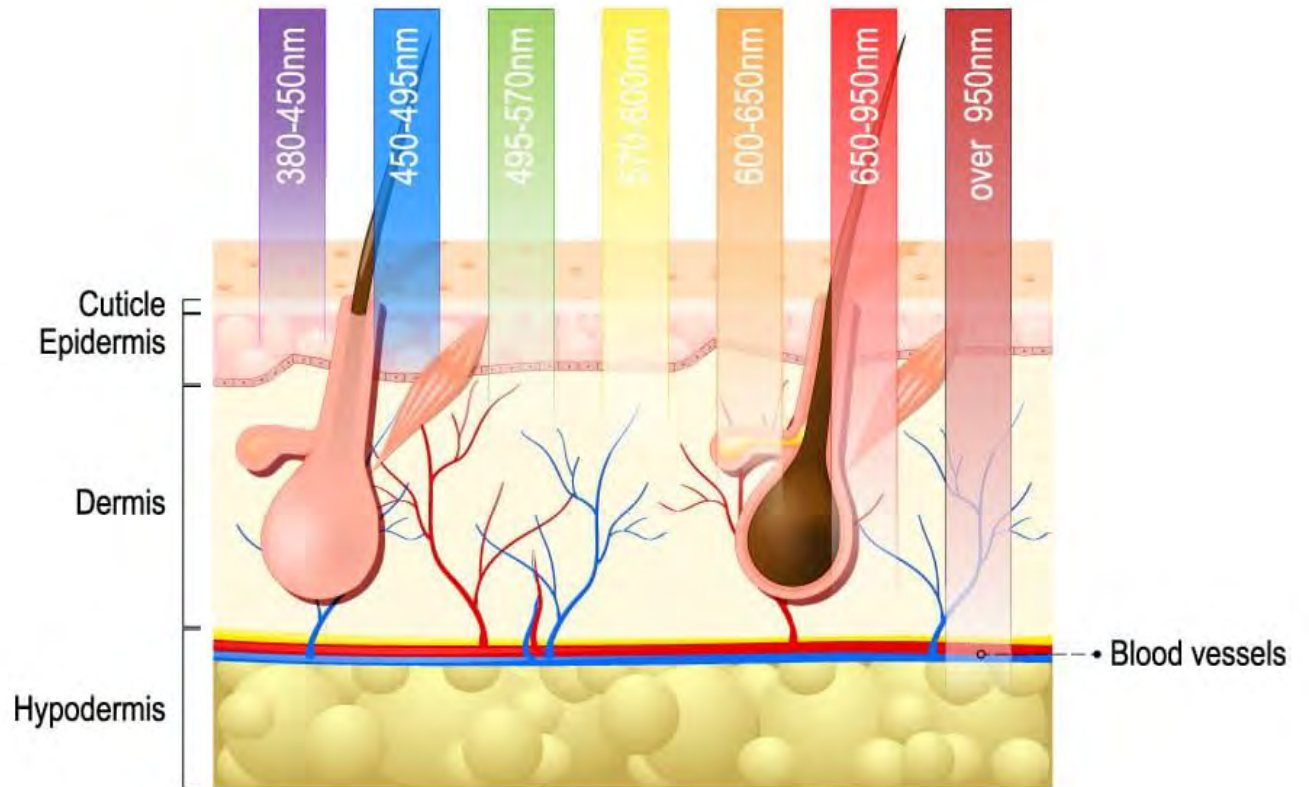
- Rosacea
- Blepharitis
- Demodex
- Hordeolum
- MGD



# IPL

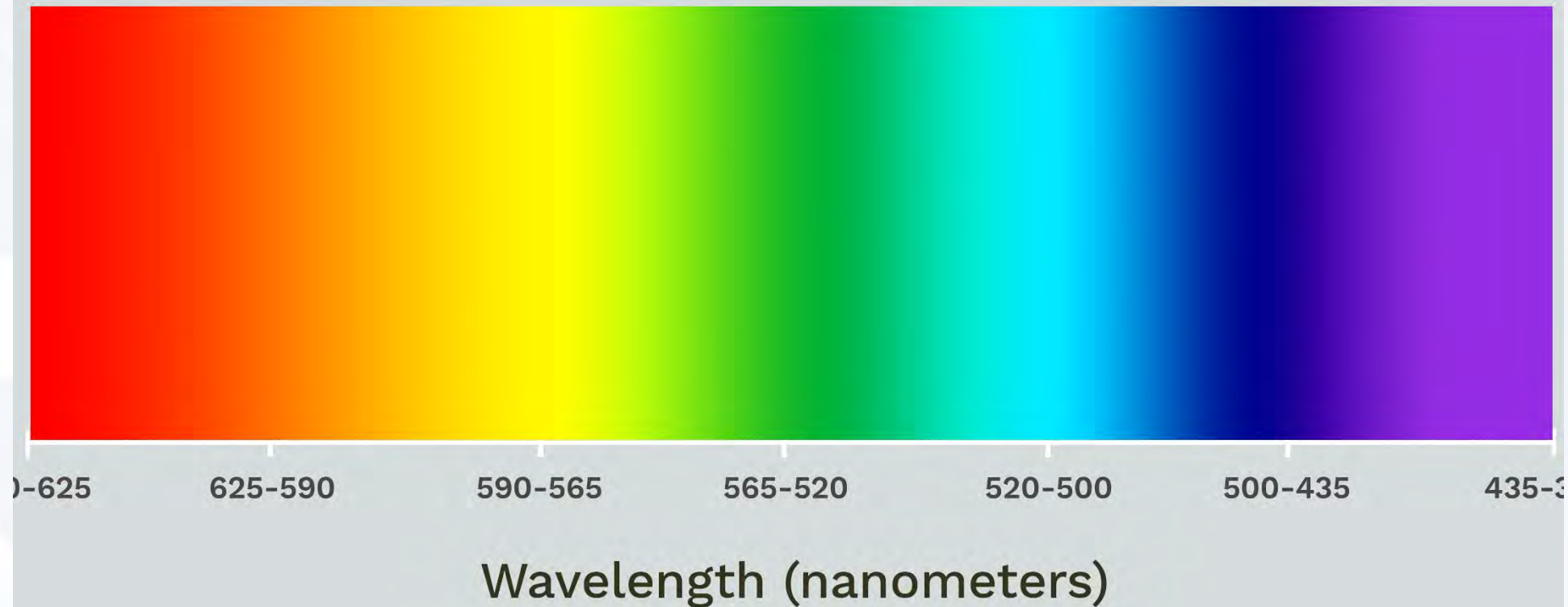
- ◆ Wavelength
- ◆ Different from 'laser light'
  - Non-Monochromatic
  - Non-coherent
  - Defocused

## Light Therapy



# The Visible Light Spectrum

The visible light spectrum is the section of the electromagnetic radiation spectrum that is visible to the human eye.



# IPL

- ◆ Emits a broad, continuous spectrum of light (515-1200nm) with the ability to apply filters to target specific chromophores (ie melanin & hemoglobin)
  - ❑ Targets Reds & Browns
  - ❑ Melanin: absorption 400-700 nm range
  - ❑ Blood: absorption 900-1200nm range
  - ❑ The light that is emitted from the flashlamp is absorbed by the oxyhemoglobin in the blood vessels → generates heat that coagulates the cells



# IPL Mechanism of Action

- Light is being absorbed by pigment & blood (chromophore) in skin
- Use different wavelengths to target skin depth, adjust power/fluence
  - Shorter wavelengths=superficial structures
  - Longer wavelengths=deeper into skin
  - 590→reaches dermis and nothing further
- Light emitted absorbed by the oxyhemoglobin → causes blood vessels to lyse—reduces release of proinflammatory mediators





Laura M Periman MD

New patient.  
Red eyes. Rx'd  
steroids x 2  
years

4 months  
later after IPL  
series



L M Periman MD

OPTOMETRIC  
Management  
SYMPOSIUM

3.6.18 chronic chalazion



3.13.18 1 week after IPL



3.20.18 2 weeks after IPL







Jessilin Quint, OD



# Death by IPL

- [\(90\) Death By IPL - Demodex Mite on Eyelash – YouTube](#)



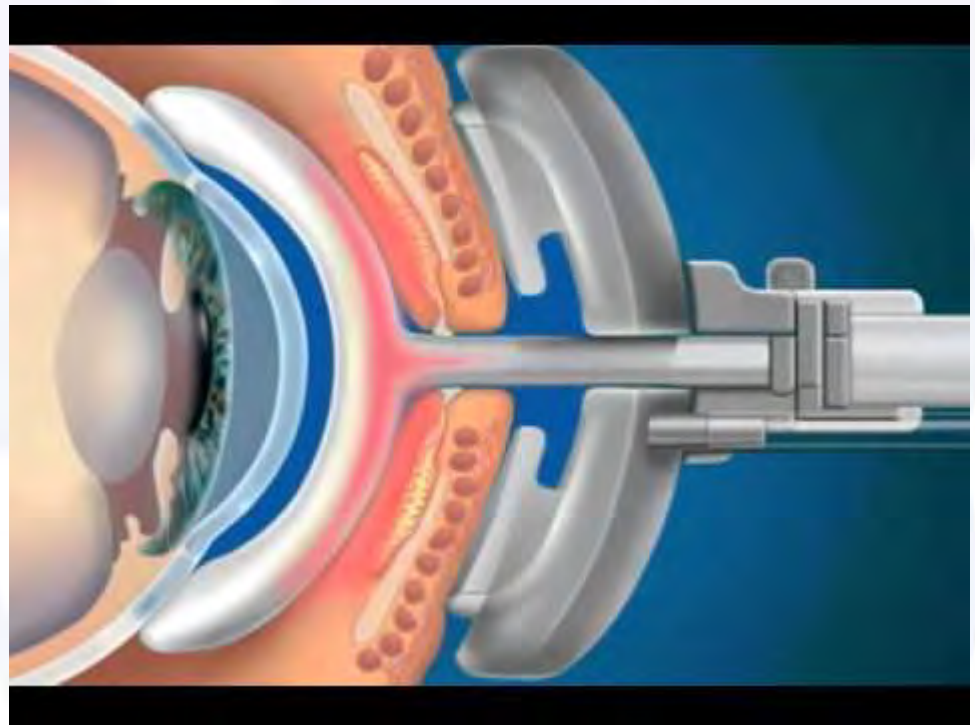


# OptiLight IPL

- ◆ FDA approved (April 2021) for dry eye disease due to meibomian gland dysfunction (MGD)
- ◆ Intense Pulsed Light Technology (IPL)
- ◆ Skin Fitzpatrick I-V
- ◆ Non-ablative device that targets melanin reoxygenates hemoglobin

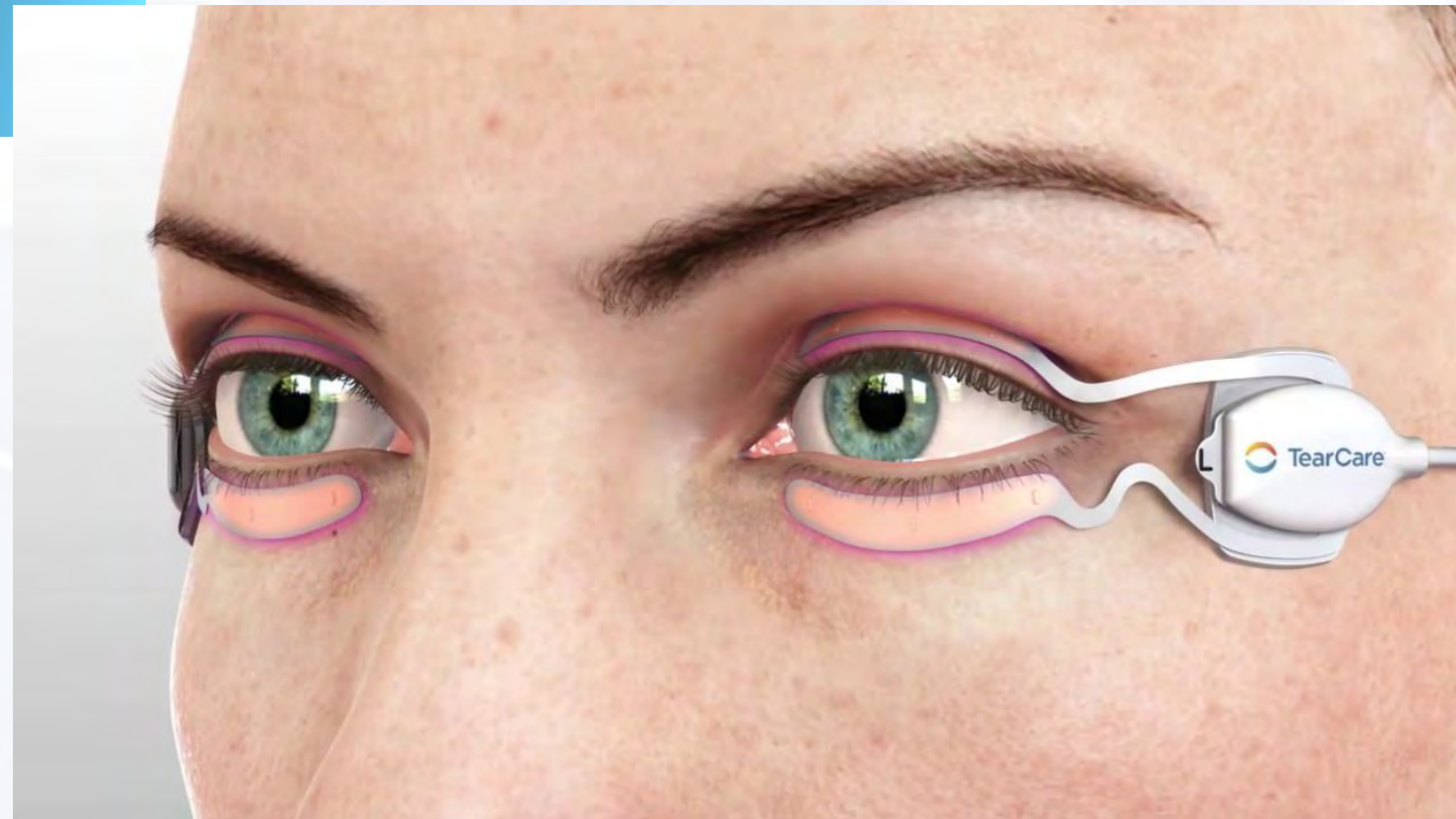


# *LIPIFLOW*





# TEAR CARE









# *MiBo* *THERMOFLO*

OPTOMETRIC  
Management  
SYMPOSIUM





# Radio Frequency

- Delivers radiofrequency to heat skin
- Dry Eye → unclogs MG
- Aesthetic Perks → “baggy” under eyes, wrinkle reduction, stimulation of collagen
- Treatments last 30-60 minutes



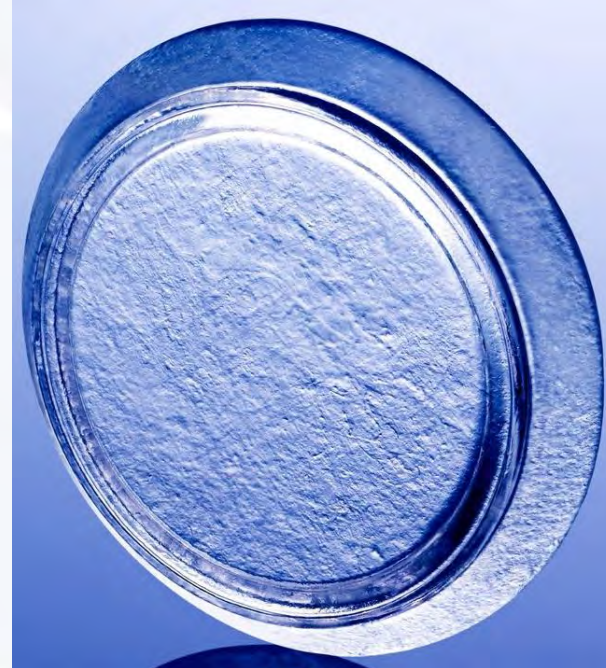
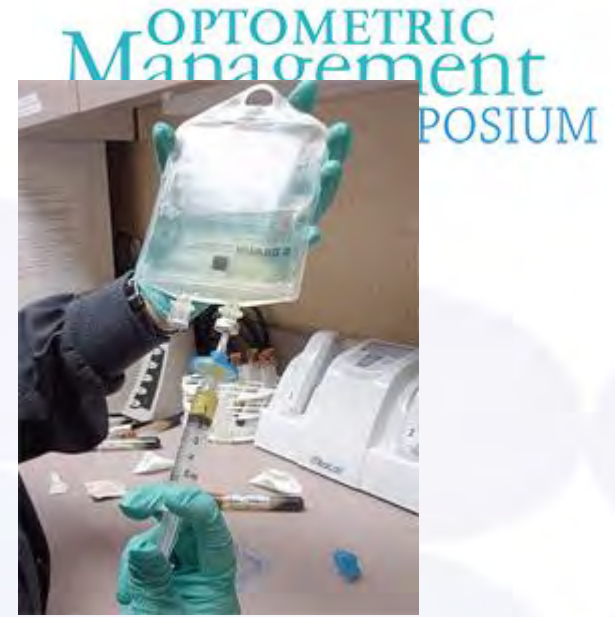
Before & after 3<sup>rd</sup> treatment  
Courtesy of R. Saluja, MD





# Other therapeutics

1. Autologous Serum tears
2. Amniotic membranes
3. Topical & Oral Ab/Steroids
4. RegenerEyes
5. cyclosporine
6. lifitegrast
7. Tyrvaya



# Tyrvaya (Oyster Point Pharma)

- ◆ FDA approved (October 2021) varenicline 0.03mg nasal spray
- ◆ Indicated for signs & symptoms of dry eye treatment
- ◆ Mechanism of Action: binds to cholinergic receptors to activate the trigeminal parasympathetic pathway resulting in increased production of basal tears



# Tyrvaya (Oyster Point Pharma)

- ◆ Side Effects: sneezing (82%), cough (5-16%), throat & nose irritation
- ◆ Clinical Trials: ONSET-1, ONSET-2, Mystic
  - 1000 participants
  - improvement >10mm Shirmer's Test Score increase at week 4
  - Onset of action 5 min
- ◆ How to use:
  - BID dosing



# Teach your patients the Tyrvaya way to spray.

Please review the full Instructions for Use with your patients before the use Tyrvaya.

Share these tips:



## **Do not spray too deep and avoid spraying into your sinuses**

Insert the tip of the nasal spray just past the nasal opening. Aim the tip out towards your ear on the same side of the nostril you're spraying into.



## **Ensure proper tongue placement**

Press your tongue to the roof of your mouth.



## **Avoid inhaling deeply**

Breathe gently as you press and release the applicator, just misting the inside of your nostril. The medication will absorb into the wall of the nose where the nerve is located.

# At Home Therapy

# Moist hot compress



- MORE EFFECTIVE THAN WASH CLOTH
- CLEANER/MORE HYGENIC
- BETTER COMPLIANCE
- LESS MESSY





## 2<sup>nd</sup> Generation iTear 100

- ◆ FDA approved March 2022
- ◆ Prescription neuromodulation therapy designed to acutely increase production without contact in adults over a 30-day period
- ◆ iTear 100 is a non-chemical connected device that offers telehealth tools
- ◆ Only prescription medical device for home use that can increase natural tear production in all adult patients
- ◆ Olympic Ophthalmics



baby shampoo for lid scrubs one of the  
worst things to recommend for  
blepharitis OR demodex



0.02% hydrochlorus acid



0.01% hydrochlorus acid





Demodex

# Omega-3



- 2,000 mg/day
- Take with food
- Watch EPA & DHA content
- 3 months





# Omega-3

OPTOMETRIC  
Management  
SYMPOSIUM

## Supplement Facts

Serving Size: 2 Soft Gels

Servings per container: 90

Amount Per Serving	% Daily Value*	
Calories	20	
Calories from fat	20	
Total Fat	2.0 g	3%
Saturated Fat	0.1 g	1%
Trans Fat	0 g	†
Total Omega-3s	1280 mg	†
EPA (Eicosapentaenoic Acid)	650 mg	†
DHA (Docosahexaenoic Acid)	450 mg	†
Other Omega-3s	180 mg	†

\* Percent Daily Values are based on a 2,000 calorie diet.

† Daily Value not established.

Less than 5 mg of Cholesterol per serving.

Breakdown of omega-3 FAs results in production of molecules that suppress inflammation



# Chalazion & Vitamin A

- Study showed correlation between childhood chalazia & serum vitamin deficiencies
- Low serum Vitamin A was significantly associated with chalazion in children

## Clinical Report: Correlation of Serum Vitamins and Chalazion

Cheng, Haixia MD<sup>1</sup>; Lv, Xuehua MM<sup>1</sup>; Yao, Jiaqi MD<sup>1\*</sup>; Chen, Zhijun MD<sup>1\*</sup>

Author Information ☺

Optometry and Vision Science: June 2022 - Volume 99 - Issue 6 - p 540-543  
doi: 10.1097/OPX.0000000000001887

### Abstract

#### SIGNIFICANCE

We demonstrate the clinical correlation between the vitamin A level with chalazion in East Chinese children. Vitamin A deficiency is likely to be a potential cause of childhood chalazion.

#### PURPOSE

Chalazion is the most common lid inflammatory lesion of the eyelid, which can be caused by retention of tarsal gland secretions. Studies have revealed that vitamin deficiency is an essential risk factor for children

# Future Treatments

- Tarsus drug in Phase 3 Clinical Trial
  - TP-03
  - Saturn 2 Phase 3 data released May 2022
  - 56% of patients achieved primary endpoint of complete collarette cure
- Dompé cenegermin Phase 3 Clinical Trial
  - Cenegermin (recombinant human nerve growth factor) in patients with severe Sjogren's related dry eye disease

# Cosmetic Impact

- Cosmetics \$62B/yr industry; Anti-aging \$2.1B/yr
- 1938: last time law governing cosmetics was updated
- 11 banned chemicals in USA; 1300+ banned in EU
  - Avg female: 12 cosmetic products & 168 chemicals on body/day
  - Avg male: 6 products
- Ingredients, procedures, and cosmetic habits can make blepharitis, demodex, and ocular rosacea worse



# What is a “cosmetic”?

- Personal care products are cosmetics
- Personal Care Safety Act (2015/2016)

MOISTURIZER

AFTER SHAVE

PERFUMES

LIPSTICK

FINGERNAIL  
POLISH

EYE MAKEUP

FACE MAKEUP

HAIR CARE

SKIN CARE

HAIR COLOR

TOOTHPASTE

DEODORANT

# Ingredients matter

- Buzzwords & Marketing
  - “hypoallergenic”, “clean”, “gentle”, “sensitive skin/eyes”, “natural”, “nontoxic”
- FDA does not require all ingredients to be listed if less than 1% (potential allergens might not be listed)
- \$\$\$ products does not make them safer
- Skincare & Makeup (any cosmetic)
- Don't focus on “brands” as brands change ingredients



CLEAN  
beauty

# COSMETIC OFFENDERS TO AVOID:

OPTOMETRIC  
Management  
SYMPOSIUM

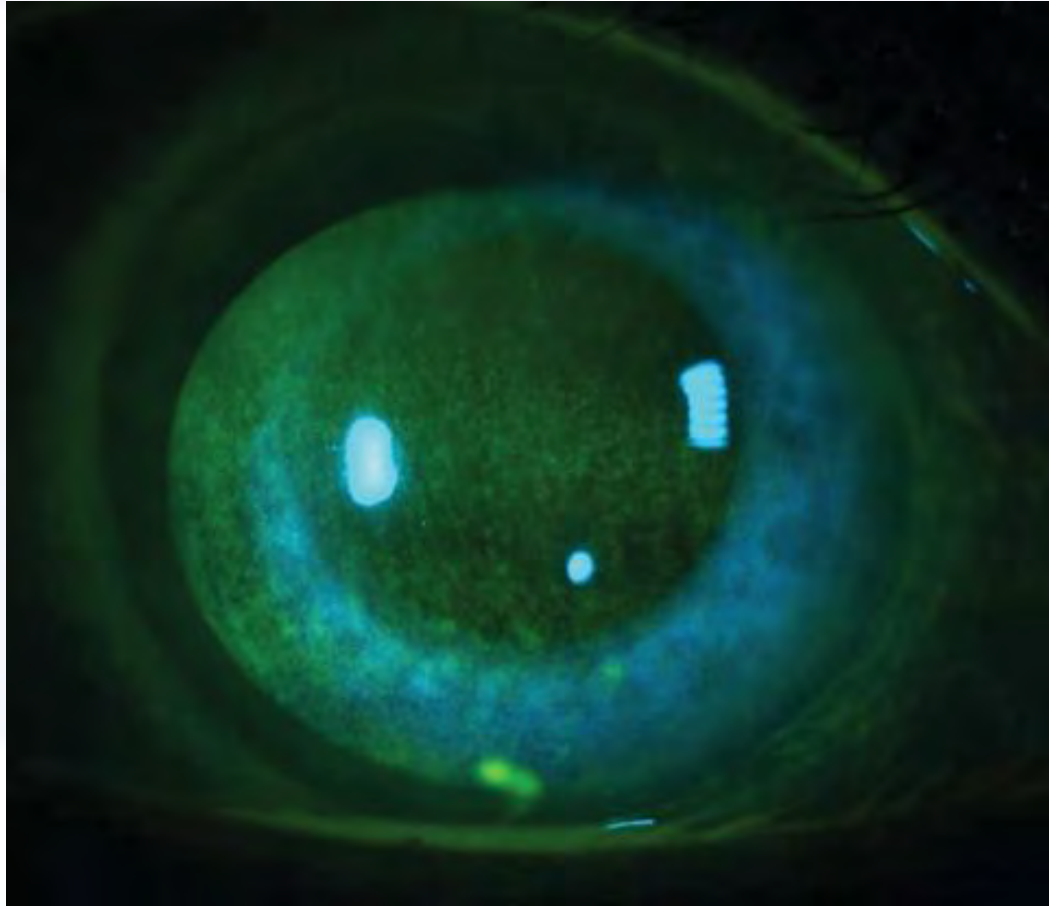
AMINOPHENOL  
BENALKONIUM CHLORIDE  
BHA & BHT  
CADMIUM  
CARBON BLACK  
COLOR ADDITIVES  
DIAMINOBENZENE  
ETHANOLAMINES  
KOHL  
ISOPROPYL  
CLOPROSTENATE  
OXYBENZONE  
PARABENS

PETROLEUM  
DISTILLATES  
POLYETHYLENE  
GLYCOL  
RETINYL ACETATE  
RETINYL PALMITATE  
SODIUM LAURYL  
SULFATE  
SYNTHETIC  
FRAGRANCE  
TITANIUM DIOXIDE  
TRICLOSAN  
TRICARBAN

**SMART EYE  
CARE**

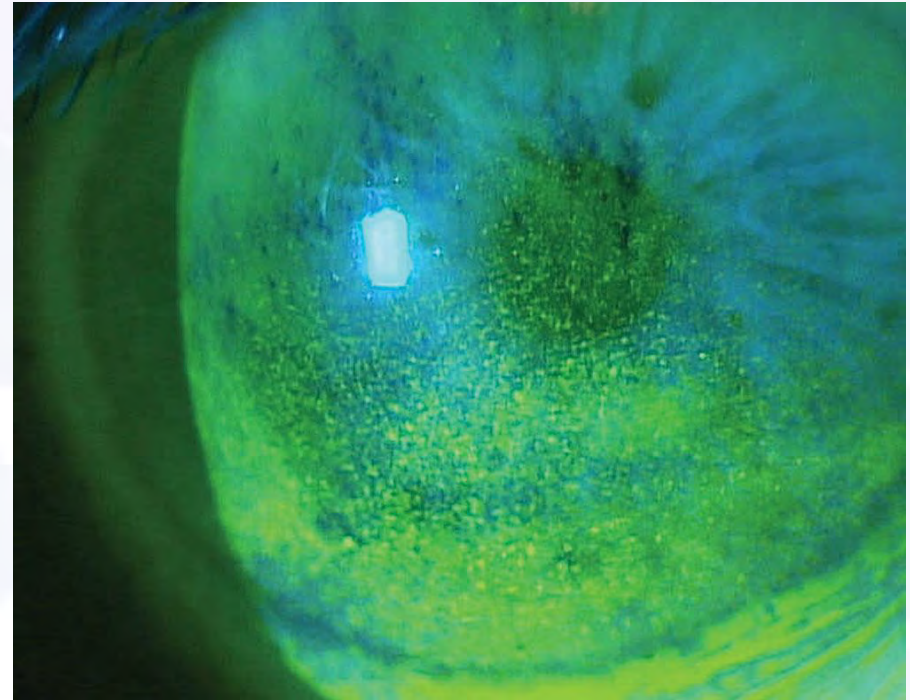


# Preservatives



MAKEUP, SKINCARE, EYE DROPS

BAK: benzalkonium chloride



# Ingredient resources

- ThinkDirty App

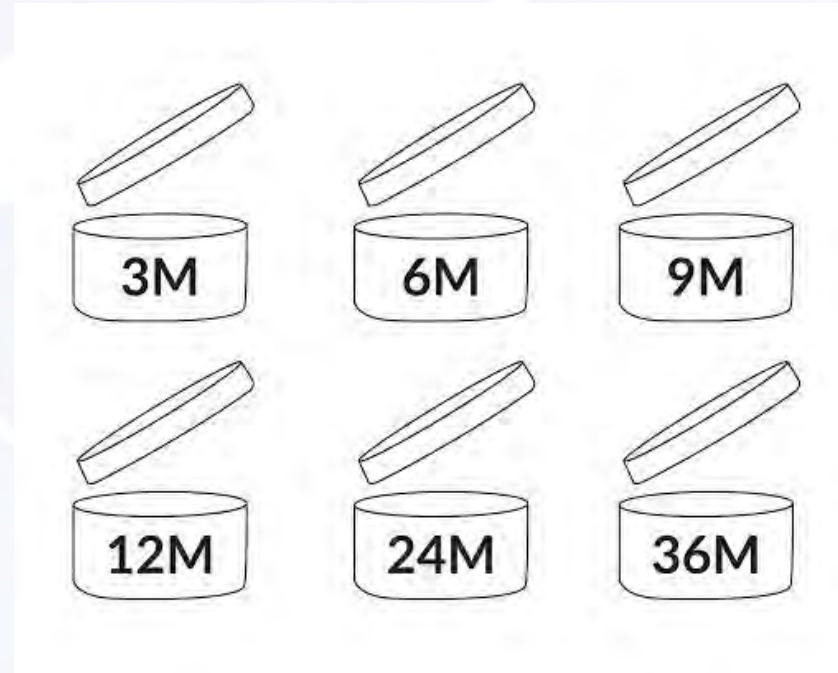


- Ingridio App



- <https://www.ewg.org/skindeep/>

# Toss expired products

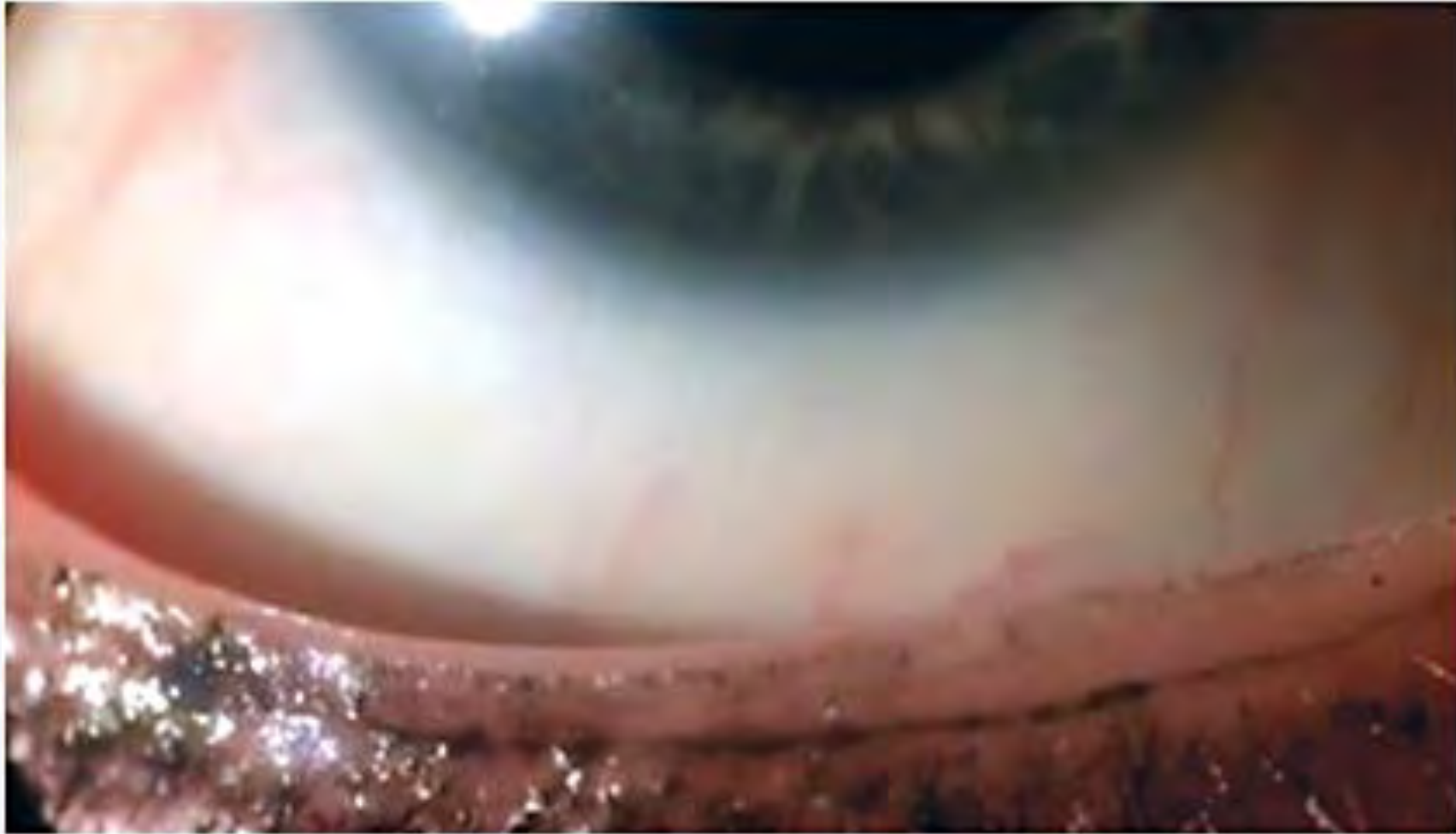


**REPLACE MASCARA  
EVERY 1 to 3 MONTHS**

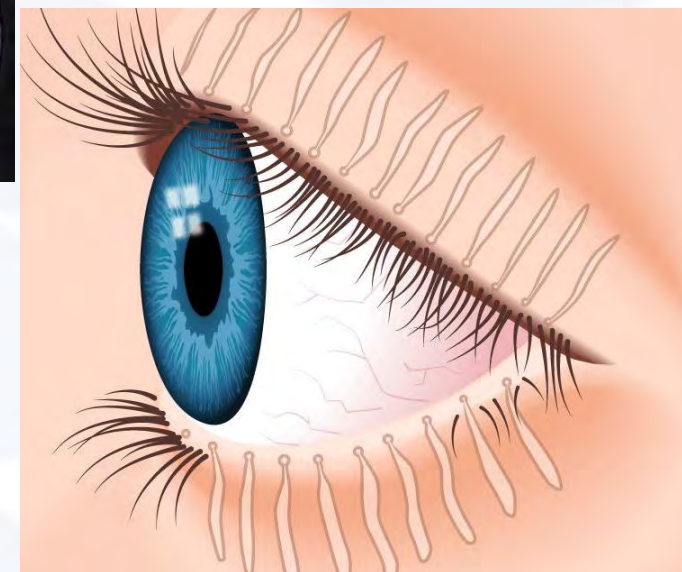


Remove eye makeup  
before sleeping





# Avoid glitter & waterproof





# Avoid tightlining/waterlining



# Avoid permanent makeup



Avoid sharing

**WARNING**

some things are not worth sharing





# Clean brushes/applicators frequently

- Clean weekly (minimum)
- Watch ingredients in products using to clean makeup tools



# Use mineral based sunscreen

- Broad-Spectrum: UVA & UVB
- Mineral Based
- Don't forget Eyelids



# Keep lashes natural

- Purpose: protection
- Optimal Length: 1/3 eye width
- Longer funnel air & debris to front surface
- Allergy, lash loss, Dry Eye Disease



- Avoid glues with formaldehyde
- Wear 'Natural' length instead of 'Glam'
- Wear partial instead of full
- Save for special occasions
- Take breaks



- DMDM HYDANTOIN
- QUANTERNIUM-15
- IMIDAZOLIDING UREA
- FORMALIN
- FORMIC ALDEHYDE
- METHANEDIOL
- METHANAL
- METHY ALDEHYDE/METHYLENE GLYCOL/METHYLENE OXIDE

AKA-Formaldehyde

# lash extension-healthier OPTION

- Request esthetician to use better materials
- Non-formaldehyde glues
- 'Natural' lash length, fewer lashes
- Keep them clean
- Consult with your Eye Care Provider



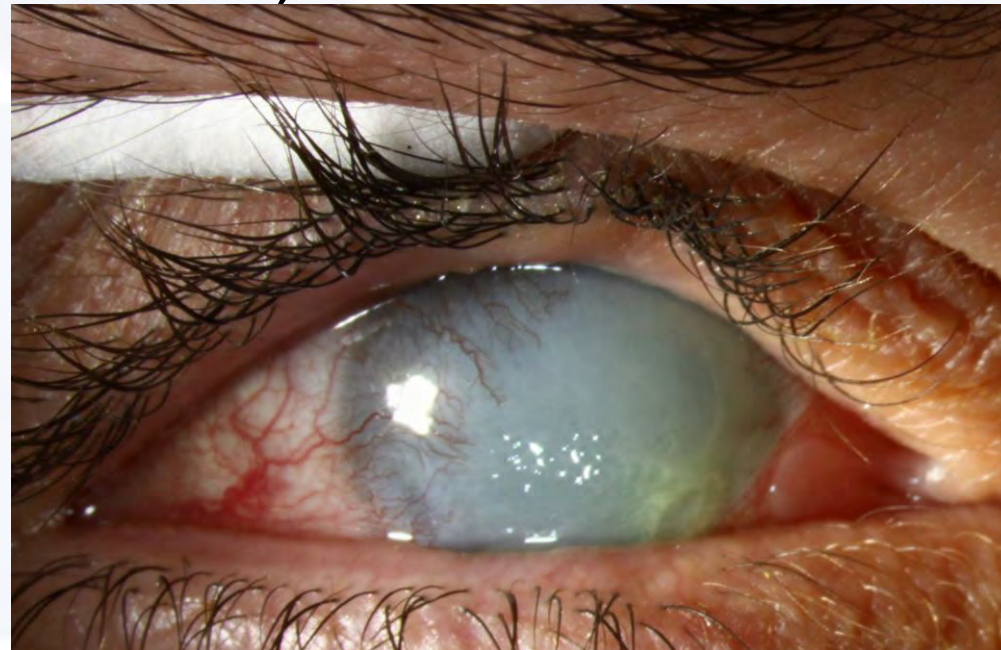
Tea-Tree Water



Hypochlorus Spray

# Eyelash tints/lifts

- Lift: perm for eyelashes
- Tint: hair dye for eyelashes
- Risk: allergy, toxicity, chemical burn, trauma





# Eye lash serums

- PROSTAGLANDIN/PROSTAGLANDIN ANALOG
- SIDE EFFECTS
- OTC/Non-Rx: not required to list side effects on



Conjunctival  
Hyperemia



Skin  
Hyper-pigmentation



Orbital Fat  
Displacement

# Take Home Message

- Diagnose
  - Look at lid margins
  - Have patient look down
- Treatment
  - In office & At Home combination
- Patient Education

THANK YOU!

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