

Ocular Surface Disease Survival Guide for Everyday Practice

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Paul M. Karpecki,
OD, FAAO Financial
Disclosures:

Adom
AI Optics
Alcon
Aldeyra
Allergan/Abbvie
Apellis
Atlas Medical
Aurion
Avellino Labs
Azura
Pharmaceuticals
Barti
Bausch + Lomb
BioTissue
BlephEx
Bruder Healthcare
Bruno Vision Care
Cambium Pharma
Dompe
Eyedaptic
Eyedetec

relationships have
been mitigated

Eyenovia
Healthe
Hue.AI iCare
USA
Imprimis
Iveena
Jobson/Web MD
Kiora
Pharmaceuticals
Konan Medical
LenTechs
Mallinckrodt
Mitotech
Neurolens
Novaliq
Novartis
Oasis Medial
Oculus
OcuMedic
Ocuphire
OcuTerra
Omega
Ophthalmics

OcuSoft
Olympic Ophthalmics
Orasis
RegenerEyes
Reichert
Rendia
RxSight
RVL
Science Based Health
Sentiss Pharma
Sight Sciences
Silk Technologies
Sun Pharmaceuticals
Surface Biopharma
Tarsus Medical
TearClear
Trukera
Vial
Viatris
Visant Medical
Vital Tears

Dry Eye Disease

- 42% of patients complain of symptoms that would indicate DED (60-80M people)
- 30-50 Million in the North America based on longitudinal studies
- 16-18 Million diagnosed with DED

OSD in CL Wearers

- Symptoms of dryness and discomfort are highly prevalent (up to 50%) among contact lens wearers and are the **most commonly cited reason** for the discontinuation of contact lens wear.¹
- 59% of CL wearers were found to have clinically significant MGD.²

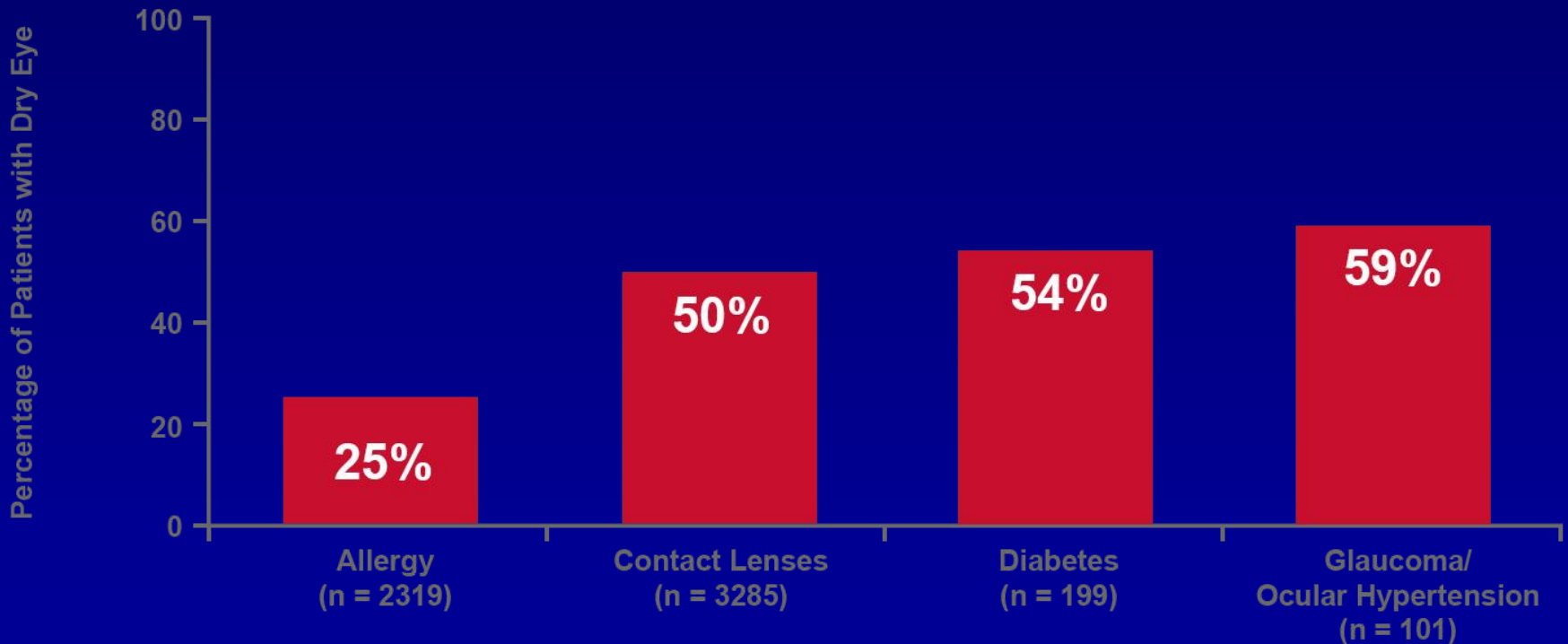
1. Blackie C. A single vectored thermal pulsation treatment for meibomian gland dysfunction increases mean comfortable contact lens wearing time by approximately 4 hours per day. *Clinical Ophthalmology* 2018; 12, 169-83.

2. Machalińska A, et al. Comparison of Morphological and Functional Meibomian Gland Characteristics Between Daily Contact Lens Wearers and Nonwearers. *Cornea*. 2015 Sep;34(9):1098-104.

Dry Eye and Other Conditions

Dry eye disease is common among patients with other conditions

Prevalence of Dry Eye in Patients With Various Conditions



1. Moss SE, et al. Optom Vis Sci. 2008;85(8):668-74;

2. Doughty MJ, et al. Optom Vis Sci. 1997;74(8):624-31;

3. Manaviat MR, et al. BMC Ophthalmol. 2008;8:10; 4. Leung EW, et al. J Glaucoma. 2008;17(5):350-5.

4. Leung EW, Medeiros FA, Weinreb RN. Prevalence of ocular surface disease in glaucoma patients. J Glaucoma. 2008;17(5):350-355.

The Impact of DED on Cataract Surgery Outcomes

- 63% of pre-cataract surgical patients had a TBUT of less than 5 seconds. 1
- Patients who had osmolarity scores within normal limits were within a half diopter of intent, whereas 17% of those with hyperosmolarity would have missed their IOL calculation by more than a diopter. 2

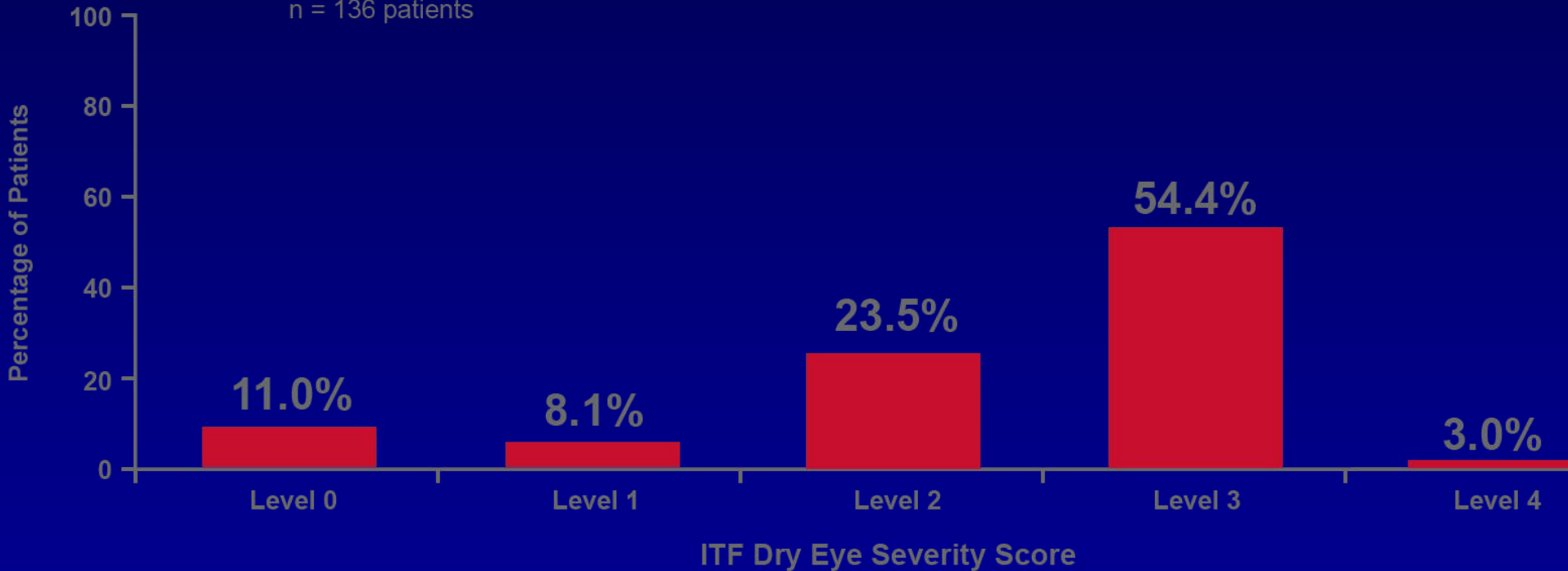
1. Trattler WS, Majmudar PA, Donnenfeld ED, McDonald MB, Stonecipher KB, Goldberg DF. The prospective health assessment of cataract patient (PHACO) study: the effect of dry eye. Clin Ophthalmol. 2017; 11:1423-1430.

2. Epitropoulos AT, Matossian C, Berdy GJ, et al. Effect of tear osmolarity on repeatability of keratometry for cataract surgery planning. Journal Cataract Refract Surg. 2015 Aug;41(8):1672-7.

Dry Eye Prevalence in Patients Scheduled for Cataract Surgery¹

80% of Patients Had Dry Eye Severity Score of Level 2 or Higher

n = 136 patients



- 22.1% of patients had previously received a diagnosis of Dry Eye Disease
- 80.9% of patients had an ITF Dry Eye Level 2* or higher, based on the presence of signs and symptoms

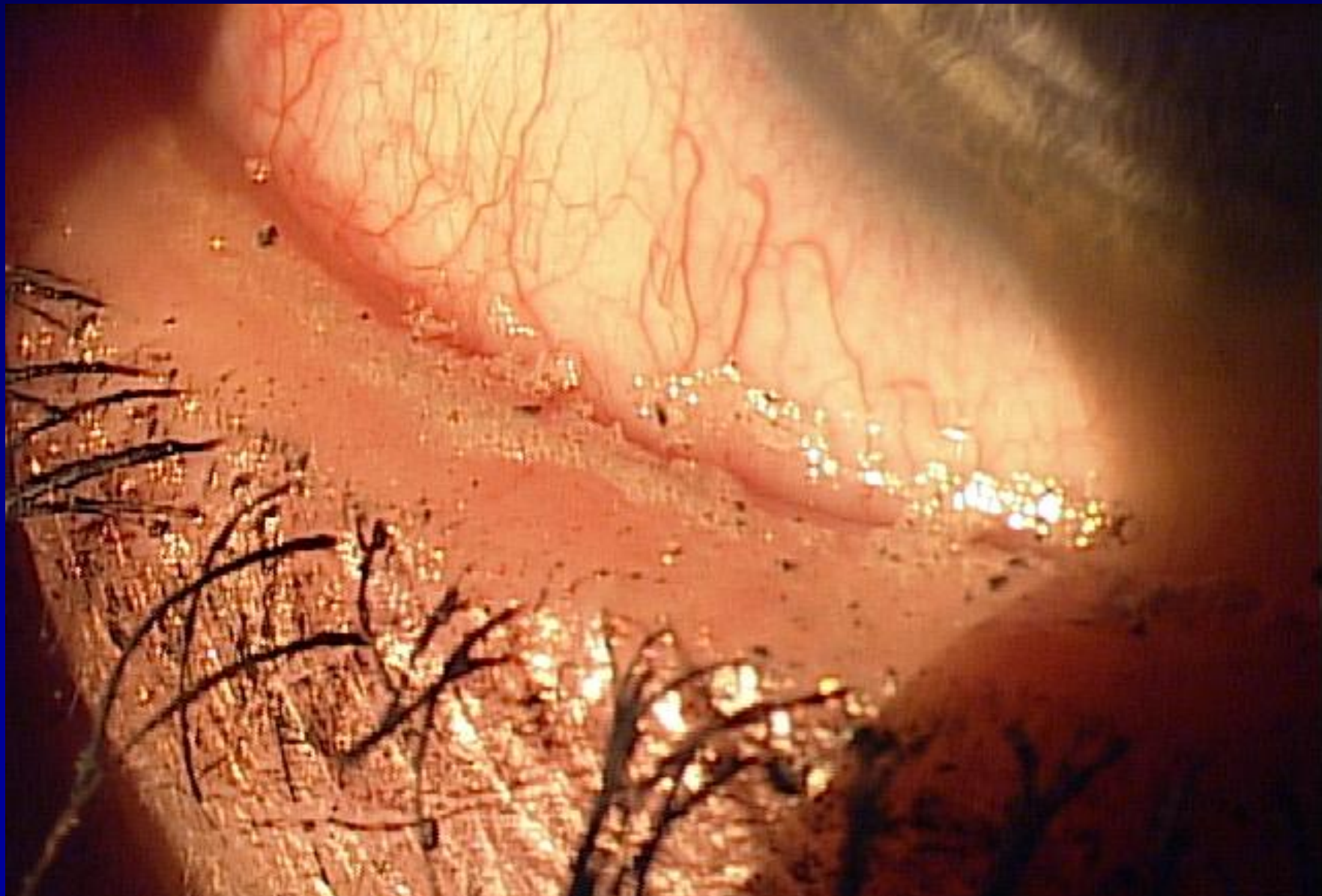
* An ITF level of 2 indicates moderate Dry Eye.

1. Trattler WB, et al. Clinical Study Report: Cataract and Dry Eye: prospective health assessment of cataract patients ocular surface study. 2010. (Unpublished study).

Ocular Surface Disease
Survival Guide for
Everyday Practice:

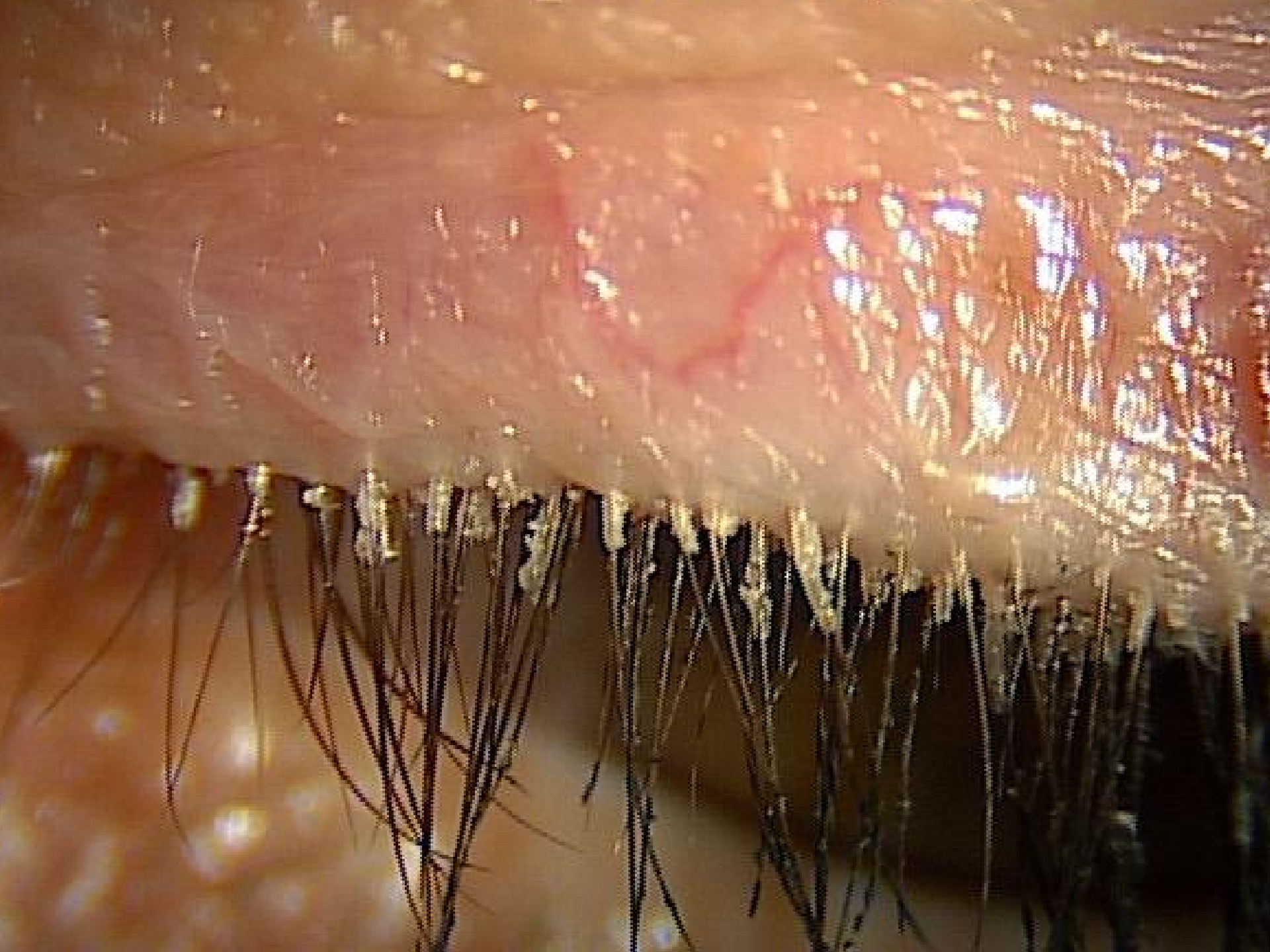
Begin with the Lid in
Mind

Frothy / Foamy Tears - MGD



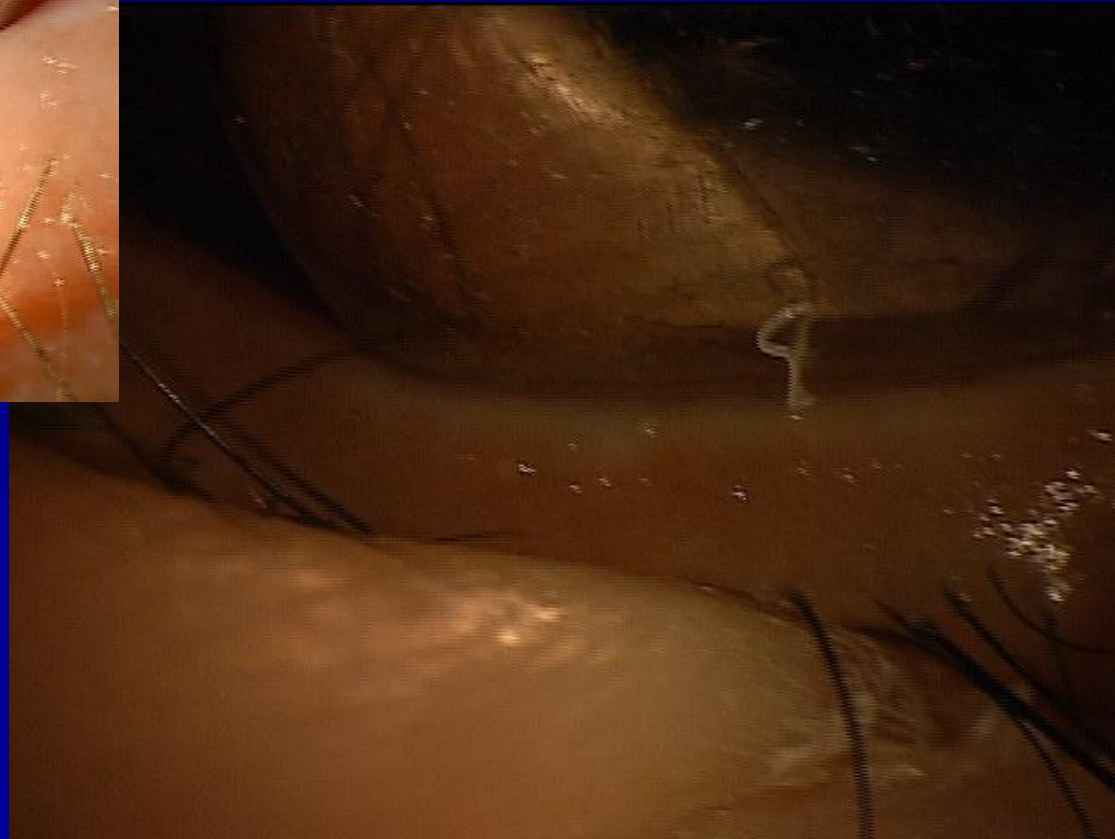
Significant Signs of Blepharitis

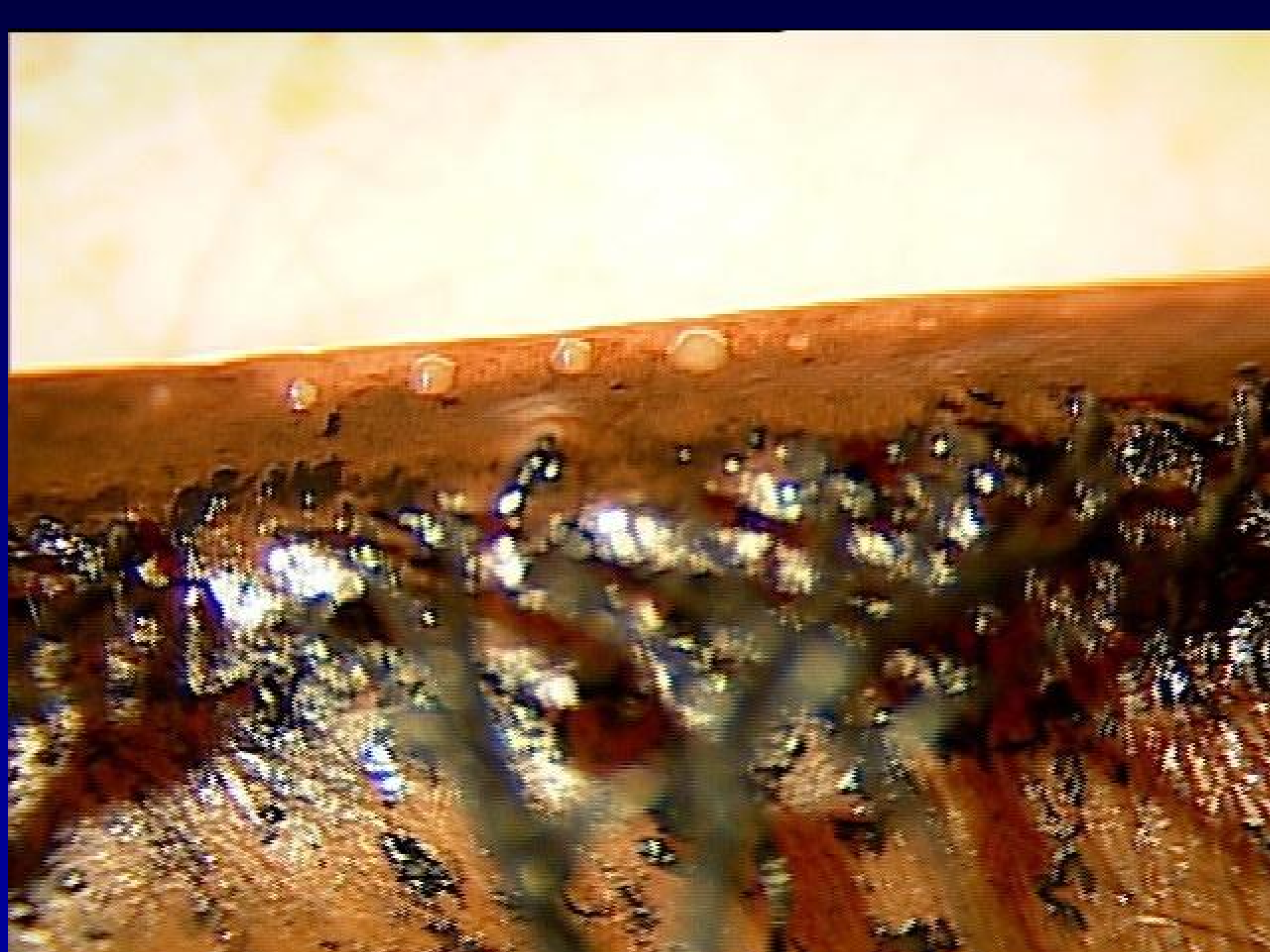




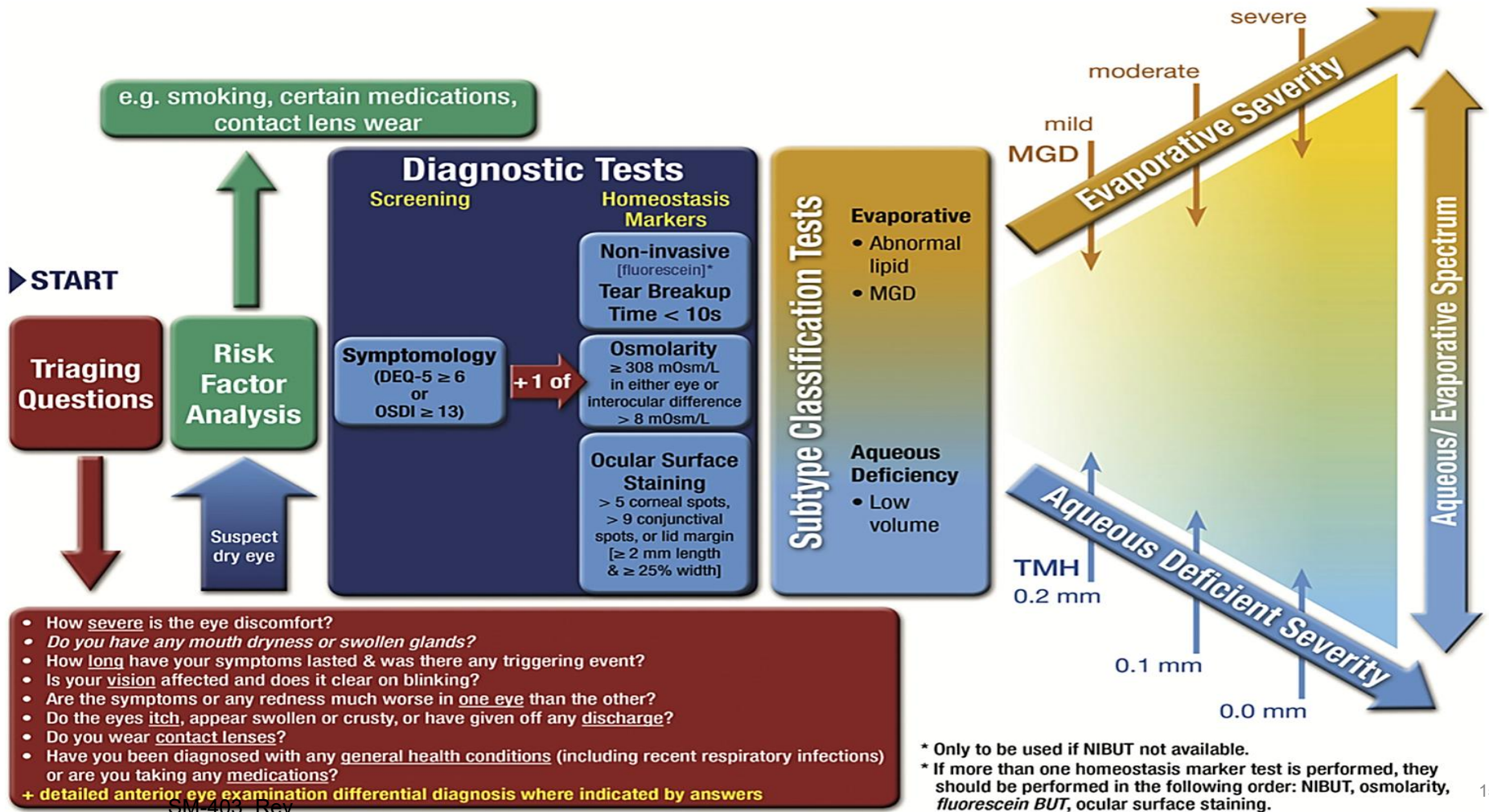


MG Expression





Straight Forward Diagnostic Methodology



SM-400, Rev

e.g. smoking, certain medications, contact lens wear

▶ **START**

Triaging Questions

Risk Factor Analysis

Suspect dry eye

Diagnostic Tests

<p>Screening</p> <p>Symptomatology (DEQ-5 \geq 6 or OSDI \geq 13)</p>	<p>Homeostasis Markers</p> <p>Non-invasive [fluorescein]* Tear Breakup Time < 10s</p> <p>Osmolarity \geq 308 mOsm/L in either eye or interocular difference > 8 mOsm/L</p> <p>Ocular Surface Staining > 5 corneal spots, > 9 conjunctival spots, or lid margin (\geq 2 mm length & \geq 25% width)</p>
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+ 1 of

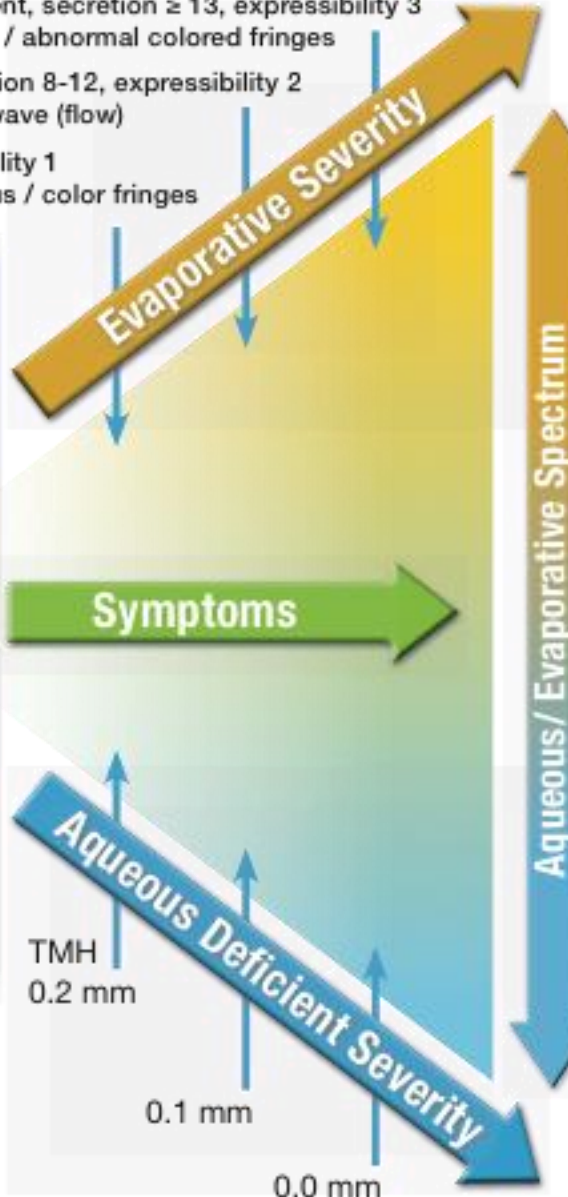
Subtype Classification Tests

<p>Evaporative</p> <ul style="list-style-type: none"> Abnormal lipid MGD 	<p>Aqueous Deficiency</p> <ul style="list-style-type: none"> Low volume
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MGD lid margin drop-out, displacement, secretion \geq 13, expressibility 3 + lipid pattern absent / globular / abnormal colored fringes

plugging, vascularity, secretion 8-12, expressibility 2 + lipid pattern meshwork / wave (flow)

secretion 4-7, expressibility 1 + lipid pattern amorphous / color fringes



- How severe is the eye discomfort?
 - Do you have any mouth dryness or swollen glands?
 - How long have your symptoms lasted & was there any triggering event?
 - Is your vision affected and does it clear on blinking?
 - Are the symptoms or any redness much worse in one eye than the other?
 - Do the eyes itch, appear swollen or crusty, or have given off any discharge?
 - Do you wear contact lenses?
 - Have you been diagnosed with any general health conditions (including recent respiratory infections) or are you taking any medications?
- + detailed anterior eye examination differential diagnosis where indicated by answers



* only to be used if NIBUT not available and if so, after osmolarity

5 Triaging Questions from OD Summit



Do your eyes ever feel irritated, dry or burn?



Are your eyes red?



Do you experience blurred vision especially fluctuating vision?



Do you use or have the urge to use artificial tears?



How much time to you spend on digital devices per day?

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e.g. smoking, certain medications,
 contact lens wear

▶ **START**

Triaging Questions

Risk Factor Analysis

Diagnostic Tests

Screening

Symptomatology
 DEQ-5 ≥ 6
 or
 OSDI ≥ 13

+ 1 of

Homeostasis Markers

Non-invasive [fluorescein]*
Tear Breakup Time < 10s

Osmolarity
 ≥ 308 mOsm/L
 in either eye or
 interocular difference
 > 8 mOsm/L

Ocular Surface Staining
 > 5 corneal spots,
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 ≥ 2 mm length & $\geq 25\%$ width]

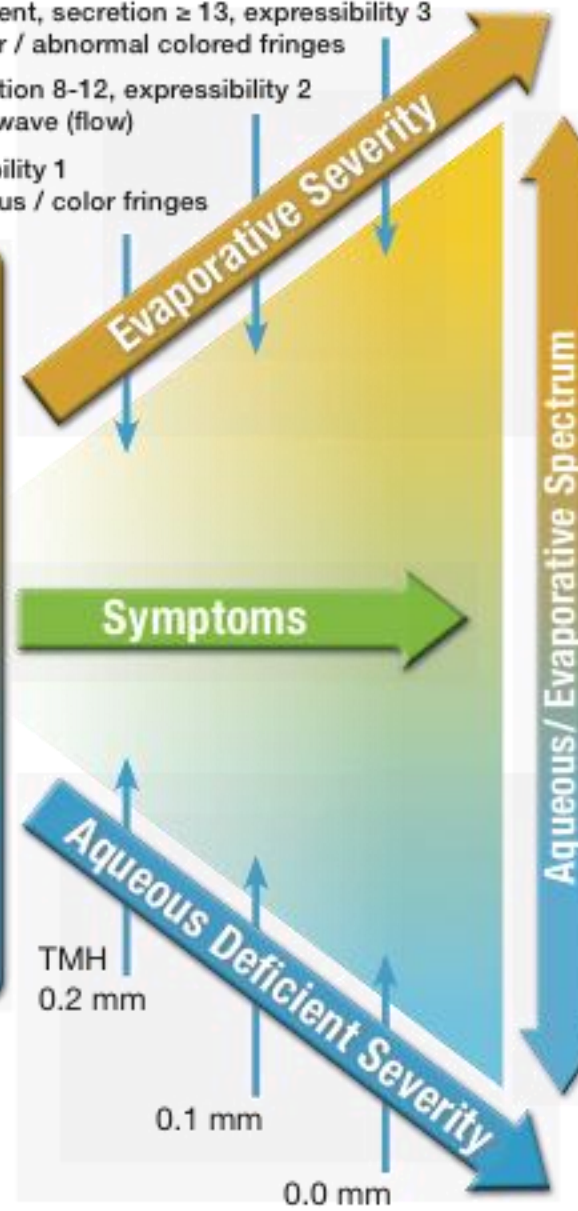
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Risk Factors for Dry Eye Disease



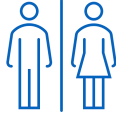
Systemic Medications



Topical Medications



Age



Gender



Contact Lens Wear



Ocular Surgery



Environment



Digital Devices



Systemic Disease



Smoking



Certain Anterior Segment Diseases

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Triaging Questions

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Non-invasive
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Diagnostic Tests

Screening

Homeostasis Markers

Subtype Classification Tests

Evaporative

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Symptoms

Aqueous Deficient Severity

TMH
 0.2 mm

0.1 mm

0.0 mm

Evaporative Severity

Aqueous/ Evaporative Spectrum

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Questionnaires

DEQ-5

OSDI

SPEED

QUESTIONNAIRE

Very often

Often

Sometimes

Rarely



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+ of

Homeostatic Markers

Non-invasive (fluorescein)*
 Tear Breakup Time < 10s

Osmolarity ≥ 308 mOsm/L in either eye or interocular difference > 8 mOsm/L

Ocular Surface Staining
 > 5 corneal spots, > 9 conjunctival spots, or lid margin (≥ 2 mm length & $\geq 25\%$ width)

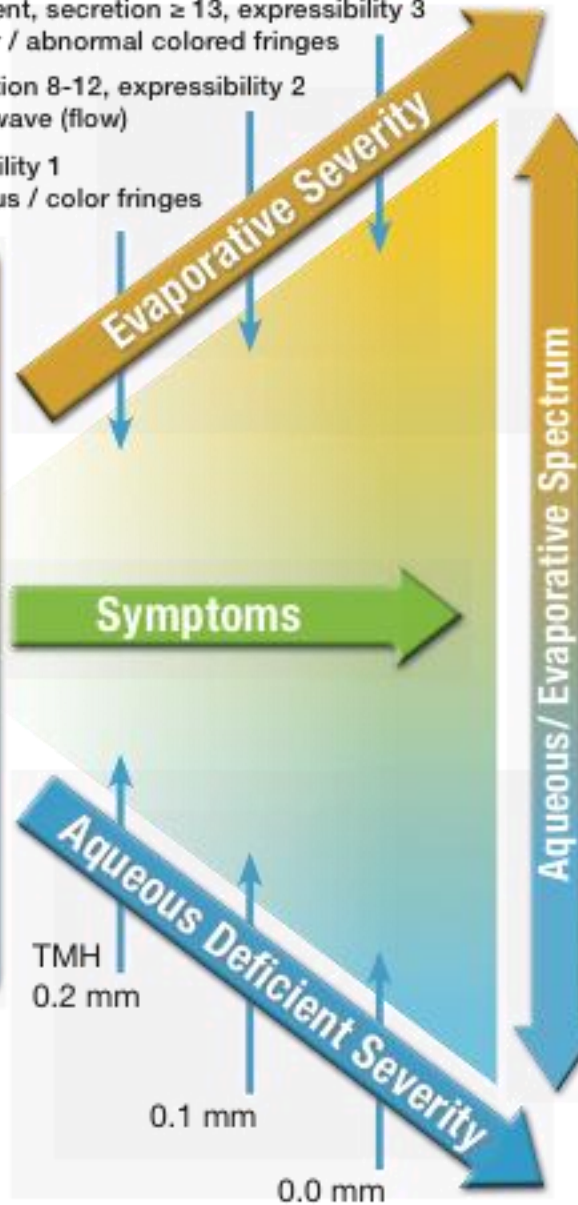
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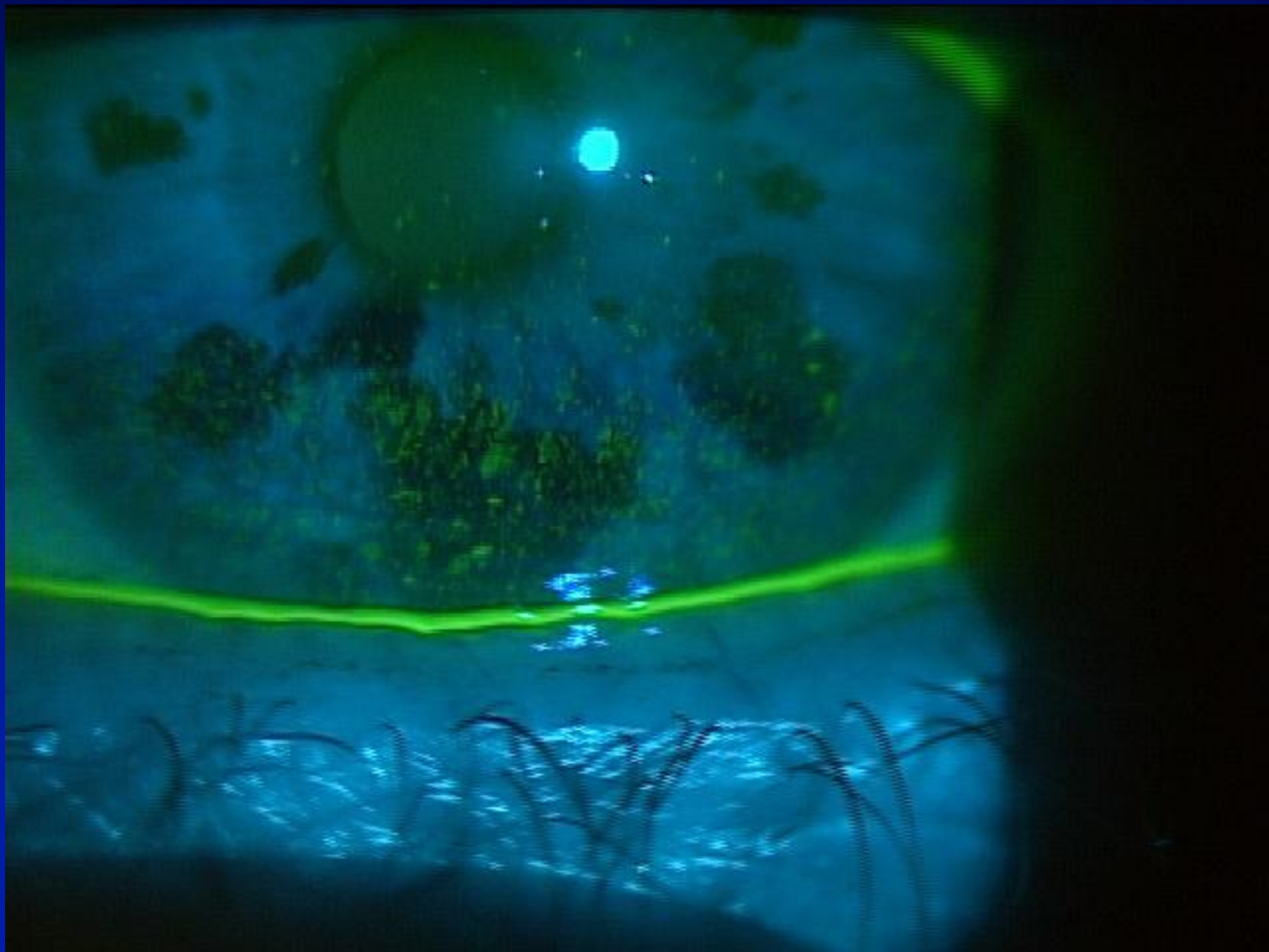


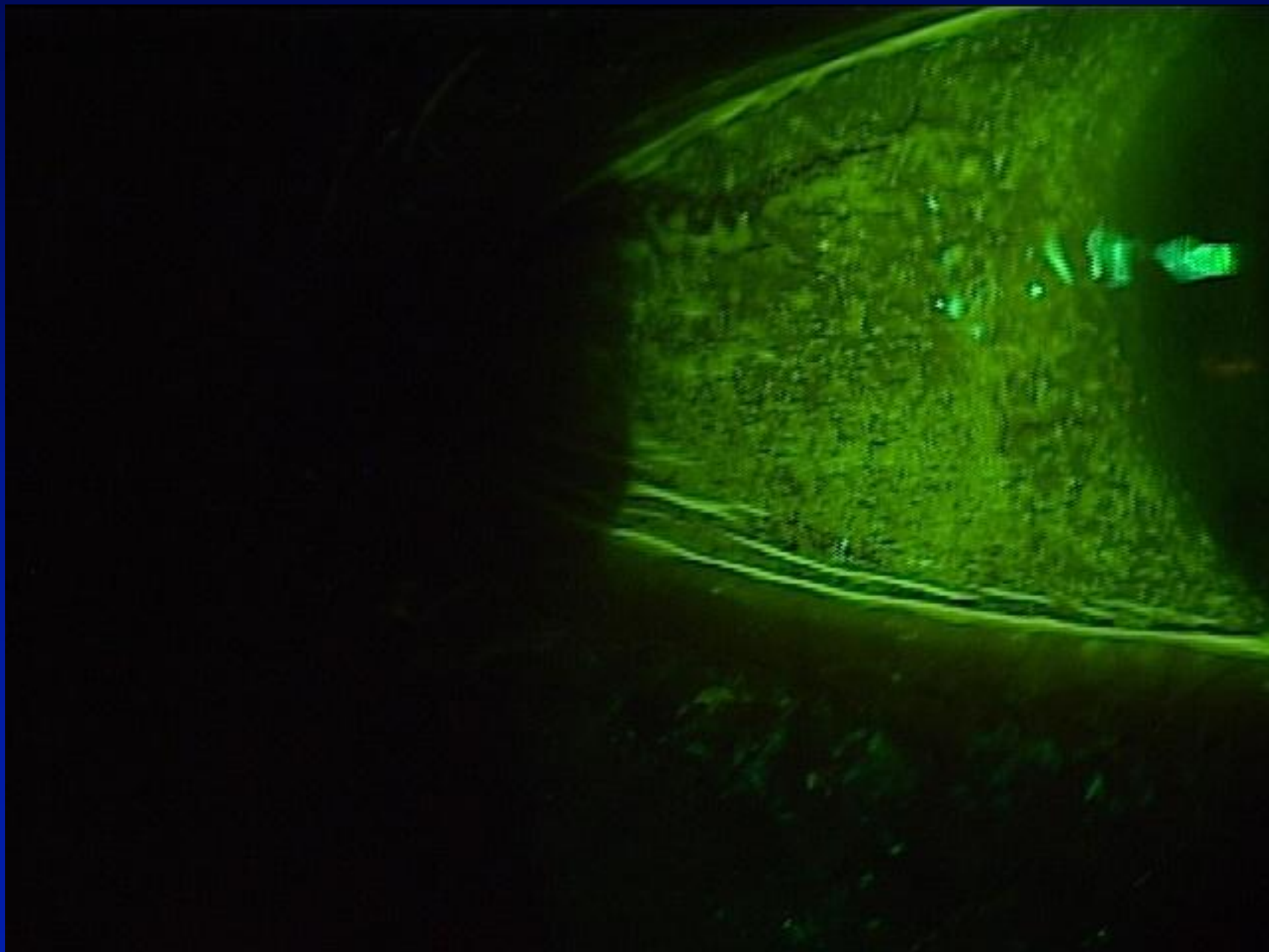
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Identify the Sub-
type of DED

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Risk Factor Analysis

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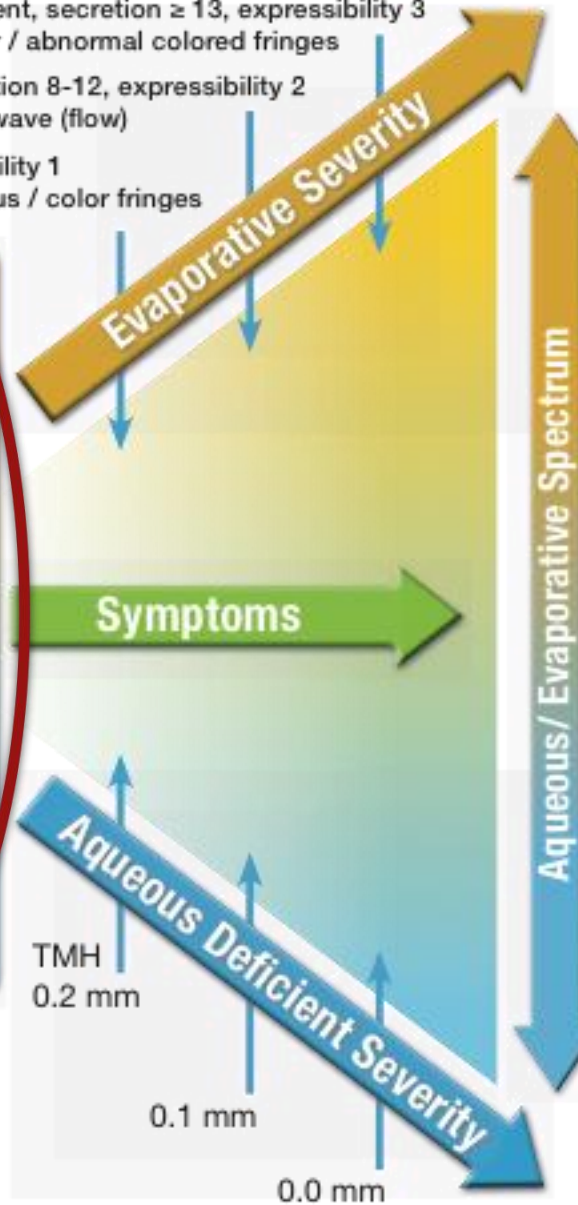
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Screening	Homeostasis Markers
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subtype Classification Tests

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- Aqueous Deficiency**
 - Low volume



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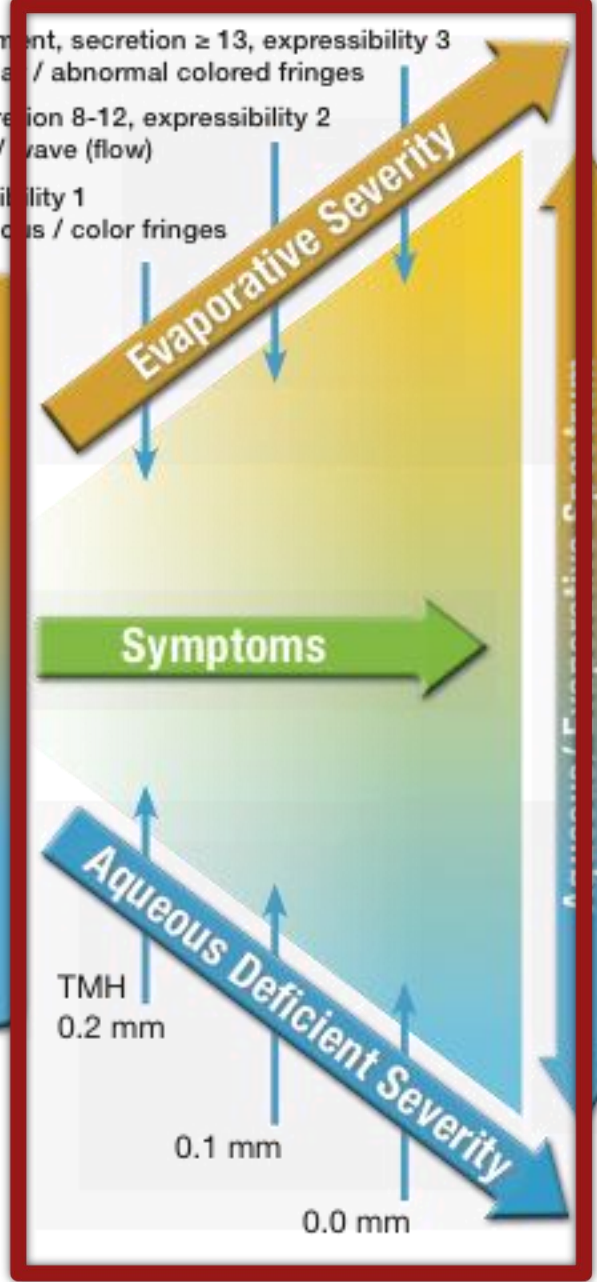
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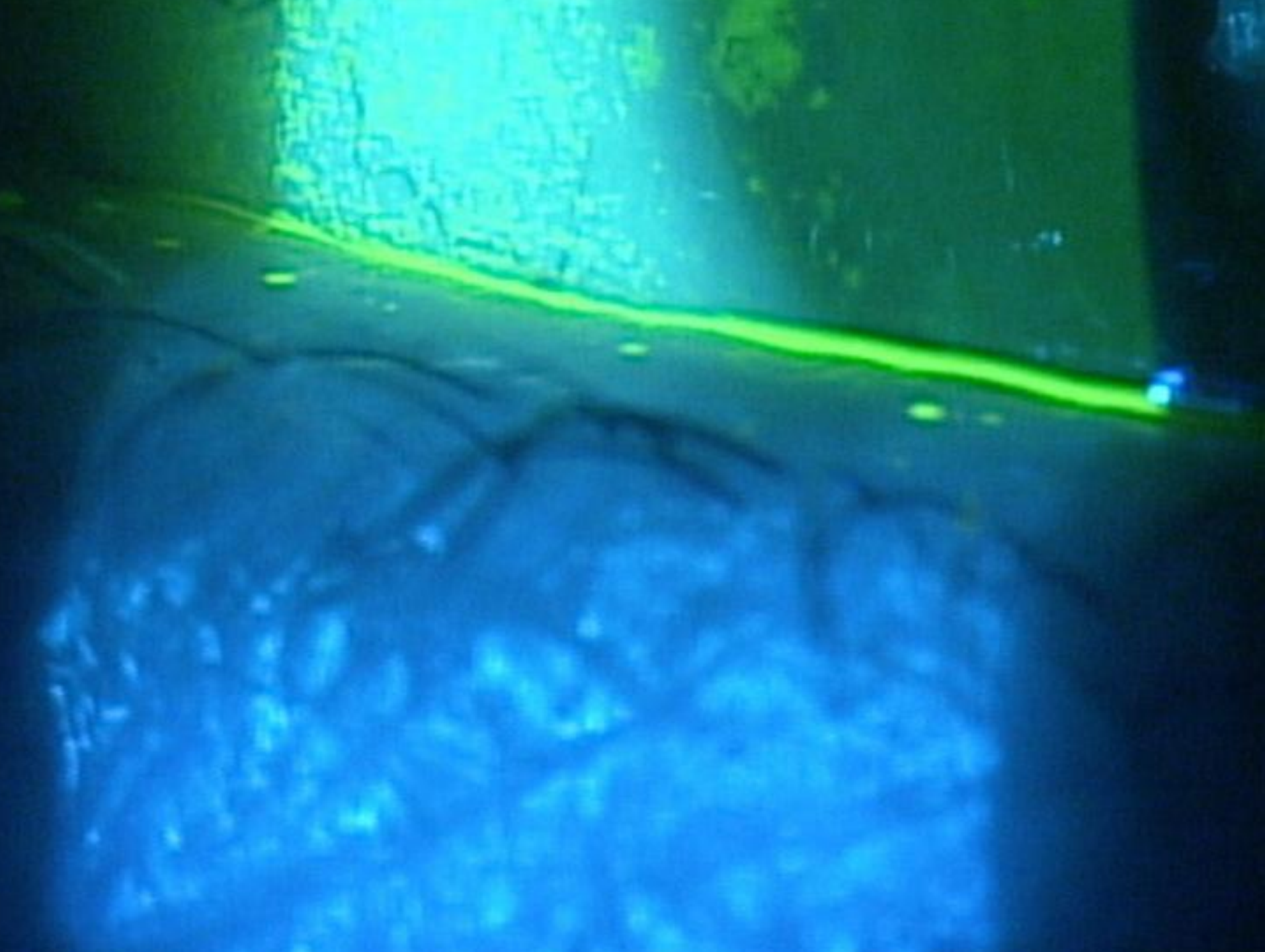


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Diagnostic Summary

1. Questionnaires
2. Global test for homeostasis
 - Ocular surface staining or
 - TFBUT or
 - Osmolarity
3. Subtype
 - MG Expression
 - Meniscus height

In Chronological Order

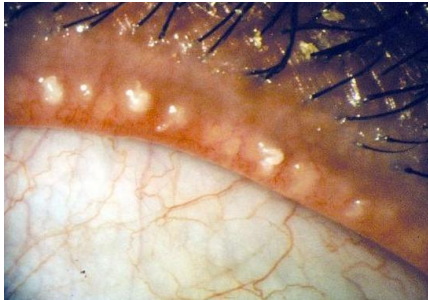
1. Symptoms (most significant and when)
2. Eyelid assessment with MG expression
3. Ocular surface staining with NAFL (#15 yellow Wratten filter)
 - TFBUT
 - Corneal stain
 - Conjunctival stain

KB Light Test



ALGORITHM for EVAPORATIVE DRY EYE

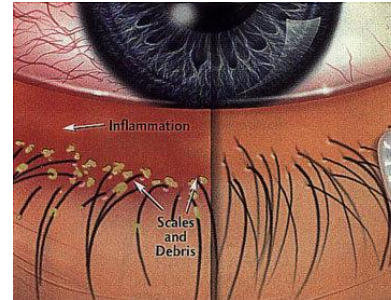
OBSTRUCTION



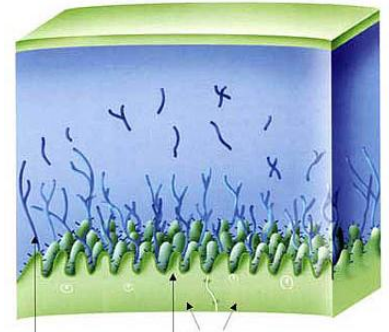
BLEPHARITIS



INFLAMMATION



TEAR FILM



Perflourohexyloctane

Indication

perfluorohexyloctane ophthalmic solution is a semifluorinated alkane indicated for treatment of the signs and symptoms of dry eye disease.

Important Safety Information

- Should not be administered while wearing contact lenses. Contact lenses should be removed before use and for at least 30 minutes after administration
- Instruct patients to instill one drop of PFHO into each eye four times daily
- The safety and efficacy in pediatric patients below the age of 18 have not been established
- The most common ocular adverse reaction was blurred vision (1% to 3% of patients reported blurred vision and conjunctival redness)

Single-ingredient Formulation

100% perfluorohexyloctane

- No inactive ingredients

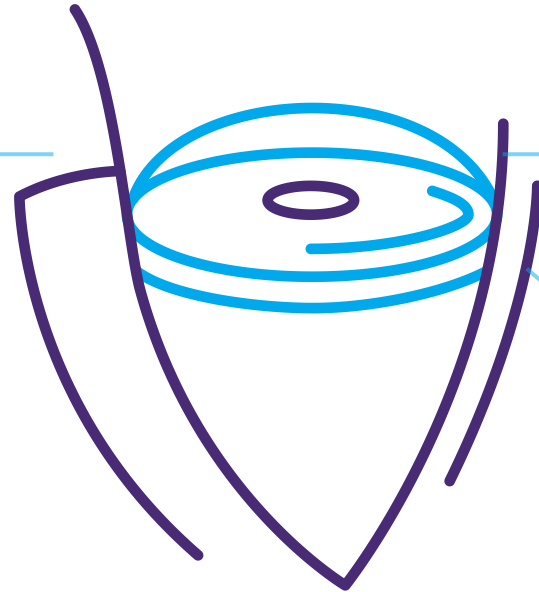


- Water free
- Preservative free
- Steroid free

PFHO Inhibits Evaporation

Mimics key functions of **natural meibum**^{1,2}

Promotes **healing** on the ocular surface⁴⁻⁶



Remains in tears for up to **6 hours** (PK rabbit study)^{2,3}

Reduces friction^{5,7}

MIEBO FORMS A MONOLAYER at the air-tear interface, which can be expected to reduce evaporation.

An in vitro study showed that MIEBO was **4X** more effective at inhibiting evaporation compared with meibum lipids.¹

PFHO Demonstrated Rapid and Sustained Relief

In 2 large clinical trials where 100% of participants had clinical signs of MGD

Improvement in the Signs and Symptoms of DED

at Day 57 (primary endpoint) and Day 15 (secondary endpoint)

- ✓ Total corneal fluorescein staining
- ✓ Eye dryness score (visual analog scale)

Excellent Tolerability

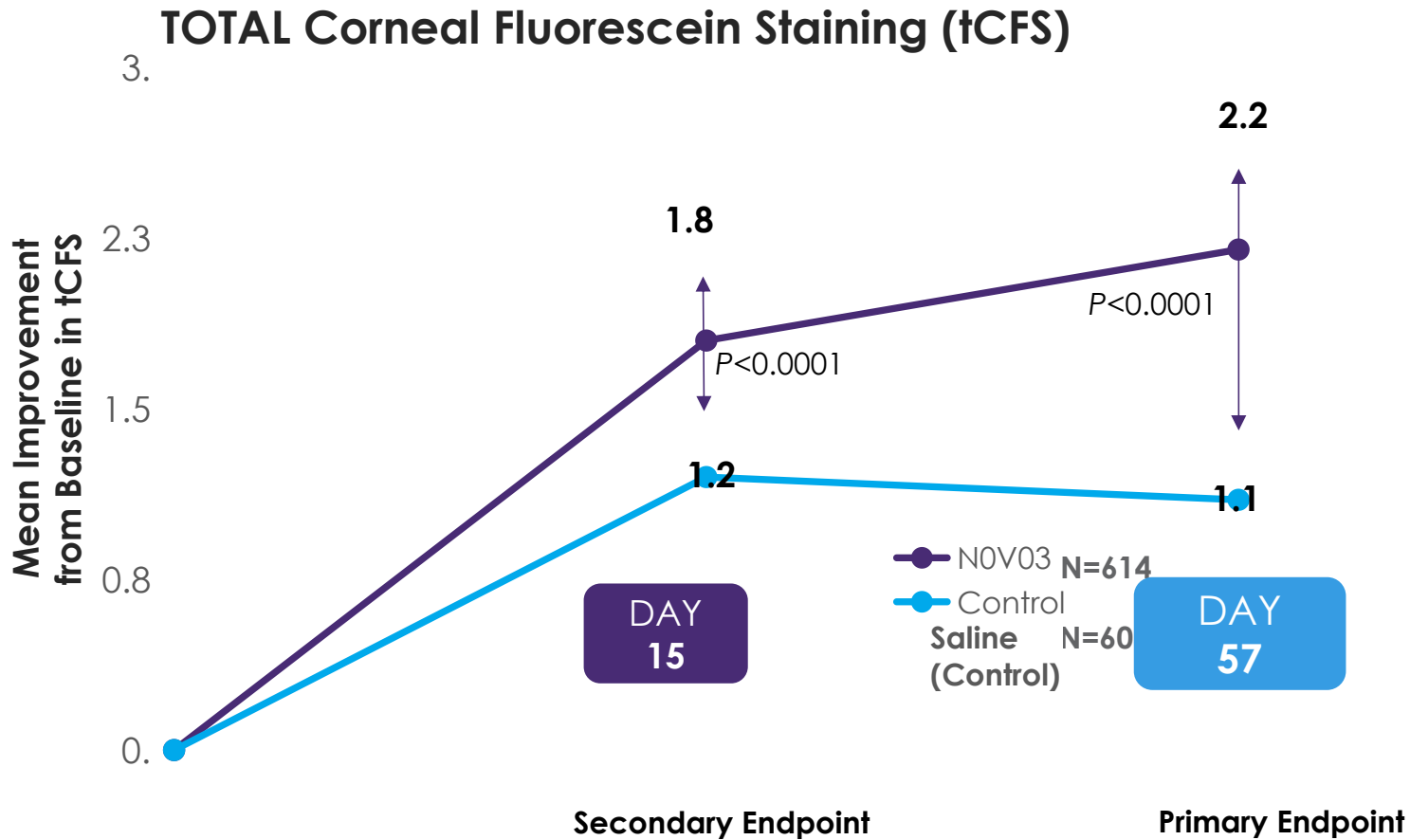
No serious ocular AEs

Low discontinuation rate due to AEs

Low rate of burning or stinging

Only 1 ocular AE with an incidence $\geq 2\%$ (blurred vision, 2.1%)

Rapid and Sustained Improvement in Total Corneal Staining as Early as Day 15 Through Day 57



Pooled data | tCFS Grading Scale: 0-15 (0-3 in each of 5 areas)

Mean Baseline = 6.9

At day 57, Mean (SD) CFB

GOBI: -2.0 (2.6) for MIEBO (n=289) vs -1.0 (2.7) for saline (n=279) (P < 0.001)

MOJAVE: -2.3 (2.8) for MIEBO (n=302) vs -1.1 (2.9) for saline (n=296) (P < 0.001)

An Excellent Tolerability Profile

In 2 pivotal clinical studies of >1200 patients (>600 treated with PFHO)



**Serious
ocular AEs**



**Low rate of
discontinuation
due to AEs**



**Low rate of
burning or
stinging**



**There was one
ocular AE with an
incidence $\geq 2\%$
(blurred vision)**

PFHO Offers a Comfortable Experience



Small drop size (11 μL) means **MIÉBO may feel different** from formulations containing water

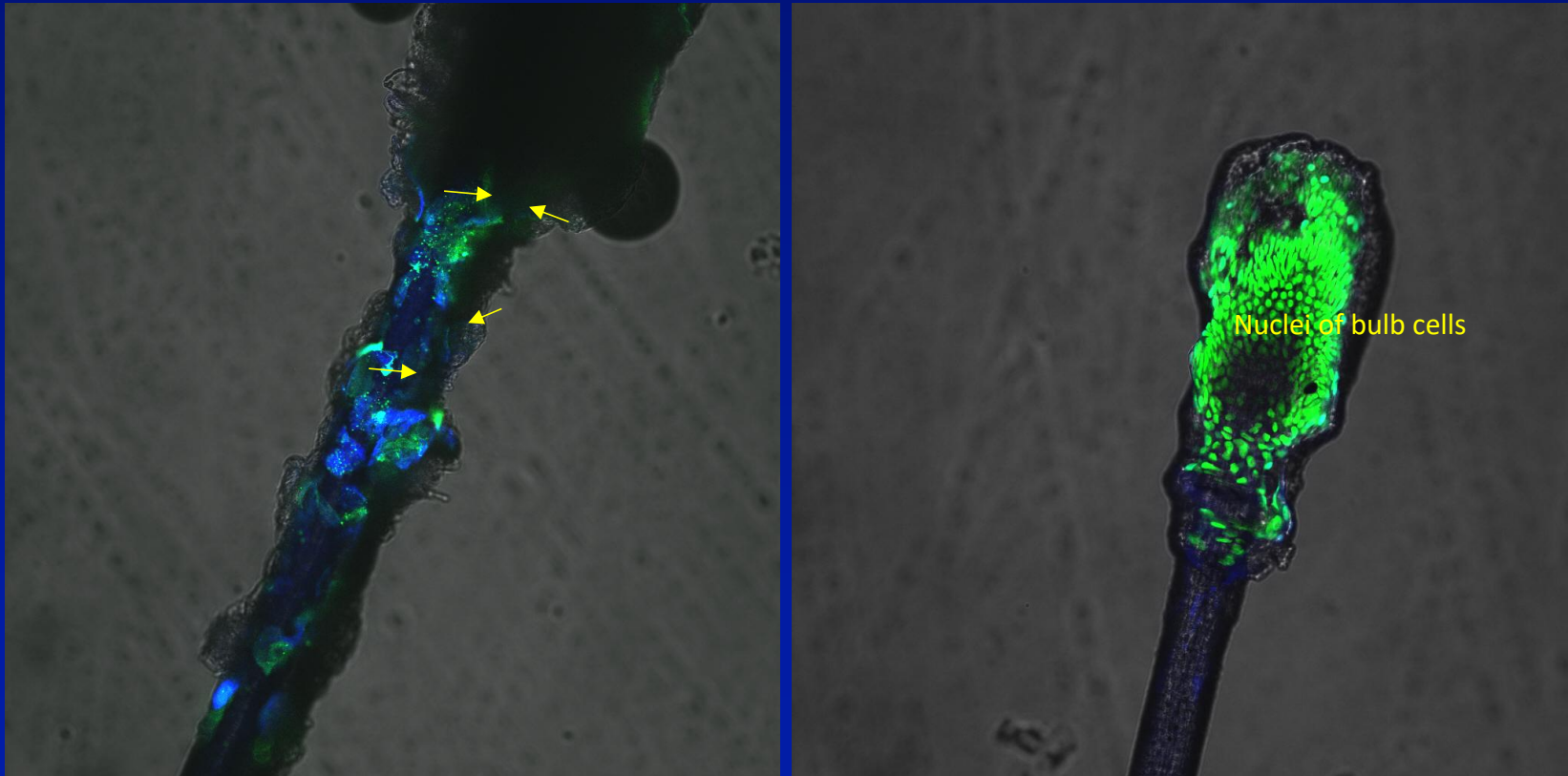


There may be **no ocular sensation or blink reflex** upon instillation

Kentucky Eye Institute



Bacterial Biofilm in Lash Follicles

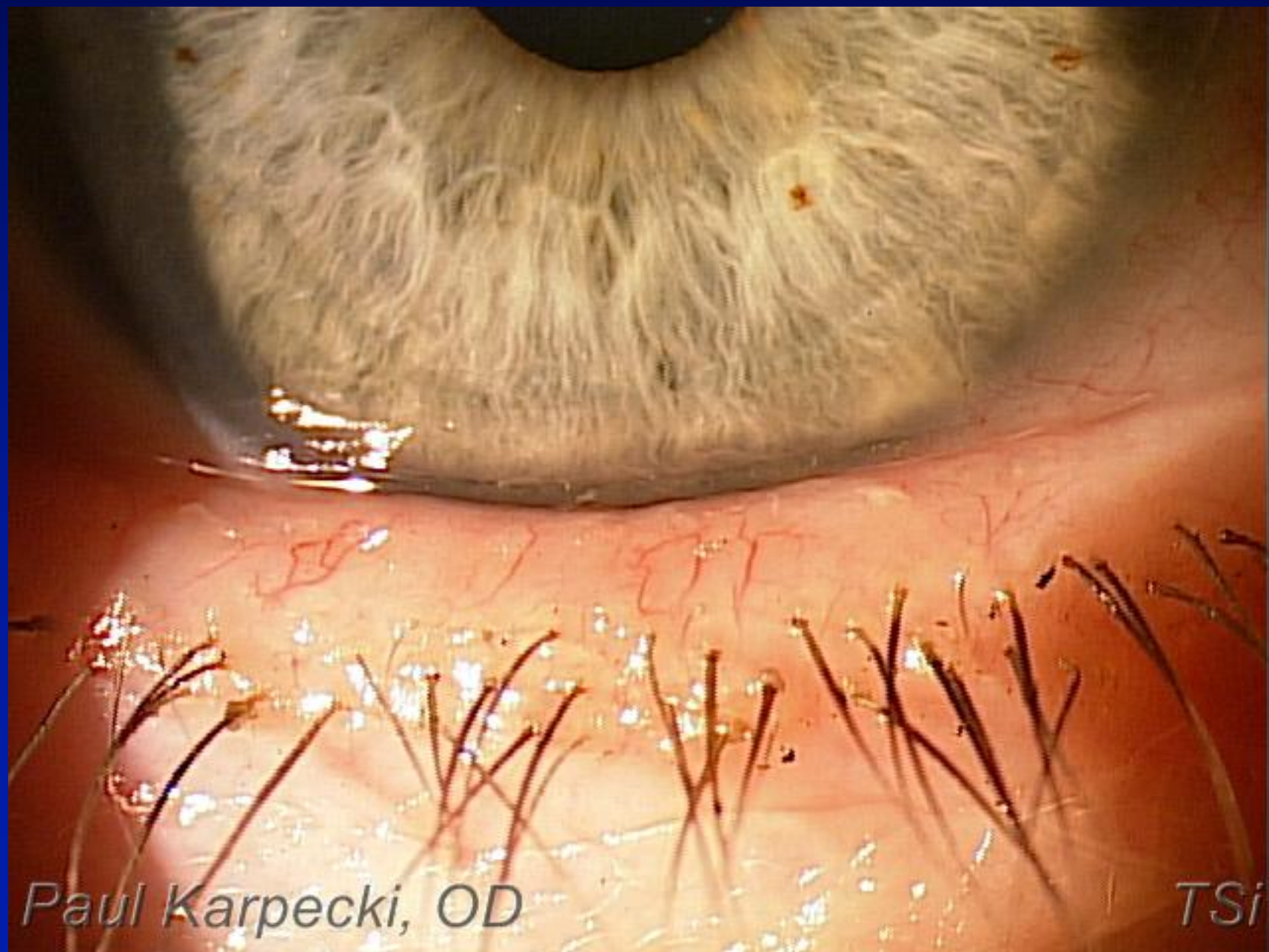


IPL and LLLT

- Intense Pulsed Light Therapy and Low Level Light Therapy
- Clear association between DED and lid margin inflammatory disease
- Widely accepted as a treatment for dermatological rosacea
- More than 80% of patients with rosacea have MGD
- 20% have ocular signs first

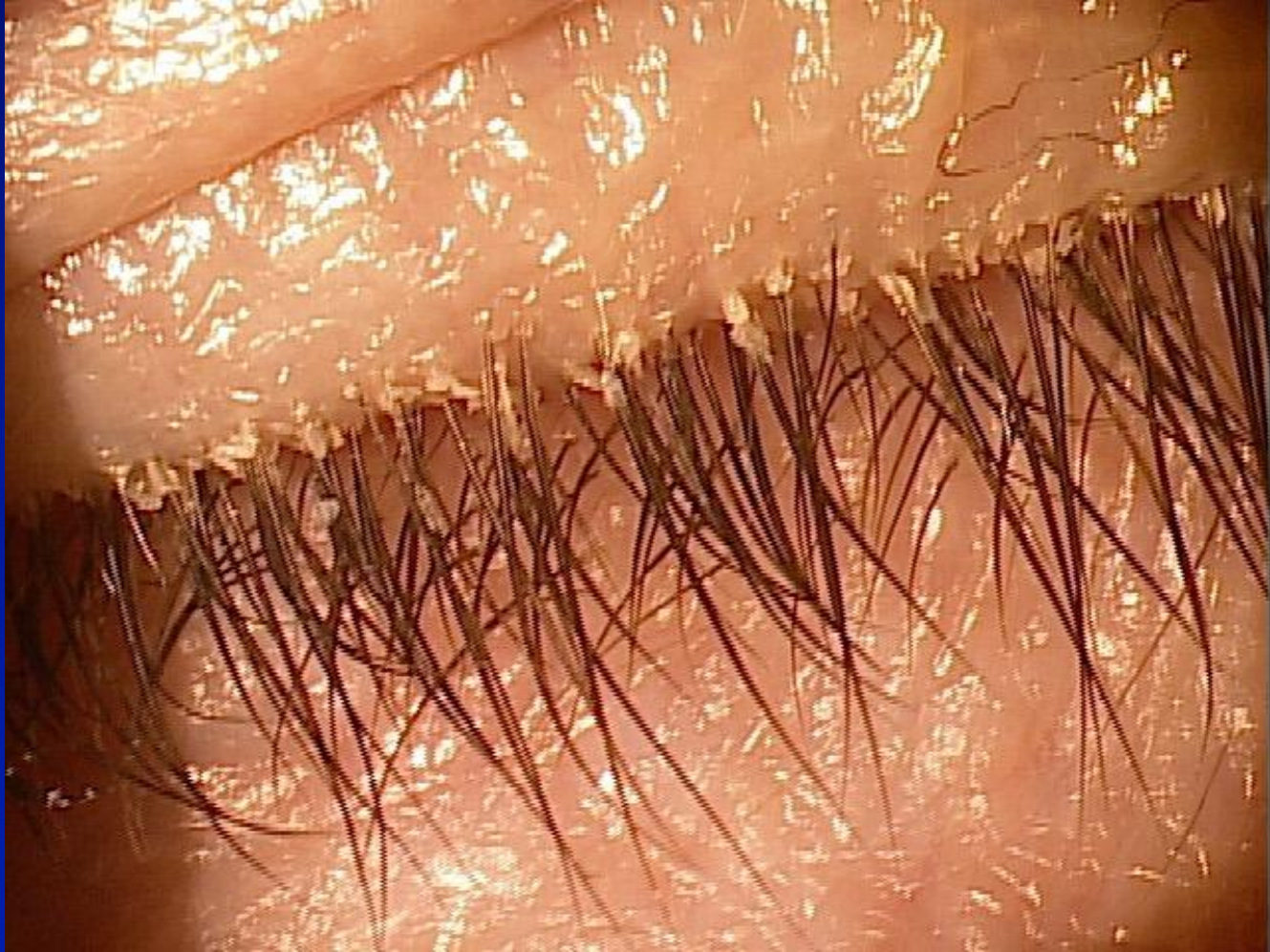
IPL and LLLT

- Telangiectatic vessels and skin erythema release inflammatory mediators
- IPL targets the abnormal erythematous blood vessels
- Affects mitochondrial activity
- Temperature effect on glands?
- Photomodulation affecting cytochrome C or activating fibroblasts and collagen synthesis



Paul Karpecki, OD

TSi



TREATMENT: Demodex



CONSISTS OF A PHASE 1 (WITH A SPECIFIC BLUE LIGHT MASK) AND A PHASE 2 (WITH THE STANDARD

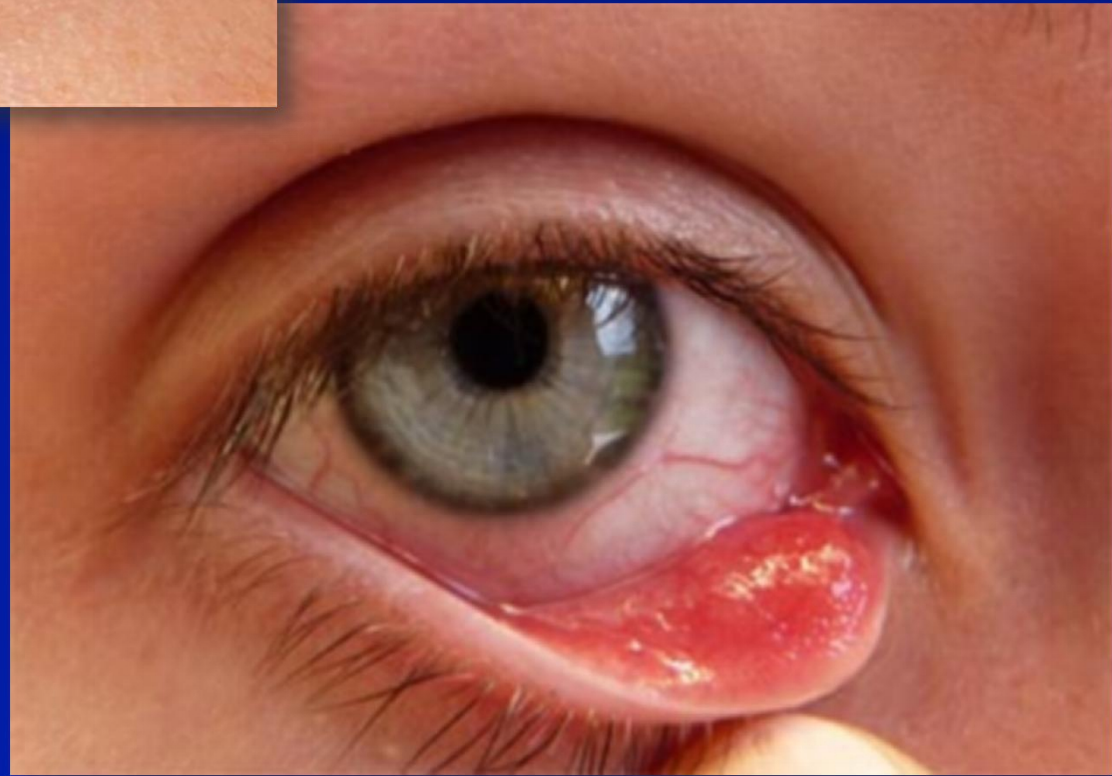
PHASE 1 – BLUE MASK

Blue light stimulates porphyrins and creates an anti-bacterial action.

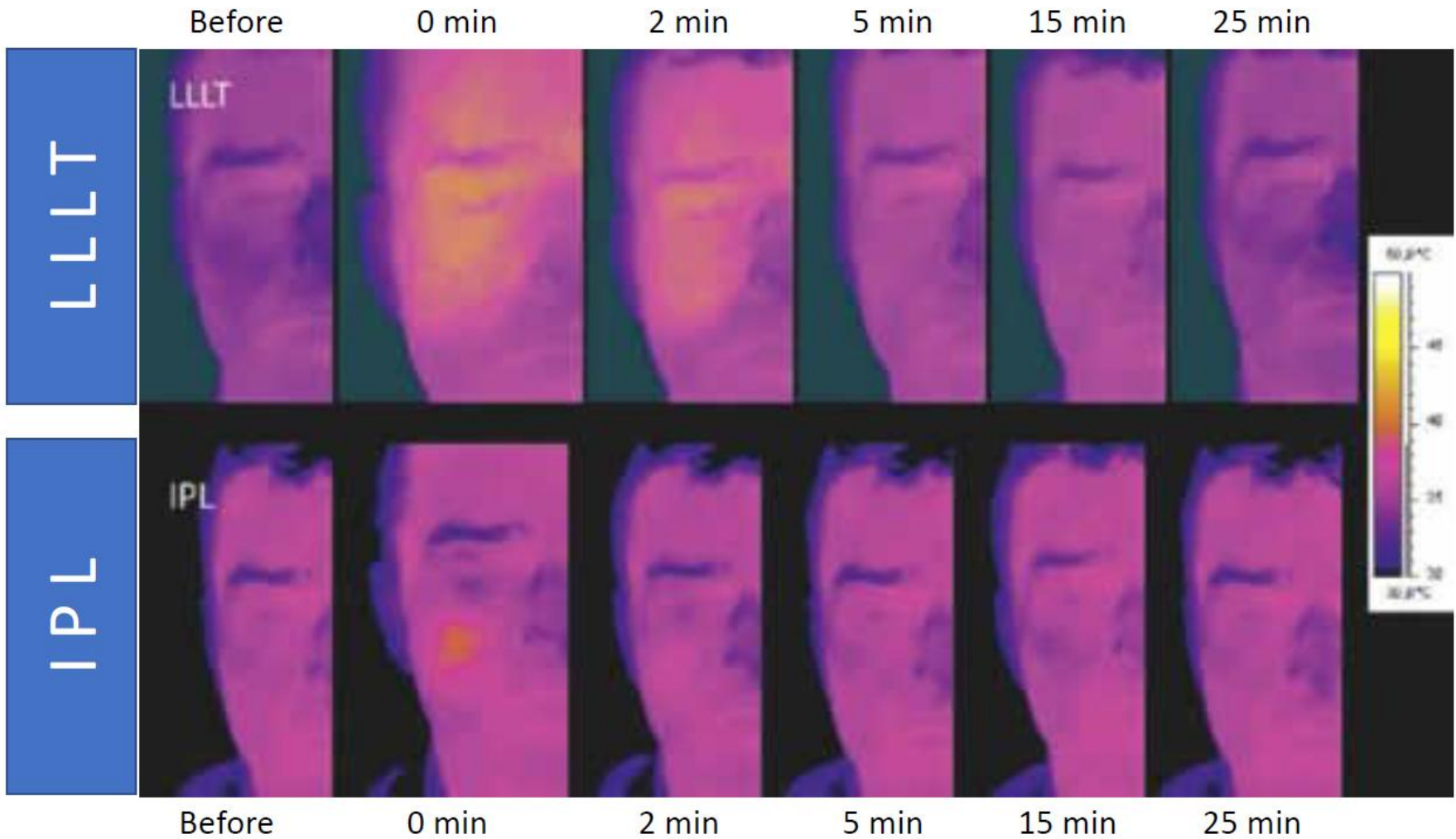
PHASE 2 – RED MASK

Red light stimulates ATP by increasing and improving cellular activity, it reduces inflammation and oedema and works on Meibomian glands.

HORDEOL
A,
CHALAZIA
& MGD



Endogenous Heat



Pult, H. Messung der Hauttemperatur nach Intense Pulse Light (IPL)-Anwendung sowie Low-Level-Light-Therapie (LLLT). die KONTAKTLINSE 4/2020.

Endogenous Heat

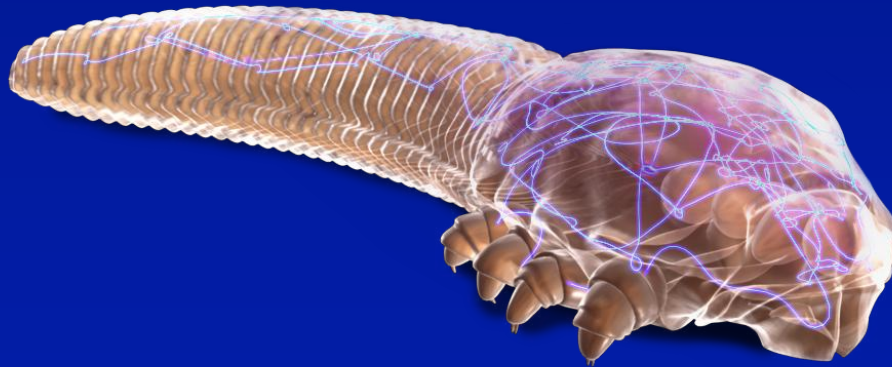
		Temperatures At Times After Treatment						Standard deviation and the p-values at specific times				
		Before	T = 0 min	T = 2 min	T = 5 min	T = 15 min	T = 25 min	T = 0 min	T = 2 min	T = 5 min	T = 15 min	T = 25 min
IPL	Lower Lid	36.2°C ±0.72	35.7°C ±0.64	35.8°C ±0.60	36.0°C ±0.71	35.9°C ±0.69	36.1°C ±0.68	p=0.028	p=0.100	p=0.270	p=0.177	p=0.326
	Upper Lid	36.5°C ±0.65	36.3°C ±0.69	36.7°C ±0.67	36.4°C ±0.73	36.5°C ±0.66	36.1°C ±0.72	p=0.257	p=0.253	p=0.371	p=0.500	p=0.103
	Cheek	35.5°C ±0.70	39.6°C ±0.72	37.1°C ±0.59	35.7°C ±0.68	35.6°C ±0.70	35.5°C ±0.71	p<0.001	p<0.001	p=0.262	p=0.320	p=0.323
		36.0°C	37.6°C	36.5°C	35.9°C	36.1°C	35.8°C	p<0.001	p=0.016	p=0.316	p=0.316	p=0.171
	Temple	±0.67	±0.68	±0.63	±0.65	±0.64	±0.66					
LLLT	Lower Lid	35.9°C ±0.69	40.4°C ±0.58	39.6°C ±0.60	37.1°C ±0.72	36.5°C ±0.63	35.3°C ±0.72	p<0.001	p<0.001	p<0.001	p=0.006	p=0.042
	Upper Lid	36.2°C ±0.65	41.8°C ±0.65	40.7°C ±0.67	37.5°C ±0.69	37.5°C ±0.67	36.1°C ±0.70	p<0.001	p<0.001	p<0.001	p<0.001	p=0.371
	Cheek	35.4°C ±0.79	39.8°C ±0.75	38.8°C ±0.63	36.7°C ±0.67	36.5°C ±0.71	36.1°C ±0.76	p<0.001	p<0.001	p<0.001	p<0.001	p=0.012
		35.0°C	37.7°C	37.1°C	36.1°C	36.1°C	35.6°C	p<0.001	p<0.001	p<0.001	p<0.001	p=0.025
	Temple	±0.73	±0.70	±0.69	±0.70	±0.65	±0.69					

Pult, H. Messung der Hauttemperatur nach Intense Pulse Light (IPL)-Anwendung sowie Low-Level-Light-Therapie (LLLT). die KONTAKTLINSE 4/2020.



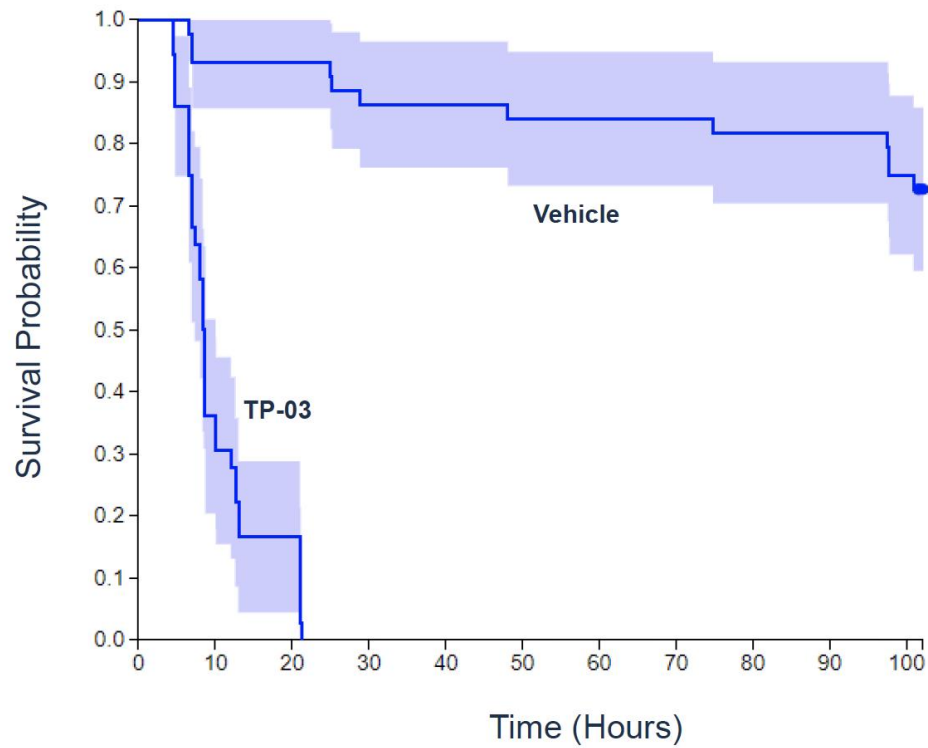
Lotilaner 0.25% is a First in Class Novel Drug Designed to **Eradicate Mites and Treat Blepharitis**

Lotilaner is designed to paralyze the mite nervous system through parasite-specific GABA inhibition



Mercury Study: TP-03 Works by **Killing Mites**

Ex-vivo mites extracted from the lashes of blepharitis patients



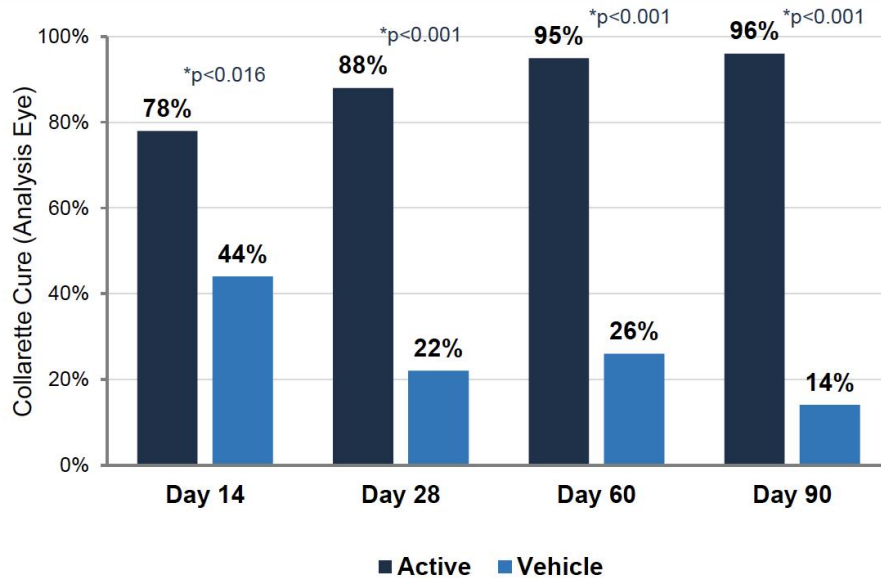
Cure of Collarettes with BID use of TP-03



Jupiter Phase 2b Study: High Collarette Cure Rate and Mite Eradication Rate

FDA-requested primary and secondary endpoints

Collarette Cure Rate



Mite Eradication Rate

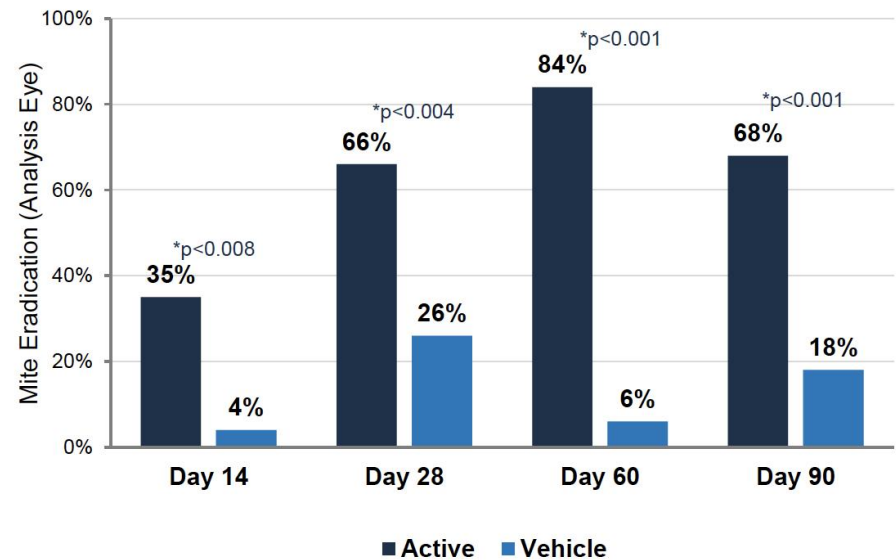
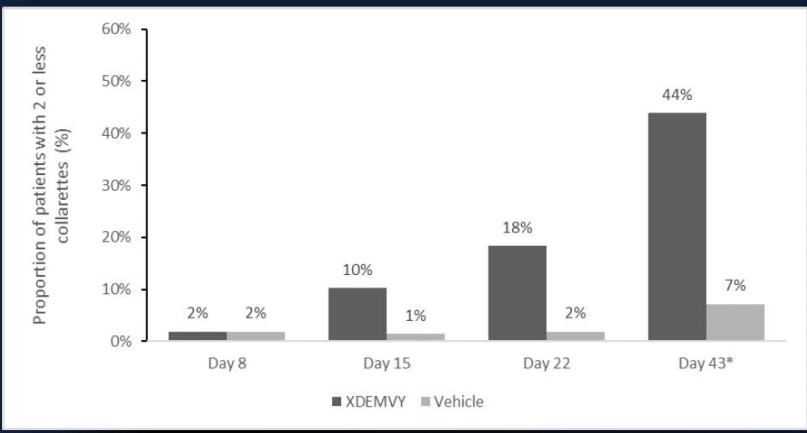


Figure 1. Saturn-1:

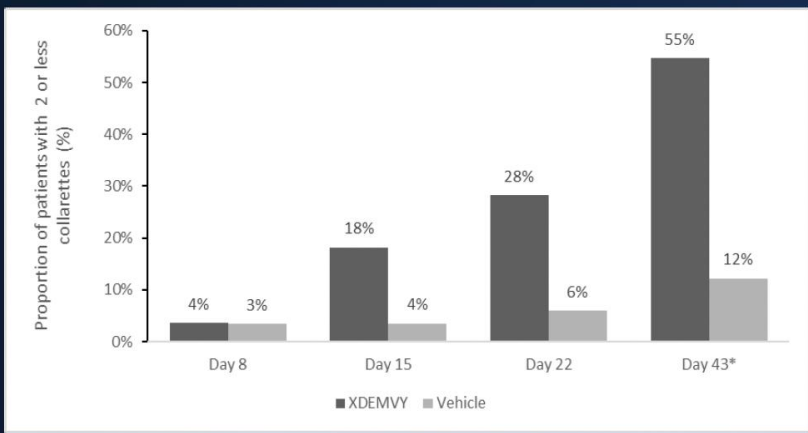
Proportion of patients with 2 or less collarettes for the upper eyelid



*Day 43 Primary Endpoint; XDEMVY N=209, Vehicle N=204, p-value <0.01








Figure 2. Saturn-2:

Proportion of patients with 2 or less collarettes for the upper eyelid



*Day 43 Primary Endpoint; XDEMVY N=193, Vehicle N=200, p-value <0.01

TP-03 is a Novel Drug to Treat Demodex Blepharitis by Eradicating Mites and Collarettes

 Product Form	Multi-dose eye drop solution bottle, preserved
 Indication for Use	Treatment of Demodex Blepharitis
 MOA	Paralysis and death of Demodex mites
 Diagnosis	Collarettes on slit lamp examination
 Dosing	BID for 6 weeks
 Efficacy	Collarette cure, mite eradication, other secondary endpoints
 Safety	Very clean to-date (mild transient stinging in < 10% of patients)

Omega fatty acids and Dry Eye

- LA / GLA (ω -6)
 - Increase “good” PG (PGE-1)
 - Against ocular surface inflammation
 - Increase tear production
- Positive action on lipid layer (Graham RH. There’s nothing fishy about omega-3 fatty acids for Dry Eye Syndrome. www.medscape.com/viewarticle/707984. Sep 3, 2010.)
 - Positive action on tear volume (Roncone M, Bartlett H, Eperjesi F. Essential fatty acids for dry eye: A review. *Cont Lens Anterior Eye* 2010; 33(2):49–54.)
- Help to maintain MG function (Macasai, 2008)

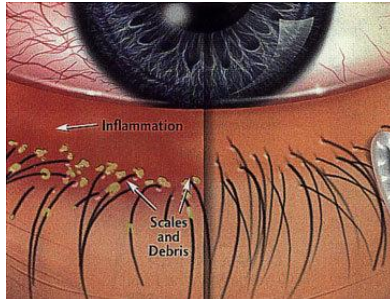


Supplemental GLA for Dry Eye: 7 Controlled Clinical Trials

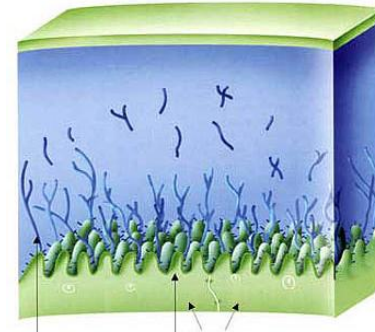
- Aqueous-deficient (Barabino S et al. Cornea 22: 97–101, 2003.)
- PRK (Macri A et al. Graefes Arch Clin Exp Ophthalmol 241:561-6, 2003.)
- Sjögren's (Aragona P, et al. Ophthalmol Vis Sci 46:4474-9, 2005.)
- Contact lens (Kokke KH et al. Contact Lens Ant. Eye 31:141-6, 2008.)
- MGD (Pinna et al. Cornea 26:260-264, 2007.)
- Mild-moderate DE (Brignole-Baudouin et al. Acta Ophthalmologica 89:e591-7, 2007.)
- Post-menopausal women (**HydroEye**) (Sheppard JD, Pflugfelder SC, et al. Cornea 32 :1297-1304, 2013.)

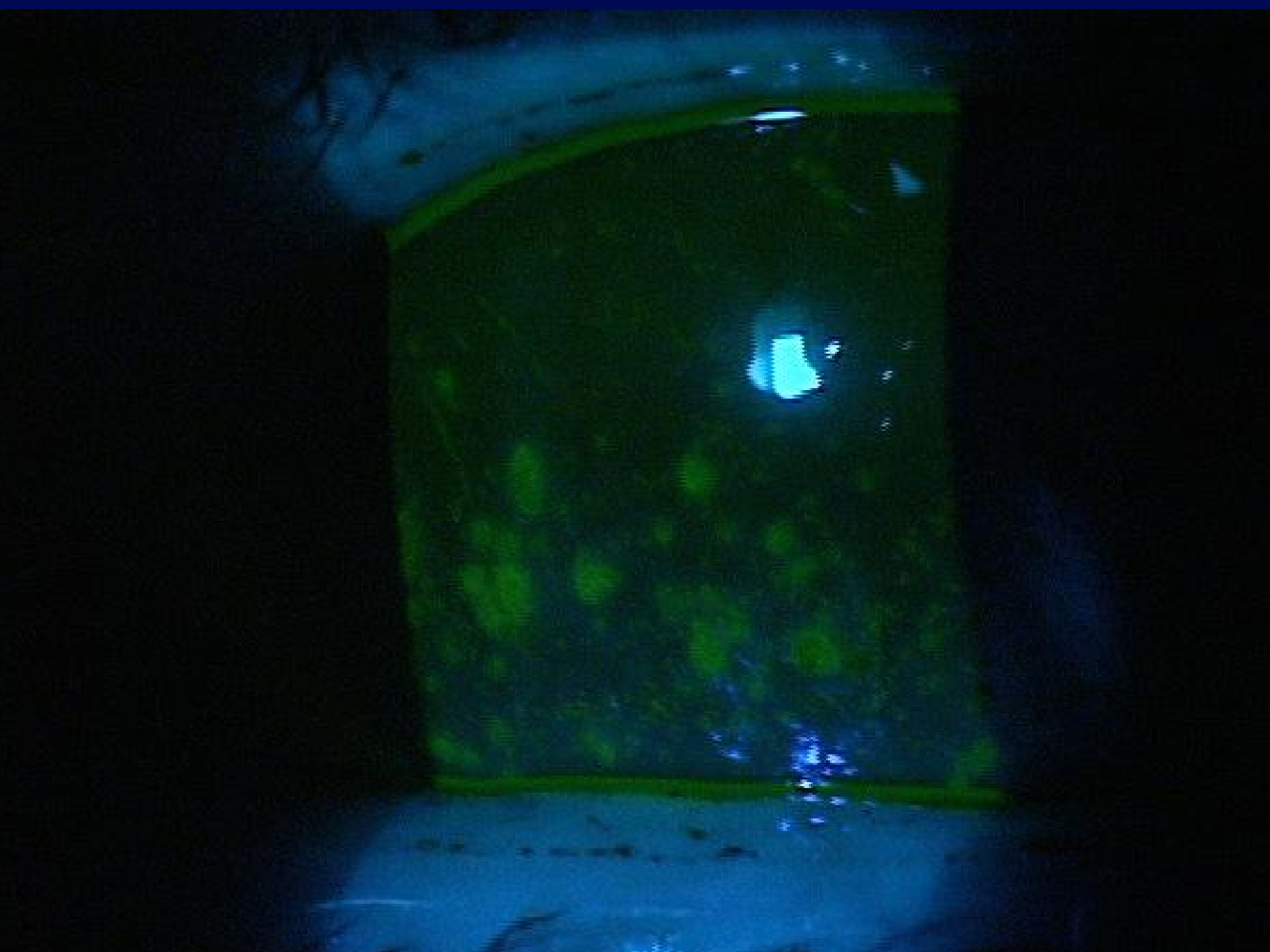
Algorithm for Aqueous Deficient Dry Eye Disease

INFLAMMATION

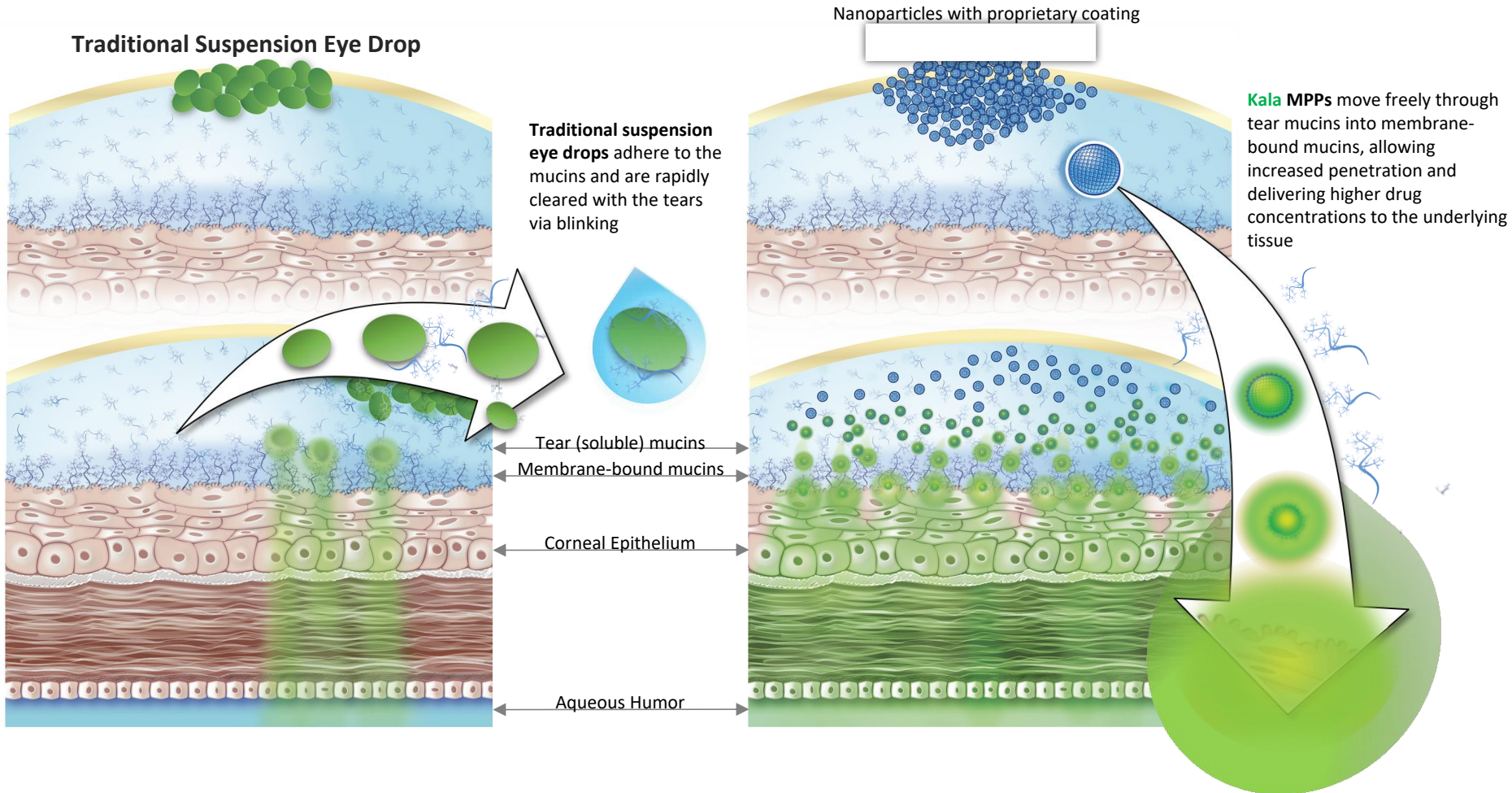


TEAR VOLUME





Loteprednol 0.25% Mucus Penetrating Particles (MPP) Drug Delivery Technology







Supplement Facts

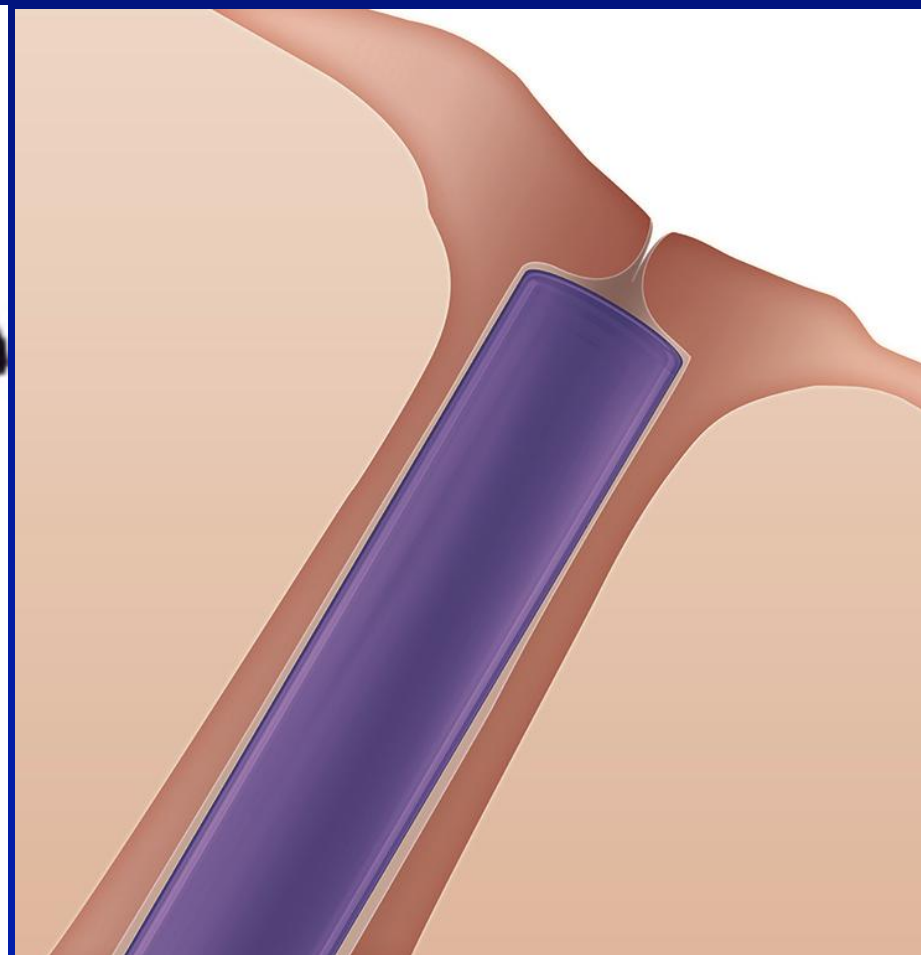
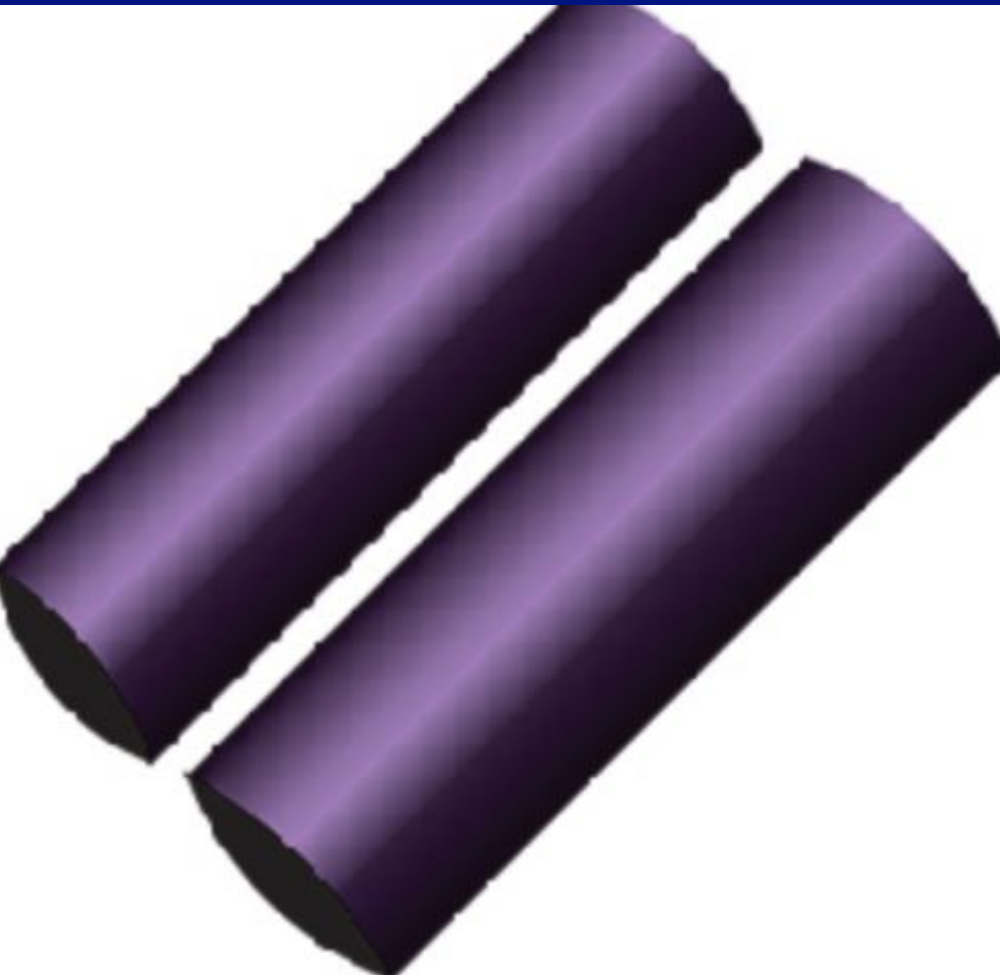
Serving Size: 5g

Servings Per Container: 20

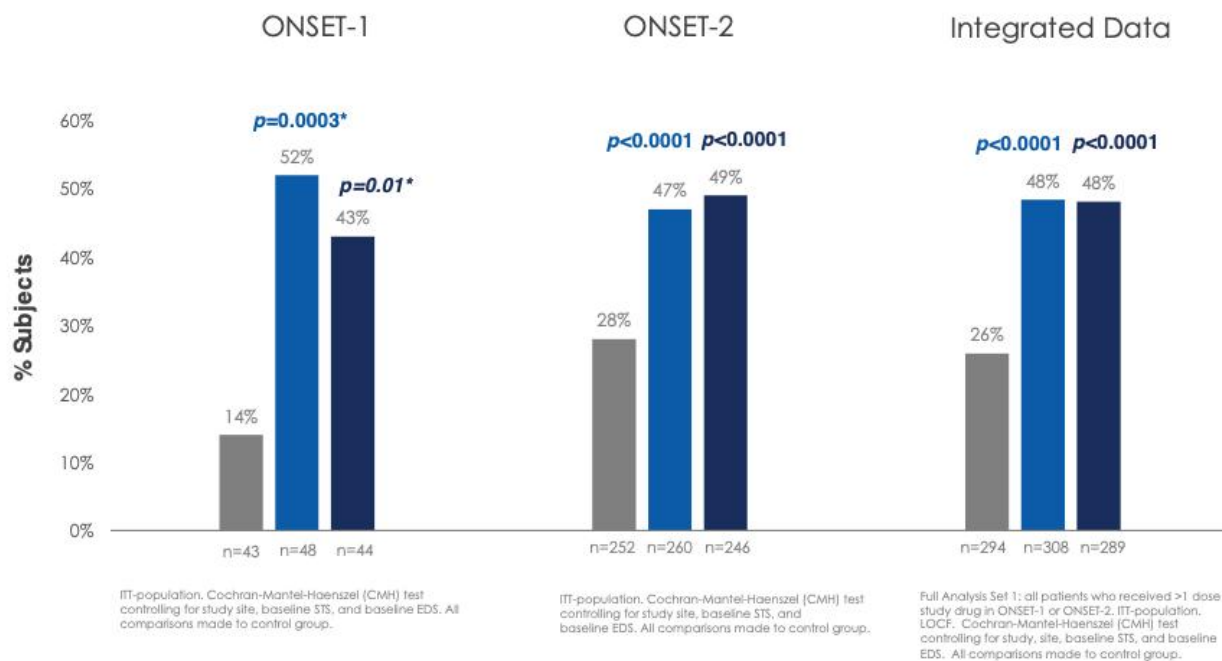
	Amount Per Serving
Calories	8
Total Fat	0g
Saturated Fat	0g
Trans Fat	0g
Cholesterol	0g
Sodium	127.2g
Potassium	30mg
Total Carbohydrate	3g
Dietary Fiber	2.1g
Sugars	0g
Protein	0g
Vitamin A	400mcg
Vitamin C	50mg
Vitamin B6	6mg
Vitamin B3	20mg
Vitamin B12	10mg
Green Tea Extract	15mg
Turmeric	8mg
DHA	20mg
Taurine	200mg
Creatine	150mg
Malic acid	250mg
Potassium Chloride	50mg
Sodium citrate	400mg
Sodium lactate	100mg
Calcium citrate	500mg
Citric acid anhydrous	
*Percent Daily Values are based on	
**Daily Value not established	

INGREDIENTS: Taurine,
Glycerol, Sodium
Citrate, Vitamin B3,
Cellulose, B3,
potassium

180 Day Extended Duration Punctal Plugs



OC-01 (varenicline solution) Nasal Spray Improved Signs at Week 4 – Integrated Data



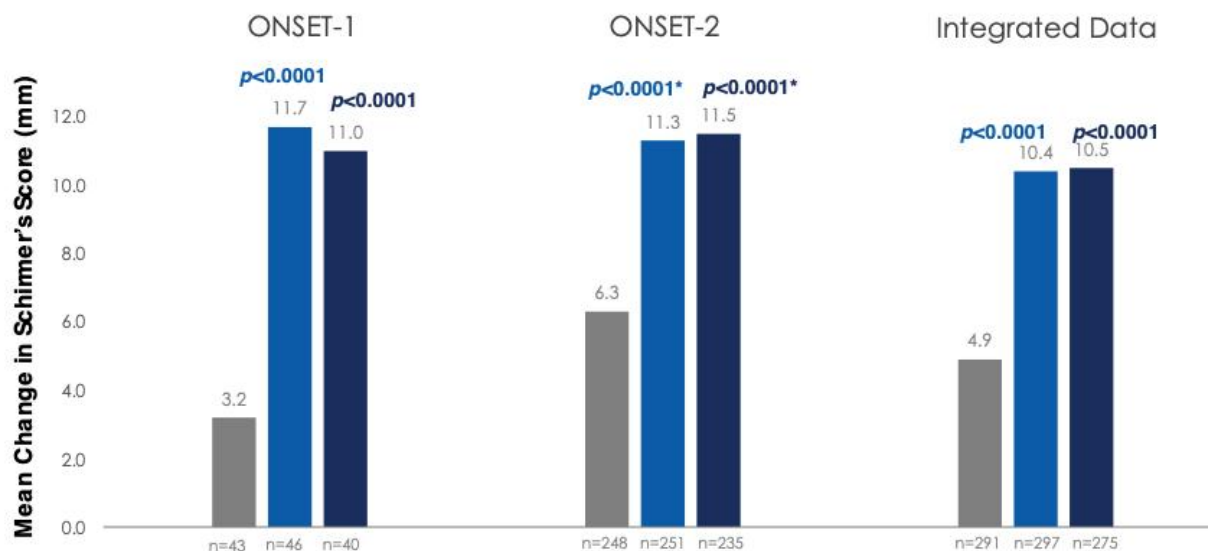
**% Subjects With ≥ 10 mm Change
From Baseline in Schirmer's
Score (mm)**

WEEK 4



Data presented with imputation for missing assessments; observed data does not alter interpretation.
 All comparisons made to control group.
 *Post-hoc statistically significant

OC-01 (varenicline solution) Nasal Spray Improved Signs at Week 4 – Integrated Data



ITT-population. Least Square (LS) means were derived from ANCOVA model with treatment, site, baseline STS, and baseline ED5 as covariates. Missing data were imputed using last-available data. All comparisons made to control group.

ITT-population. Least Square (LS) means were derived from ANCOVA model with treatment, site, baseline STS, and baseline ED5 as covariates. Missing data were imputed using last-available data. All comparisons made to control group.

Full Analysis Set 1: All patients who received >1 dose of study drug in ONSET-1 or ONSET-2. ITT-population. LOCF. The LS means were derived from an ANCOVA model with study, site, treatment, baseline STS, and baseline ED5 as covariates. All comparisons are made to vehicle control group.

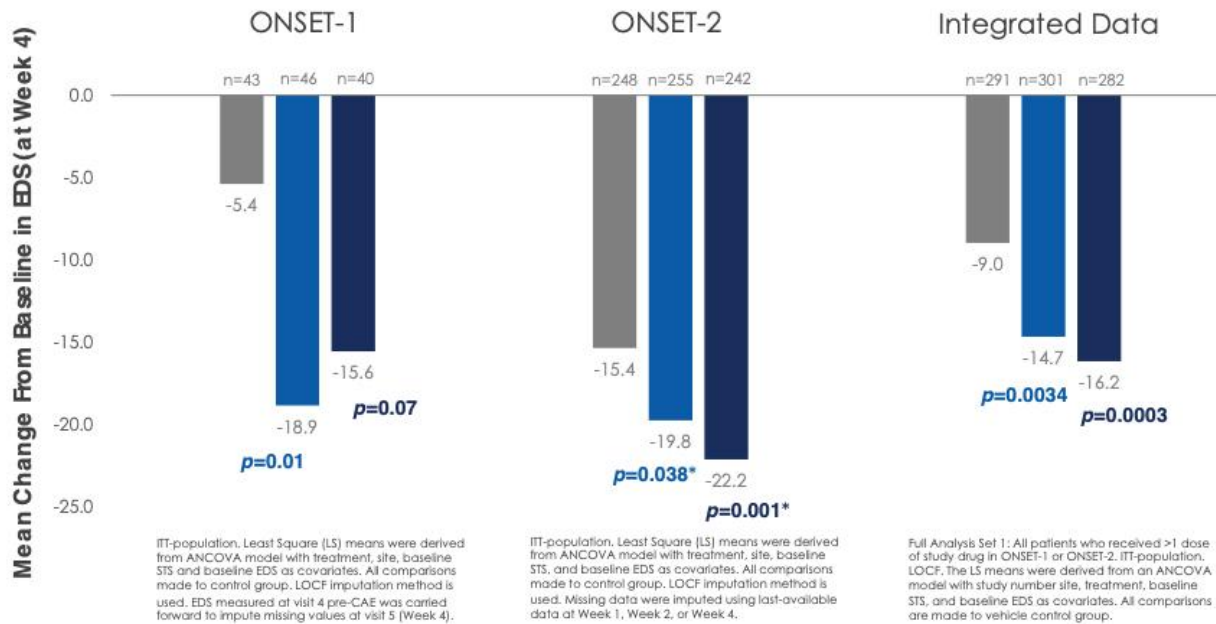
Mean Change From Baseline in Schimer's Score (mm)

WEEK 4



Data Presented with imputation for missing assessments; observed data does not alter interpretation
All comparisons made to control group.
*Nominally statistically significant

OC-01 (varenicline solution) Nasal Spray Improved Symptoms at Week 4 – Integrated Data



**Mean Change From Baseline
in Eye Dryness Score in the
Clinic Environment (mm)**

WEEK 4

- Vehicle Control
- OC-01: 0.03 mg
- OC-01: 0.06 mg

Data presented with imputation for missing assessments; observed data does not alter interpretation. All comparisons made to control group.
*Nominal p-value

There Is No Substitute for Natural Tear Film

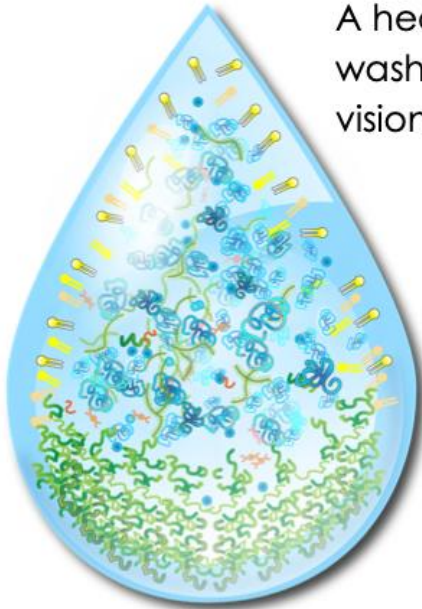
Growth factors, such as nerve growth factor (NGF) and epidermal growth factor (EGF), found in natural human tears, are critical regulators for corneal wound healing.

A healthy tear film lubricates and protects the eyes from injury and infection, washes away foreign particles, and contributes refractive power for clear vision.

TFOS DEWS II tear film report

Natural tears contain a complex mixture of lipids, proteins, mucins, and electrolytes^{1,2}

- Over 1,500 proteins
- 5+ lipid classes
- 20+ mucins
- Contains growth factors and has anti-inflammatory and antimicrobial properties



1. Klenkler B, Sheardown H, Jones L. Growth factors in the tear film: role in tissue maintenance, wound healing, and ocular pathology. *Ocul Surf.* 2007;5(3):228-239.
2. Willcox MDP, Argüeso P, Georgiev GA, et al. TFOS DEWS II tear film report. *Ocul Surf.* 2017;15(3):366-403.

Amniotic Membrane Types

• **Cryopreserved**

Pros

- FDA Approved
- Proprietary Freezing Process
- Ease of use (fitting a contact lens)

Cons

- Requires refrigeration and space in office
- Has to be thawed before use
- Ring placement can be uncomfortable
- Shorter shelf-life
- Price

Amniotic Membrane Types

- **Dehydrated**

- Pros
 - Patient comfort
 - Variety of sizes
 - Reduced cost
 - Ease of use
- Requires BCL for retention or Lid Seal
- BCL can cause hypoxia
- Amniotic Membrane
 - Sizes: 8mm, 10mm, 12mm & 14mm
 - Stored at room temperature
 - Shelf life of 5 years
 - Product can be placed either side down on ocular surface



Neurotrophin-3/Neurotrophin-4	NT-3/NT-4
Basic fiberblast growth factor	bFGF
Beta nerve growth factor	β -NGF
Epidual growth factor/Epidermal growth factor receptor	EGF/EGF-R
Glial cell line-derived neurotrophic factor	GDNF
Heparin binding growth factor	HB-EGF
Hepatocyte growth factor	HGF
Platelet-derived growth factor	PDGF-AA/PDGF-BB
Placenta growth factor	PIGF
Stem cell factor	SCF/SCF-R
Transforming Growth Factor Alpha	TGF α /TGF β 1/TGF β 3
Vascular endothelial growth factor	VEGF

Protein	Abbreviation
Growth differentiation factor 15	GDF-15
Interleukin 1 α	IL-1 α
Interleukin 1 Beta	IL-1 β
Interleukin 1 receptor antagonist	IL-1ra
Interleukin 12 p40	IL-12p40
Interleukin 17	IL-17
Osteoprotegerin	OPG
Interleukin 8	IL-8
Intercellular adhesion molecule 1	ICAM-1
Tumor necrosis factor	TNF
Interleukin 4	IL-4
Interleukin 5 receptor	IL-6R
Macrophage colony-stimulating factor 1 receptor	MCSF R
B lymphocyte chemoattractant (CXCL 13)	BLC
Eotaxin 2	Eotaxin-2

**Amniotic
Membrane**



Removal

Insertion



Autologous Serum Tear Substitutes

First described 1984 by Fox et al (for KCS), more after success in eyes with persistent epithelial defects (Tsubota et al 1999)

	TEARS	SERUM
		
Ph	7.4	7.4
Osmolality	298	296
Albumin (mg/l)	54	35-55
EGF (ng/ml)	1.5	0.7
TGF-b (ng/ml)	2-10	6-33
Vitamin A (mg/ml)	0.02	46
Lysozyme (mg/ml)	1.4	6
SIgA (ug/ml)	1190	2
Fibronectin (ug/ml)	21	205
Hepatocyte GF, NGF, IGF-1, Substance P, Complement, Fibroblast GF, cGRP, other Ig, etc.		✓

National Outfit for ASED

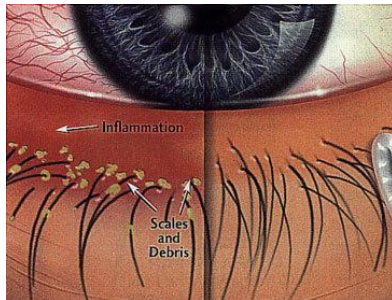
- Present in almost every major city in the US
- Blood draw at patients home or work
- Sterile Processing
- Regular replacement
- Doctors must specify concentration
 - 20% for most patients
 - 40% for GVHD etc.

SCLERAL LENSES

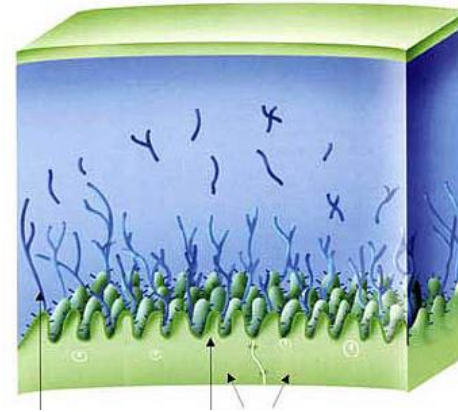


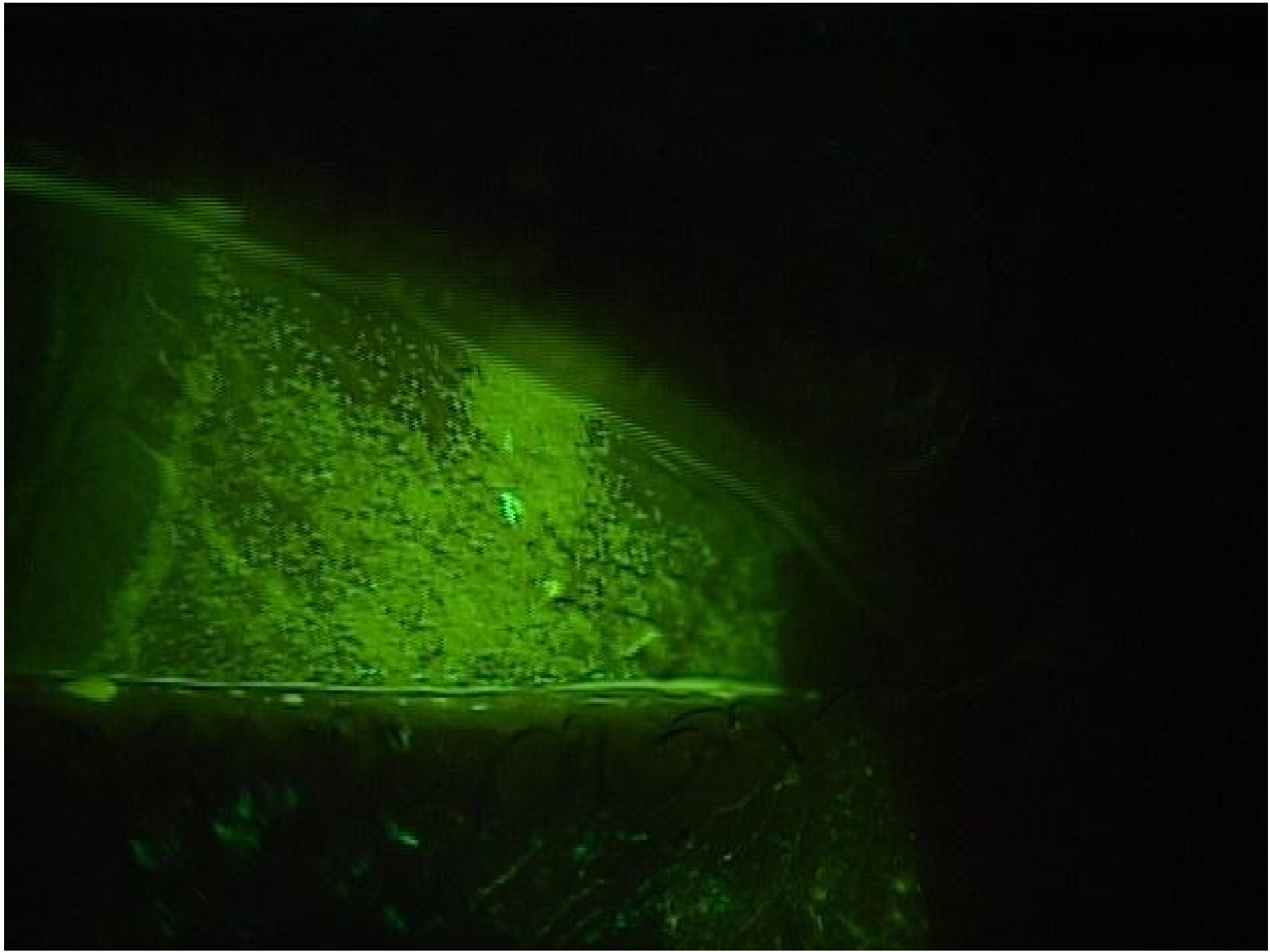
Mucin Deficient Dry Eye Disease Management

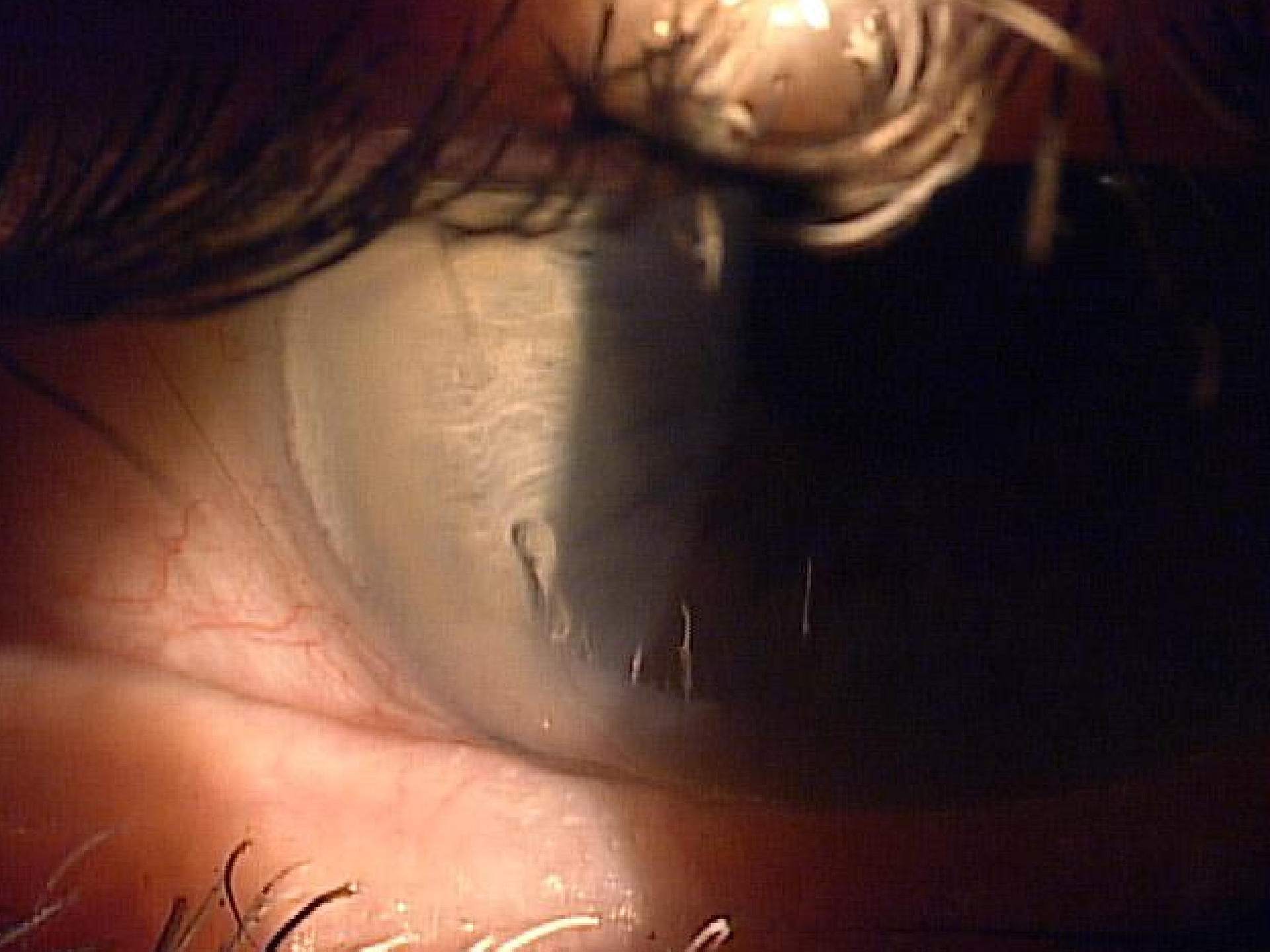
INFLAMMATION/MUC
EXPRESSION



MUCIN QUALITY









Category: Lubrication

- Preservative free formulations are required
- Good PFMD bottle
- Multi-use for extended period of time



Vitamin A

Active Ingredients	White Petrolatum (90%), Lanolin (6.9%), Light Mineral Oil (1.4%)
Inactive Ingredients	Retinol Palmitate (Vitamin A)
Preservative Free	✓
Phosphate Free	✓
Sterile Period (from first opening)	6 months
Presentation	0.18 fl. oz. (5g)
No of Applications	300
Indications	Moderate to Severe Forms of Dry Eye which require a more viscous ointment. Recommended for night time use

Morning Symptoms



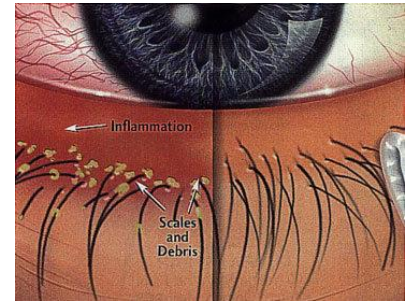
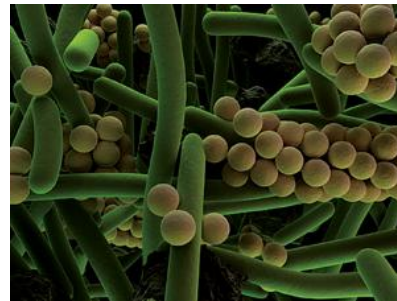
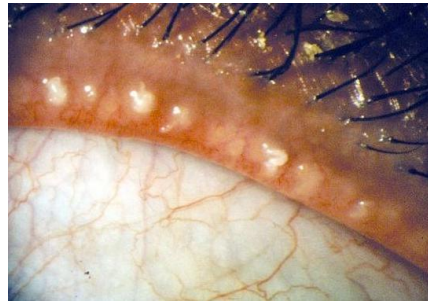
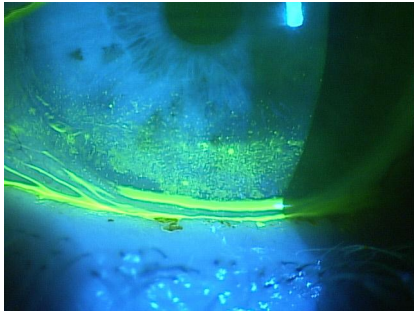
Exposure Keratitis: Inadequate Lid Seal (ILS)

ILS

OBSTRUCTION

BIOFILM

INFLAMMATION

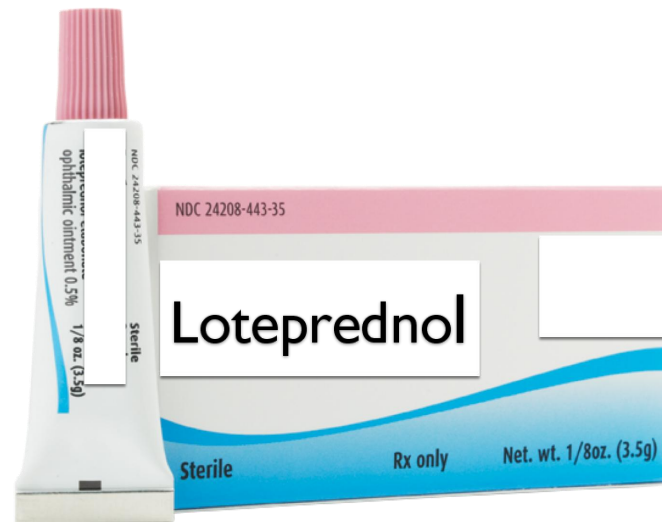


Morning Symptoms

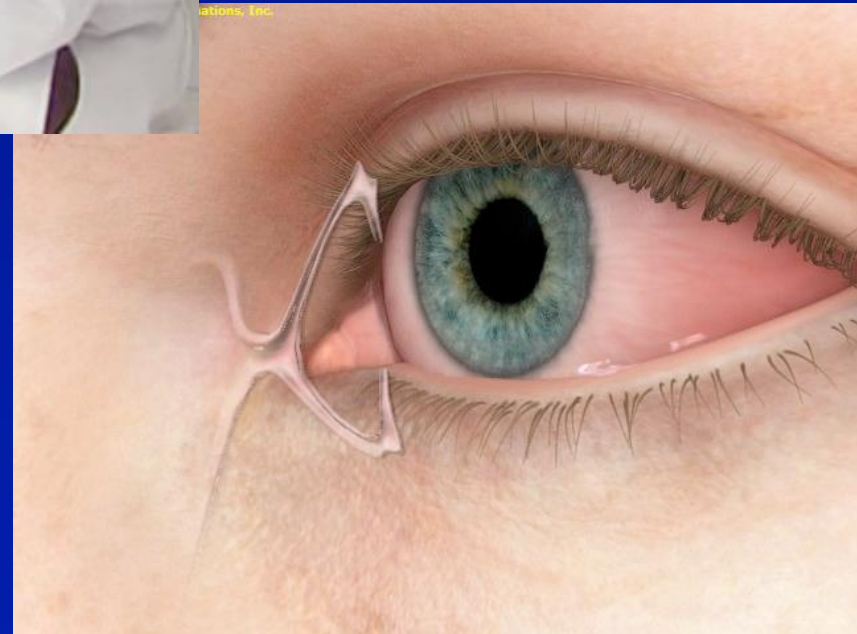
- And leads to desiccative stress, MGD, blepharitis, exposure keratitis etc.
- It is NOT lagophthalmos
- ILS - is an overnight inadequate lid seal
- Overnight eye seals
- Hypoallergenic
- Oxygen permeable
- Adequate mild adhesive
- Sensitive and regular



Loteprednol ointment is a new **preservative-free** steroid ointment.



Loteprednol ointment is a corticosteroid indicated for the treatment of post-operative inflammation and pain following ocular surgery.



Patient Education and Tracking + Anterior Segment Photography



Slit Lamp Imaging
Systems

OSD CONCLUSIONS

- Impact on contact lenses, cataracts and spectacles/refraction is significant
- Start with the LID in mind
- Follow a straight forward diagnostic algorithm
- Use a treatment algorithm
- Incorporate new and effective technologies
- Communicate effectively

I thank

You

karpecki@karpecki.com