

Updating Your Practical Approach to Dry Eye



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1

24 M Financial Disclosures For Marc R. Bloomenstein, OD, FAAO

All financial relationships have been mitigated.

- Allergan-Speaker/Consultant
- Avellino-Consultant
- Azura-Consultant
- Bausch & Lomb-Speaker/Consultant
- Bruder-Consultant
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- Sun-Speaker/Consultant
- Tarsus-Speaker/Consultant
- Thea-Consultant
- Topcon-Consultant

2

Dry Eye Disease Burden

- 42% of patients complain of symptoms that would indicate DED (60-80M people).
- 46.2 Million people in North America have DED, based on longitudinal studies ^{1, 2}
- 16-18 Million diagnosed with DED

1. Paulsen AJ, Cruickshanks KJ, Fischer ME et al, Dry eye in the beaver dam offspring study: prevalence, risk factors, and health-related quality of life. *Invest Ophthalmol Vis Sci*. 2004;45(12):4111-4118. doi: 10.1167/45.12.4111

2. Moss SE, Klein R, Klein BEK, Arch Ophthalmol. Incidence of dry eye in an older population. 2004 Mar;122(3):369-73. doi: 10.1001/archophth.122.3.369

3

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.

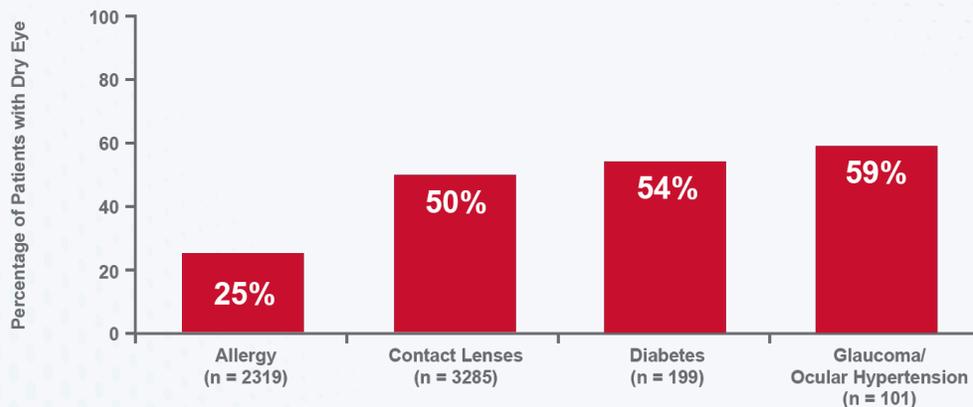
2. Machalińska A, et al. Comparison of Morphological and Functional Meibomian Gland Characteristics Between Daily Contact Lens Wearers and Nonwearers. *Cornea*. 2015 Sep;34(9):1098-104.

4

Dry Eye and Other Conditions

Dry eye disease is common among patients with other conditions

Prevalence of Dry Eye in Patients With Various Conditions



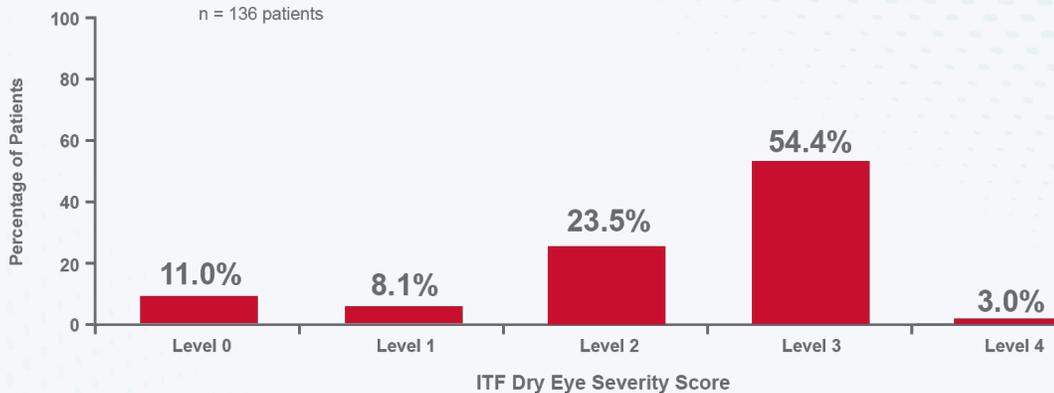
1. Moss SE, et al. Optom Vis Sci. 2008;85(8):668-74;
 2. Doughty MJ, et al. Optom Vis Sci. 1997;74(8):624-31;
 3. Manaviat MR, et al. BMC Ophthalmol. 2008;8:10; 4. Leung EW, et al. J Glaucoma. 2008;17(5):350-5.
 4. Leung EW, Medeiros FA, Weinreb RN. Prevalence of ocular surface disease in glaucoma patients. J Glaucoma. 2008;17(5):350-355.

5

Dry Eye Prevalence in Patients Scheduled for Cataract Surgery¹

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

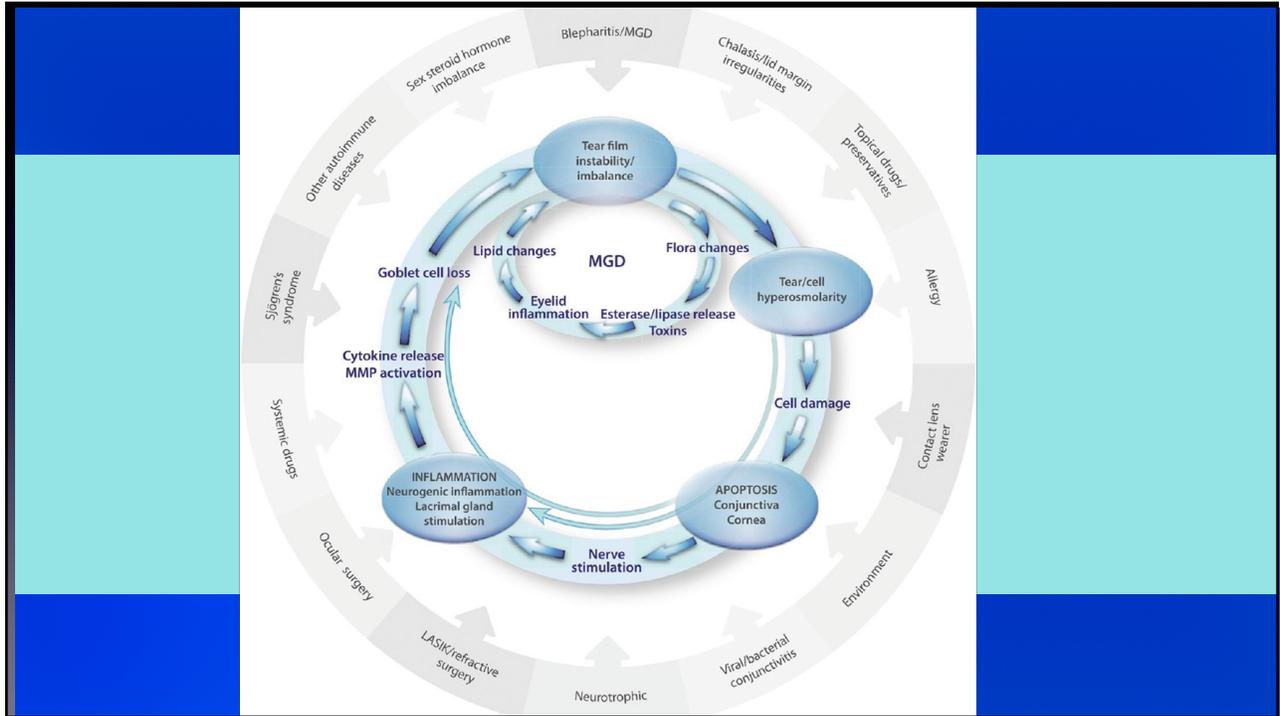
n = 136 patients



- 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).

6



7

The Vicious Circle

Adapted Sept 2025 from Baudouin et al. BJO. 2016 (100): 300-306

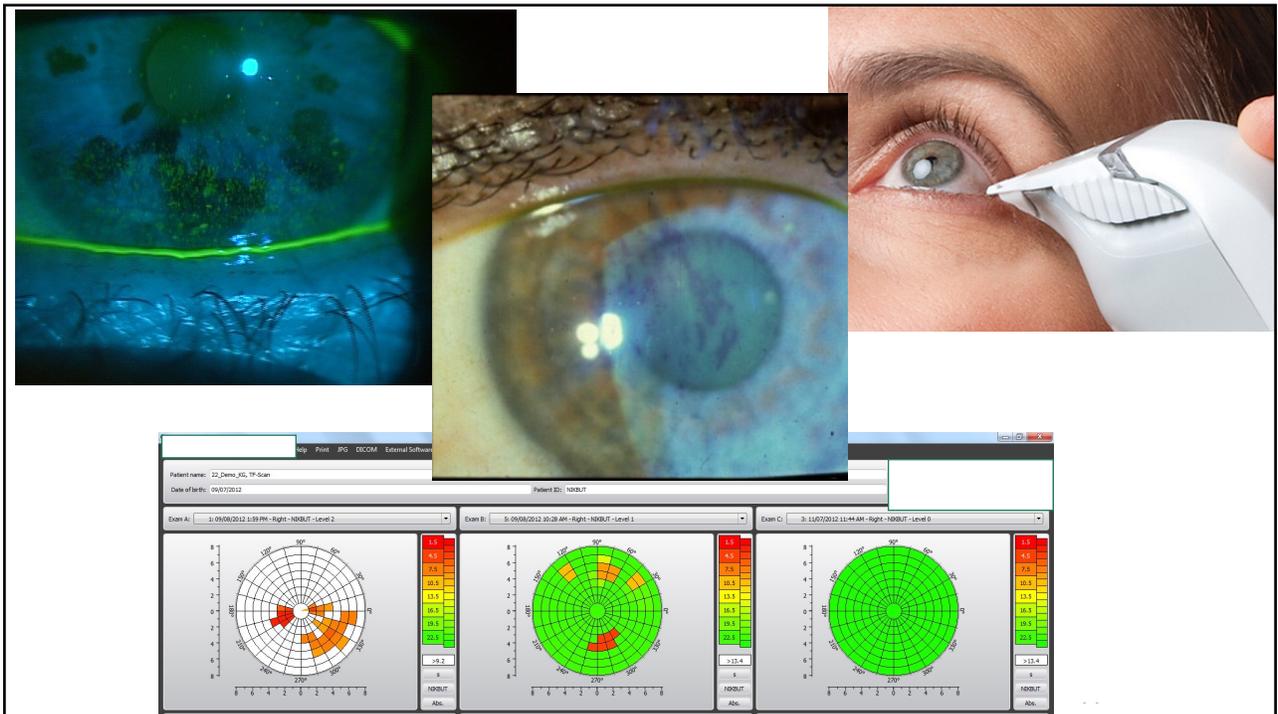
8

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?

Optometry Dry Eye Summit, Denver 2014

9



10

Evaporative...

- MGD
- Push and Pull
- Look Down!

11

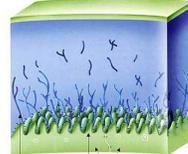
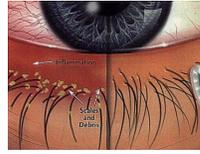
INFLAMMATORY

You see **injection, chemosis..**
Your patient has an auto-immune disease
They have a co-morbidity

THINK INFLAMMATION

12

Evaporative Dry Eye Disease



OBSTRUCTION

BLEPHARITIS/BIO FILM

INFLAMMATION

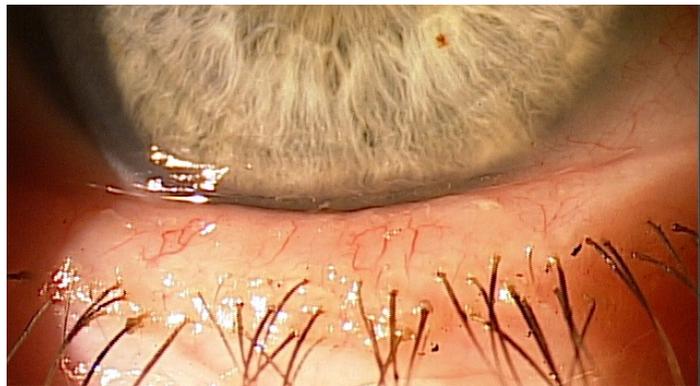
TEAR FILM

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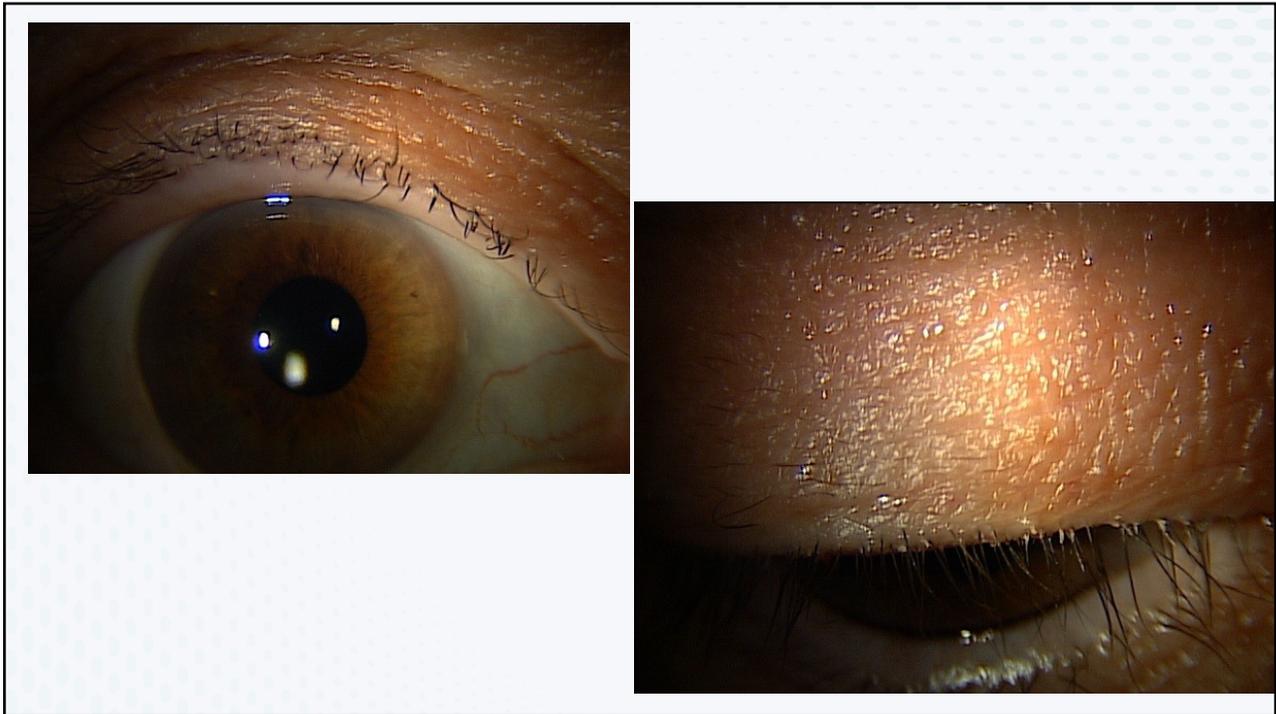
13

How Many Signs are Present?

Begin with the Lid in Mind



14



15

The Alpenglow Sign

Look at the nasal bridge

- Rapid clinical exam finding to pick up cases of suspected demodex in patients with excellent lid hygiene
- ASCRS 2024, ARVO 2024

Facial Collarettes: The Alpenglow Sign

Dermal Filaments observed on nasal bridge during SLE. Forceps extraction revealed 6 Demodex mites
LM Periman MD

Periman Alpenglow Sign

Before After

LM Periman MD

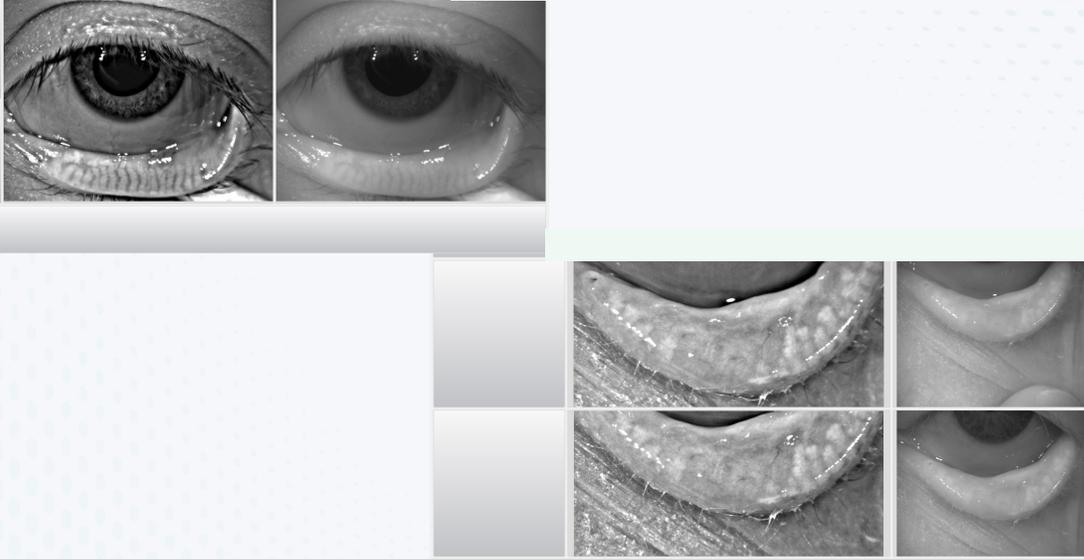
Morbihan's Rosacea: B/A OPT IPL and Noon MCH #1

Dermal Collarettes Demodex within Dermal Collarettes Dermal Collarettes improved post Tx

LM Periman MD

16

Meibography



17

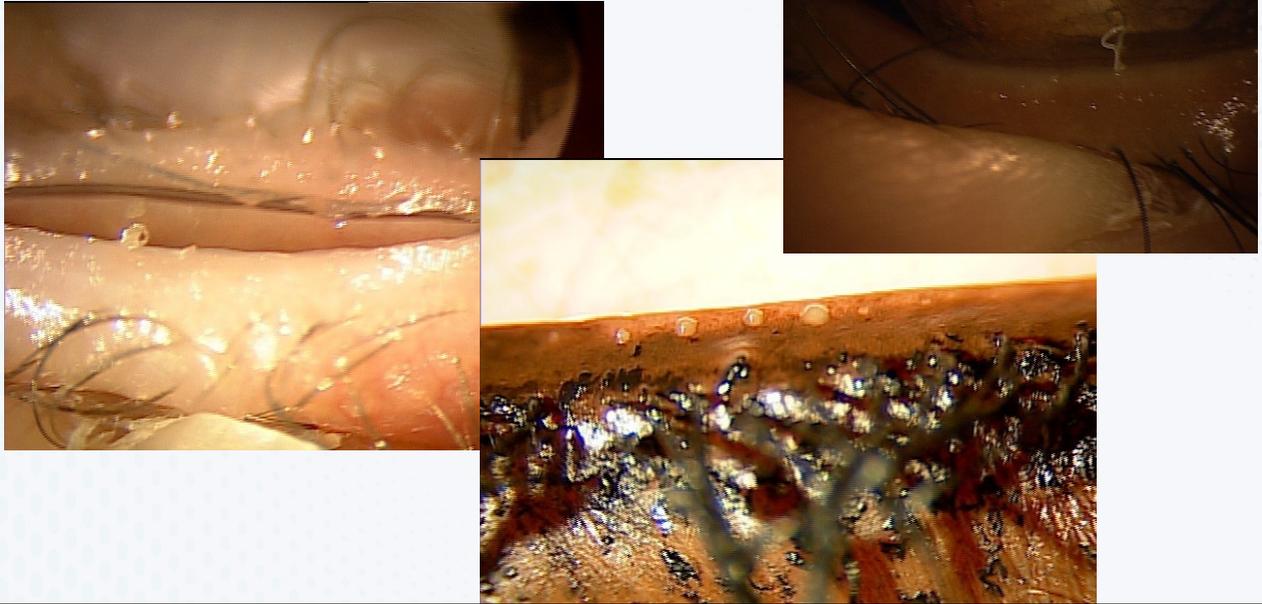
Eyelid Evertors

- Silicone soft but grips well
- Painless
- Maintains hold
- Like a 3rd hand



18

MG Expression

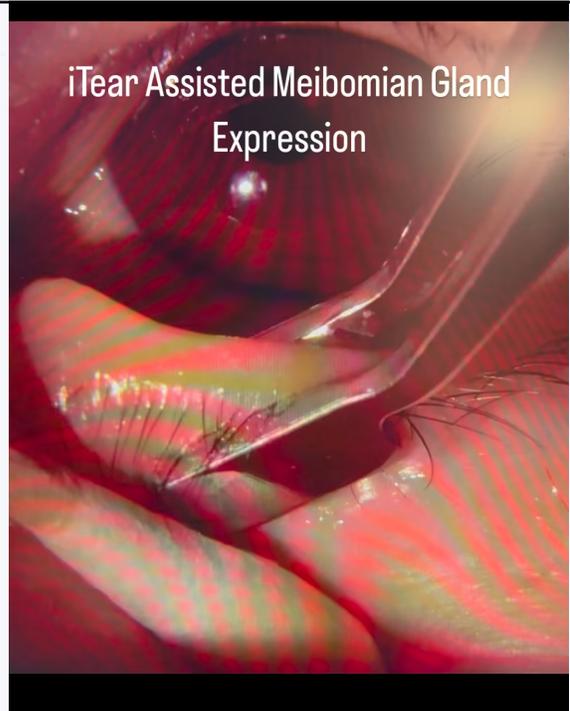


19

MG Expression

- Heat Assist
- Extranasal Vibrational Assist
- Technique Pearls:
 - Pin lid with q-tip in non-dominant hand
 - Pt applies energy to side of nose

iTear Assisted Meibomian Gland Expression

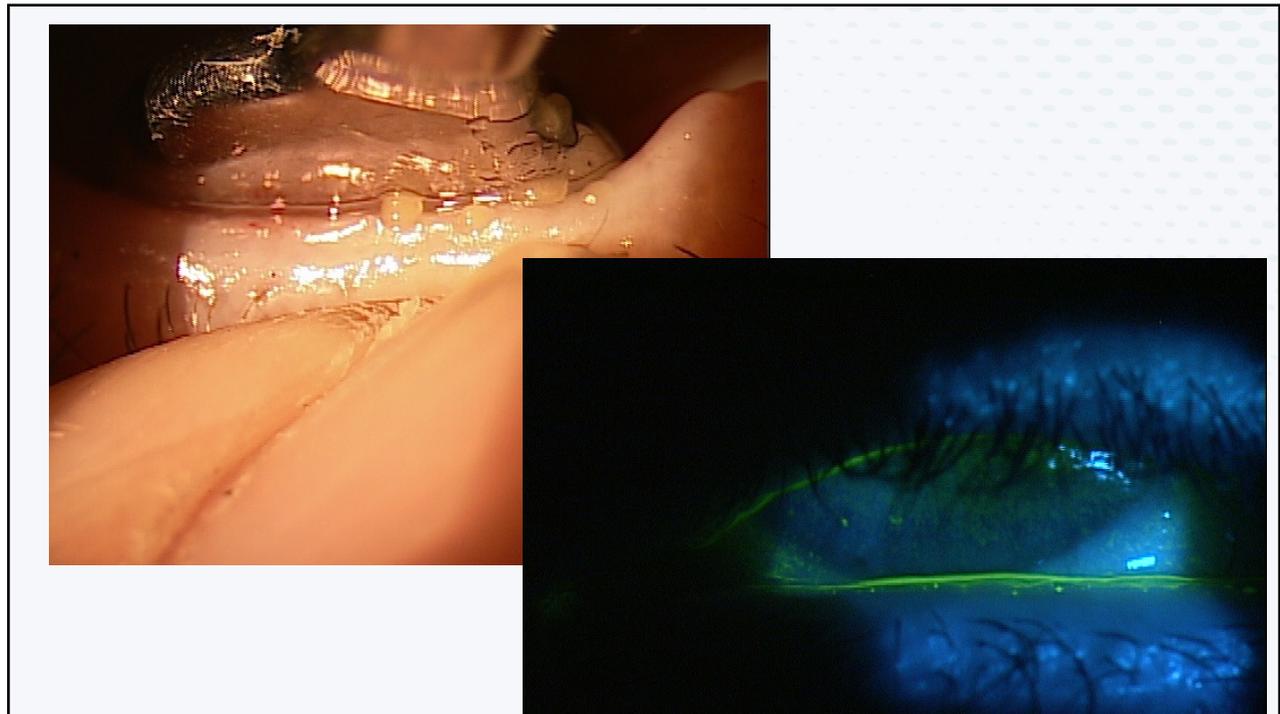


20

Neural Stimulation:

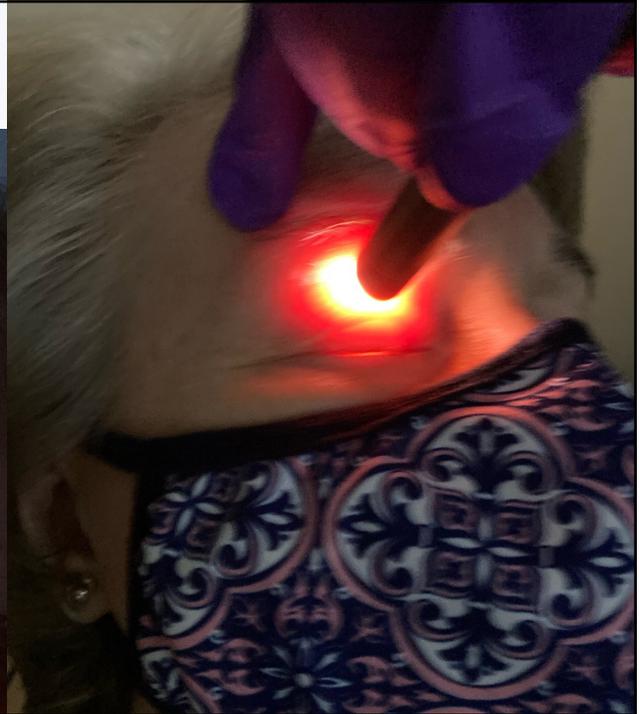
- FDA Approvals:
 - Intranasal Electrical (2017)
 - External Vibration (2020)
 - Varenicline 0.03% (2021)
 - TRPM8 agonist (2025)
- Similar improvements on:
 - OSDI, VAS, TMH, Schirmers, Staining across the modalities

21



22

KB Light Test



23



24

Expressible MGD



25

ELM: For Moderate to Severe DED (Q1 '26 launch)



1

Heat

Heating of the eyelids lowers meibum (lipid) viscosity



2

Vibration

Vibration-induced shear thinning™ (VIST™) liquefies the meibum



3

Neuro-Modulation

Vibration induces neuro-modulation of the 5th cranial nerve resulting in natural meibum expression

26

26

Photobiomodulation: IPL/LLLT

- MGD/EDED
- DEMODEX
- Ocular Rosacea
- CHALAZION
- HORDEOLUM



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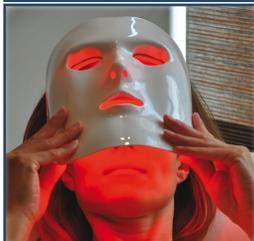
27

LLLT (now half masks)



PHASE 1 –

Blue light stimulates porphyrins and creates an anti-bacterial, anti-parasitic action. BLUE MASK



PHASE 2 – RED MASK

Red light stimulates ATP by increasing and improving cellular activity, it reduces inflammation and edema
Targets the Meibomian glands.

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28

Single-ingredient Formulation

100% perfluorohexyloctane

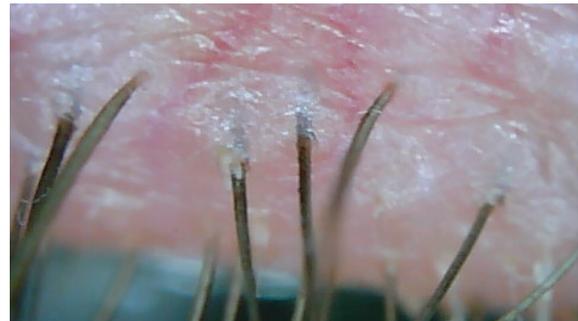
- No inactive ingredients



- ▶ Water free
- ▶ Preservative free
- ▶ Steroid free

29

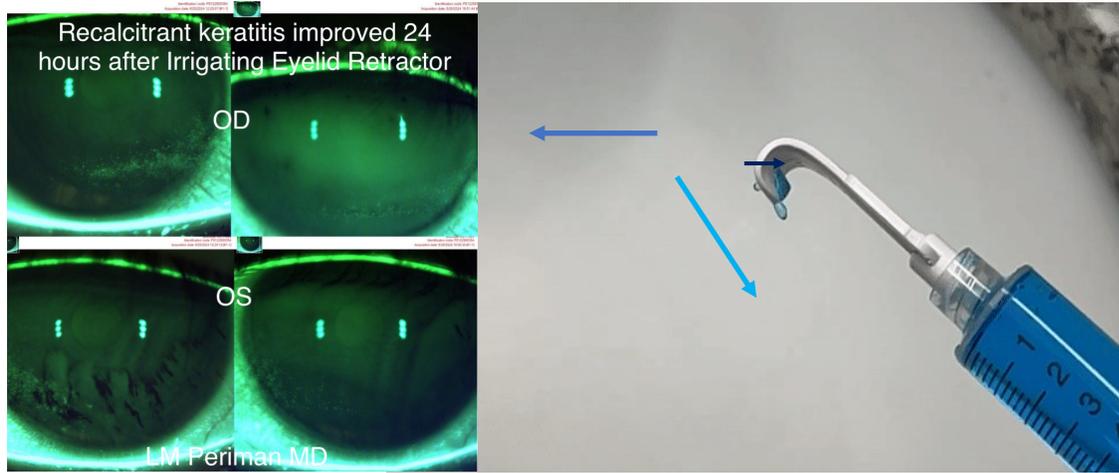
Microblepharoexfoliation (MBE)



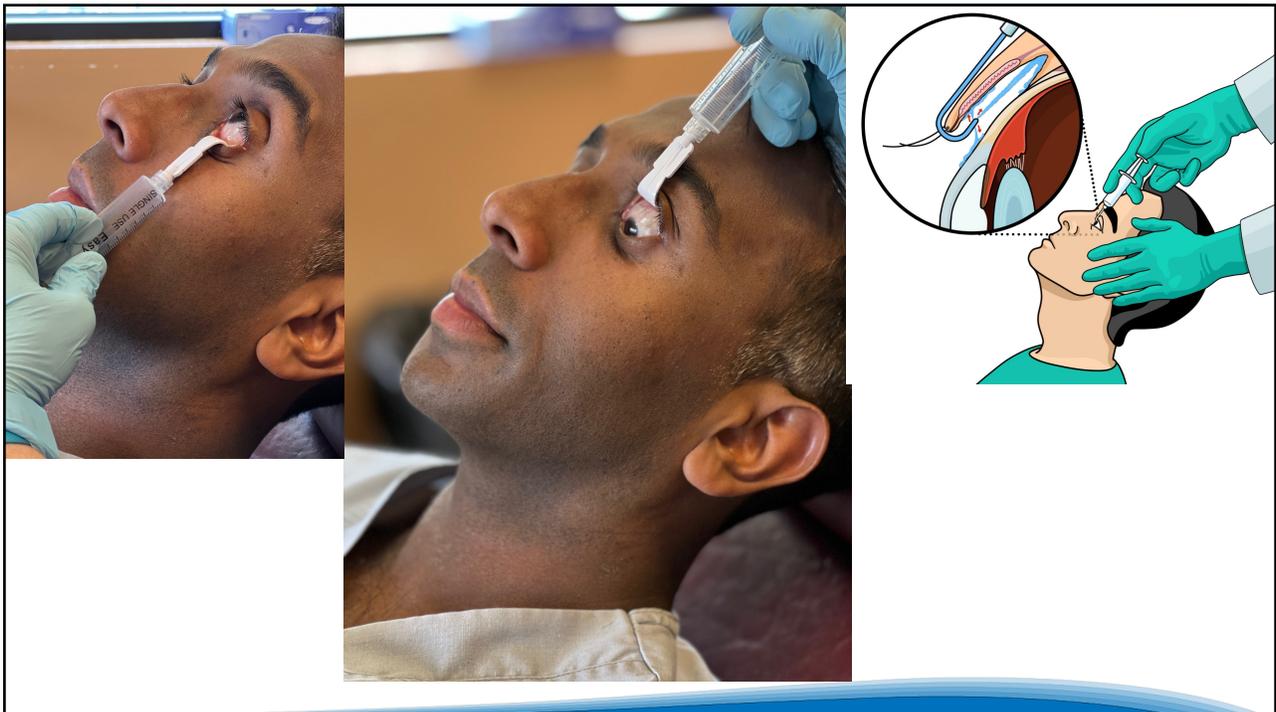
30

Irrigating Eyelid Retractor

Fixed to a syringe, the retractor has 5 ports which aim fluid at the palpebral conjunctiva, bulbar conjunctiva and conjunctival fornix.



31



32

DC current
Very low voltage & amperage



Courtesy Montana State University Center for Biofilm Engineering

33

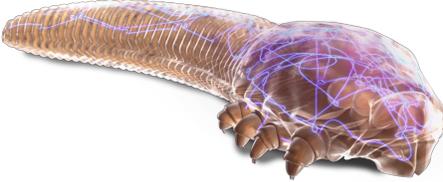
The doctor uses a this technology to deliver a 6 volt current (equivalent of 2 AA batteries) through a specialty contact lens that is harmonically tuned to separate the bonds of a bacterial polysaccharide biofilm



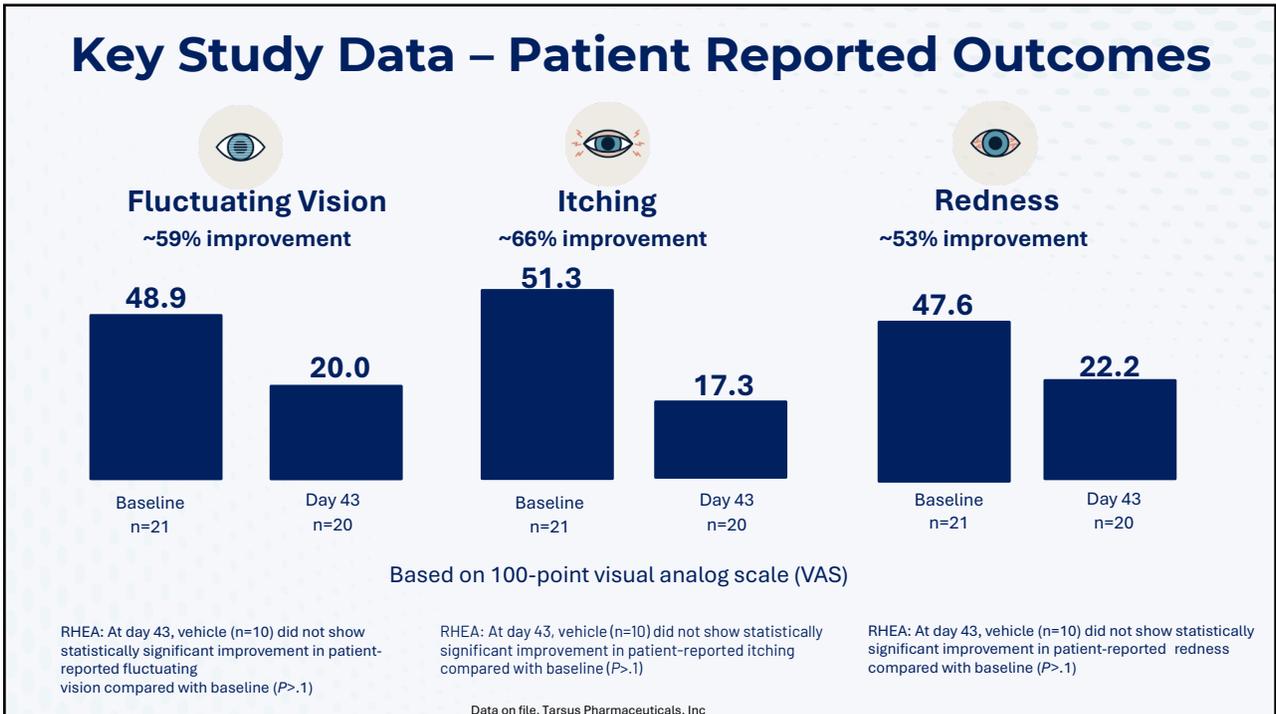
34

Eradicate Mites and Treat Demodex Blepharitis

Lotilaner 0.25% is designed to paralyze the mite nervous system through parasite-specific GABA inhibition



35

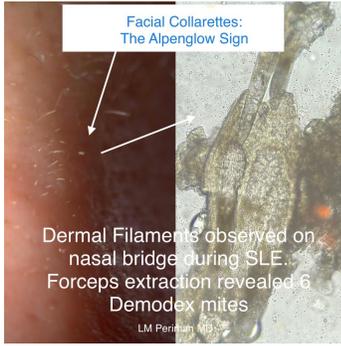


36

The Alpenglow Sign

Look at the nasal bridge

- Rapid clinical exam finding to pick up cases of suspected demodex in patients with excellent lid hygiene
- ASCRS 2024, ARVO 2024
- IPL, topical ivermectin, chemical peels, skin care



Facial Collarettes: The Alpenglow Sign

Dermal Filaments observed on nasal bridge during SLE. Forceps extraction revealed 6 Demodex mites
LM Periman MD

Morbihan's Rosacea: B/A OPT IPL and Noon MCH #1

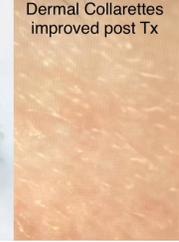




Dermal Collarettes



Demodex within Dermal Collarettes
LM Periman MD



Dermal Collarettes improved post Tx

Periman Alpenglow Sign



Before After
LM Periman MD

37

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)



38

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 (Sheppard JD, Pflugfelder SC, et al. Cornea 32 :1297-1304, 2013.)

39

Anti-inflammatory and Anti-oxidant Supplements

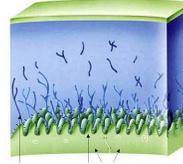
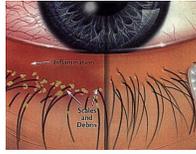
Carotenoids
Vitamin D3
Turmeric/curcuminoids
Lutein
Zeaxanthin



In the U.S. study (NCT05481450), supplement significantly improved tear volume and OSDI total score, versus placebo, from Baseline to end of study (Day 56; p<0.001 for both). There were also significant improvements in TBUT, SPEED, ocular staining scores (p<0.0001 for each outcome), tear osmolality (p<0.0005), and presence of MMP-9 (p<0.0017).

40

Aqueous Deficient Dry Eye Disease



INFLAMMATION

TEAR VOLUME

Monitor for MGD

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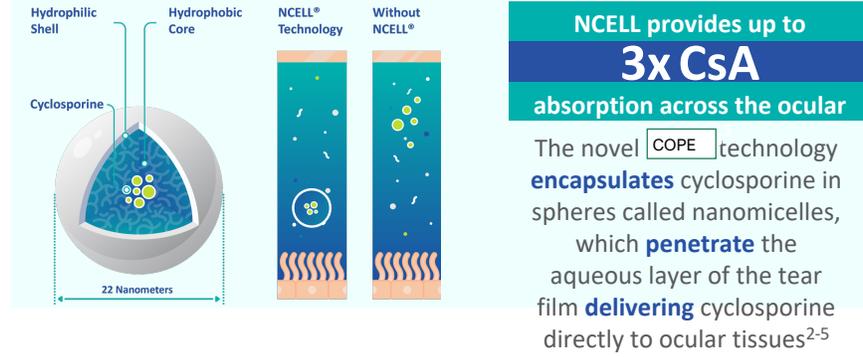
41

0.25% Loteprednol: For Dry Eye Flares- Most Recent FDA Approval

- Dry eye is a chronic inflammatory disease with flares that are characterized by acute exacerbations of signs and/or symptoms
- Loteprednol 0.25% approved for short term signs and symptoms of DED (QID for up to 2 weeks)
- Most dry eye disease patients with or without maintenance dry eye therapy, experience flares and desire rapid relief.
- Regardless of dry eye severity, flares typically occur 4-6 times per year
- Dosing and delivery systems

42

Nanomicelle Formulation Provides Up to 3x Higher CsA Absorption Over Cyclosporine Emulsion 0.05%^{1,2}



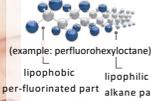
Study design: Ocular tissue distribution of cyclosporine was evaluated in a total of 26 female New Zealand White rabbits that received a single dose (administered to both eyes) of vehicle, cyclosporine 0.05% or 0.1% with NCELL Technology, or a commercially available cyclosporine 0.05% emulsion (Restasis®, Allergan). Pharmacokinetic parameters for cyclosporine exposure were assessed in tears, whole blood, and ocular tissues.^{1,2}
 1. Data on file. Cranbury, NJ: Sun Pharmaceutical Industries, Inc. 2. US Patent 9,937,225 B2. 3. Cholkar K, et al. *Transl Vis Sci Technol.* 2015;4(3):1-16. 4. Mandal A, et al. *J Control Release.* 2017;248:96-116. 5. Cholkar K, et al. *Recent Pat Nanomed.* 2012;2(2):82-95.
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43

Water-free Novel Drug Products: P4H5 and PFHO



Semifluorinated alkanes



Active Pharmaceutical Ingredient

(examples: Cyclosporine and timolol)

solutions of lipophilic APIs

suspensions of hydrophilic APIs, salts, and biomolecules

Drug Attributes:

- Increased **bioavailability** of APIs
- Drug products of **instable/sensitive APIs**
- Up to **60x longer residual time** on the eye
- High **patient comfort** and **satisfaction**
- Enables **composition-of-matter IP¹**
- Broad **applicability across indications**

- Fully validated and qualified technology
- Physically, chemically & physiologically inert
- No catabolism or metabolism
- 100% water- and therefore preservatives-free
- Expand universe of applicable medicines
- Highly biocompatibility, no accumulation

44

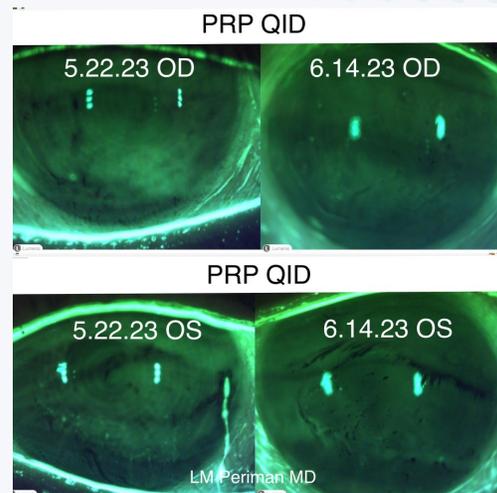
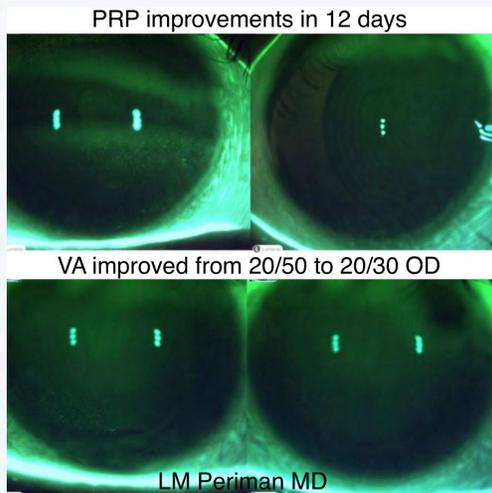
Autologous Serum Tear Substitutes

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
SlgA (ug/ml)	1190	2
Fibronectin (ug/ml)	21	205
Hepatocyte GF, NGF, IGF-1, Substance P, Complement, Fibroblast GF, cGRP, other Ig, etc.		✓

45

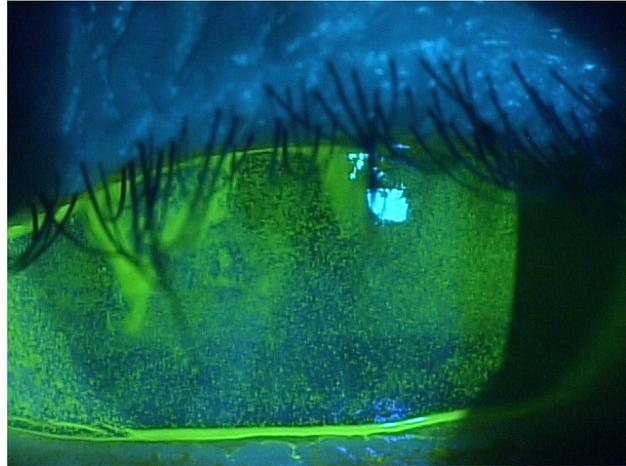
Platelet Rich Plasma



46

Amniotic Membrane Placement

- Persistent corneal staining from OSD ranging from NK to KCS, LSCD, SLK etc.



47

Amniotic Membrane- Dehydrated

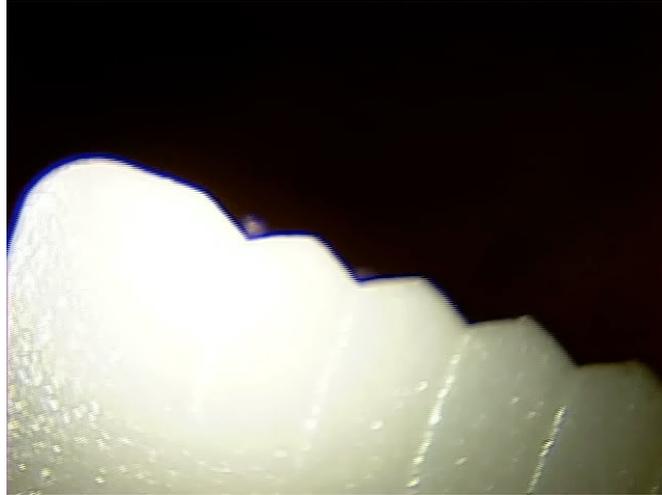
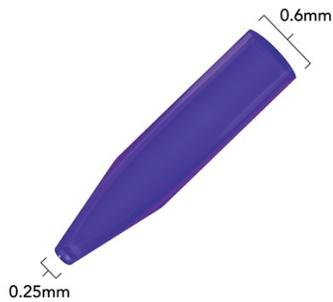
- Preserved by using vacuum with low temperature heat to retain devitalized cellular components
- FDA approved claims for dehydrated membranes are limited to wound coverage
- Stored at room temperature
- Placed on the ocular surface with an overlying bandage contact lens



48

Tapered Extended Duration Plugs

Vertical Canal



49

Form Fitting Punctal Plugs

Vertical Canal is Key

- Fits any size punctae
- Can be flushed with BSS



50

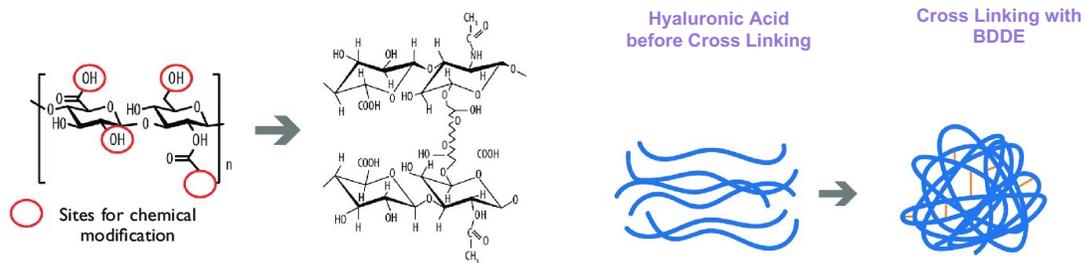
Canalicular Gel

- Cross-linked hyaluronic acid gel that allows patient's eyes to be bathed in their own natural tears
- Customized for each individual patient or provide full fill of the canalicular system

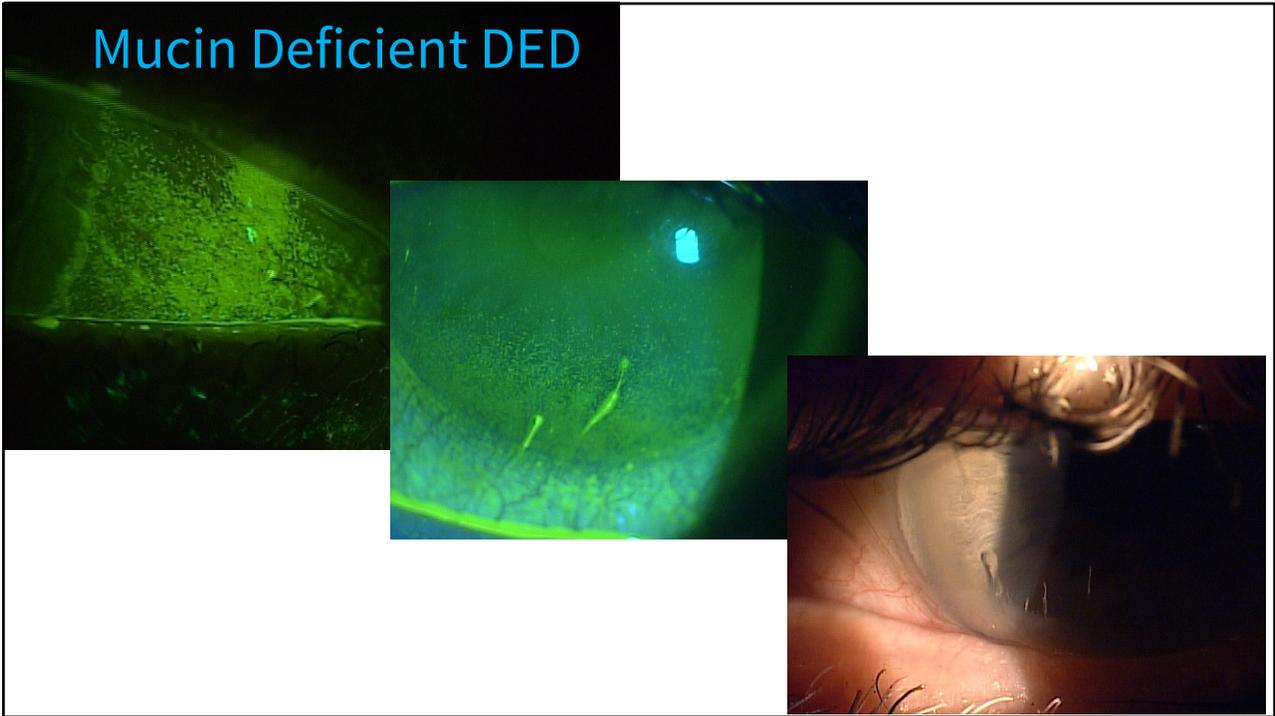


51

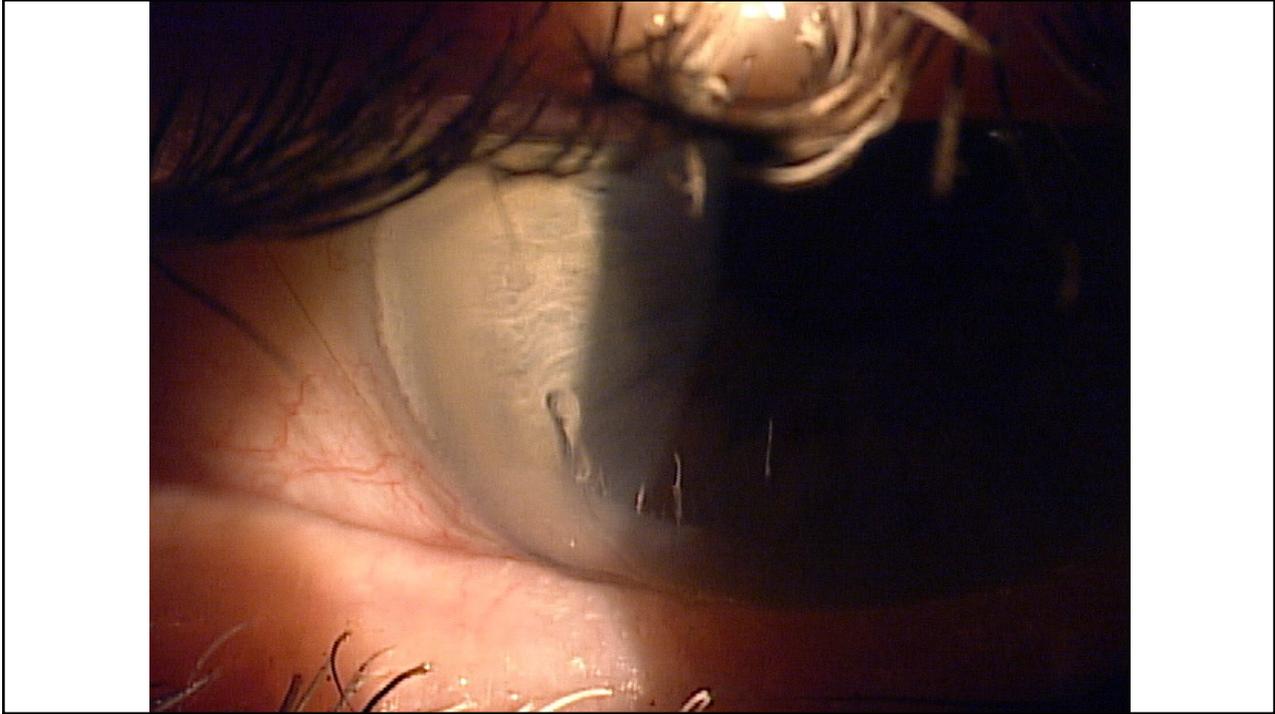
Intricate Crossing of Hyaluronic Acid Chains to Create Gels



52



53



54

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

55

SDP-4:L SILK PROTEIN DERIVED

Differentiated Biologic Product with Unique Properties:

- Highly soluble protein in aqueous formulation
- Broad acting anti-inflammatory activity
- Prolonged wetting without increased viscosity
- Absence of toxicity & immunogenicity
- Transparent, preservative free & single unit dose format
- Highly stable at room temperature

Silkworm Cocoon

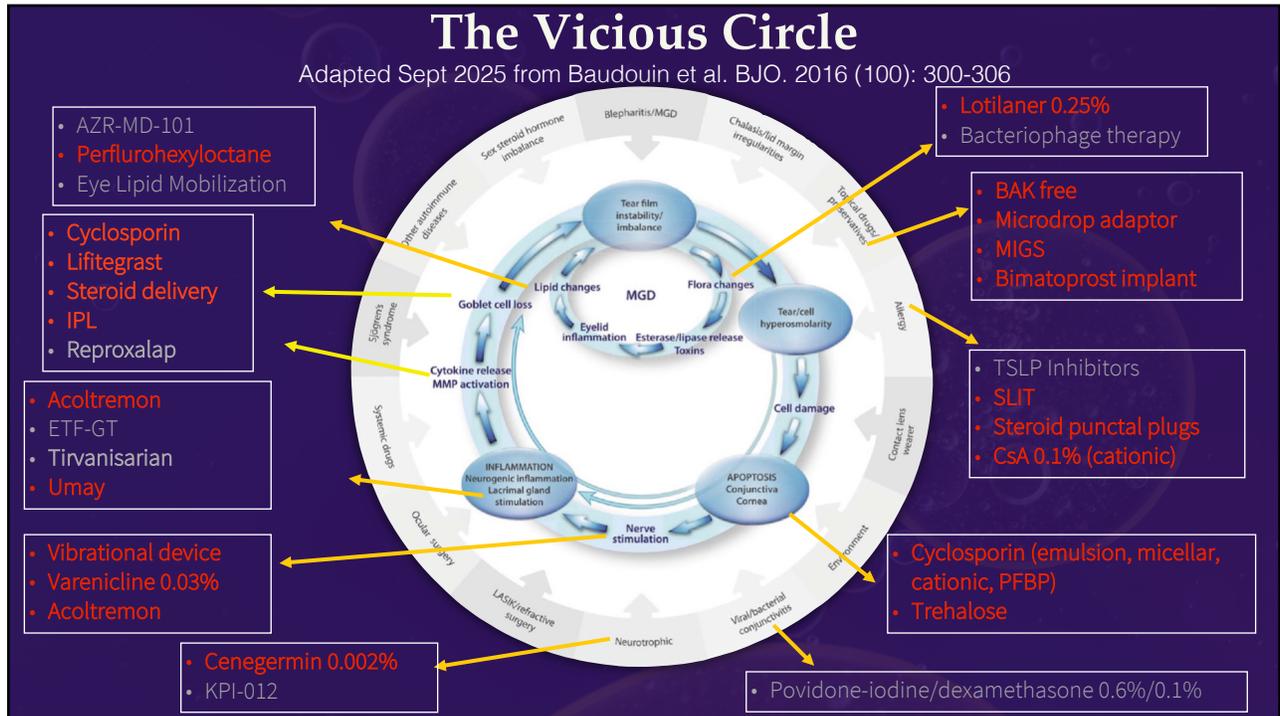


↓

Drug Product



56



57

THANK YOU

58