

Experience EXPO With Us!

- Innovation Stage - *Exhibit Hall – The Bridge (Booth P14051)*
Our Innovation Stage sessions feature free, promotional content for all attendees.

- Vision Series - *Thursday, Sept 19 and Friday, Sept 20*
Grab a bite to eat or drink and continue learning over breakfast or lunch!* Listen to industry leaders as they address the latest clinical innovations in a relaxed and collaborative environment.

**Open to Optometrists only. Not for Credit. Meals offered on first-come, first-serve basis to pre-registered attendees.*

- Exhibit Hall Hours

Thursday, Sept 19	9:30am – 6:00pm
Friday, Sept 20	9:30am – 6:00pm
Saturday, Sept 21	9:30am – 3:00pm

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

Vision Expo Has Gone Green!

We have eliminated all paper session evaluation forms. Please be sure to complete your electronic session evaluations online when you login to request your CE Letter for each course you attended! Your feedback is important to us as our Education Planning Committee considers content and speakers for future meetings to provide you with the best education possible.



lessons learned from
things done well and
things done poorly in dry
eye

milton m. hom
eyemage@mminternet.com

lessons learned from
things done well and
things done poorly in dry
eye

milton m. hom
eyemage@mminternet.com

disclosures

last 12 months

allergan/abbvie
bausch health
novartis
sun pharma
kala pharma
tarsus pharma
hovione scientia
silk-tech

last 12 months

sydnexis
topcon
eyenovia bio
laboratoires Thea
aurinia pharma
eyevance pharma
surface pharma
nevakar, inc.
visus therapeutics

last 12 months

aperta biosciences
astareal, inc.
azura ophthalmics
aldeyra therapeutics
allysta
vyluma
nicox
ocuphire
lenz

Lessons Learned

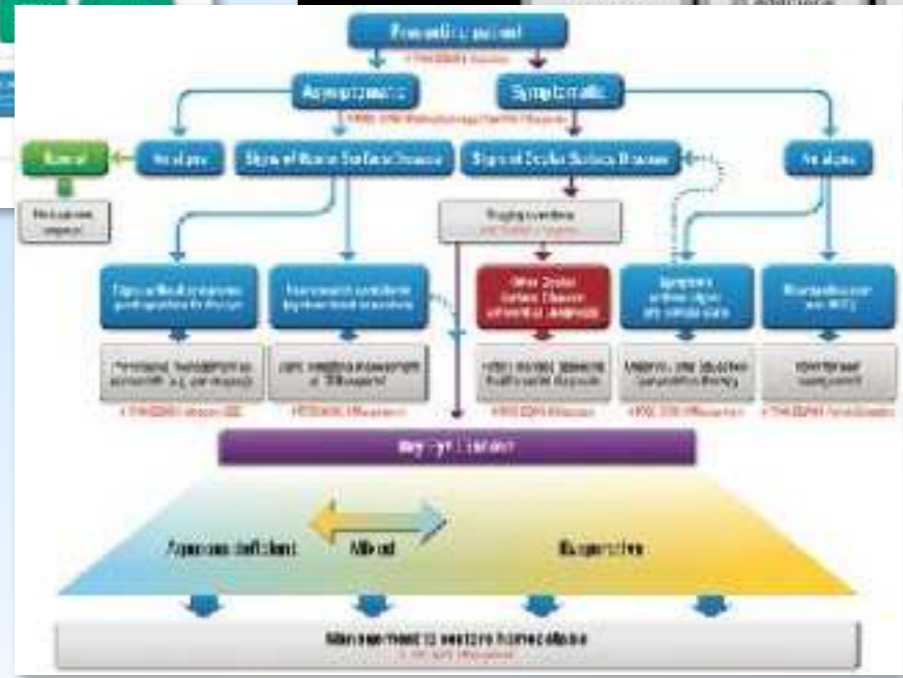
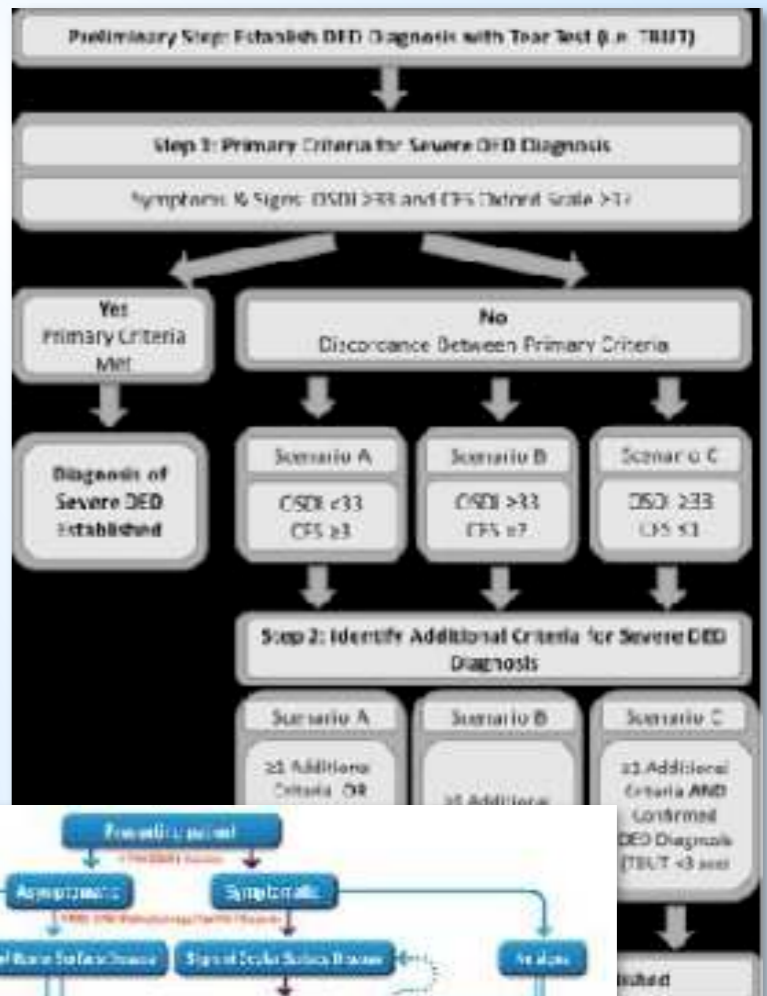
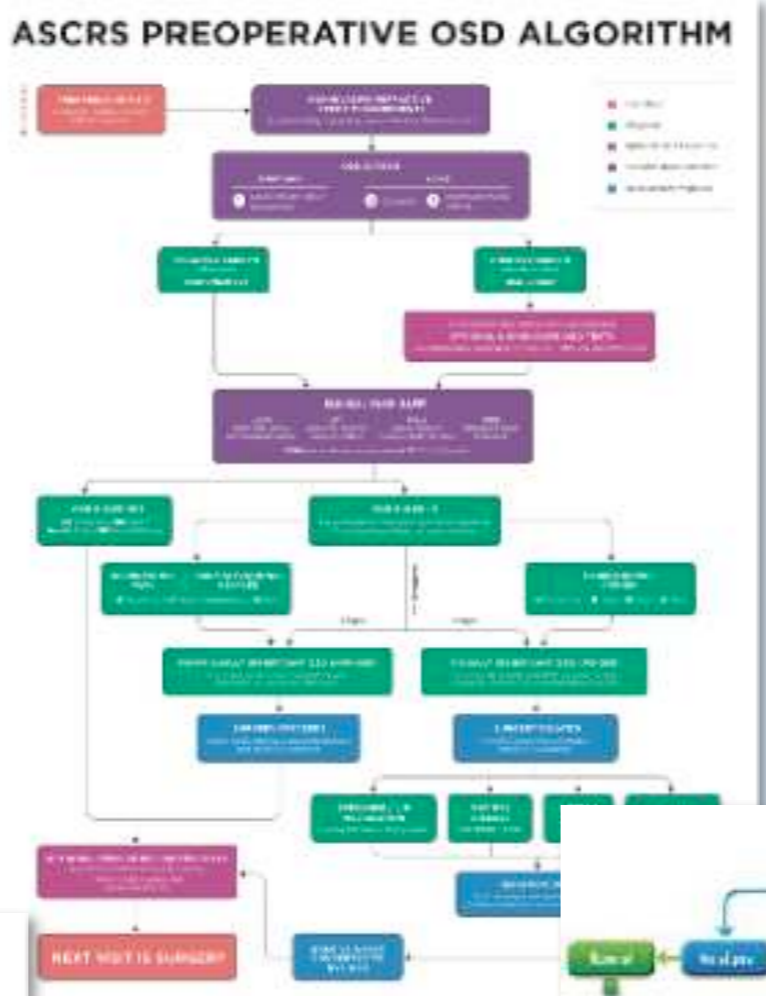
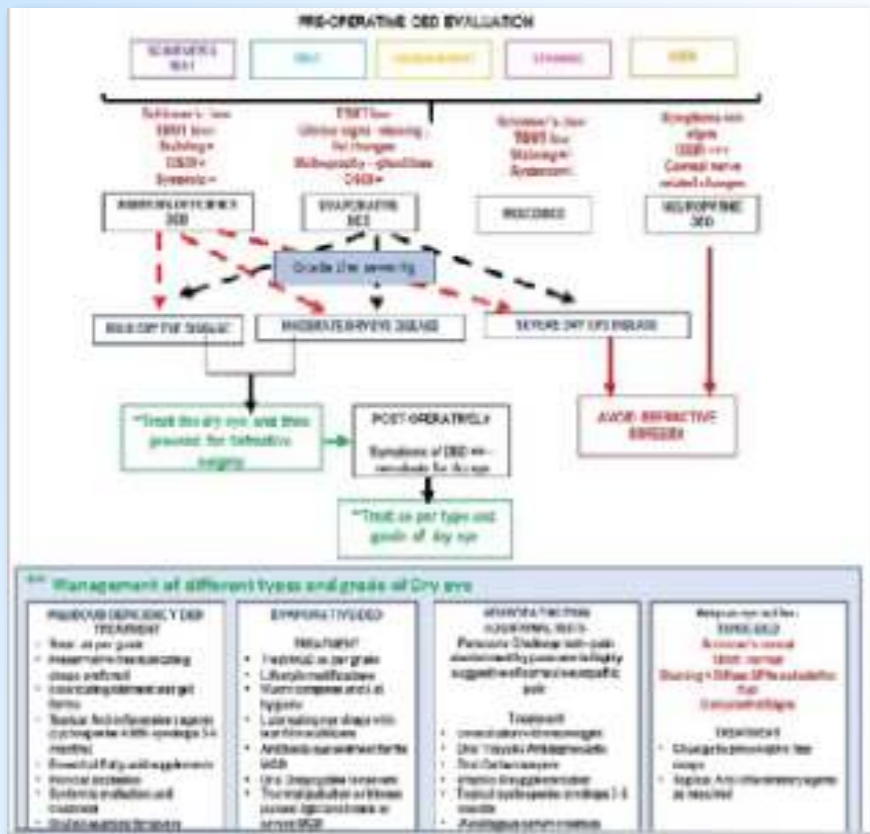
Algorithms

Artificial tears

Tear break up patterns

Tear Film Oriented Therapy

Dry eye/MGD algorithms



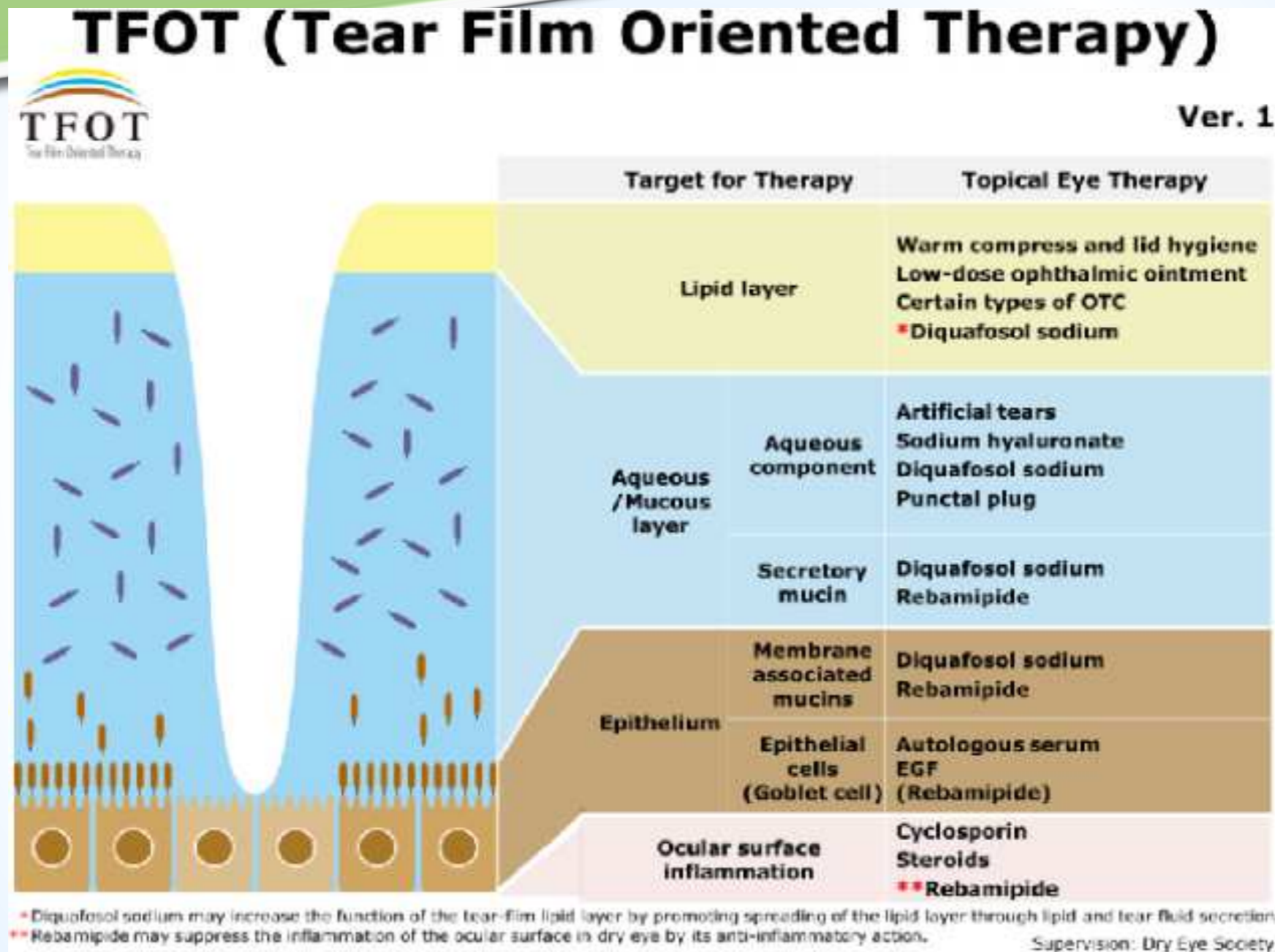
D'Souza S, James E, Swarup R, Mahuvakar S, Pradhan A, Gupta K. Algorithmic approach to diagnosis and management of post-refractive surgery dry eye disease. Indian J Ophthalmol. 2020 Dec;68(12):2888-2894. <https://ascrs.org/clinical-education/cornea/ascrs-preoperative-osd-algorithm>

Baudouin C, Aragona P, Van Setten G, Rolando M, Irkeç M, Benítez del Castillo J, Geerling G, Labetoulle M, Bonini S; ODISEY European Consensus Group members. Diagnosing the severity of dry eye: a clear and practical algorithm. Br J Ophthalmol. 2014 Sep;98(9):1168-76.

Rodriguez-Garcia A, Babayan-Sosa A, Ramirez-Miranda A, Santa Cruz-Valdes C, Hernandez-Quintela E, Hernandez-Camarena JC, Ramos-Betancourt N, Velasco-Ramos R, Ruiz-Lozano RE. A Practical Approach to Severity Classification and Treatment of Dry Eye Disease: A Proposal from the Mexican Dry Eye Disease Expert Panel. Clin Ophthalmol. 2022 Apr 28;16:1331-1355.

The Ocular Surface, 2017 Jul;15(3):276-283, Craig JP, Nichols KK, Akpek EK, et al. TFOS DEWS II Definition and Classification Report

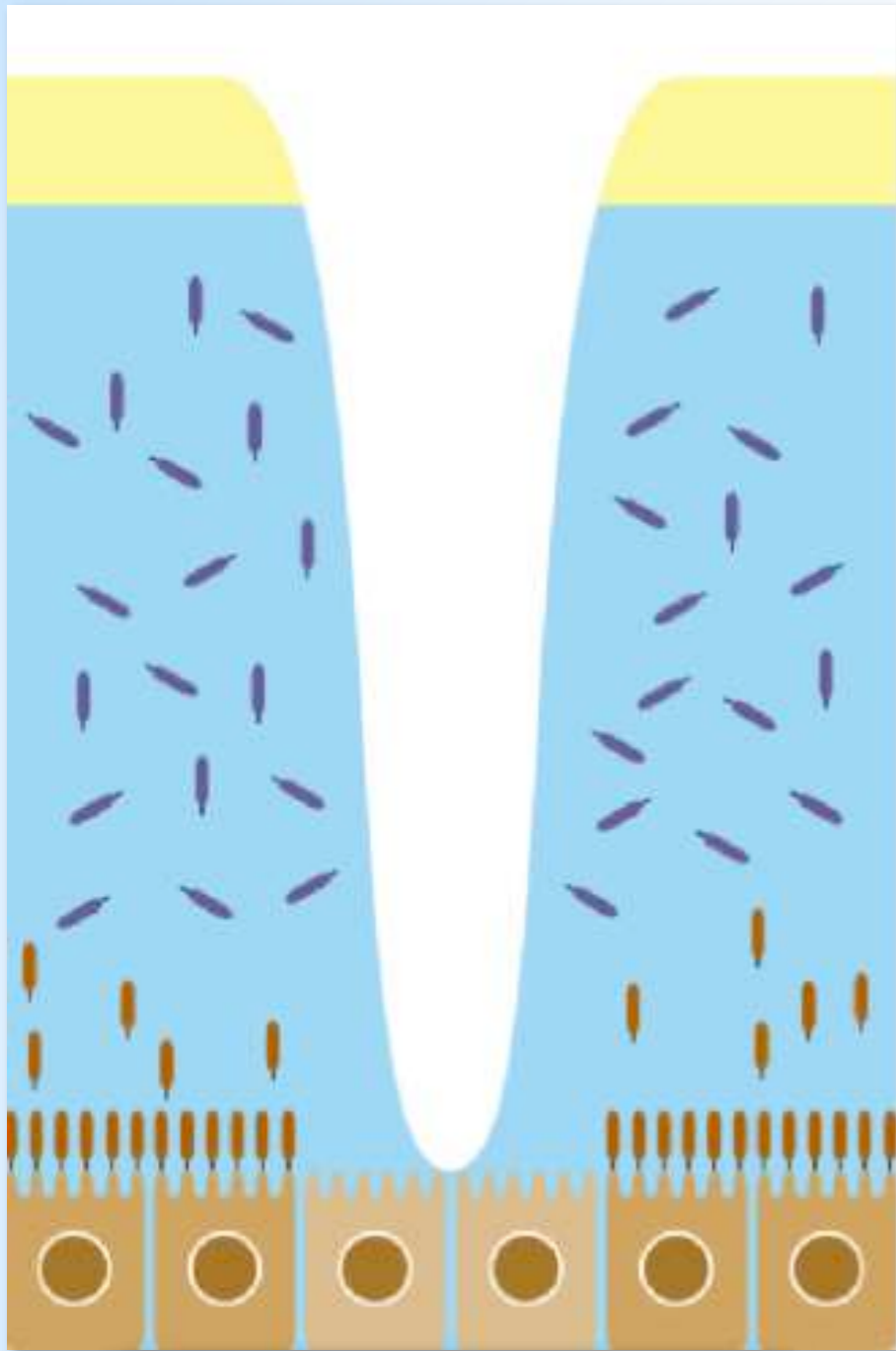
Tear Film Oriented Therapy (TFOT)



Yokoi N, Georgiev GA. Tear Film-Oriented Diagnosis and Tear Film-Oriented Therapy for Dry Eye Based on Tear Film Dynamics. Invest Ophthalmol Vis Sci. 2018 Nov 1;59(14):DES13-DES22. doi: 10.1167/iovs.17-23700. PMID: 30481801.

Target

Topical therapy



Inflammation

Lipid

Evaporative/MGD

Aqueous

Aqueous deficient

Mucin

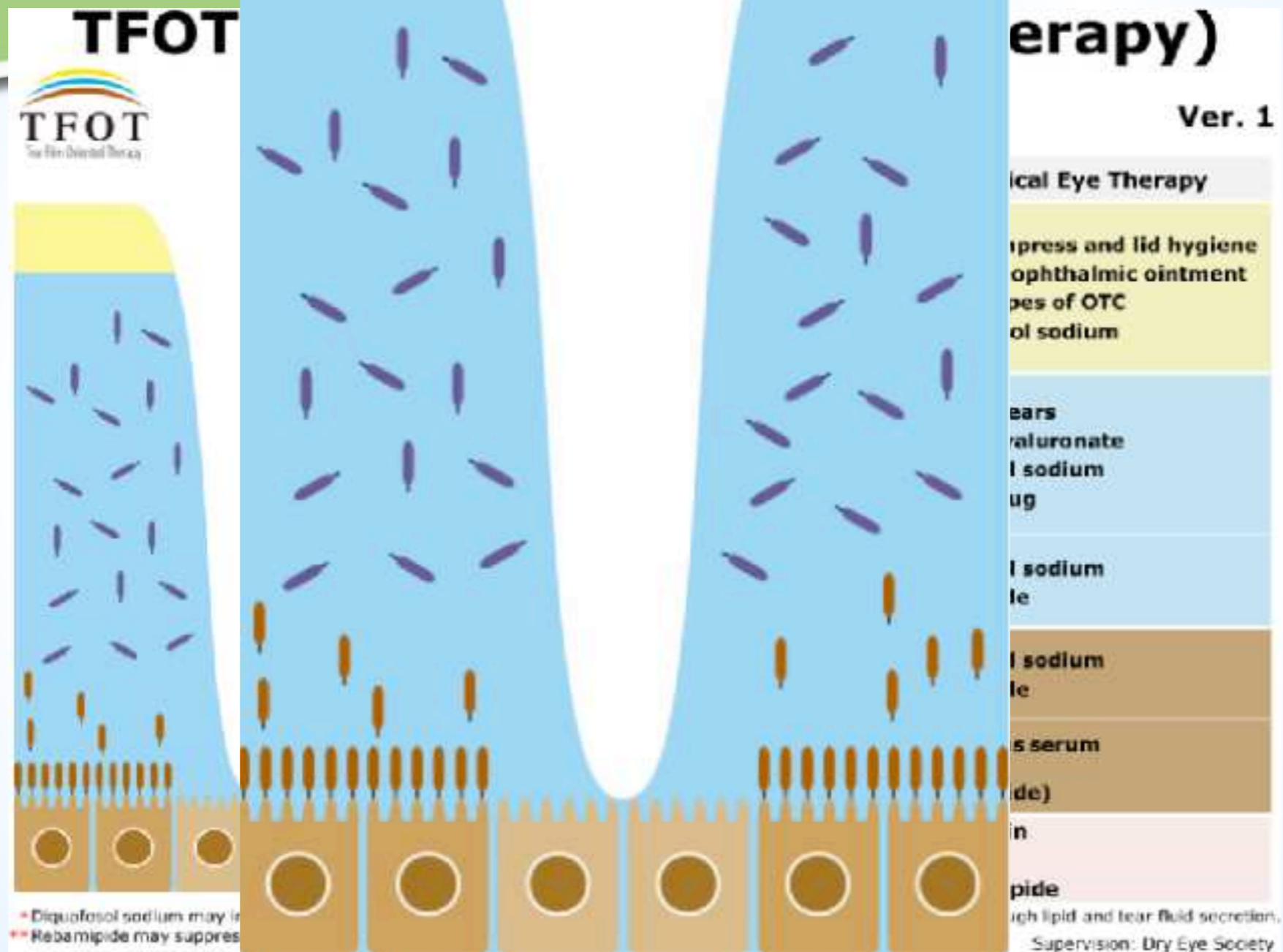
Mucin deficient

Epithelium

Staining

Tear Film

Therapy (TFOT)



Yokoi N, Georgiev GA. Tear Film-Oriented Diagnosis and Tear Film-Oriented Therapy for Dry Eye Based on Tear Film Dynamics. Invest Ophthalmol Vis Sci. 2018 Nov 1;59(14):DES13-DES22. doi: 10.1167/iovs.17-23700. PMID: 30481801.

Tear break-up time

Break up pattern

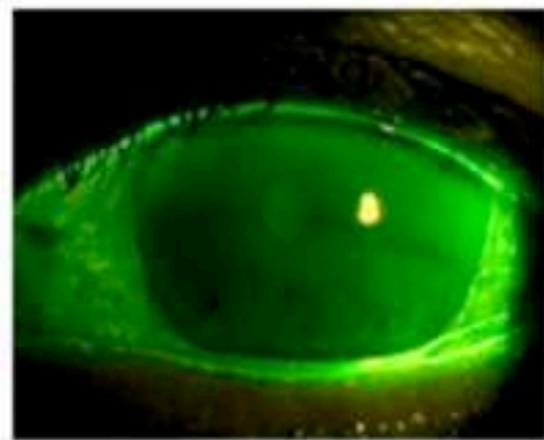
“TBUT less than 10 s...an abnormal tear film...5 s to 10 s considered marginal...less than 5 s indicative of dry eye”

“The cutoff value for short TBUT is 5 seconds.”

Vidas Pauk S, Petriček I, Jukić T, Popović-Suić S, Tomić M, Kalauz M, Jandroković S, Masnec S. NONINVASIVE TEAR FILM BREAK-UP TIME ASSESSMENT USING HANDHELD LIPID LAYER EXAMINATION INSTRUMENT. *Acta Clin Croat*. 2019 Mar;58(1):63-71. doi: 10.20471/acc.2019.58.01.09. PMID: 31363327; PMCID: PMC6629192.

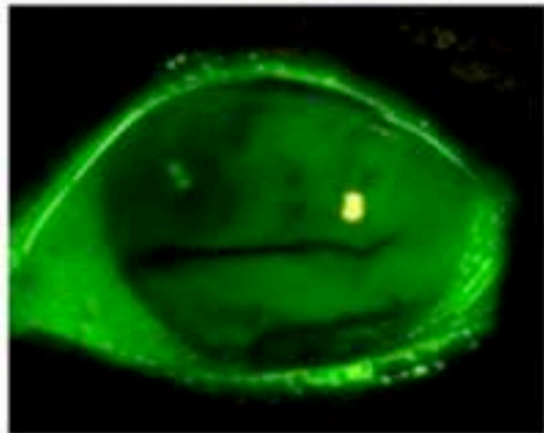
Tsubota K. Short Tear Film Breakup Time-Type Dry Eye. *Invest Ophthalmol Vis Sci*. 2018 Nov 1;59(14):DES64-DES70. doi: 10.1167/iovs.17-23746. PMID: 30481808..

Break up pattern

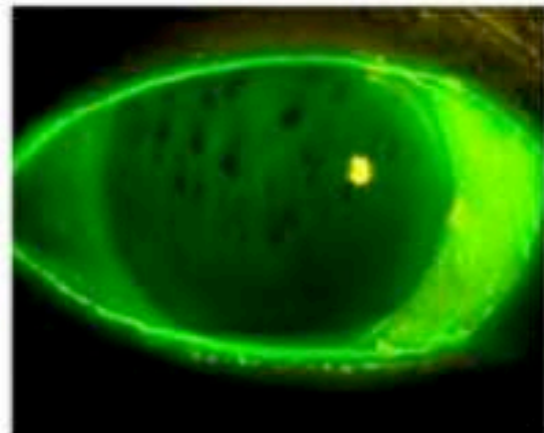


Random break
13.5% (n=117)

Undefined
3.5% (n=30)



Dimple break
16.3% (n=141)

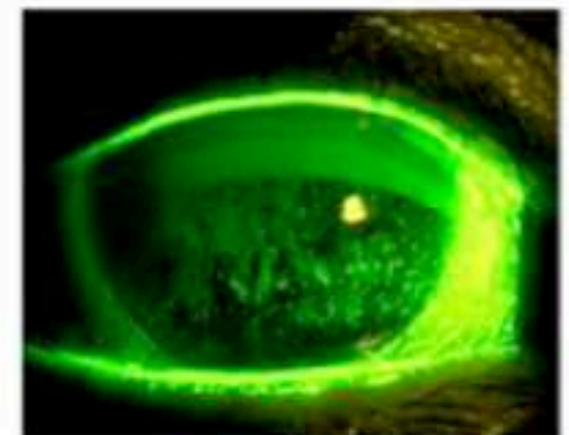
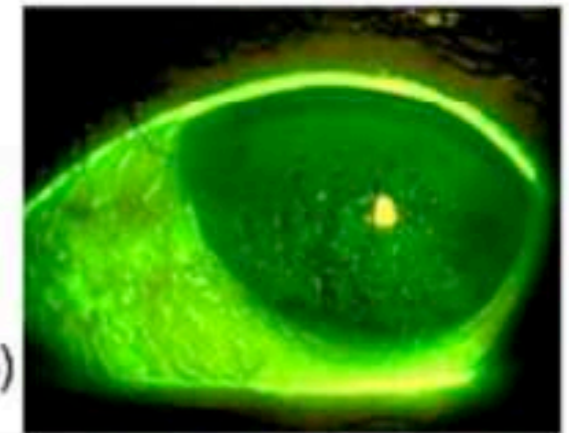


Spot break
10.5% (n=91)



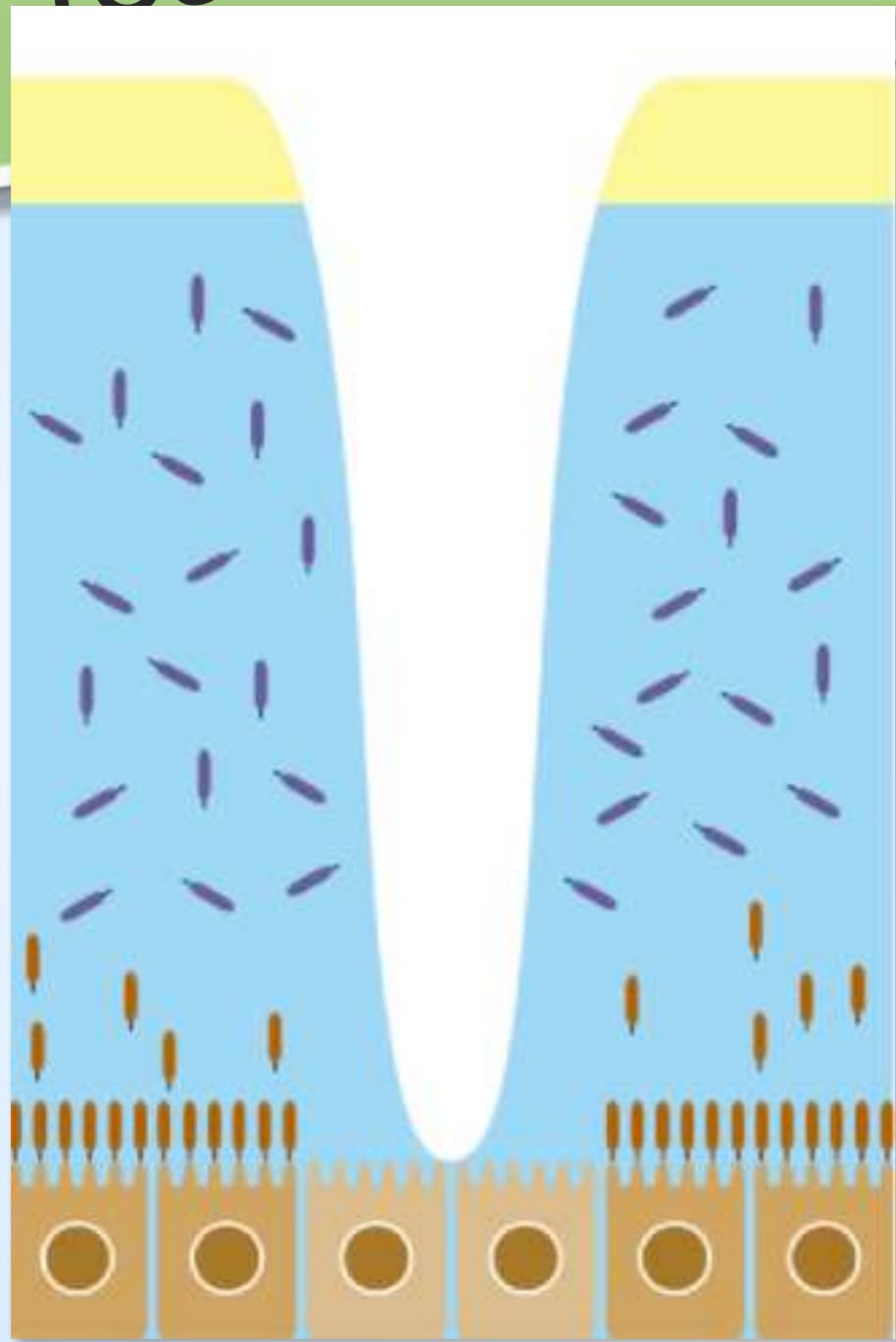
Line break
51.6% (n=448)

Area break
4.6% (n=40)



Shigeyasu C, Yamada M, Yokoi N, Kawashima M, Suwaki K, Uchino M, Hiratsuka Y, Tsubota K, On Behalf Of The Decs-J Study Group. Characteristics and Utility of Fluorescein Breakup Patterns among Dry Eyes in Clinic-Based Settings. *Diagnostics (Basel)*. 2020 Sep 17;10(9):711. doi: 10.3390/diagnostics10090711. PMID: 32957707; PMCID: PMC7555739.

Tear Film Oriented Therapy (TFOT)



Break up pattern	Dry eye subtype
Line break	Aqueous deficient (ADDE)
Spot break	Mucin deficient
Dimple break	Mucin deficient
Random break	Evaporative (EDE) (MGD)

Yokoi N, Georgiev GA. Tear Film-Oriented Diagnosis and Tear Film-Oriented Therapy for Dry Eye Based on Tear Film Dynamics. Invest Ophthalmol Vis Sci. 2018 Nov 1;59(14):DES13-DES22. doi: 10.1167/iovs.17-23700. PMID: 30481801.

Aqueous

Aqueous deficient

Schirmer test

$\leq 5\text{mm}$ 5min

Phenol red thread

$\leq 10\text{mm}$ 15s

Tear meniscus height

$\leq 0.1\text{mm}$

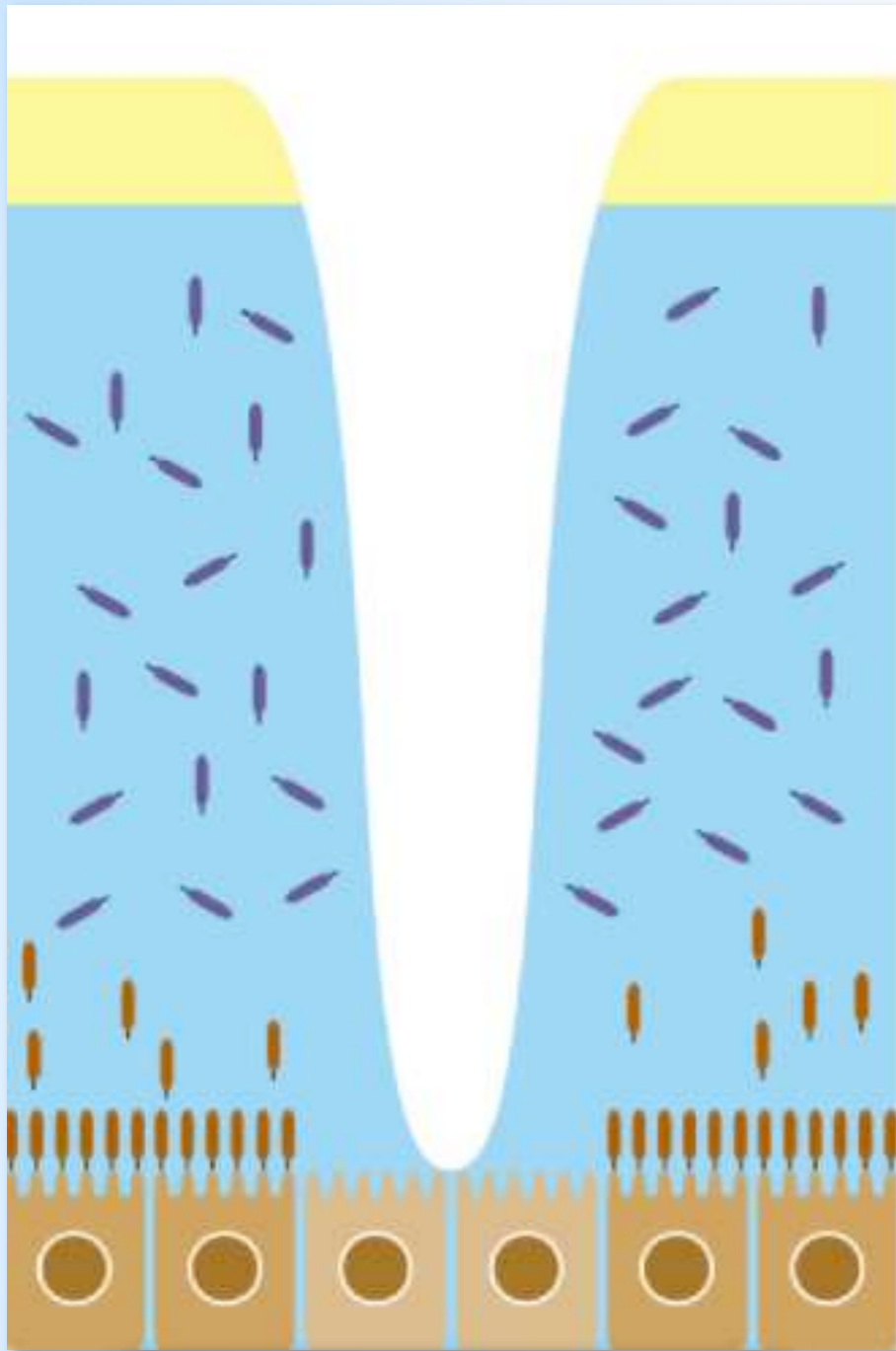


BUP: Lines

Shigeyasu C, Yamada M, Yokoi N, Kawashima M, Suwaki K, Uchino M, Hiratsuka Y, Tsubota K, On Behalf Of The Decs-J Study Group. Characteristics and Utility of Fluorescein Breakup Patterns among Dry Eyes in Clinic-Based Settings. *Diagnostics (Basel)*. 2020 Sep 17;10(9):711. doi: 10.3390/diagnostics10090711. PMID: 32957707; PMCID: PMC7555739.

Target

Topical therapy



Lipid
Evaporative/MGD

Aqueous
Aqueous deficient

Mucin
Mucin deficient

Epithelium
Staining

Inflammation

Artificial tears

Plugs

Artificial tears

Virtually every DED
treatment regimen
includes artificial tears

Artificial tears



Artificial tears

All the same?

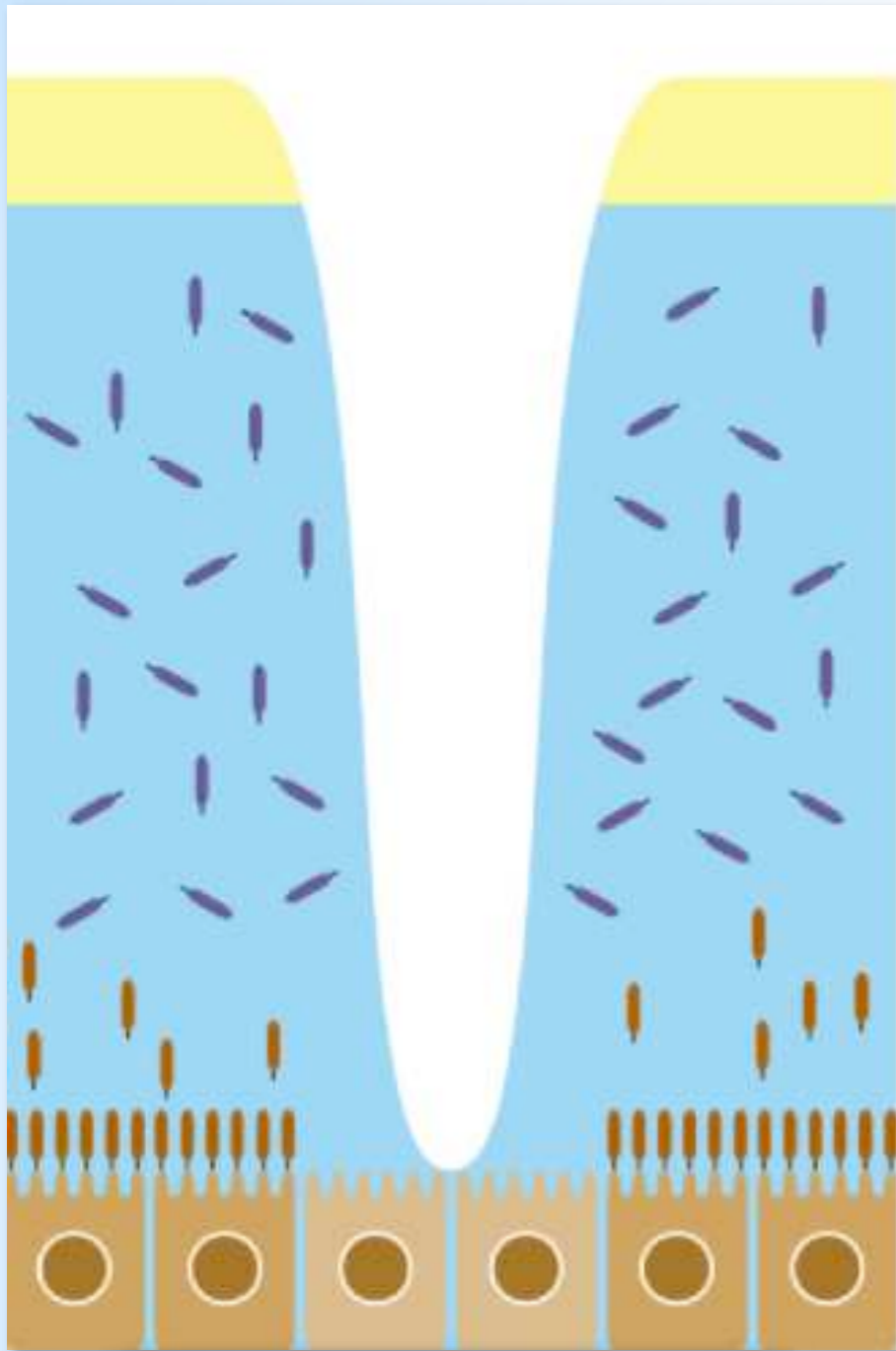
“Given the large number of artificial tear formulations...it is difficult to propose that one OTC artificial tear formulation is superior to another for the treatment of dry eye syndrome”

Pucker AD, Ng SM, Nichols JJ. Over the counter (OTC) artificial tear drops for dry eye syndrome. Cochrane Database Syst Rev. 2016;2:CD009729

Product	Mechanism of Action	Ingredient	Category
Systane Ultra/Classic	pH activated	HP Guar	Viscosity
Refresh	muco-adhesive	cmc	Viscosity
Refresh PM/Systane Nighttime/ Soothe Lubricant Nighttime	ointment	mineral oil/white petrolatum	Viscosity
Optive	compatible solutes	L-carnitine/erythritol/cmc	Osmo-protectants/Viscosity
Soothe XP	oily tears	mineral oil	Emulsion
Systane Balance Systane Complete	oily tears oily tears/nanomicellular	mineral oil HP Guar	Emulsion/Viscosity
Refresh Digital	oily tears compatible solutes	castor oil L-carnitine/erythritol/cmc	Emulsion Osmo-protectants/Viscosity
Refresh Optive Mega-3	oily tears/nanomicellular	trehalose castor oil L-carnitine/erythritol/cmc	Cytoprotective Emulsion Osmo-protectants/Viscosity
iVizia	high shear thinning	trehalose sodium hyaluronate (HA)	Cytoprotective HA Osmo-protectants
blink tears	high shear thinning	sodium hyaluronate (HA)	HA
Refresh Relieva	high shear thinning compatible solutes	sodium hyaluronate (HA) L-carnitine/erythritol/cmc	HA Osmo-protectants/Viscosity
Biotrue Hydration Boost	high shear thinning	sodium hyaluronate (HA)	HA
Oasis	high shear thinning	sodium hyaluronate (HA)	HA
Systane Hydration	high shear thinning	sodium hyaluronate (HA) HP Guar	HA/Viscosity
blink Triple Care	high shear thinning compatible solutes	sodium hyaluronate (HA) castor oil	Emulsion HA
Refresh Relieva PF Xtra	high shear thinning compatible solutes	trehalose sodium hyaluronate (HA) L-carnitine/erythritol/cmc	Cytoprotective HA Osmo-protectants/Viscosity

Target

Topical therapy



Lipid
Evaporative/MGD

Aqueous
Aqueous deficient

Mucin
Mucin deficient

Epithelium
Staining

Viscosity

Plugs

Inflammation

Viscosity cmc



<https://www.youtube.com/watch?v=sC3Dfka-Ywg>

Product	Mechanism of Action	Ingredient	Category
Systane Ultra/Classic	pH activated	HP Guar	Viscosity
Refresh	muco-adhesive	cmc	Viscosity
Refresh PM/Systane Nighttime/ Soothe Lubricant Nighttime	ointment	mineral oil/white petrolatum	Viscosity
Optive	compatible solutes	L-carnitine/erythritol/cmc	Osmo-protectants/Viscosity
Soothe XP	oily tears	mineral oil	Emulsion
Systane Balance Systane Complete	oily tears oily tears/nanomicellular	mineral oil HP Guar	Emulsion/Viscosity
Refresh Digital	oily tears compatible solutes	castor oil L-carnitine/erythritol/cmc	Emulsion Osmo-protectants/Viscosity
Refresh Optive Mega-3	oily tears/nanomicellular	trehalose castor oil L-carnitine/erythritol/cmc	Cytoprotective Emulsion Osmo-protectants/Viscosity
iVizia	high shear thinning	trehalose sodium hyaluronate (HA)	Cytoprotective HA Osmo-protectants
blink tears	high shear thinning	sodium hyaluronate (HA)	HA
Refresh Relieva	high shear thinning compatible solutes	sodium hyaluronate (HA) L-carnitine/erythritol/cmc	HA Osmo-protectants/Viscosity
Biotrue Hydration Boost	high shear thinning	sodium hyaluronate (HA)	HA
Oasis	high shear thinning	sodium hyaluronate (HA)	HA
Systane Hydration	high shear thinning	sodium hyaluronate (HA) HP Guar	HA/Viscosity
blink Triple Care	high shear thinning compatible solutes	sodium hyaluronate (HA) castor oil	Emulsion HA
Refresh Relieva PF Xtra	high shear thinning compatible solutes	trehalose sodium hyaluronate (HA) L-carnitine/erythritol/cmc	Cytoprotective HA Osmo-protectants/Viscosity

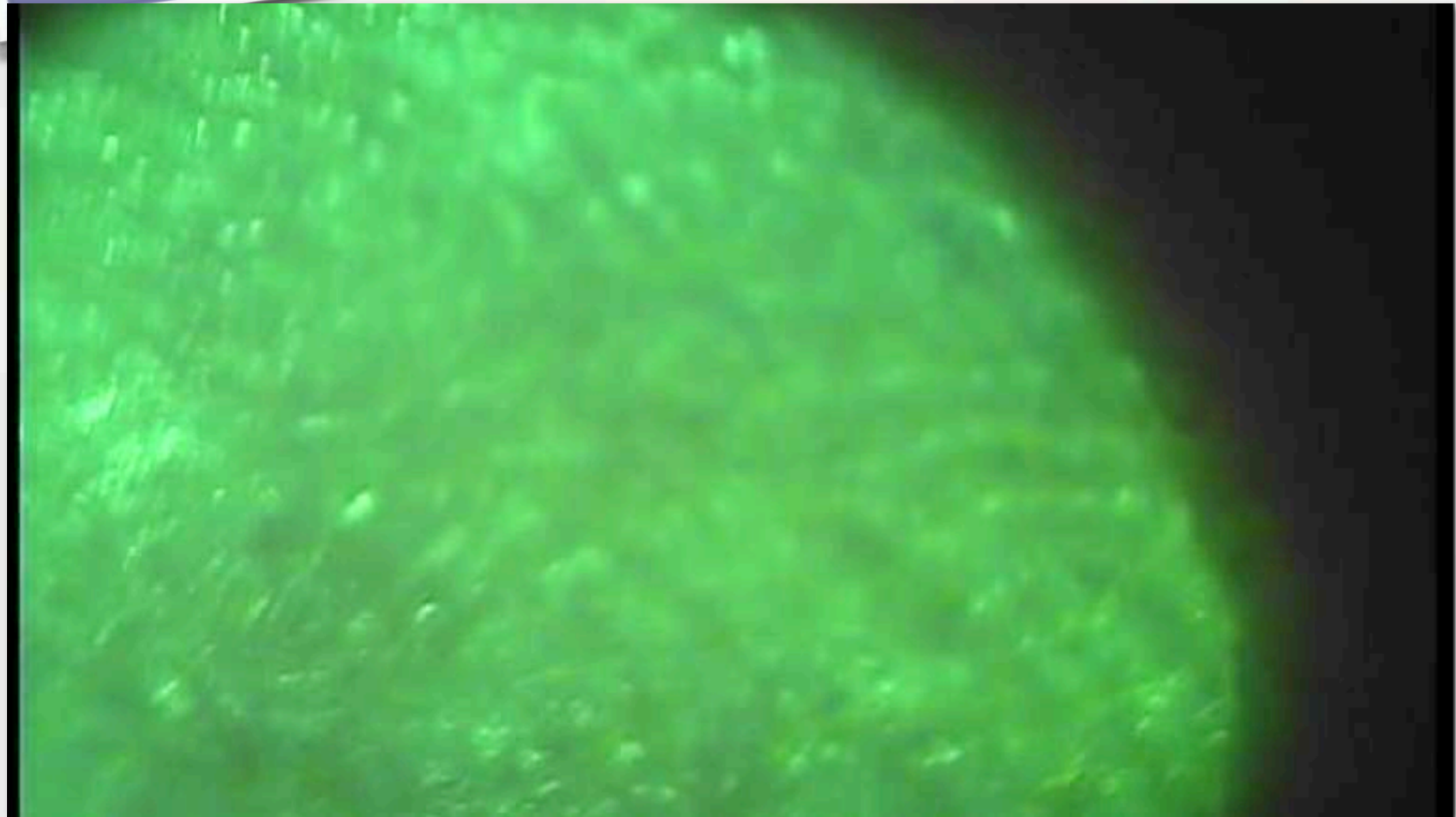
Mucin

Break up pattern

“Den et al. and Uchino et al. reported the association of mucin components with TBUT...suggesting the involvement of mucin as a major player in short TBUT”

Tsubota K. Short Tear Film Breakup Time-Type Dry Eye. Invest Ophthalmol Vis Sci. 2018 Nov 1;59(14):DES64-DES70. doi: 10.1167/iovs.17-23746. PMID: 30481808..

BUPE: Spots



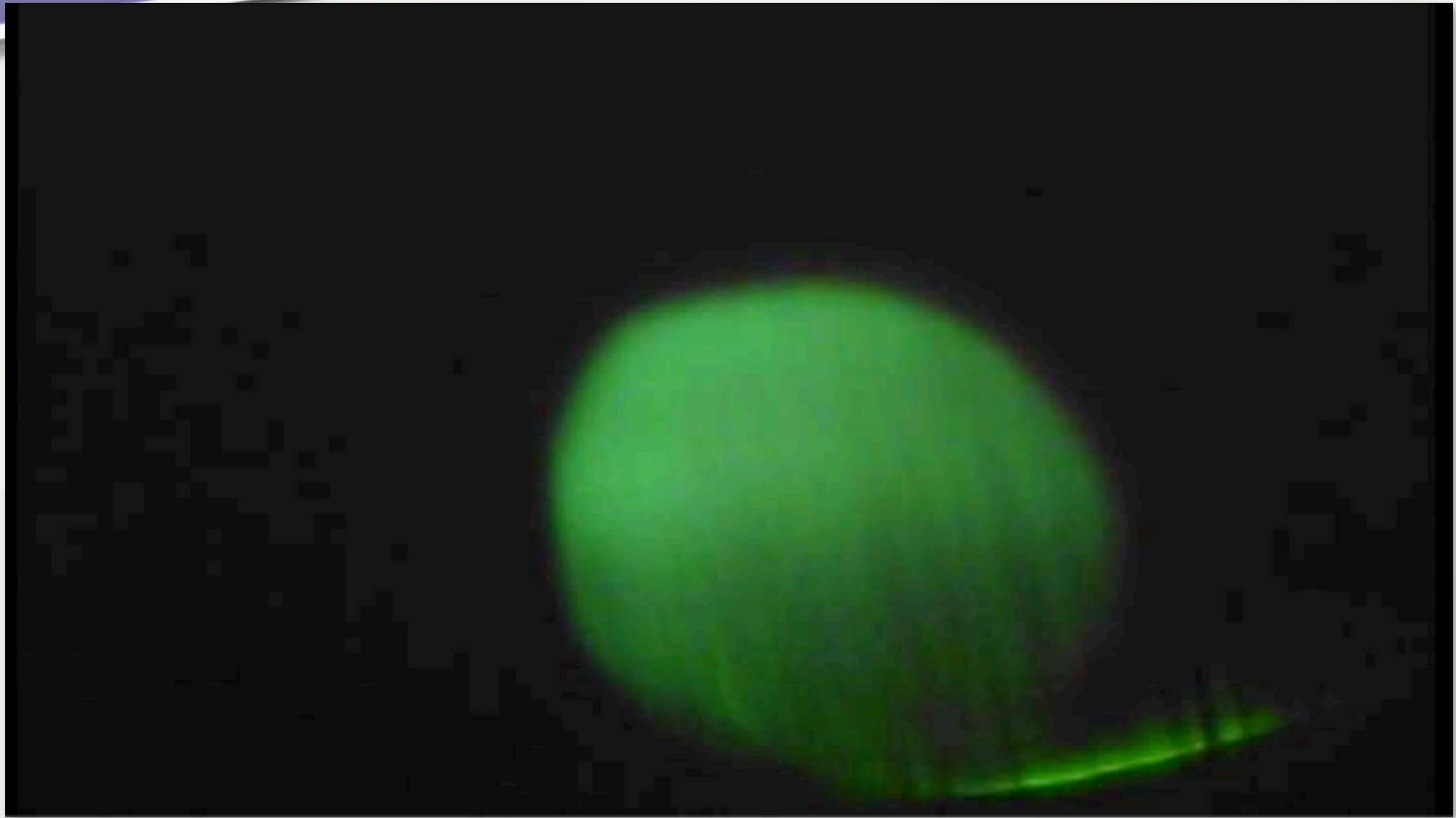
Shigeyasu C, Yamada M, Yokoi N, Kawashima M, Suwaki K, Uchino M, Hiratsuka Y, Tsubota K, On Behalf Of The Decs-J Study Group. Characteristics and Utility of Fluorescein Breakup Patterns among Dry Eyes in Clinic-Based Settings. *Diagnostics (Basel)*. 2020 Sep 17;10(9):711. doi: 10.3390/diagnostics10090711. PMID: 32957707; PMCID: PMC7555739.

BUF: Spots



Shigeyasu C, Yamada M, Yokoi N, Kawashima M, Suwaki K, Uchino M, Hiratsuka Y, Tsubota K, On Behalf Of The Decs-J Study Group. Characteristics and Utility of Fluorescein Breakup Patterns among Dry Eyes in Clinic-Based Settings. *Diagnostics (Basel)*. 2020 Sep 17;10(9):711. doi: 10.3390/diagnostics10090711. PMID: 32957707; PMCID: PMC7555739.

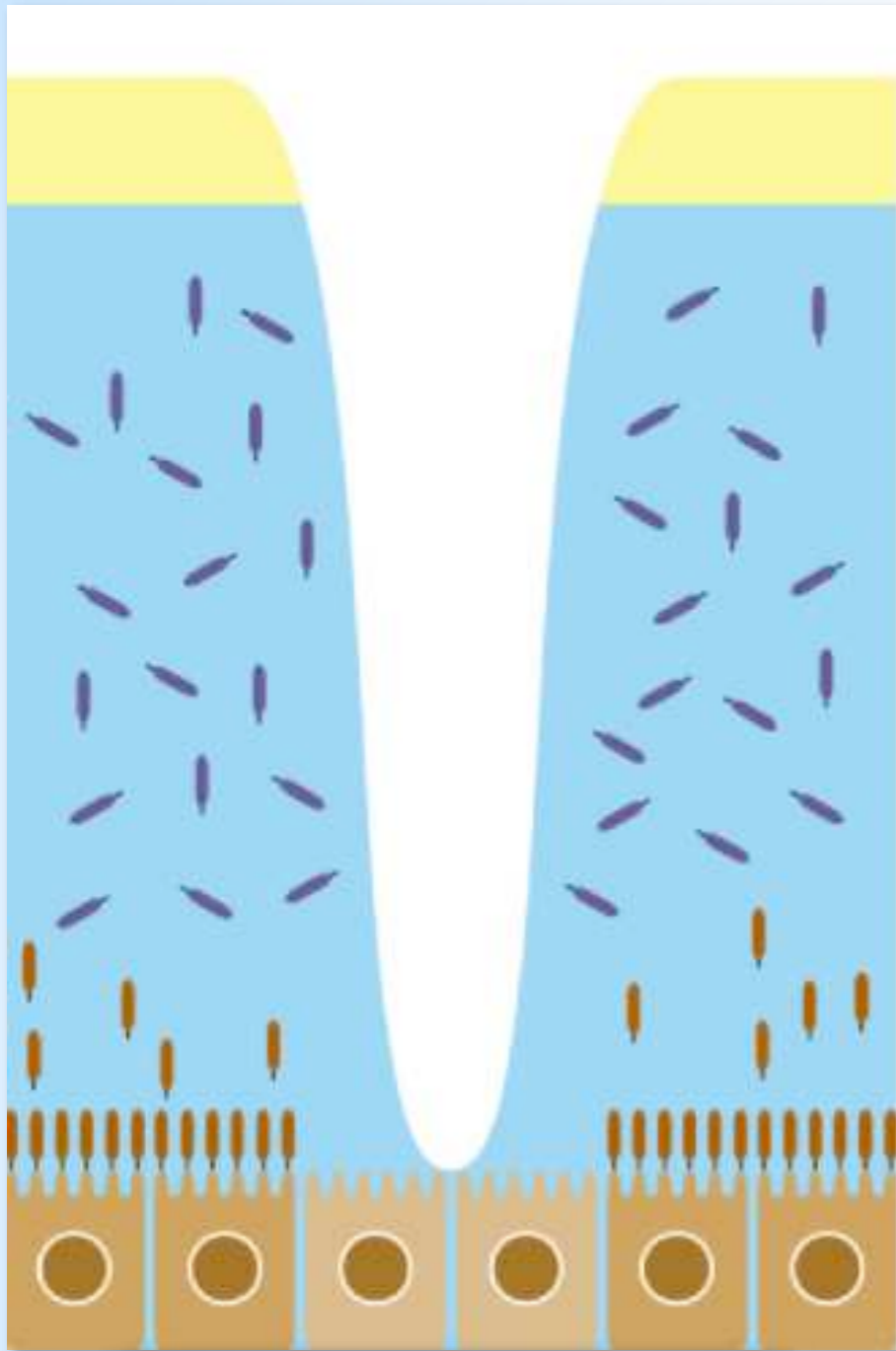
BUP: Dimple



Shigeyasu C, Yamada M, Yokoi N, Kawashima M, Suwaki K, Uchino M, Hiratsuka Y, Tsubota K, On Behalf Of The Decs-J Study Group. Characteristics and Utility of Fluorescein Breakup Patterns among Dry Eyes in Clinic-Based Settings. *Diagnostics (Basel)*. 2020 Sep 17;10(9):711. doi: 10.3390/diagnostics10090711. PMID: 32957707; PMCID: PMC7555739.

Target

Topical therapy



Inflammation

Lipid
Evaporative/MGD

Aqueous
Aqueous deficient

Mucin
Mucin deficient

Epithelium
Staining

Viscosity

Plugs

Artificial tears

Vit A ointment

Vitamin A

"vitamin A...led to a significant improvement in [OSDI] score and prevented the gradual decline in tear break-up time"

Cui X, Xiang J, Zhu W, Wei A, Le Q, Xu J, Zhou X. Vitamin A Palmitate and Carbomer Gel Protects the Conjunctiva of Patients With Long-term Prostaglandin Analogs Application. *J Glaucoma*. 2016 Jun;25(6):487-92. doi: 10.1097/IJG.0000000000000316. PMID: 26317483.

Vitamin A

"Vitamin A palmitate significantly increased the Goblet Cell density after treatment"

Cui X, Xiang J, Zhu W, Wei A, Le Q, Xu J, Zhou X. Vitamin A Palmitate and Carbomer Gel Protects the Conjunctiva of Patients With Long-term Prostaglandin Analogs Application. *J Glaucoma*. 2016 Jun;25(6):487-92. doi: 10.1097/IJG.0000000000000316. PMID: 26317483.

HYLO Night Eye Ointment

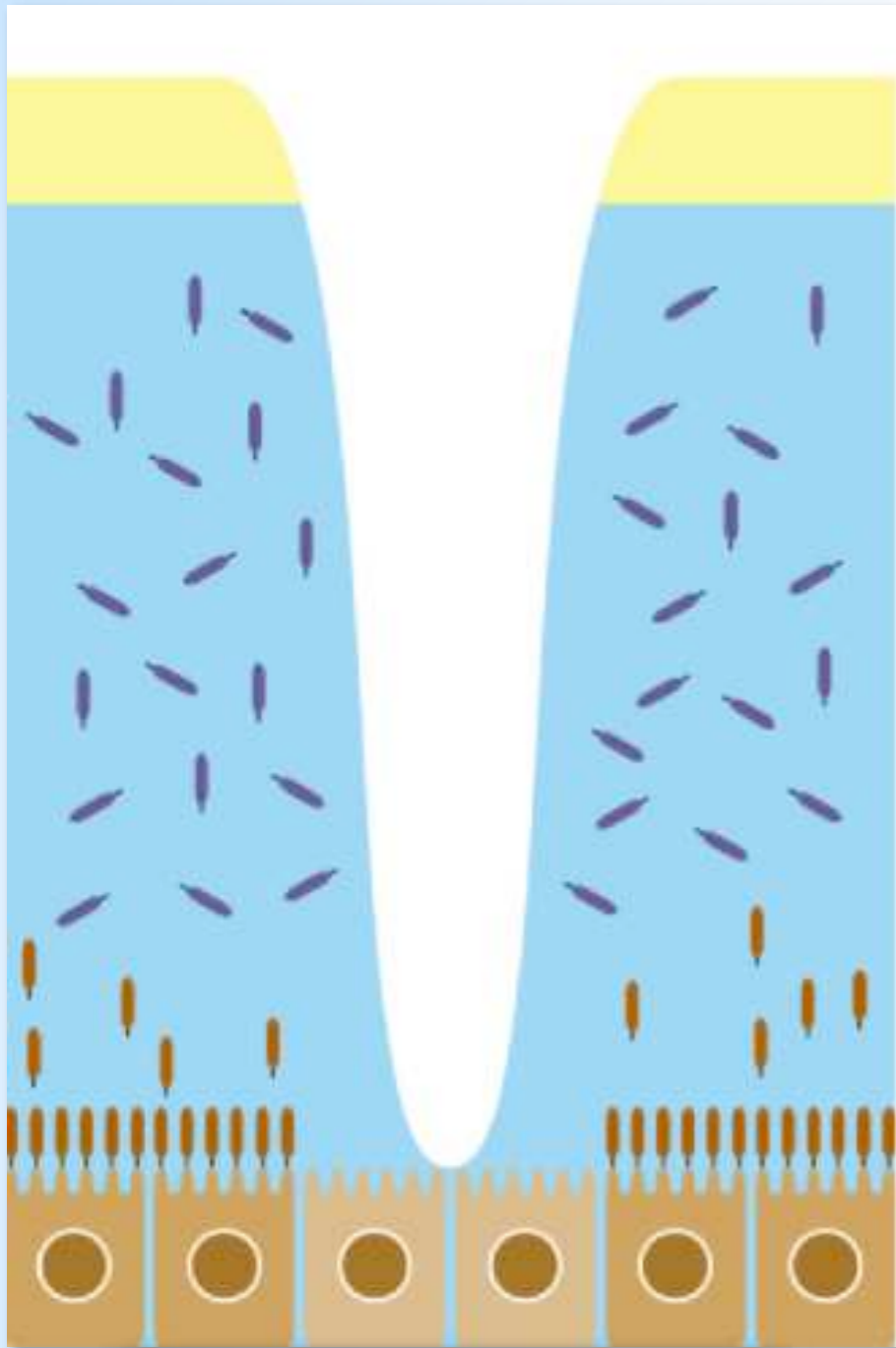


Active ingredients: White Petrolatum (91.72%), Lanolin (6.9%), Light Mineral Oil

Inactive ingredients: Retinol palmitate (Vitamin A), light liquid paraffin

Target

Topical therapy



Inflammation

Lipid
Evaporative/MGD

Aqueous
Aqueous deficient

Mucin
Mucin deficient

Epithelium
Staining

Viscosity

Plugs

Artificial tears

Vit A ointment

Product	Mechanism of Action	Ingredient	Category
Systane Ultra/Classic	pH activated	HP Guar	Viscosity
Refresh	muco-adhesive	cmc	Viscosity
Refresh PM/Systane Nighttime/ Soothe Lubricant Nighttime	ointment	mineral oil/white petrolatum	Viscosity
Optive	compatible solutes	L-carnitine/erythritol/cmc	Osmo-protectants/Viscosity
Soothe XP	oily tears	mineral oil	Emulsion
Systane Balance Systane Complete	oily tears oily tears/nanomicellular	mineral oil HP Guar	Emulsion/Viscosity
Refresh Digital	oily tears compatible solutes	castor oil L-carnitine/erythritol/cmc	Emulsion Osmo-protectants/Viscosity
Refresh Optive Mega-3	oily tears/nanomicellular	trehalose castor oil L-carnitine/erythritol/cmc	Cytoprotective Emulsion Osmo-protectants/Viscosity
iVizia	high shear thinning	trehalose sodium hyaluronate (HA)	Cytoprotective HA Osmo-protectants
blink tears	high shear thinning	sodium hyaluronate (HA)	HA
Refresh Relieva	high shear thinning compatible solutes	sodium hyaluronate (HA) L-carnitine/erythritol/cmc	HA Osmo-protectants/Viscosity
Biotrue Hydration Boost	high shear thinning	sodium hyaluronate (HA)	HA
Oasis	high shear thinning	sodium hyaluronate (HA)	HA
Systane Hydration	high shear thinning	sodium hyaluronate (HA) HP Guar	HA/Viscosity
blink Triple Care	high shear thinning compatible solutes	sodium hyaluronate (HA) castor oil	Emulsion HA
Refresh Relieva PF Xtra	high shear thinning compatible solutes	trehalose sodium hyaluronate (HA) L-carnitine/erythritol/cmc	Cytoprotective HA Osmo-protectants/Viscosity

Carboxymethylcellulose

cmc

"CMC, well-known for its mucoadhesive...properties, binds to corneal epithelial cells and remains bound for at least several hours"

Garrett Q, Simmons PA, Xu S, Vehige J, Zhao Z, Ehrmann K, Willcox M. Carboxymethylcellulose binds to human corneal epithelial cells and is a modulator of corneal epithelial wound healing. Invest Ophthalmol Vis Sci. 2007 Apr;48(4):1559-67. doi: 10.1167/iovs.06-0848. PMID: 17389485.

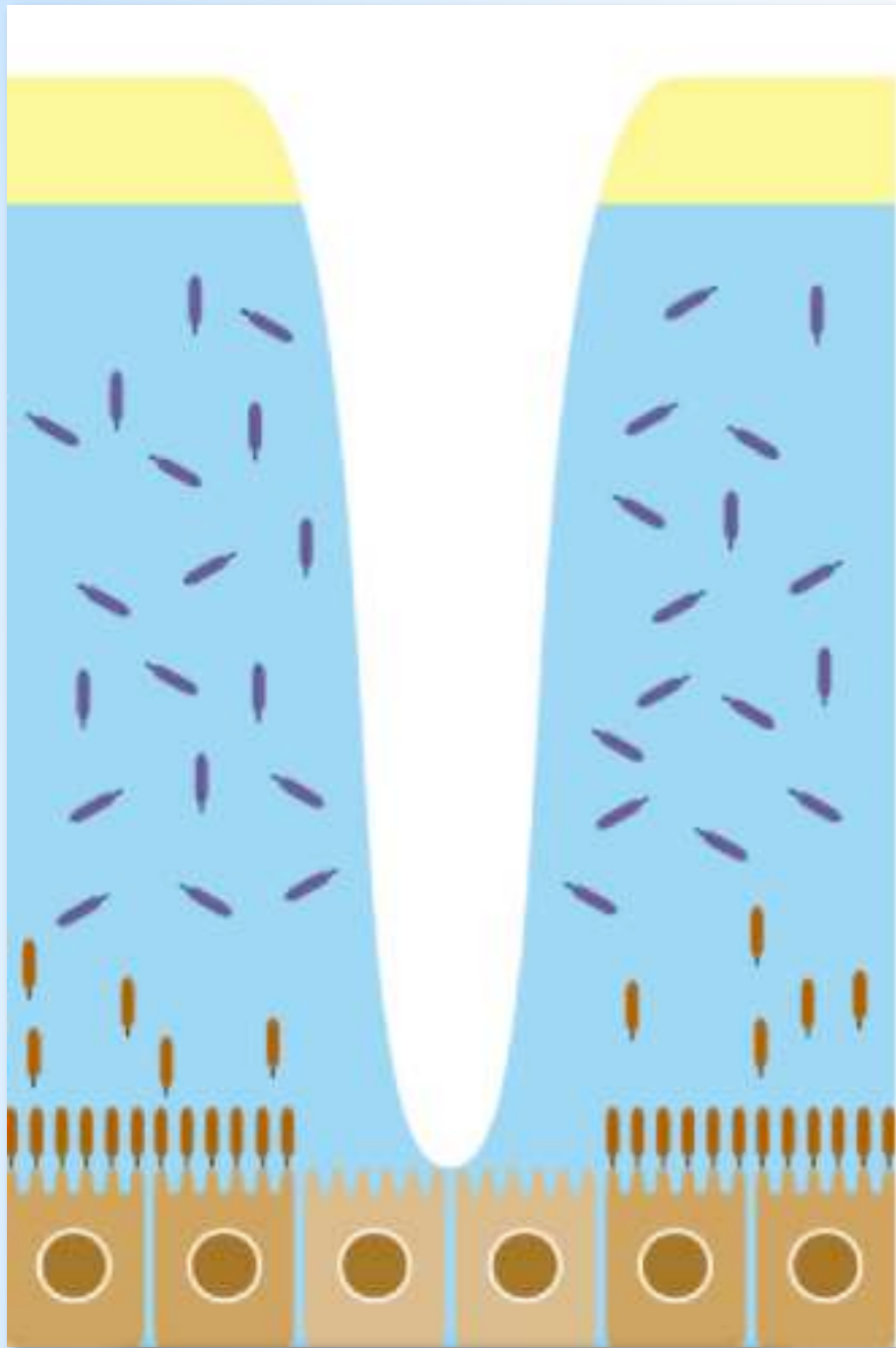
Carboxymethylcellulose cmc

"a formulation containing mucoadhesive CMC prolongs the adherence of the matrix to the mucosa"

Cook SL, Woods S, Methven L, Parker JK, Khutoryanskiy VV. Mucoadhesive polysaccharides modulate sodium retention, release and taste perception. *Food Chem.* 2018 Feb 1;240:482-489. doi: 10.1016/j.foodchem.2017.07.134. Epub 2017 Jul 26. PMID: 28946301; PMCID: PMC5625848.

Target

Topical therapy



Inflammation

Lipid
Evaporative/MGD

Aqueous
Aqueous deficient

Mucin
Mucin deficient

Epithelium
Staining

Viscosity

Plugs

cmc

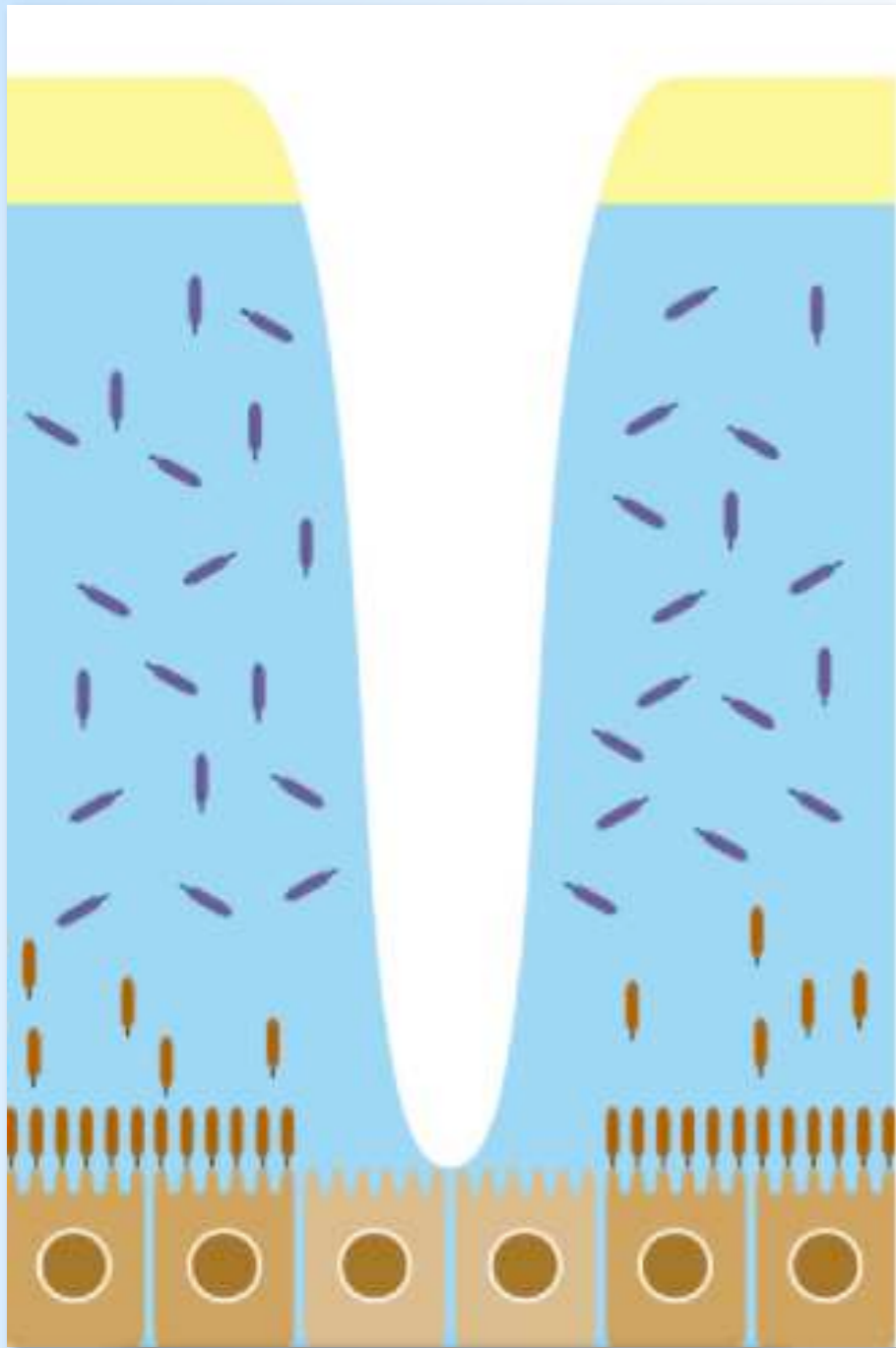
Vit A ointment

Product	Mechanism of Action	Ingredient	Category
Systane Ultra/Classic	pH activated	HP Guar	Viscosity
Refresh	muco-adhesive	cmc	Viscosity
Refresh PM/Systane Nighttime/ Soothe Lubricant Nighttime	ointment	mineral oil/white petrolatum	Viscosity
Optive	compatible solutes	L-carnitine/erythritol/cmc	Osmo-protectants/Viscosity
Soothe XP	oily tears	mineral oil	Emulsion
Systane Balance Systane Complete	oily tears oily tears/nanomicellular	mineral oil HP Guar	Emulsion/Viscosity
Refresh Digital	oily tears compatible solutes	castor oil L-carnitine/erythritol/cmc	Emulsion Osmo-protectants/Viscosity
Refresh Optive Mega-3	oily tears/nanomicellular	trehalose castor oil L-carnitine/erythritol/cmc	Cytoprotective Emulsion Osmo-protectants/Viscosity
iVizia	high shear thinning	trehalose sodium hyaluronate (HA)	Cytoprotective HA Osmo-protectants
blink tears	high shear thinning	sodium hyaluronate (HA)	HA
Refresh Relieva	high shear thinning compatible solutes	sodium hyaluronate (HA) L-carnitine/erythritol/cmc	HA Osmo-protectants/Viscosity
Biotrue Hydration Boost	high shear thinning	sodium hyaluronate (HA)	HA
Oasis	high shear thinning	sodium hyaluronate (HA)	HA
Systane Hydration	high shear thinning	sodium hyaluronate (HA) HP Guar	HA/Viscosity
blink Triple Care	high shear thinning compatible solutes	sodium hyaluronate (HA) castor oil	Emulsion HA
Refresh Relieva PF Xtra	high shear thinning compatible solutes	trehalose sodium hyaluronate (HA) L-carnitine/erythritol/cmc	Cytoprotective HA Osmo-protectants/Viscosity

Epithelium

Target

Topical therapy



Inflammation

Lipid
Evaporative/MGD

Aqueous
Aqueous deficient

Mucin
Mucin deficient

Epithelium
Staining

Viscosity

Plugs

cmc

Vit A ointment

Artificial tears

Neurotrophic keratitis

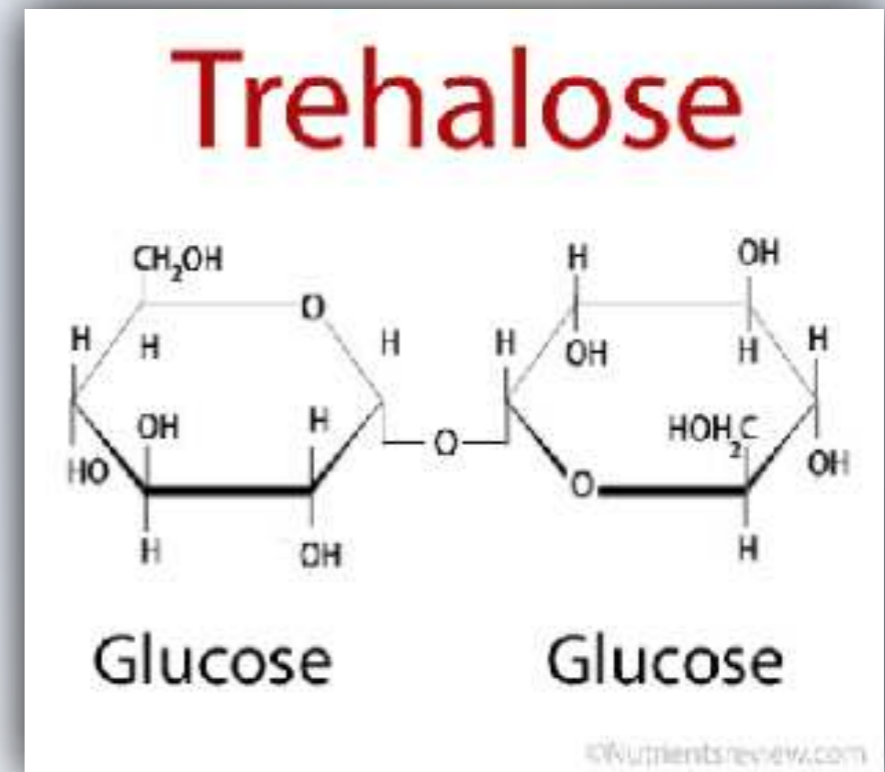


Product	Mechanism of Action	Ingredient	Category
Systane Ultra/Classic	pH activated	HP Guar	Viscosity
Refresh	muco-adhesive	cmc	Viscosity
Refresh PM/Systane Nighttime/ Soothe Lubricant Nighttime	ointment	mineral oil/white petrolatum	Viscosity
Optive	compatible solutes	L-carnitine/erythritol/cmc	Osmo-protectants/Viscosity
Soothe XP	oily tears	mineral oil	Emulsion
Systane Balance Systane Complete	oily tears oily tears/nanomicellular	mineral oil HP Guar	Emulsion/Viscosity
Refresh Digital	oily tears compatible solutes	castor oil L-carnitine/erythritol/cmc	Emulsion Osmo-protectants/Viscosity
Refresh Optive Mega-3	oily tears/nanomicellular	trehalose castor oil L-carnitine/erythritol/cmc	Cytoprotective Emulsion Osmo-protectants/Viscosity
iVizia	high shear thinning	trehalose sodium hyaluronate (HA)	Cytoprotective HA Osmo-protectants
blink tears	high shear thinning	sodium hyaluronate (HA)	HA
Refresh Relieva	high shear thinning compatible solutes	sodium hyaluronate (HA) L-carnitine/erythritol/cmc	HA Osmo-protectants/Viscosity
Biotrue Hydration Boost	high shear thinning	sodium hyaluronate (HA)	HA
Oasis	high shear thinning	sodium hyaluronate (HA)	HA
Systane Hydration	high shear thinning	sodium hyaluronate (HA) HP Guar	HA/Viscosity
blink Triple Care	high shear thinning compatible solutes	sodium hyaluronate (HA) castor oil	Emulsion HA
Refresh Relieva PF Xtra	high shear thinning compatible solutes	trehalose sodium hyaluronate (HA) L-carnitine/erythritol/cmc	Cytoprotective HA Osmo-protectants/Viscosity

Trehalose

Trehalose

Sugar
Stress
protectant



Artificial tears

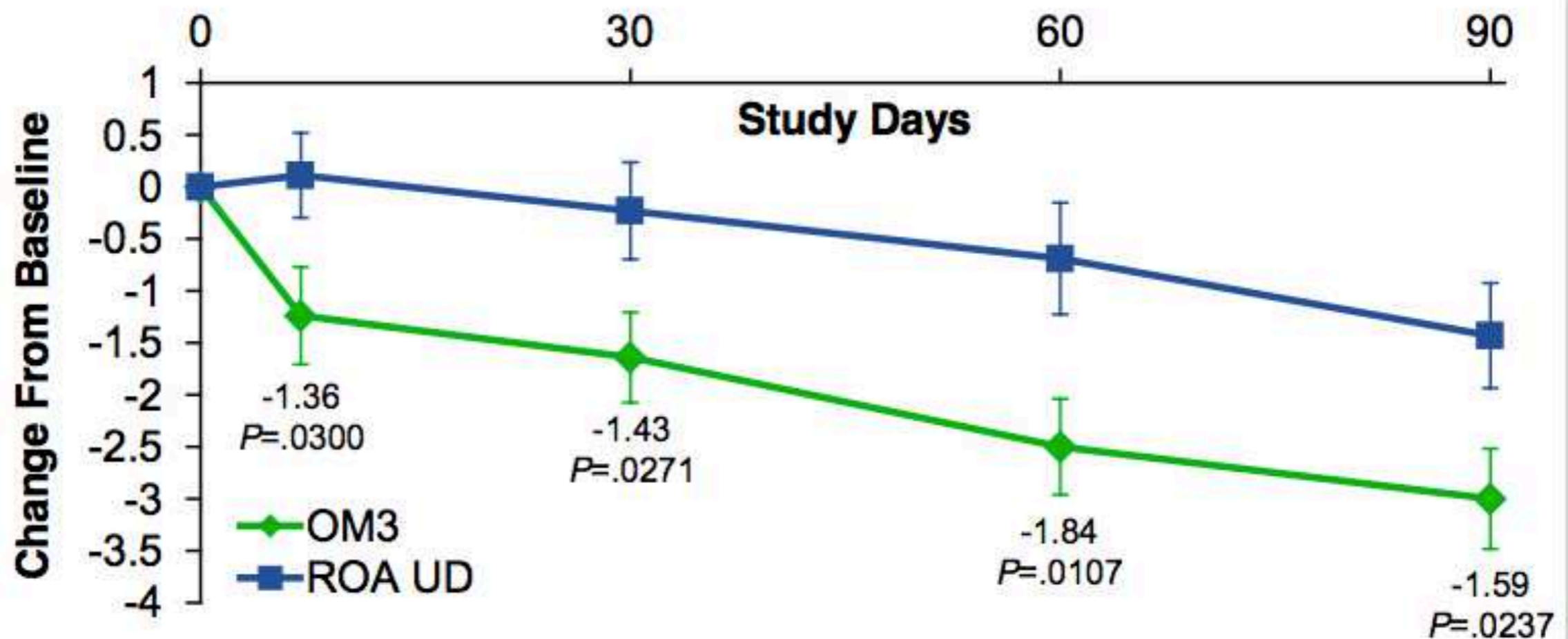
“Trehalose, a natural disaccharide, was also found to protect corneal epithelial cell[s]”

“trehalose plays an important cytoprotective role for corneal and conjunctival epithelial cells in order to prevent their apoptosis, one of the underlying etiological roles of DED”

Labetoulle M, Benitez-Del-Castillo JM, Barabino S, Herrero Vanrell R, Daull P, Garrigue JS, Rolando M. Artificial Tears: Biological Role of Their Ingredients in the Management of Dry Eye Disease. *Int J Mol Sci*. 2022 Feb 23;23(5):2434. doi: 10.3390/ijms23052434. PMID: 35269576; PMCID: PMC8910031.

Mega-3

Figure 3. Combined Corneal and Conjunctival Staining



Hom MM. Berdy GJ. Downie LE. El-Harazi S. Verachtert A. Liu H. Carlise-Wilcox C. Simmons PA. Vehige JG. Clinical evaluation of a novel lipid-containing lubricant eye drop with omega-3 oil and trehalose. Invest Ophthalmol Vis Sci 2017;58(8):ARVO E-Abstract:2671 - A0261

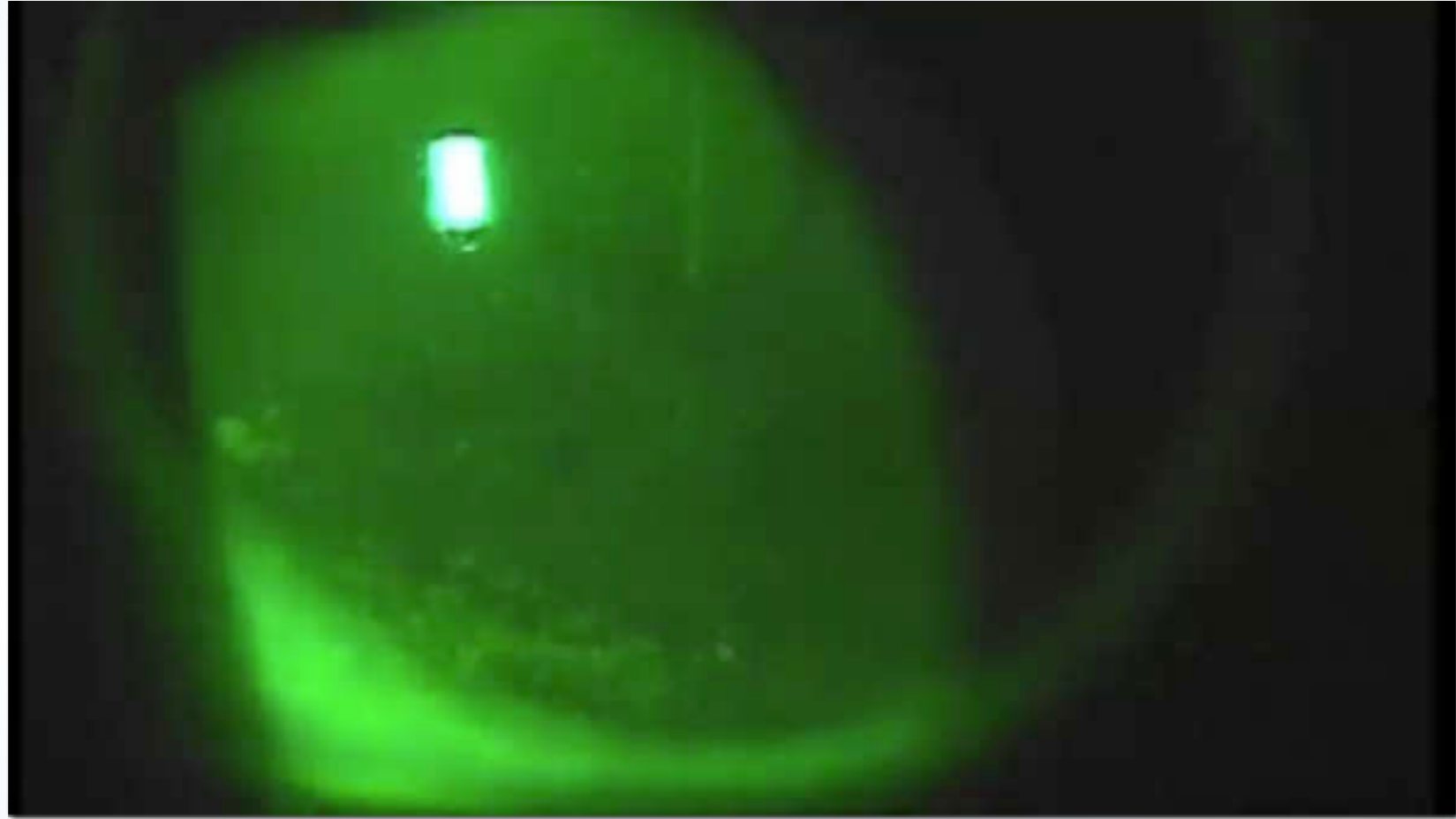
Product	Mechanism of Action	Ingredient	Category
Systane Ultra/Classic	pH activated	HP Guar	Viscosity
Refresh	muco-adhesive	cmc	Viscosity
Refresh PM/Systane Nighttime/ Soothe Lubricant Nighttime	ointment	mineral oil/white petrolatum	Viscosity
Optive	compatible solutes	L-carnitine/erythritol/cmc	Osmo-protectants/Viscosity
Soothe XP	oily tears	mineral oil	Emulsion
Systane Balance Systane Complete	oily tears oily tears/nanomicellular	mineral oil HP Guar	Emulsion/Viscosity
Refresh Digital	oily tears compatible solutes	castor oil L-carnitine/erythritol/cmc	Emulsion Osmo-protectants/Viscosity
Refresh Optive Mega-3	oily tears/nanomicellular	trehalose castor oil L-carnitine/erythritol/cmc	Cytoprotective Emulsion Osmo-protectants/Viscosity
iVizia	high shear thinning	trehalose sodium hyaluronate (HA)	Cytoprotective HA Osmo-protectants
blink tears	high shear thinning	sodium hyaluronate (HA)	HA
Refresh Relieva	high shear thinning compatible solutes	sodium hyaluronate (HA) L-carnitine/erythritol/cmc	HA Osmo-protectants/Viscosity
Biotrue Hydration Boost	high shear thinning	sodium hyaluronate (HA)	HA
Oasis	high shear thinning	sodium hyaluronate (HA)	HA
Systane Hydration	high shear thinning	sodium hyaluronate (HA) HP Guar	HA/Viscosity
blink Triple Care	high shear thinning compatible solutes	sodium hyaluronate (HA) castor oil	Emulsion HA
Refresh Relieva PF Xtra	high shear thinning compatible solutes	trehalose sodium hyaluronate (HA) L-carnitine/erythritol/cmc	Cytoprotective HA Osmo-protectants/Viscosity

Case: Poor blinker

The poor blinker

34 year old female wanting
SCL

No symptoms of dryness



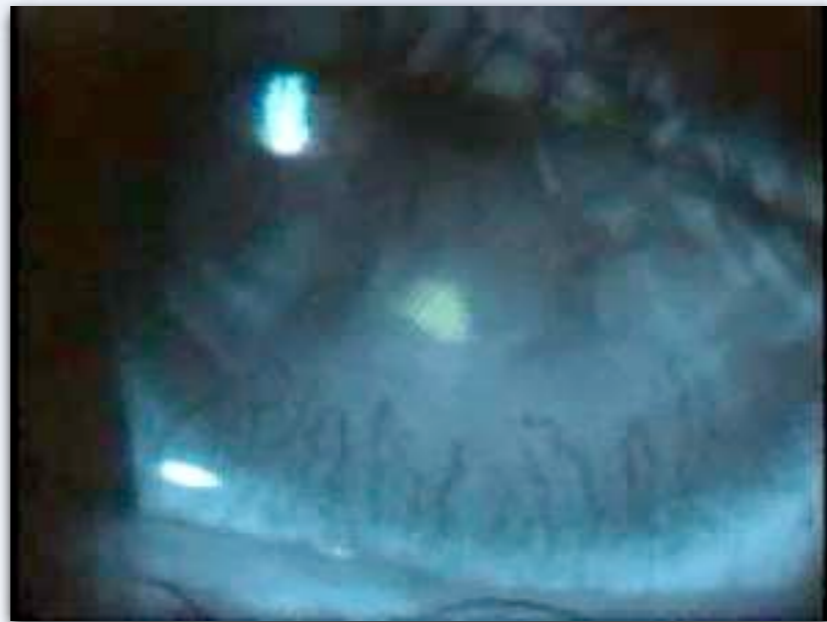
**The poor
blinker**

6 months later....

The poor blinker



The poor blinker



Diagnosis

Microbial keratitis

related to poor blinking

Dryness related staining

Treatment

Antibiotics

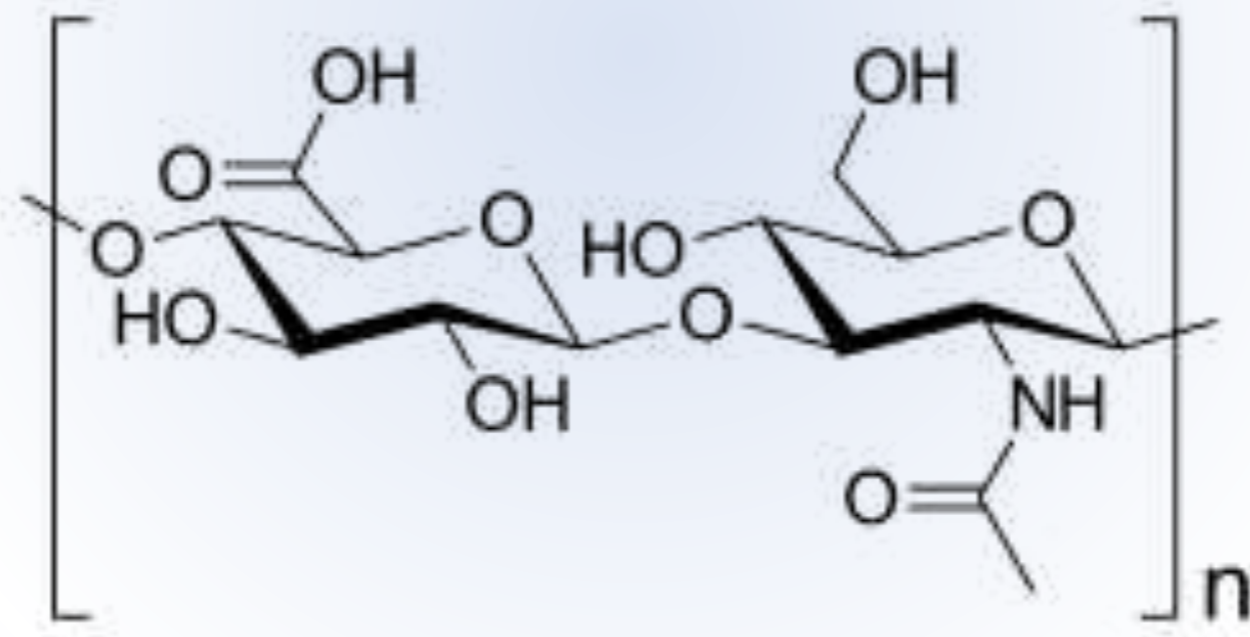
3G 4G FQs

Steroid

Doxycycline

Artificial tear?

Hyaluronate acid (HA)

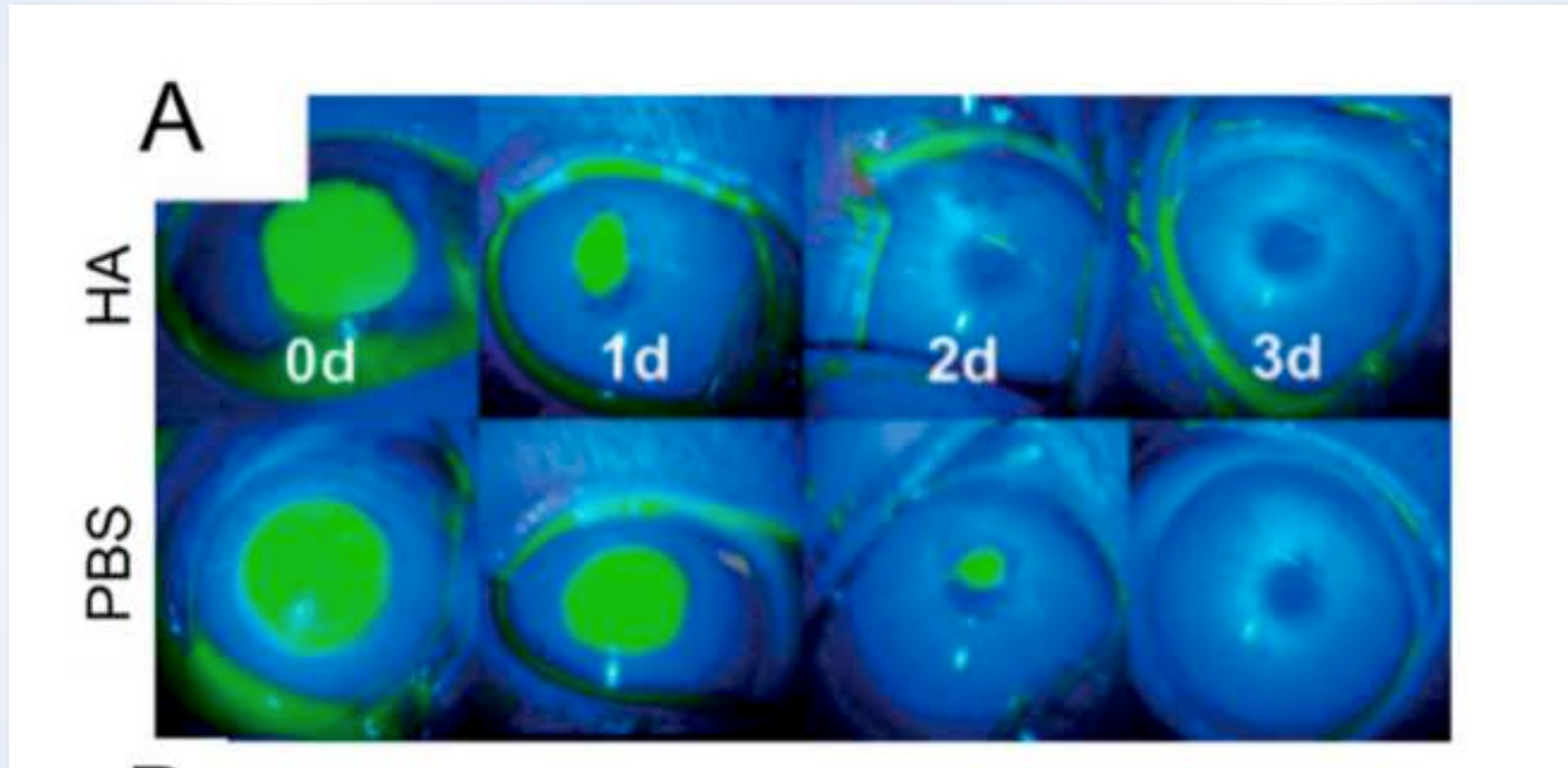


Artificial tears

“HA, especially high molecular weight HA (HMW-HA)...accelerate wound healing of the epithelium after corneal debridement abrasion and alkali burn injuries”

Labetoulle M, Benitez-Del-Castillo JM, Barabino S, Herrero Vanrell R, Daull P, Garrigue JS, Rolando M. Artificial Tears: Biological Role of Their Ingredients in the Management of Dry Eye Disease. *Int J Mol Sci*. 2022 Feb 23;23(5):2434. doi: 10.3390/ijms23052434. PMID: 35269576; PMCID: PMC8910031.

Artificial tears

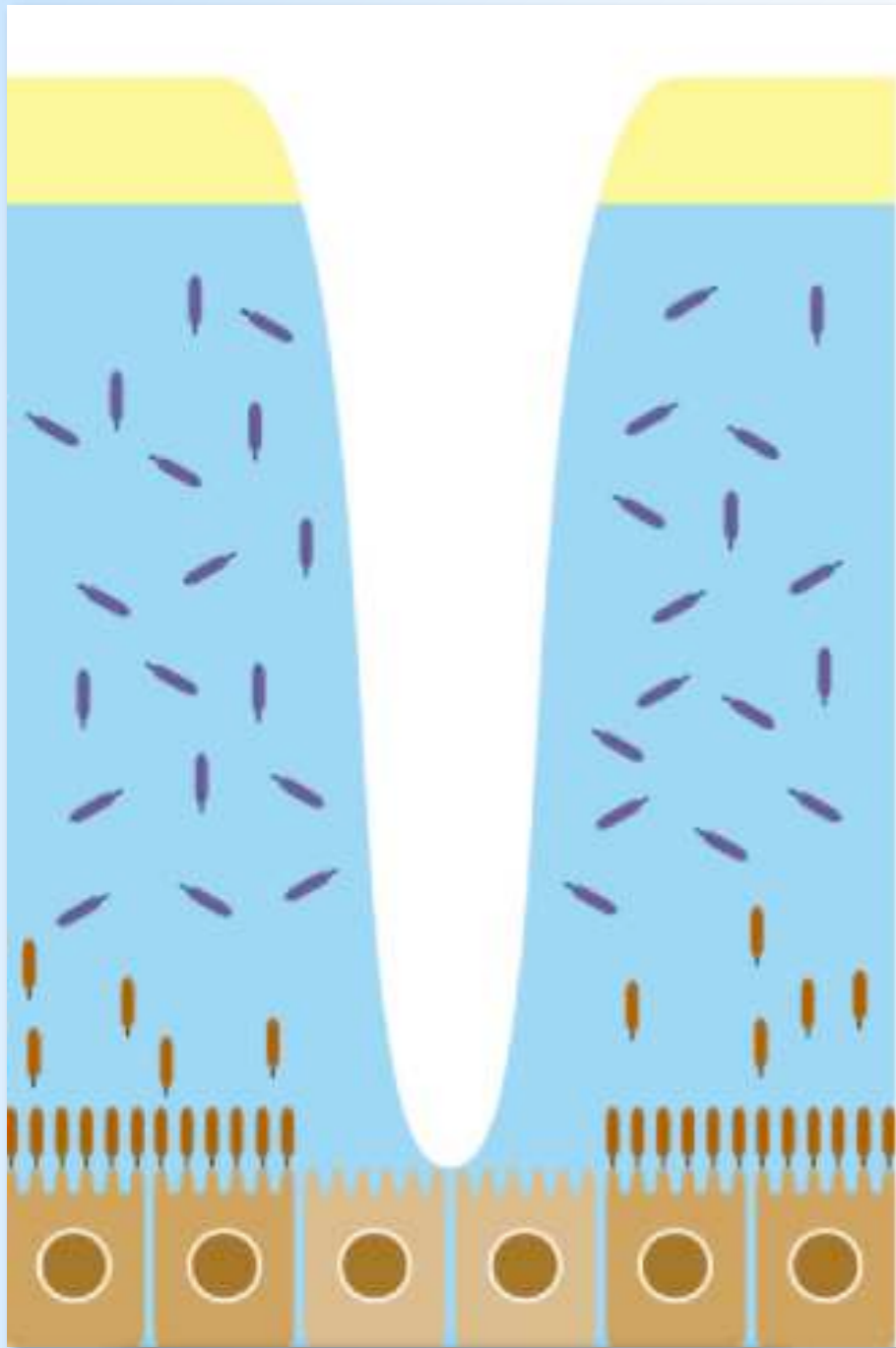


Labetoulle M, Benitez-Del-Castillo JM, Barabino S, Herrero Vanrell R, Daull P, Garrigue JS, Rolando M. Artificial Tears: Biological Role of Their Ingredients in the Management of Dry Eye Disease. *Int J Mol Sci.* 2022 Feb 23;23(5):2434. doi: 10.3390/ijms23052434. PMID: 35269576; PMCID: PMC8910031.

Product	Mechanism of Action	Ingredient	Category
Systane Ultra/Classic	pH activated	HP Guar	Viscosity
Refresh	muco-adhesive	cmc	Viscosity
Refresh PM/Systane Nighttime/ Soothe Lubricant Nighttime	ointment	mineral oil/white petrolatum	Viscosity
Optive	compatible solutes	L-carnitine/erythritol/cmc	Osmo-protectants/Viscosity
Soothe XP	oily tears	mineral oil	Emulsion
Systane Balance Systane Complete	oily tears oily tears/nanomicellular	mineral oil HP Guar	Emulsion/Viscosity
Refresh Digital	oily tears compatible solutes	castor oil L-carnitine/erythritol/cmc	Emulsion Osmo-protectants/Viscosity
Refresh Optive Mega-3	oily tears/nanomicellular	trehalose castor oil L-carnitine/erythritol/cmc	Cytoprotective Emulsion Osmo-protectants/Viscosity
iVizia	high shear thinning	trehalose sodium hyaluronate (HA)	Cytoprotective HA Osmo-protectants
blink tears	high shear thinning	sodium hyaluronate (HA)	HA
Refresh Relieva	high shear thinning compatible solutes	sodium hyaluronate (HA) L-carnitine/erythritol/cmc	HA Osmo-protectants/Viscosity
Biotrue Hydration Boost	high shear thinning	sodium hyaluronate (HA)	HA
Oasis	high shear thinning	sodium hyaluronate (HA)	HA
Systane Hydration	high shear thinning	sodium hyaluronate (HA) HP Guar	HA /Viscosity
blink Triple Care	high shear thinning compatible solutes	sodium hyaluronate (HA) castor oil	Emulsion HA
Refresh Relieva PF Xtra	high shear thinning compatible solutes	trehalose sodium hyaluronate (HA) L-carnitine/erythritol/cmc	Cytoprotective HA Osmo-protectants/Viscosity

Target

Topical therapy



Inflammation

Lipid
Evaporative/MGD

Aqueous
Aqueous deficient

Mucin
Mucin deficient

Epithelium
Staining

Viscosity

Plugs

cmc

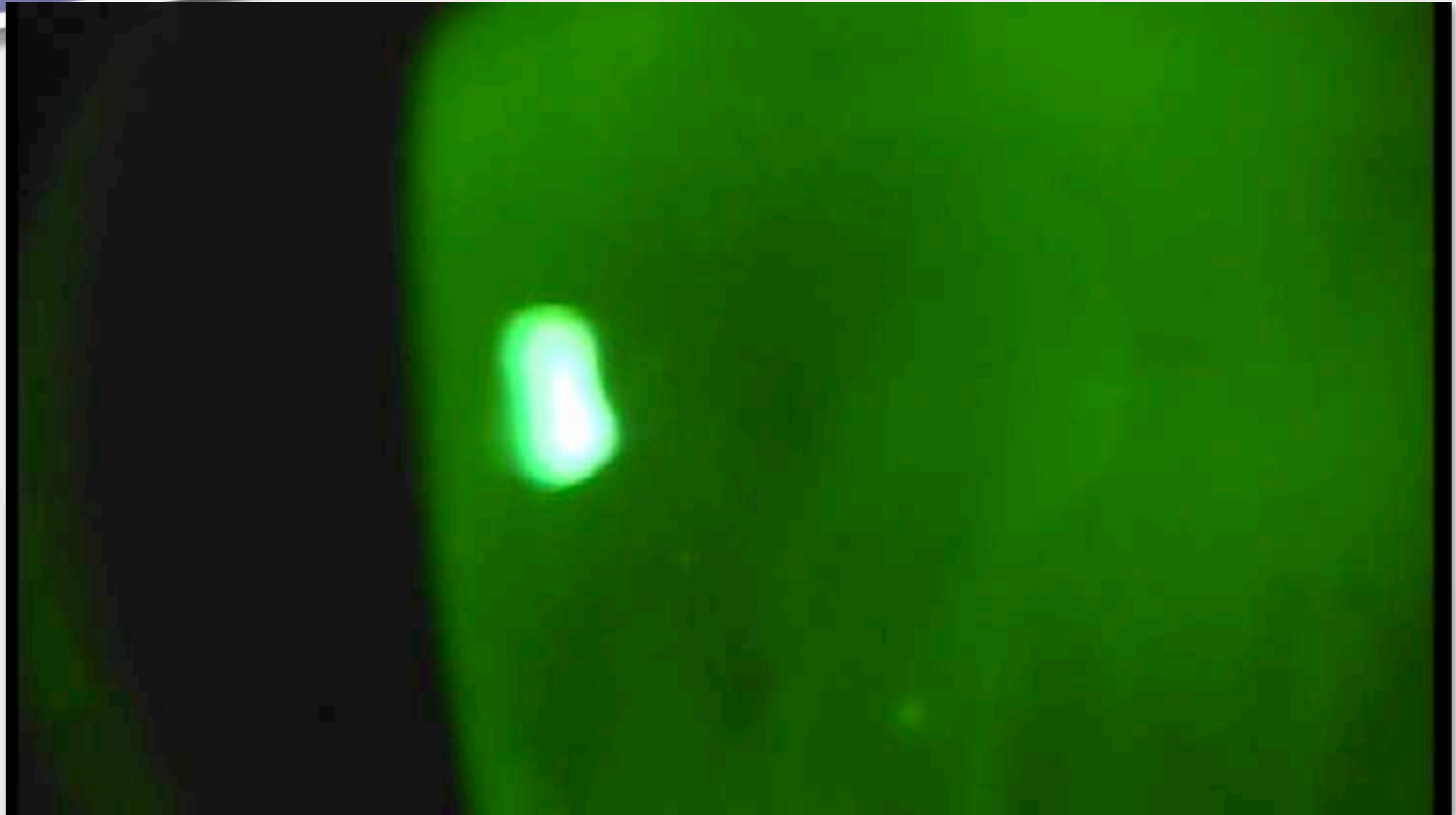
Vit A ointment

Trehalose

Hyaluronate acid (HA)

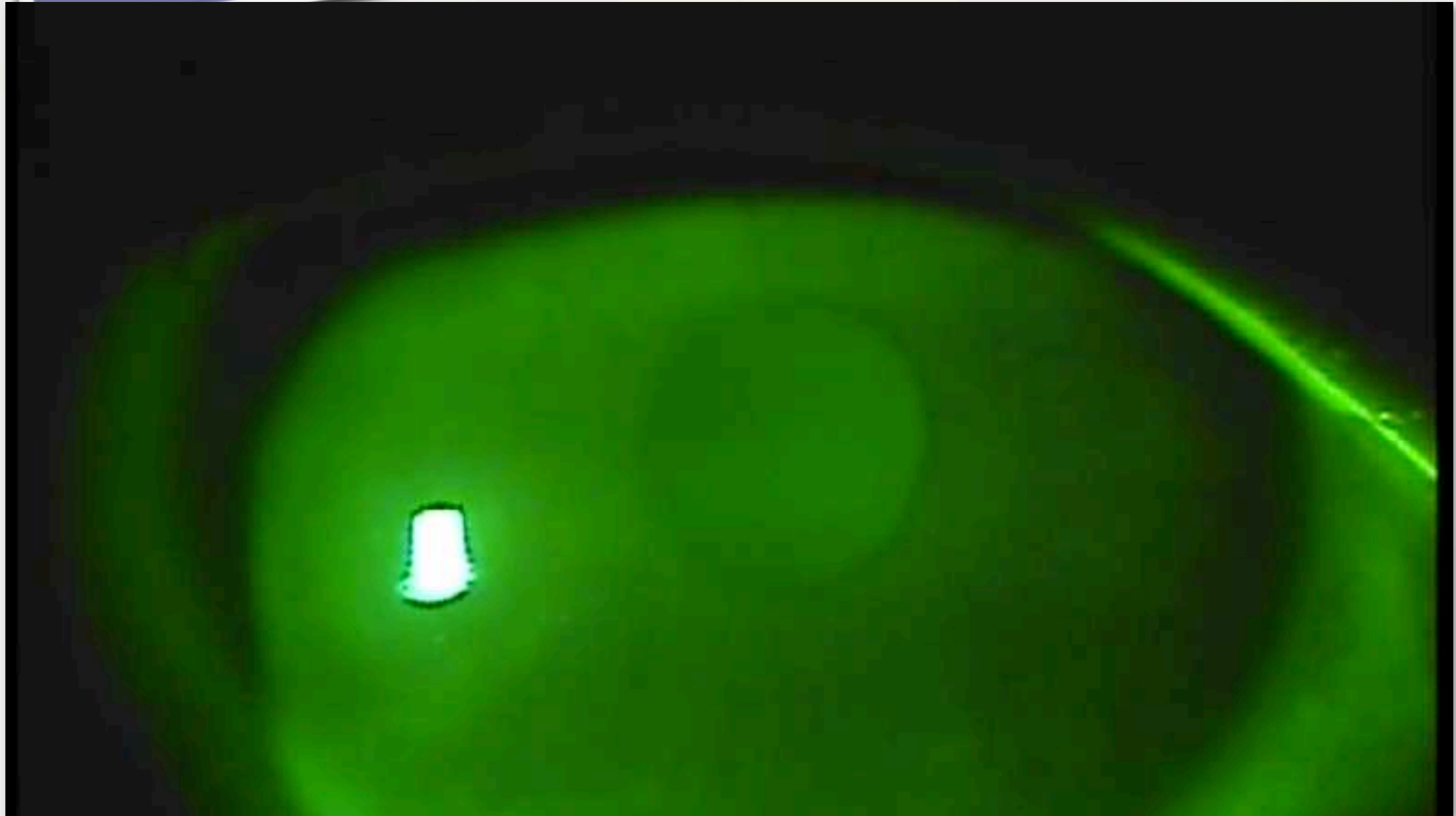
Lipid

BUP: Random

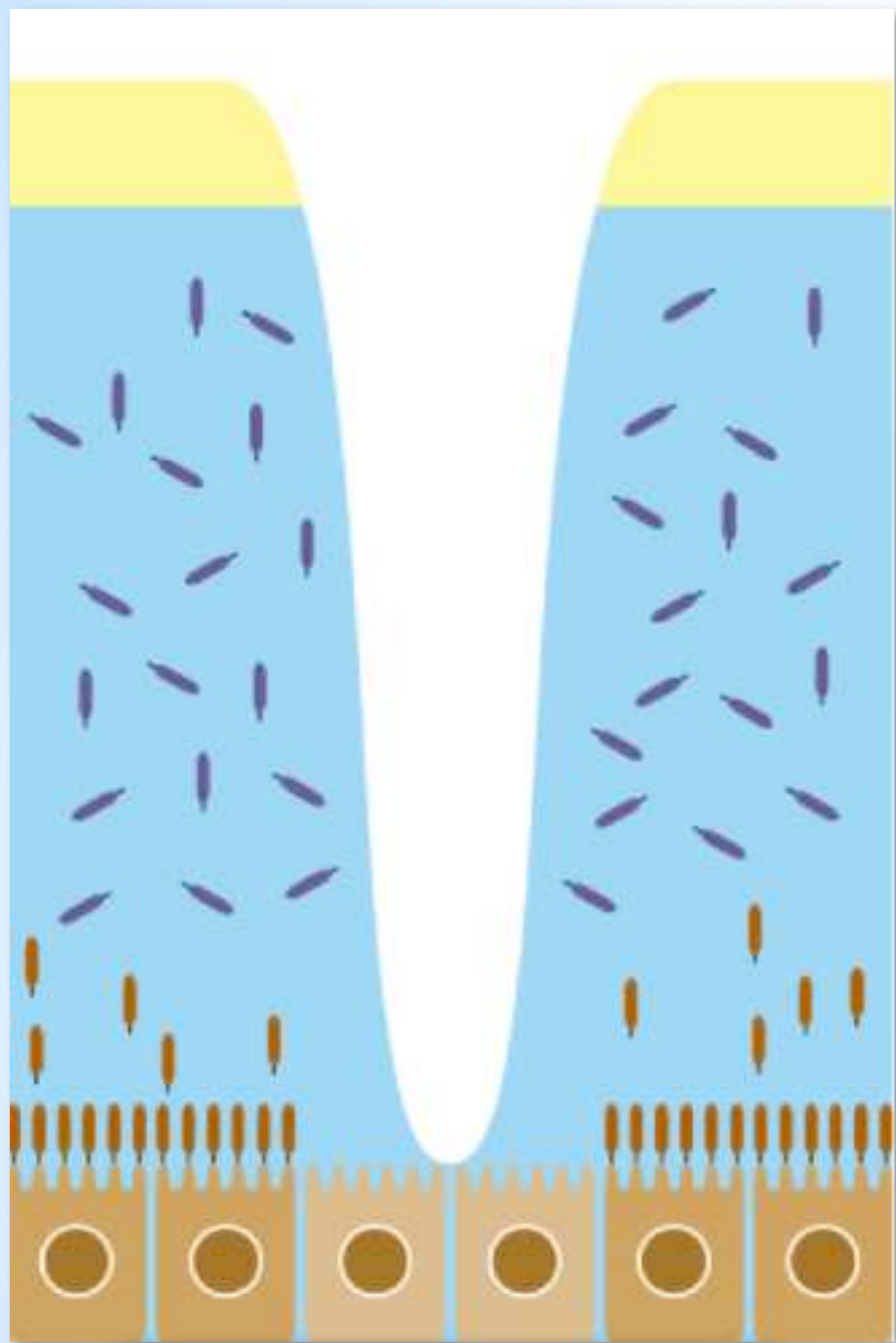


Shigeyasu C, Yamada M, Yokoi N, Kawashima M, Suwaki K, Uchino M, Hiratsuka Y, Tsubota K, On Behalf Of The Decs-J Study Group. Characteristics and Utility of Fluorescein Breakup Patterns among Dry Eyes in Clinic-Based Settings. *Diagnostics (Basel)*. 2020 Sep 17;10(9):711. doi: 10.3390/diagnostics10090711. PMID: 32957707; PMCID: PMC7555739.

BUP: Random



Shigeyasu C, Yamada M, Yokoi N, Kawashima M, Suwaki K, Uchino M, Hiratsuka Y, Tsubota K, On Behalf Of The Decs-J Study Group. Characteristics and Utility of Fluorescein Breakup Patterns among Dry Eyes in Clinic-Based Settings. *Diagnostics (Basel)*. 2020 Sep 17;10(9):711. doi: 10.3390/diagnostics10090711. PMID: 32957707; PMCID: PMC7555739.



Inflammation

Target

Lipid
Evaporative/MGD

Aqueous
Aqueous deficient

Mucin
Mucin deficient

Epithelium
Staining

Topical therapy

Warm compresses

Artificial tears

Miebo

Mechanical therapy: Lipiflow, MiboThemaflor, etc.

Viscosity

Plugs

cmc

Vit A ointment

Trehalose

Hyaluronate acid (HA)

Obstruction

Mechanical therapy:
Lid therapy/Masks
In office manual expression
Lid margin scraping
LipiFlow

Mechanical therapy

Masks

Best temperature range: 40-42 C



Case: Diabetes

Diabetes and dry eye

52 year old female

Dry eye symptoms: OSDI
25.0 moderate

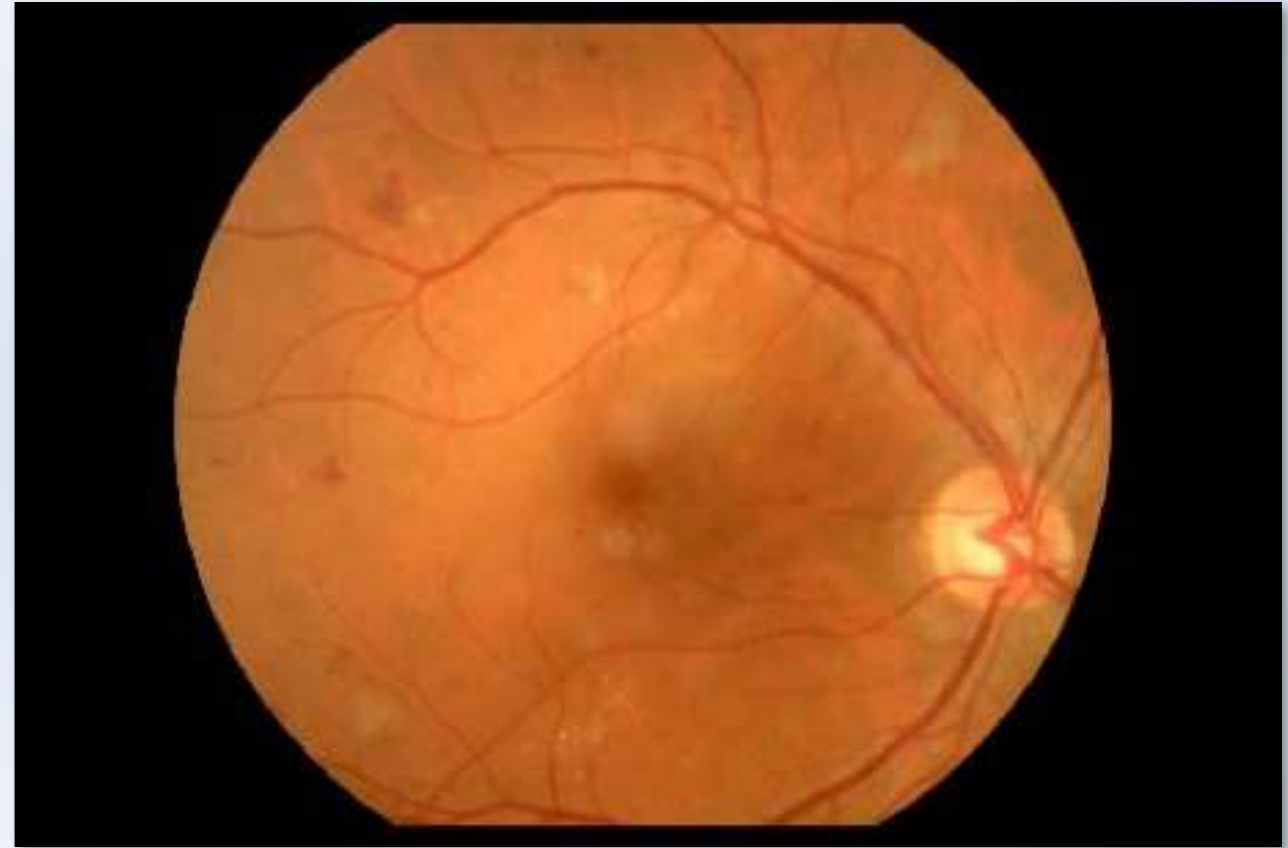
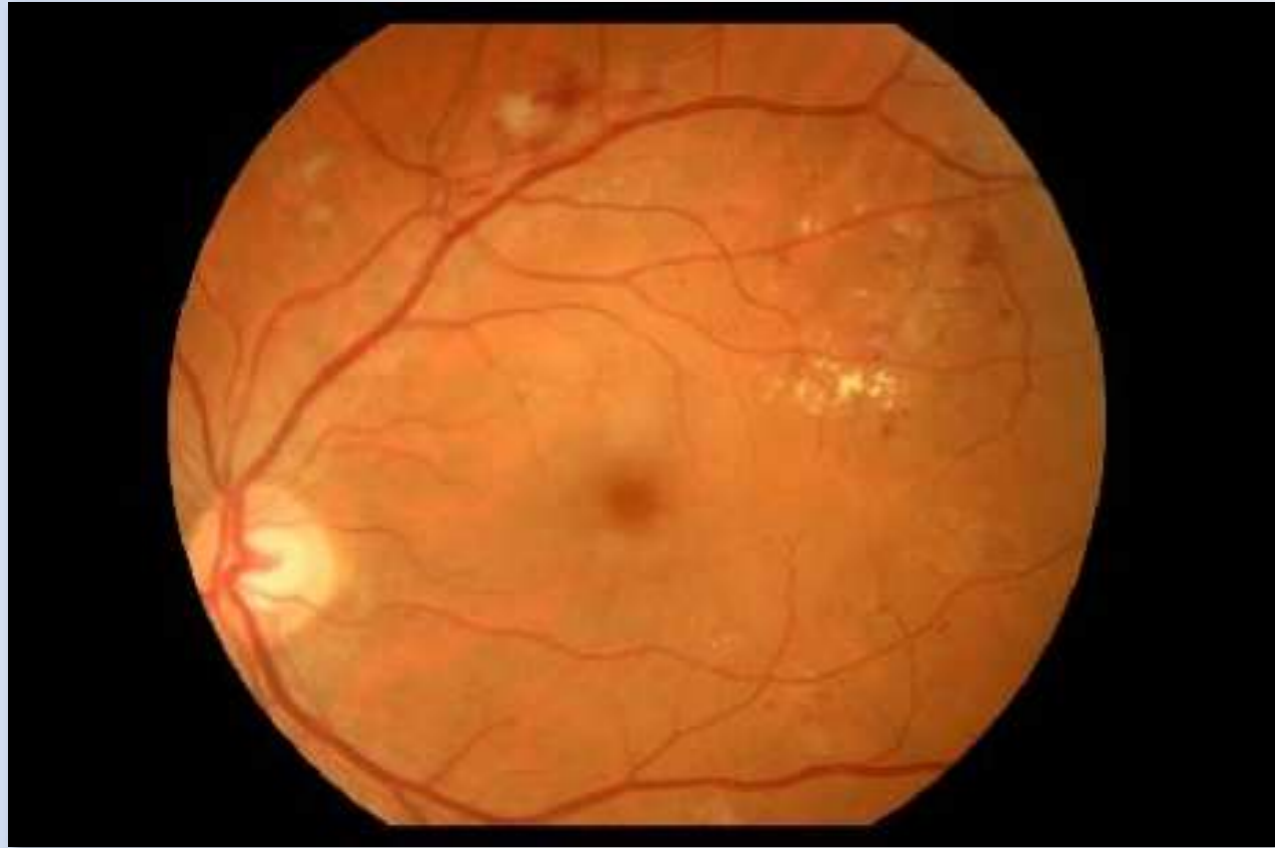
Diabetes and dry eye

HA1c: 11.0%

6.5% + diabetic

June 2009 American Diabetes Association,
European Association for Study of Diabetes,
International Diabetes Federation.

Diabetes and dry eye



Diabetes and MGD

“long-term diabetes could induce...keratinization...inflammation...in the MG, which were consistent with characteristics of MGD”

Guo Y, Zhang H, Zhao Z, Luo X, Zhang M, Bu J, Liang M, Wu H, Yu J, He H, Zong R, Chen Y, Liu Z, Li W. Hyperglycemia Induces Meibomian Gland Dysfunction. *Invest Ophthalmol Vis Sci*. 2022 Jan 3;63(1):30. doi: 10.1167/iops.63.1.30. PMID: 35072689; PMCID: PMC8802017.

Treatment?

Emulsions

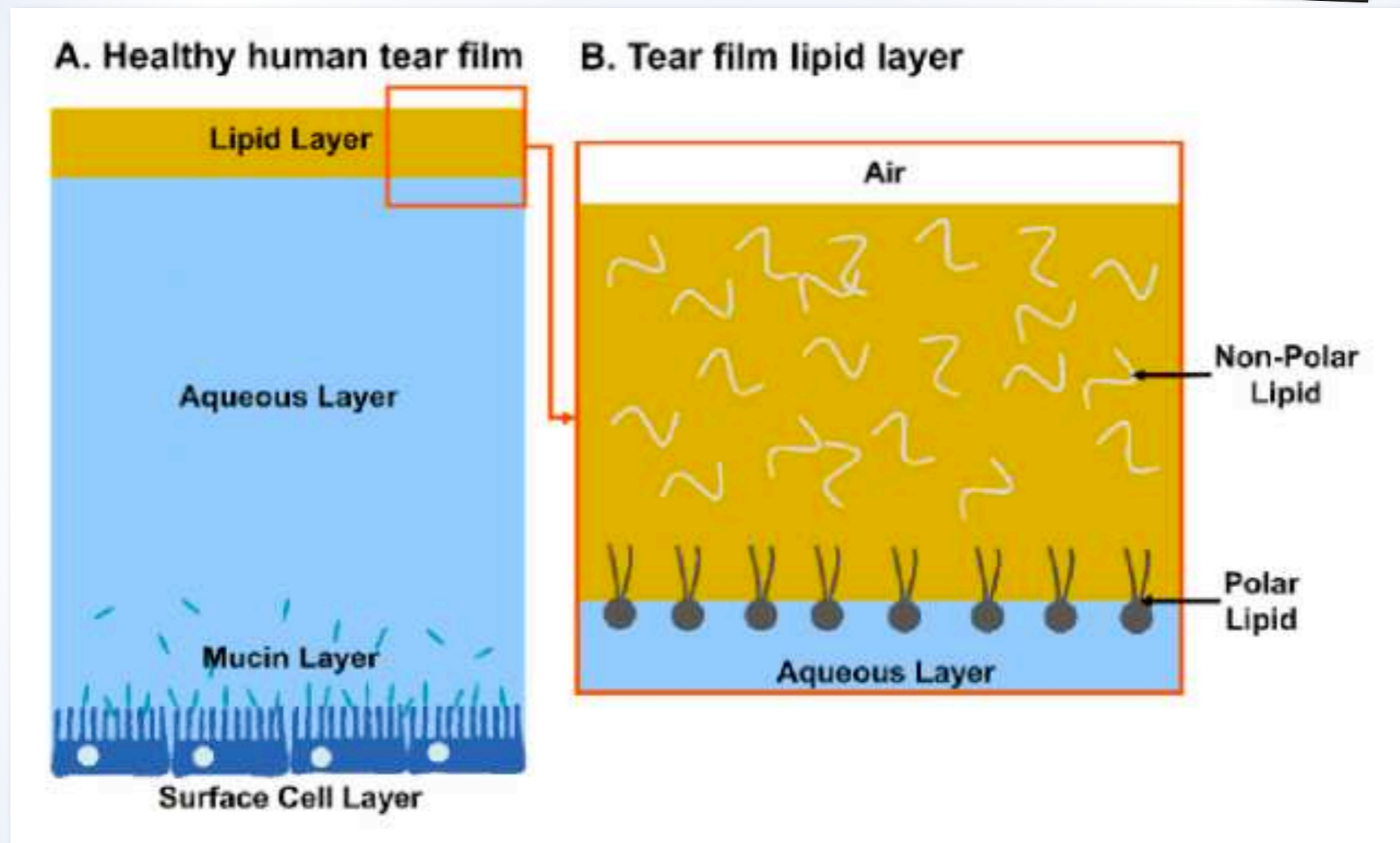
Tears

MGD

**Stage 1-1st line treatment:
emulsion tears**

Barr JT. Hamrah P. Hom MM. et.al. Today's methods for managing dry eye. Review of Optometry. 2015

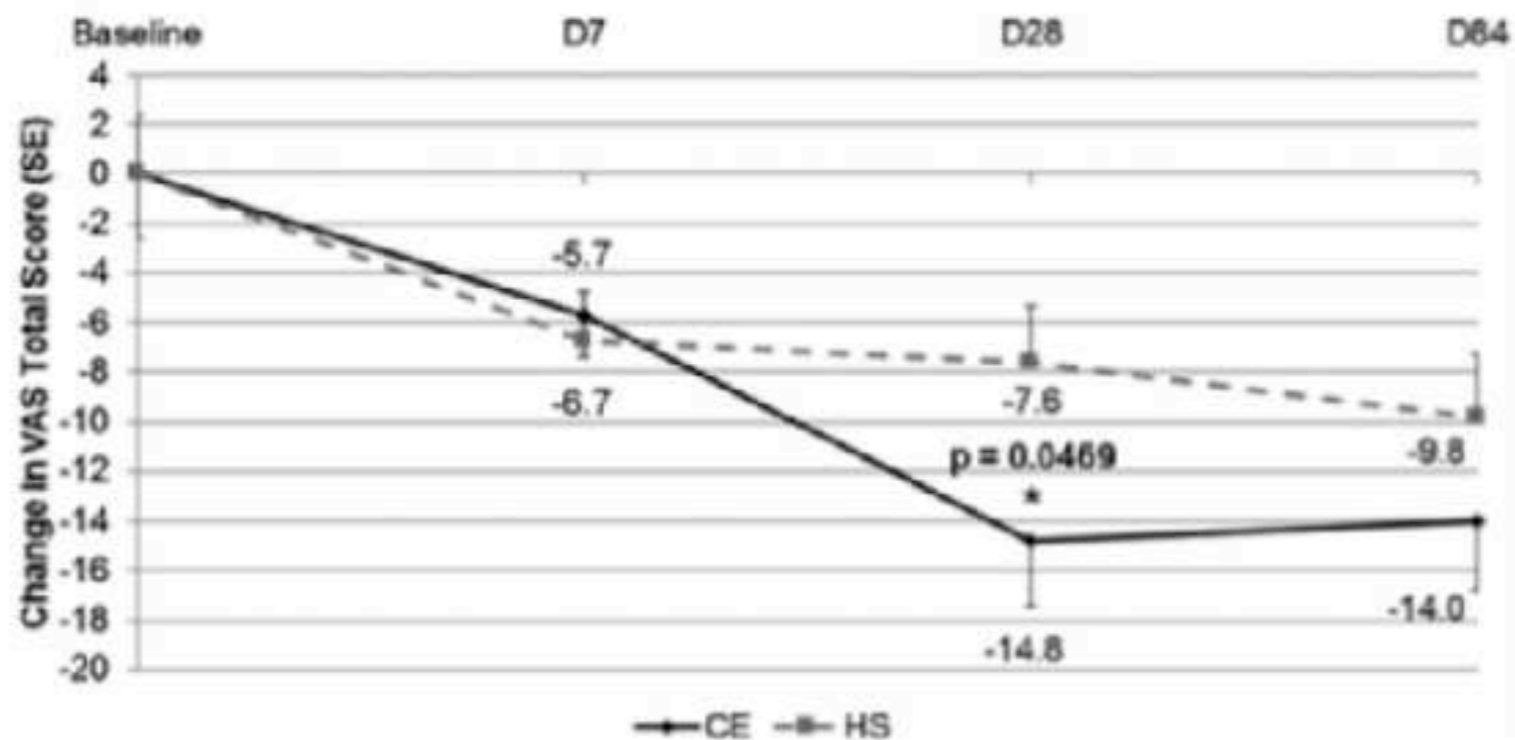
Artificial tears



Labetoulle M, Benitez-Del-Castillo JM, Barabino S, Herrero Vanrell R, Daull P, Garrigue JS, Rolando M. Artificial Tears: Biological Role of Their Ingredients in the Management of Dry Eye Disease. *Int J Mol Sci*. 2022 Feb 23;23(5):2434. doi: 10.3390/ijms23052434. PMID: 35269576; PMCID: PMC8910031.

Artificial tears

C. Oily agents

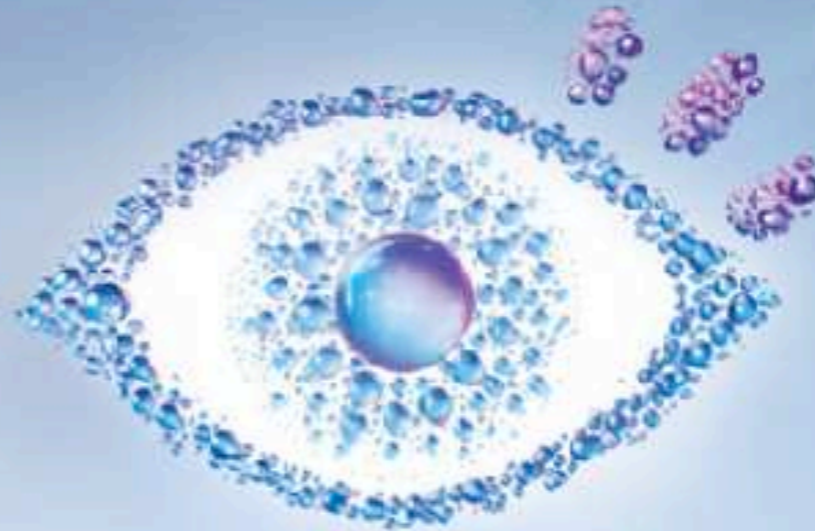


Labetoulle M, Benitez-Del-Castillo JM, Barabino S, Herrero Vanrell R, Daull P, Garrigue JS, Rolando M. Artificial Tears: Biological Role of Their Ingredients in the Management of Dry Eye Disease. *Int J Mol Sci.* 2022 Feb 23;23(5):2434. doi: 10.3390/ijms23052434. PMID: 35269576; PMCID: PMC8910031.

Product	Mechanism of Action	Ingredient	Category
Systane Ultra/Classic	pH activated	HP Guar	Viscosity
Refresh	muco-adhesive	cmc	Viscosity
Refresh PM/Systane Nighttime/ Soothe Lubricant Nighttime	ointment	mineral oil/white petrolatum	Viscosity
Optive	compatible solutes	L-carnitine/erythritol/cmc	Osmo-protectants/Viscosity
Soothe XP	oily tears	mineral oil	Emulsion
Systane Balance Systane Complete	oily tears oily tears/nanomicellular	mineral oil HP Guar	Emulsion/Viscosity
Refresh Digital	oily tears compatible solutes	castor oil L-carnitine/erythritol/cmc	Emulsion Osmo-protectants/Viscosity
Refresh Optive Mega-3	oily tears/nanomicellular	trehalose castor oil L-carnitine/erythritol/cmc	Cytoprotective Emulsion Osmo-protectants/Viscosity
iVizia	high shear thinning	trehalose sodium hyaluronate (HA)	Cytoprotective HA Osmo-protectants
blink tears	high shear thinning	sodium hyaluronate (HA)	HA
Refresh Relieva	high shear thinning compatible solutes	sodium hyaluronate (HA) L-carnitine/erythritol/cmc	HA Osmo-protectants/Viscosity
Biotrue Hydration Boost	high shear thinning	sodium hyaluronate (HA)	HA
Oasis	high shear thinning	sodium hyaluronate (HA)	HA
Systane Hydration	high shear thinning	sodium hyaluronate (HA) HP Guar	HA/Viscosity
blink Triple Care	high shear thinning compatible solutes	sodium hyaluronate (HA) castor oil	Emulsion HA
Refresh Relieva PF Xtra	high shear thinning compatible solutes	trehalose sodium hyaluronate (HA) L-carnitine/erythritol/cmc	Cytoprotective HA Osmo-protectants/Viscosity

Miebo™

(perfluorohexyloctane
ophthalmic solution)



100%
of patients had
clinical signs of MGD¹⁻³

**Robust, reproducible
efficacy and tolerability
results across
2 pivotal studies¹**

Study design¹⁻³:

- Two 57-day, multicenter, double-masked, saline-controlled studies (GOBI and MOJAVE) were conducted in adults ≥18 years old with a self-reported history of DED in both eyes
- Primary endpoints were change from baseline in tCFS and change from baseline in eye dryness score (Visual Analog Scale) at Day 57
- Day 15 was the earliest time point at which signs and symptoms were evaluated in the trials. Day 57 was the last

HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use MIEBO safely and effectively. See full prescribing information for MIEBO.

MIEBO™ (perfluorohexyloctane ophthalmic solution), for topical ophthalmic use

Initial U.S. Approval: 2023

INDICATIONS AND USAGE

MIEBO (perfluorohexyloctane ophthalmic solution) is a semifluorinated alkane indicated for treatment of the signs and symptoms of dry eye disease. (1)

DOSAGE AND ADMINISTRATION

Instill one drop of MIEBO four times daily into each eye. (2.1)

DOSAGE FORMS AND STRENGTHS

Ophthalmic solution: 100% perfluorohexyloctane. (3)

CONTRAINDICATIONS

None. (4)



ADVERSE REACTIONS

The most common adverse reaction was blurred vision. Blurred vision occurred in 4% of individuals. (6.1)

For information on adverse reactions, contact Bausch & Lomb at 1-800-53-5340 or FDA at 1-800-FDA-1088

HOW TO USE MIEBO

Revised: 5/2023

OPEN

A Randomized Clinical Trial of the Efficacy, Safety, and Tolerability of a Novel Treatment for Dry Eye Disease

Joseph Tausler, MD,* David L. Williams, MD,† Daniela Wilton, PhD,‡ and

Purpose: NUV03 has a unique dual mode of action for dry eye disease (DED) associated with meibomian gland dysfunction. BECCARD evaluated the efficacy, safety, and tolerability of 2 dosing regimens compared with a saline control in patients with DED.

Methods: BECCARD was a prospective, random, double-masked, active-controlled clinical study. A total of 500 patients (mean age 52.5 years) with moderate to severe DED (breakup time ≤ 5 seconds, tear meniscus height ≤ 0.5 mm, and total corneal fluorescein staining [TCFS] ≥ 11) (National Eye Institute scales) were randomized in a 2:2:1 ratio to NUV03 4 times daily (NUV03 4T), NUV03 BID, and saline Q. The primary efficacy endpoint was TCFS staining at 8 weeks. Secondary endpoints included visual analog scale (VAS) for eye dryness, burning or stinging, and VAS for eye irritation.



Where's your data?!

Associated with

Study

PaD,* Juan L. Vignaw, PhD,[†]






... ophthalmic drug in patients with moderate to severe dry eye disease in a randomized, double-masked, active-controlled study. The primary endpoint was the mean change from baseline in TCFS at 8 weeks. Secondary endpoints included VAS for eye dryness, burning or stinging, and VAS for eye irritation.

and eye dryness score (0–100 visual analog scale [VAS]) at week 8. Key secondary endpoints were change from baseline in eye dryness score at week 8, TCFS at week 8, eye burning or stinging score (0–100 VAS) at week 8, and central corneal fluorescein staining (cCFS; 0–3 NEI) scale at week 8.

Results: Of the 500 patients randomized, 507 were treated (NUV03, n = 303; saline, n = 204). At week 8, improvement from baseline was significantly greater (P < 0.001) with NUV03 versus saline for TCFS (least squares [LS] mean treatment difference, -0.97; 95% confidence interval [CI], -1.40, -0.56) and VAS dryness score (-7.6; 95% CI, -11.8, -3.4). Improvement from baseline also significantly (P < 0.01) favored NUV03 on all key secondary endpoints: 1.5-point treatment difference (95% CI, -2.7, -0.2) for VAS for burning or stinging at week 8.





 CVS Pharmacy <small>🔥 Most popular 📍 Closest store</small>	<small>\$911 retail Save 12%</small>	\$798.30	Get free savings
 Rite Aid	<small>\$1,018 retail Save 24%</small>	\$775.93	Get free savings
 Walgreens	<small>\$926 retail Save 13%</small>	\$803.42	Get free savings
 Vons Pharmacy <small>📉 Low price</small>	<small>\$943 retail Save 18%</small>	\$771.80	Get free savings
 Costco*	<small>\$948 retail Save 9%</small>	\$859.53	Get free savings



2 x Ursapharm EvoTears Dry Eye Drops 3ml



glamye-42 (8)

83.3% positive · [Seller's other items](#) · [Contact seller](#)

US \$55.70

Condition: New

Quantity: 5 available / 12 sold

Buy It Now

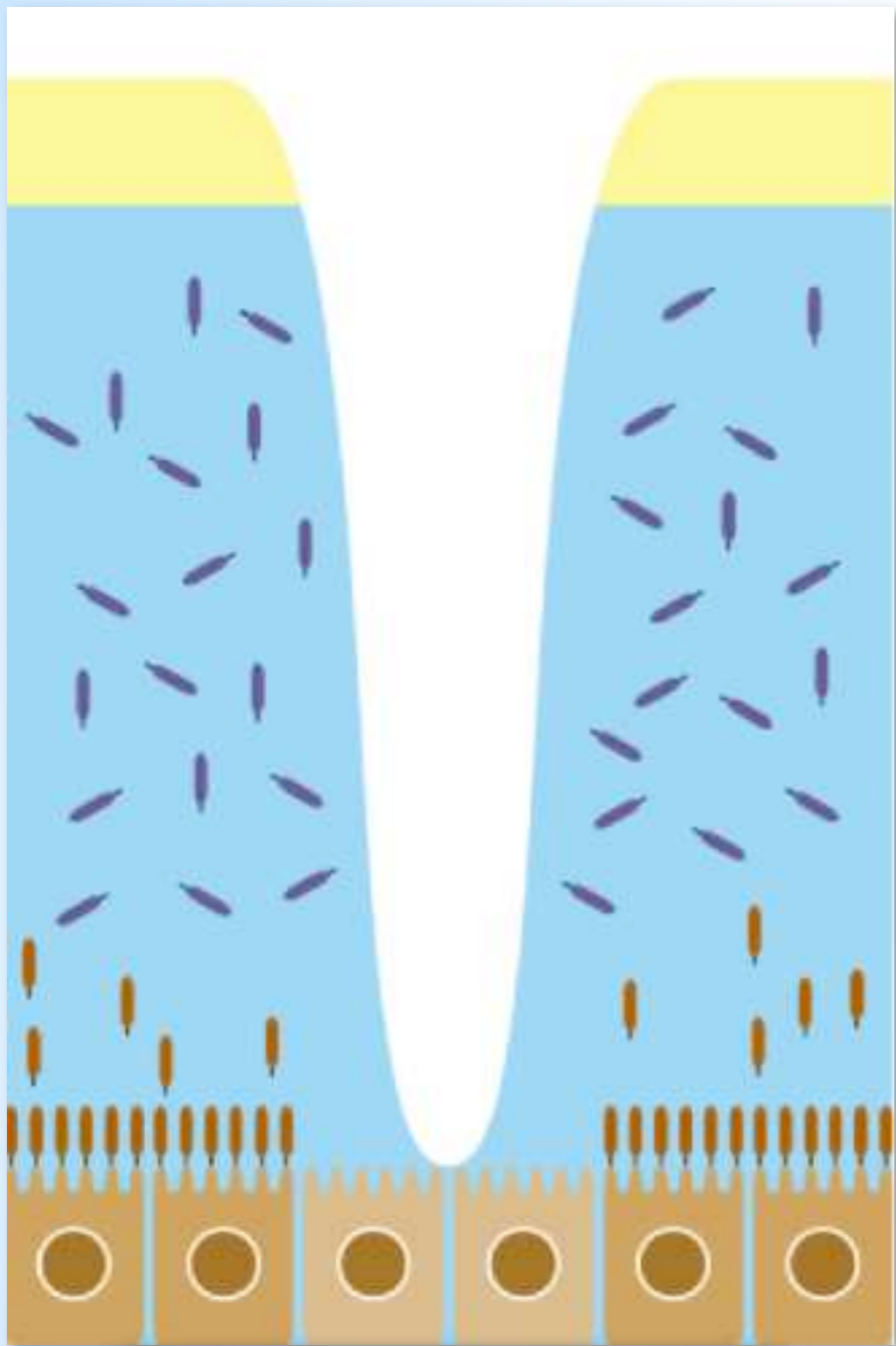
Add to cart

[Add to watchlist](#)

Shipping: US \$21.20 Economy Shipping from outside US. See details
International shipment of items may be subject to customs processing and additional charges. ⓘ
Located in: Athens, Greece

Delivery: ⓘ Estimated between Mon, Jan 22 and Fri, Feb 16 to 91702 ⓘ
Please note the delivery estimate is greater than 24

Inflammation



Target

Topical therapy

Lipid

Evaporative/MGD

Warm compresses

Emulsions

Miebo

Mechanical therapy: Lipiflow, MiboThemaflor, etc.

Aqueous

Aqueous deficient

Viscosity

Plugs

Mucin

Mucin deficient

cmc

Vit A ointment

Inflammation

Epithelium

Staining

Trehalose

Cyclosporine, Restasis, Cequa, Vevye, Xiidra, Eysuvis, Lotemax, IPL, LLLT

Hyaluronate acid (HA)

Does IPL increase meibum secretion?



You

does IPL increase meibum?



ChatGPT

There isn't direct research specifically linking the Indian Premier League (IPL) cricket tournament to an increase in meibum secretion. Meibum is the oily substance produced by the meibomian glands in the eyelids, and its production can be influenced by various factors such as hormonal changes, environmental conditions, and ocular health.

However, it's possible that activities associated with watching or participating in IPL matches could indirectly affect meibum production. For example, spending long hours watching screens, particularly in environments with air conditioning or dry air, can contribute to dry eye symptoms, which are related to meibomian gland dysfunction (MGD).

Friction related disease

Friction related disease

Superior limbic keratoconjunctivitis (SLK)

Conjunctivochalasis

Lid wiper epitheliopathy (LWE)

Ahn H, Ji YW, Jun I, Kim TI, Lee HK, Seo KY. Effects of meibomian gland dysfunction and aqueous deficiency on friction-related disease. *Ocul Surf.* 2022 Oct;26:295-299. doi: 10.1016/j.jtos.2022.02.002. Epub 2022 Feb 24. PMID: 35219899.

Friction related disease

“The reviewed literature demonstrated that...[HP-guar] showed...a low coefficient of friction in an in-vitro model”

Springs CL. Novel hydroxypropyl-guar gellable lubricant eye drops for treatment of dry eye. Adv Ther. 2010 Oct;27(10):681-90. doi: 10.1007/s12325-010-0052-3. Epub 2010 Aug 26. PMID: 20803266.

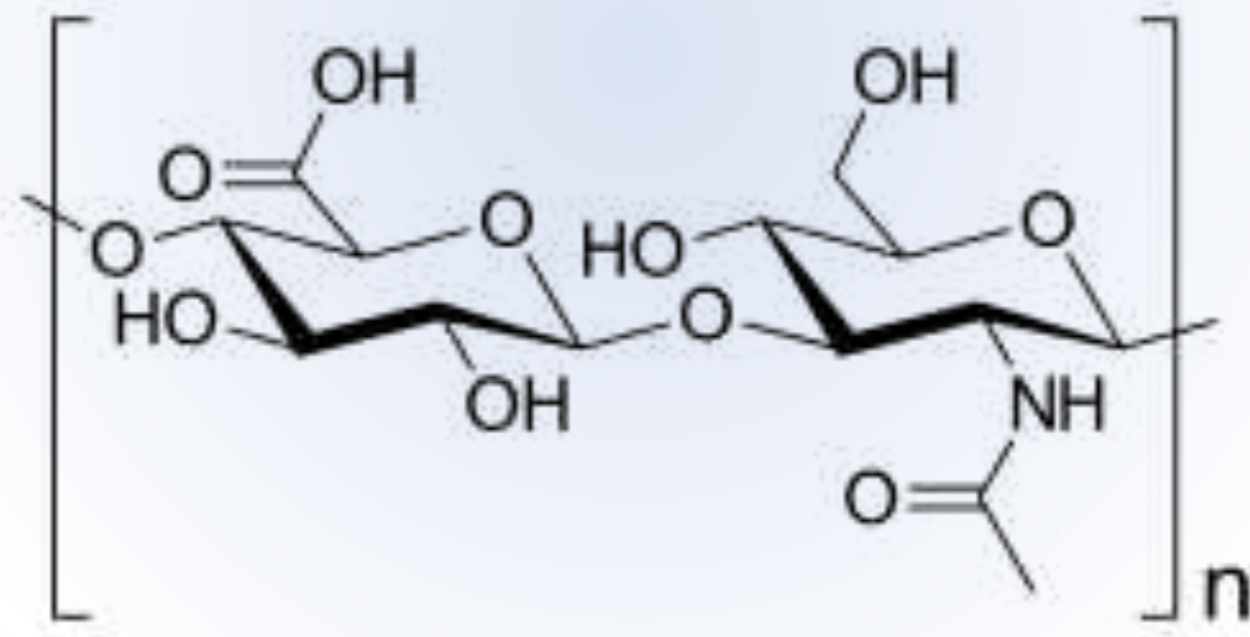
Aqueous deficient

“HA/HPG...reduced surface friction to a greater extent than HA ($P \leq 0.02$) and maintained lubricity after the formulations were rinsed away.”

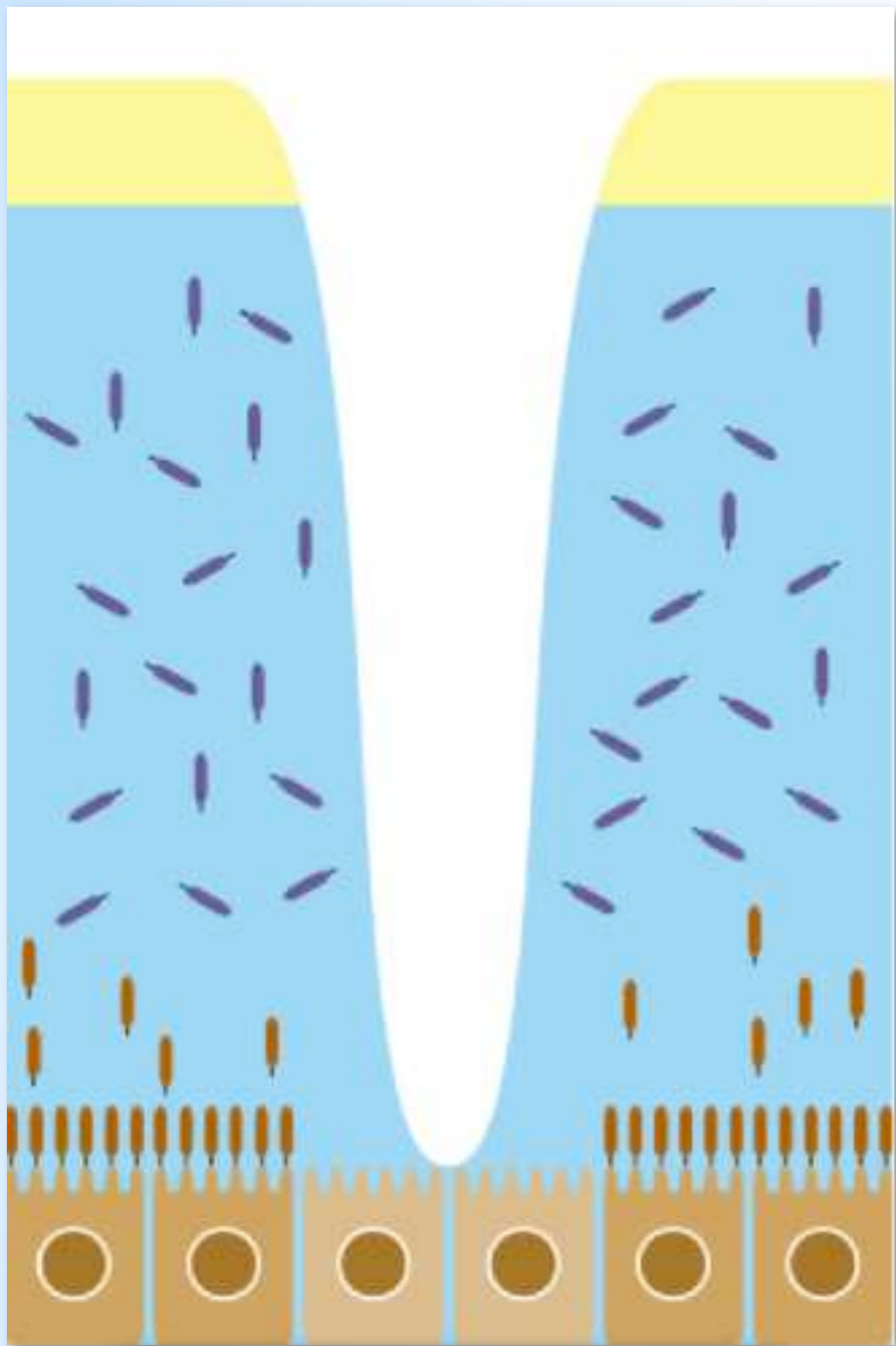
Rangarajan R, Kraybill B, Ogundele A, Ketelson HA. Effects of a Hyaluronic Acid/ Hydroxypropyl Guar Artificial Tear Solution on Protection, Recovery, and Lubricity in Models of Corneal Epithelium. *J Ocul Pharmacol Ther.* 2015 Oct;31(8):491-7. doi: 10.1089/jop.2014.0164. Epub 2015 Jun 11. PMID: 26067908; PMCID: PMC4599388.

Product	Mechanism of Action	Ingredient	Category
Systane Ultra/Classic	pH activated	HP Guar	Viscosity
Refresh	muco-adhesive	cmc	Viscosity
Refresh PM/Systane Nighttime/ Soothe Lubricant Nighttime	ointment	mineral oil/white petrolatum	Viscosity
Optive	compatible solutes	L-carnitine/erythritol/cmc	Osmo-protectants/Viscosity
Soothe XP	oily tears	mineral oil	Emulsion
Systane Balance Systane Complete	oily tears oily tears/nanomicellular	mineral oil HP Guar	Emulsion/Viscosity
Refresh Digital	oily tears compatible solutes	castor oil L-carnitine/erythritol/cmc	Emulsion Osmo-protectants/Viscosity
Refresh Optive Mega-3	oily tears/nanomicellular	trehalose castor oil L-carnitine/erythritol/cmc	Cytoprotective Emulsion Osmo-protectants/Viscosity
iVizia	high shear thinning	trehalose sodium hyaluronate (HA)	Cytoprotective HA Osmo-protectants
blink tears	high shear thinning	sodium hyaluronate (HA)	HA
Refresh Relieva	high shear thinning compatible solutes	sodium hyaluronate (HA) L-carnitine/erythritol/cmc	HA Osmo-protectants/Viscosity
Biotrue Hydration Boost	high shear thinning	sodium hyaluronate (HA)	HA
Oasis	high shear thinning	sodium hyaluronate (HA)	HA
Systane Hydration	high shear thinning	sodium hyaluronate (HA) HP Guar	HA/Viscosity
blink Triple Care	high shear thinning compatible solutes	sodium hyaluronate (HA) castor oil	Emulsion HA
Refresh Relieva PF Xtra	high shear thinning compatible solutes	trehalose sodium hyaluronate (HA) L-carnitine/erythritol/cmc	Cytoprotective HA Osmo-protectants/Viscosity

Hyaluronate acid (HA)



Product	Mechanism of Action	Ingredient	Category
Systane Ultra/Classic	pH activated	HP Guar	Viscosity
Refresh	muco-adhesive	cmc	Viscosity
Refresh PM/Systane Nighttime/ Soothe Lubricant Nighttime	ointment	mineral oil/white petrolatum	Viscosity
Optive	compatible solutes	L-carnitine/erythritol/cmc	Osmo-protectants/Viscosity
Soothe XP	oily tears	mineral oil	Emulsion
Systane Balance Systane Complete	oily tears oily tears/nanomicellular	mineral oil HP Guar	Emulsion/Viscosity
Refresh Digital	oily tears compatible solutes	castor oil L-carnitine/erythritol/cmc	Emulsion Osmo-protectants/Viscosity
Refresh Optive Mega-3	oily tears/nanomicellular	trehalose castor oil L-carnitine/erythritol/cmc	Cytoprotective Emulsion Osmo-protectants/Viscosity
iVizia	high shear thinning	trehalose sodium hyaluronate (HA)	Cytoprotective HA Osmo-protectants
blink tears	high shear thinning	sodium hyaluronate (HA)	HA
Refresh Relieva	high shear thinning compatible solutes	sodium hyaluronate (HA) L-carnitine/erythritol/cmc	HA Osmo-protectants/Viscosity
Biotrue Hydration Boost	high shear thinning	sodium hyaluronate (HA)	HA
Oasis	high shear thinning	sodium hyaluronate (HA)	HA
Systane Hydration	high shear thinning	sodium hyaluronate (HA) HP Guar	HA /Viscosity
blink Triple Care	high shear thinning compatible solutes	sodium hyaluronate (HA) castor oil	Emulsion HA
Refresh Relieva PF Xtra	high shear thinning compatible solutes	trehalose sodium hyaluronate (HA) L-carnitine/erythritol/cmc	Cytoprotective HA Osmo-protectants/Viscosity



Target

Topical therapy

Lipid

Evaporative/MGD

Warm compresses

Emulsions

Miebo

Mechanical therapy: Lipiflow, MiboThemaflor, etc.

Aqueous

Aqueous deficient

Viscosity

Plugs

Mucin

Mucin deficient

cmc

Vit A ointment

Inflammation

Epithelium

Staining

Trehalose

Cyclosporine, Restasis, Cequa, Vevye, Xiidra, Eysuvis, Lotemax, IPL, LLLT

Hyaluronate acid (HA)

thank you!

milton m. hom
eyemage@mminternet.com