

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.



Drops vs Tears

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Disclosures

Milton Hom

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

Disclosures

Mahnia Madan

last 12 months

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Santeen

Zeiss

Drops vs.tears

Screen time

Tears

Allergies

Sleep

Screen associated dry eye

Studies Investigating the Relationship Between Digital Screen Use and Symptoms of Dry Eye or Dry Eye Disease

Reference	Sample	Finding
Hikichi et al, 1995 ²⁷	New outpatients at eye centers (N=2127; age range=10-92 years)	133 (6%) individuals used digital screens. The prevalence of DED was higher among those who used digital screens (30/133; 23%).
Uchino et al, 2008 ²⁹	Office workers (N=3549)	Severe symptoms of dry eye were more prevalent among those who used digital screens for >4 hours per day (OR=1.83).
Uchino et al, 2013 ³¹	Office workers (N=561)	Those who used digital screens for >8 hours per day had a higher risk of definite or probable DED (OR=1.94).
Moon et al, 2014 ³³	Children (N=288; age range=10-12 years)	Prevalence of smartphone use was higher among children with DED (71.4% vs 50%). Daily duration of smartphone use (OR=1.86) and total daily duration of digital screen use (OR=1.82) were associated with an increased risk of DED.
Kawashima et al, 2015 ³	Office workers (N=369)	Duration of digital screen use was longer in those with DED (6.5 hours vs 6.0 hours).
Moon et al, 2016 ³⁶	Children (N=916; age range=7-12)	Prevalence of smartphone use was higher in the DED group than the non-DED group (96.7% vs 55.4%). Daily duration of smartphone and computer use were higher in the DED group (3.18 hours and 1.10 hours) than in the non-DED group (0.62 hours and 0.76 hours).
Hanyuda et al, 2020 ³²	Adults (N=102,582)	Greater digital screen use was associated with a higher risk of clinically diagnosed DED (OR=1.18 for men and OR=1.18 for women for each 1 hour/day increment) and severe symptoms of dry eye (OR=1.11 for men and OR=1.12 for women for each 1 h/day increment).
Inomata et al, 2020 ³⁰	Adults (N=4454)	Greater than 8 hours per day of screen exposure was associated with symptomatic dry eye (OSDI total score ≥ 13 ; OR=1.55) compared to less than 4 hours.
Wang et al, 2021 ³³	Individuals ≥ 16 years of age (N=322)	Greater digital screen time per day was a risk factor for DED (OR=1.14).
Wolffsohn et al, 2021 ³⁴	Adults and children (N=1125)	Digital screen time per day was a risk factor for DED (OR=1.09) and for evaporative DED (OR=1.08).

9 studies since iPhone

Al-Mohtaseb Z, Schachter S, Shen Lee B, Garlich J, Trattler W. The Relationship Between Dry Eye Disease and Digital Screen Use. Clin Ophthalmol. 2021 Sep 10;15:3811-3820. doi: 10.2147/OPHTH.S321591. PMID: 34531649; PMCID: PMC8439964.

Screen time

"A commonly accepted hypothesis...is that digital screen use changes blinking dynamics, leading to ocular dryness."

Al-Mohtaseb Z, Schachter S, Shen Lee B, Garlich J, Trattler W. The Relationship Between Dry Eye Disease and Digital Screen Use. Clin Ophthalmol. 2021 Sep 10;15:3811-3820. doi: 10.2147/OPTH.S321591. PMID: 34531649; PMCID: PMC8439964.

Screen time

“millennials...are noticing increased symptoms of OSD, and they are presenting to our offices in higher numbers”

Hauswirth SG. Dry eye disease onset at a younger age. Optometry Times Journal, February digital edition 2022, Volume 14, Issue 2

<https://www.optometrytimes.com/view/dry-eye-disease-onset-at-a-younger-age>

Screen time

"their eyes generally feel worse at the end of the day after they have been on the computer for a long time."

Hauswirth SG. Dry eye disease onset at a younger age. Optometry Times Journal, February digital edition 2022, Volume 14, Issue 2

<https://www.optometrytimes.com/view/dry-eye-disease-onset-at-a-younger-age>

Pediatric dry eye

50% grades 7-12 during Covid
(Thailand)

24.7% school age (China)

21.6% school children (Japan)

Tonkerdmongkol D, Poyomtip T, Poolsanam C, Watcharapalakorn A, Tawonkasiwattanakun P. Prevalence and associated factors for self-reported symptoms of dry eye among Thai school children during the COVID-19 outbreak. PLoS One. 2023 Apr 24;18(4):e0284928.

Villani E. Nucci P. Pediatric dry eye American Academy of Ophthalmology July 15 2020.
<https://www.aao.org/education/disease-review/pediatric-dry-eye>

Risk Factors

- Female sex
- Ocular allergies
- Underlying systemic diseases
 - congenital autoimmune
 - endocrine disorders
 - inflammatory conditions

Risk Factor - Screen Time

“Daily use of a smartphone was identified as an independent risk factor for DED, though researchers suggested that overall digital device use could be influenced by direct but related variables like time spent outdoors, sedentary lifestyles and impaired sleep”

Screen time

"Higher daily screen time is associated with lower cognition in children."

Walsh, Jeremy & Barnes, Joel & Tremblay, Mark & Chaput, Jean-Philippe. (2020). Associations between duration and type of electronic screen use and cognition in US children. *Computers in Human Behavior*. 108. 106312. 10.1016/j.chb.2020.106312.

Screen time

"These findings suggest moderating screen-use for promoting cognitive development in children."

Walsh, Jeremy & Barnes, Joel & Tremblay, Mark & Chaput, Jean-Philippe. (2020). Associations between duration and type of electronic screen use and cognition in US children. *Computers in Human Behavior*. 108. 106312. 10.1016/j.chb.2020.106312.



SCREEN TIME FOR KIDS



CONCERNS REGARDING TOO MUCH OR POOR QUALITY SCREEN TIME FOR KIDS

BRAIN DEVELOPMENT	IRREGULAR SLEEP SCHEDULES
CHILDHOOD OBESITY	DEPRESSION & BEHAVIORAL PROBLEMS
ATTENTION SPAN	SOCIAL SKILLS & RELATIONSHIP DEVELOPMENT
BRAIN DEVELOPMENT	POOR COPING SKILLS FOR STRUGGLES & STRESS

CURRENT SCREEN TIME STATISTICS PER DAY



AMERICAN ACADEMY OF PEDIATRICS RECOMMENDED SCREEN TIME PER DAY

WHAT CAN YOU DO TO HELP?

SET FAMILY MEDIA-FREE TIME LIKE MEALS & MEDIA-FREE ZONES LIKE BEDROOMS

DON'T LET SCREEN TIME TAKE THE PLACE OF READING, PLAYING, OR PROBLEM SOLVING

DISCOURAGE USE OF SCREENS 30-45 MINUTES BEFORE BEDTIME

ENSURE THE QUALITY OF SCREEN TIME THROUGH SUPERVISION AND PARENTAL CONTROLS

DON'T FORGET, YOUR KIDS ARE WATCHING AND LEARNING FROM YOUR SCREEN TIME USE!

Pediatric dry eye

Drug	Age	Brand
Cyclosporine	16 years+	Restasis/Cequa
Lifitigrast	17 years+	Xiidra
Perflurohexyloctane	18 years+	Miebo
Loteprednol	18 years+	Eysuvis
Varenicline	18 years+	Tyrvaya
Cyclosporine/Perflurohexyloctane	18 years+	Vevye

Pediatric dry eye

Drug	Age	Brand
Cyclosporine 0.1%	4 Years	Verkazia
Loteprednol	Birth	Lotemax gel

Treatment

"There is little research on the safety and efficacy of DED treatment options in children."

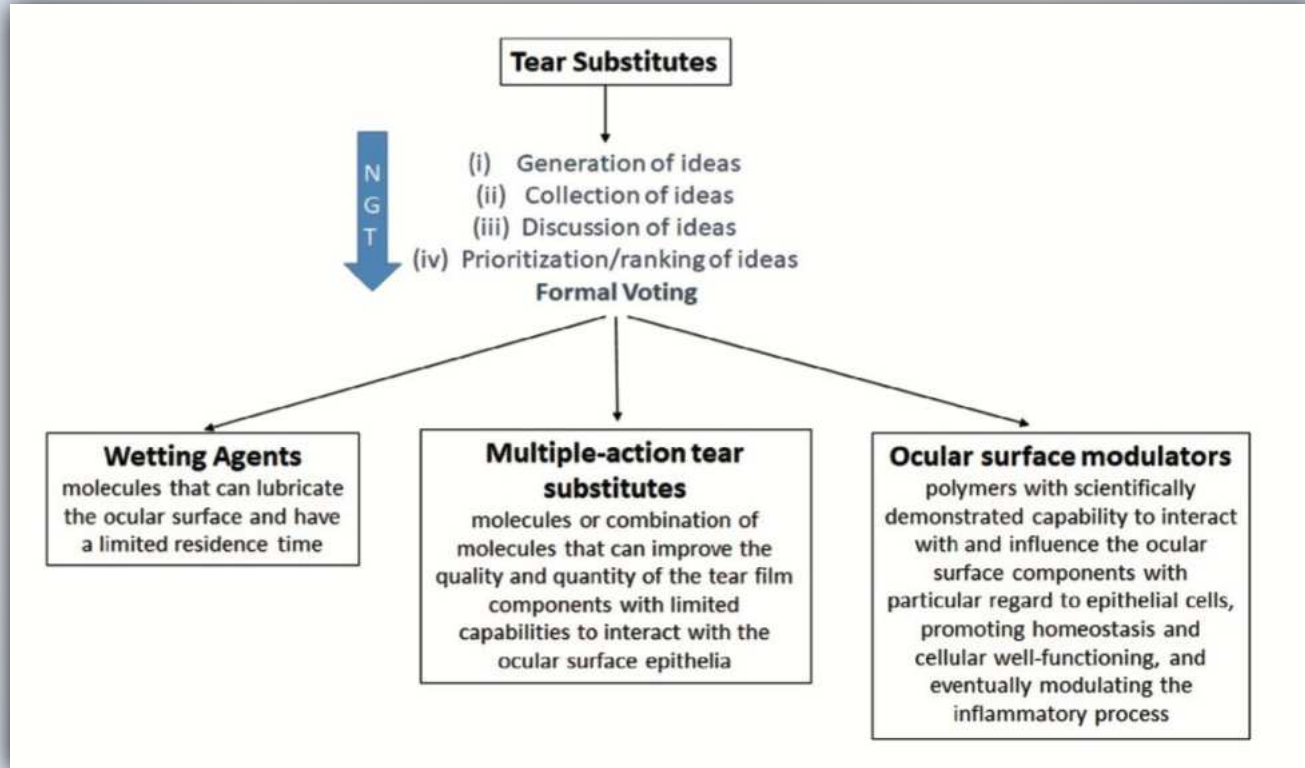
The forgotten option: Artificial tears

Artificial tears

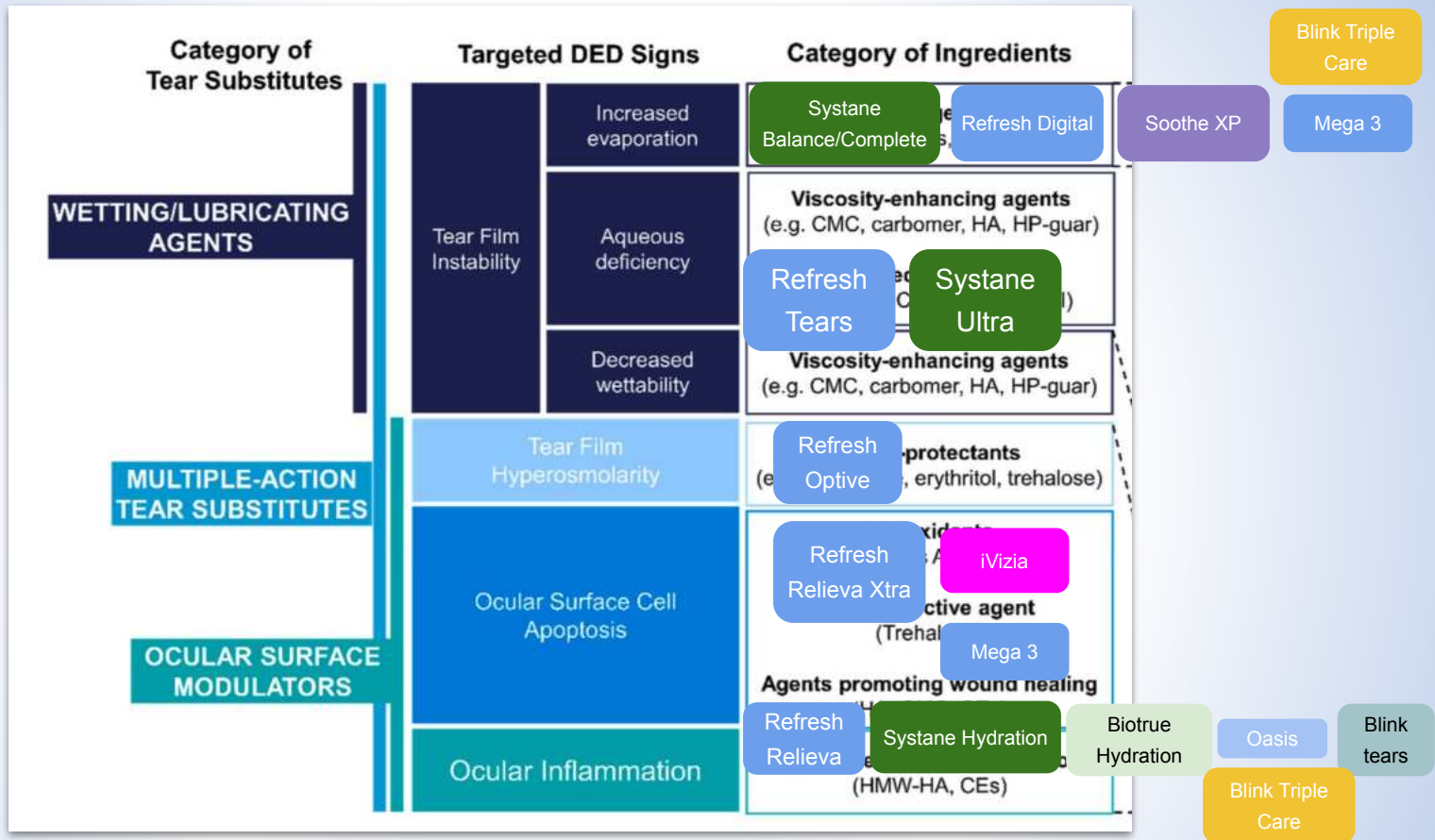
1. Availability
2. Cost
3. Save the Big guns

4. Confusion
5. They are all the same
6. Not as effective?

European NGT Classification



Barabino S, Benitez-Del-Castillo JM, Fuchsluger T, Labetoulle M, Malachkova N, Meloni M, Utheim TP, Rolando M. Dry eye disease treatment: the role of tear substitutes, their future, and an updated classification. *Eur Rev Med Pharmacol Sci.* 2020 Sep;24(17):8642-8652. doi: 10.26355/eurrev_202009_22801. PMID: 32964952.



Barabino S, Benitez-Del-Castillo JM, Fuchsluger T, Labetoulle M, Malachkova N, Meloni M, Utheim TP, Rolando M. Dry eye disease treatment: the role of tear substitutes, their future, and an updated classification. *Eur Rev Med Pharmacol Sci.* 2020 Sep;24(17):8642-8652. doi: 10.26355/eurrev_202009_22801. PMID: 32964952.

Case: Lid wiper epitheliopathy (LWE)

Case: CL dryness

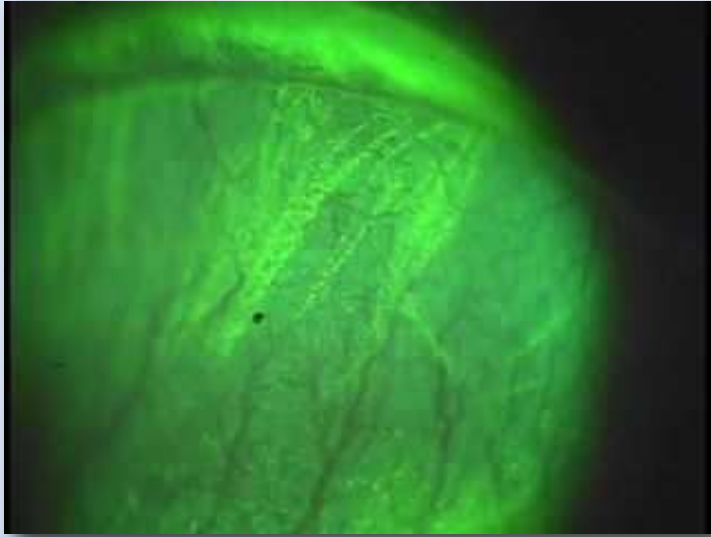
22 year old hispanic female

OSDI: 45.83

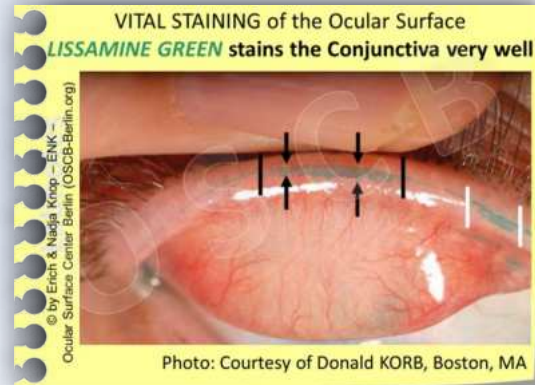
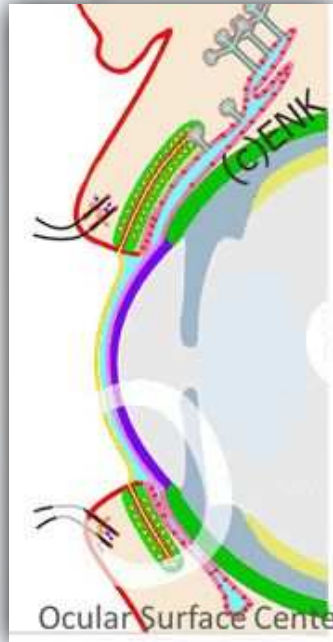
Frequency of dryness score: Moderate

Normal meibomian secretion

Case: CL dryness



Lid wiper



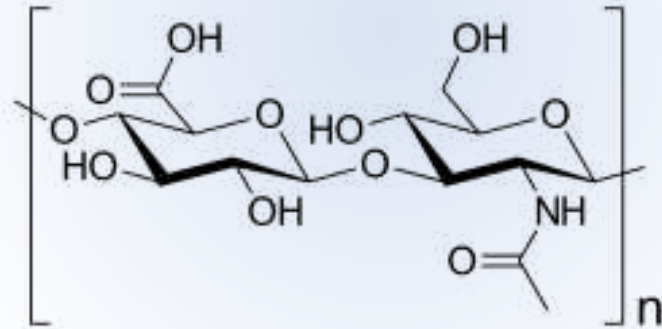
Erich Knop <https://oscb-berlin.org/diagnosis-4>

Treatment

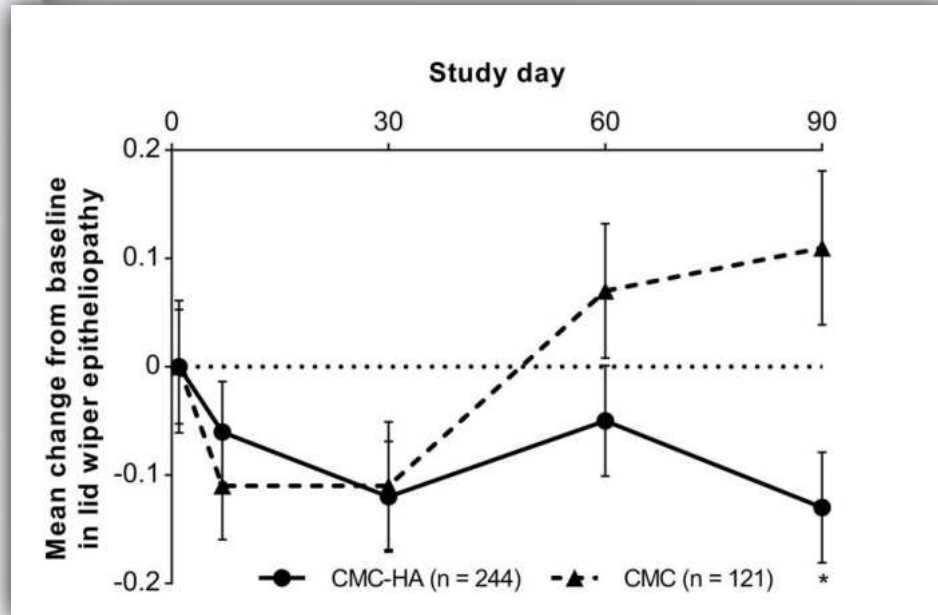
Steroids

Artificial tear?

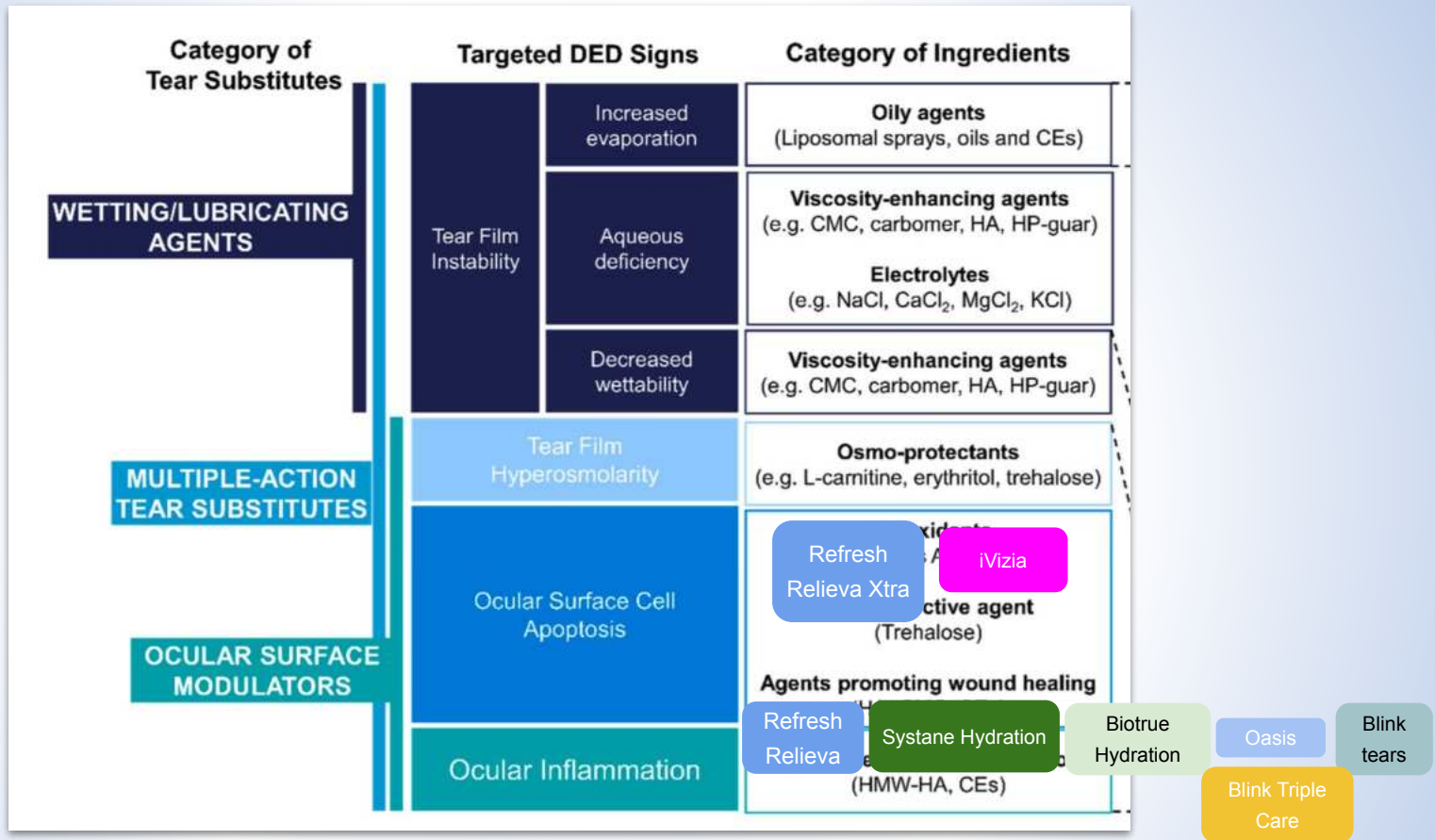
Hyaluronate acid (HA)



Relieva



Nichols JJ, Lievens CW, Bloomenstein MR, Liu H, Simmons P, Vehige J. Dual-Polymer Drops, Contact Lens Comfort, and Lid Wiper Epitheliopathy. *Optom Vis Sci.* 2016;93(8):979–986. doi:10.1097/OPX.0000000000000878



Barabino S, Benitez-Del-Castillo JM, Fuchsluger T, Labetoulle M, Malachkova N, Meloni M, Utheim TP, Rolando M. Dry eye disease treatment: the role of tear substitutes, their future, and an updated classification. Eur Rev Med Pharmacol Sci. 2020 Sep;24(17):8642-8652. doi: 10.26355/eurrev_202009_22801. PMID: 32964952.

Case - 16 YO B

CC: Dry eyes for many months. Notes redness, tearing, burning and light sensitivity. Interested in IPL

“Eyes sting, burn and I can feel the blink on my eyeballs”

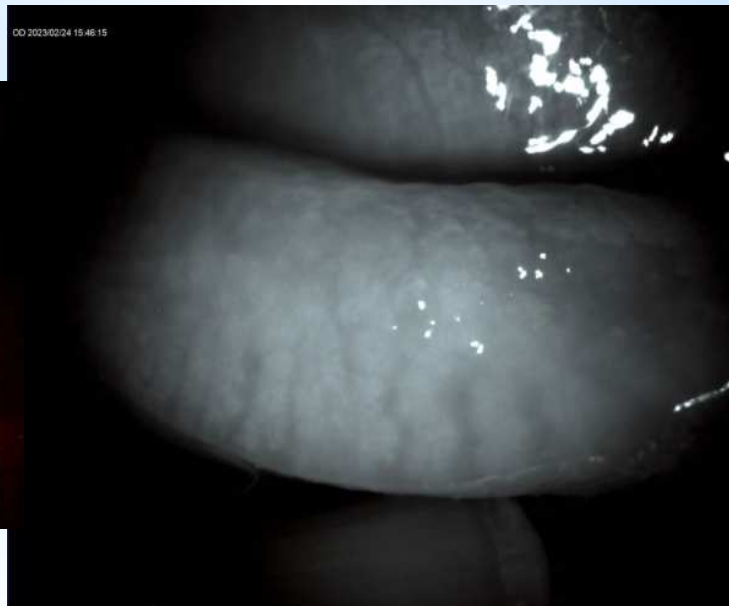
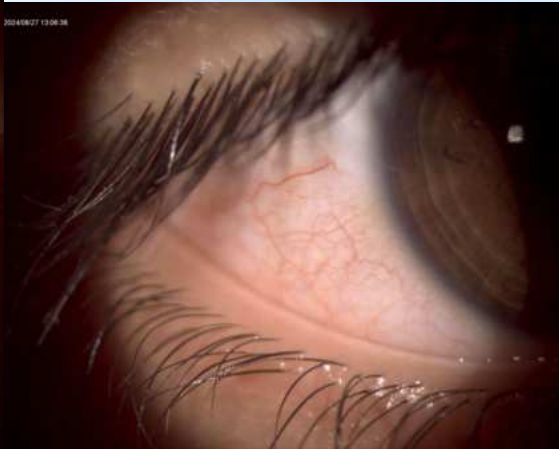
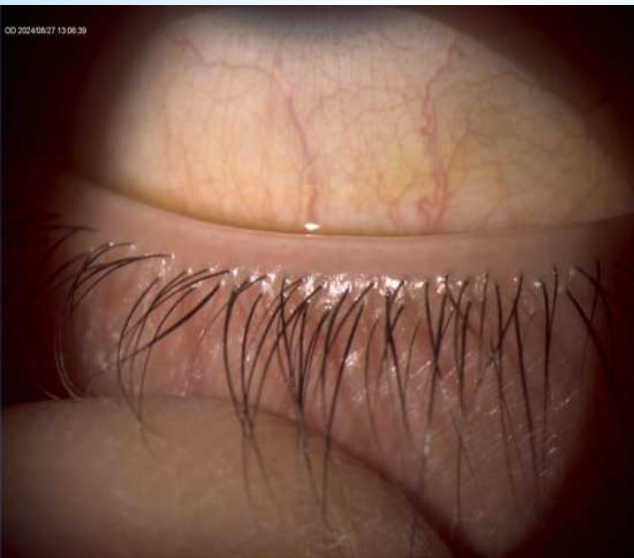
Referred to Rheumatology for investigation of autoimmune disorders causing dry eyes

Tx: PFAT Q30min, hot compresses QID, Omega 3 and had multiple RF treatments with no help.

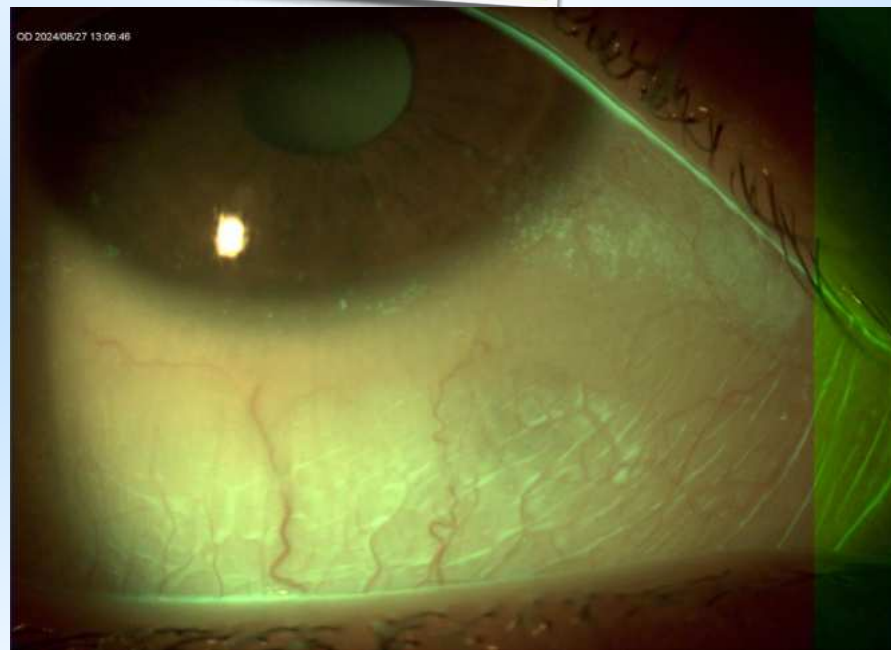
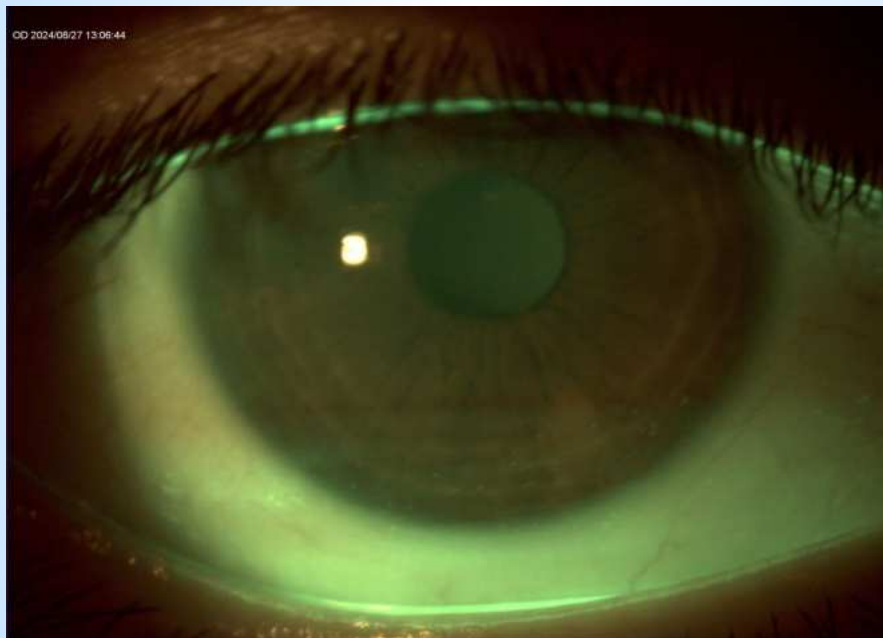
Hx: Many hours on screens, goes to bed between 1-3 am, anxiety, ADHD, adderall 5mg, atomoxetine 20mg



Patient

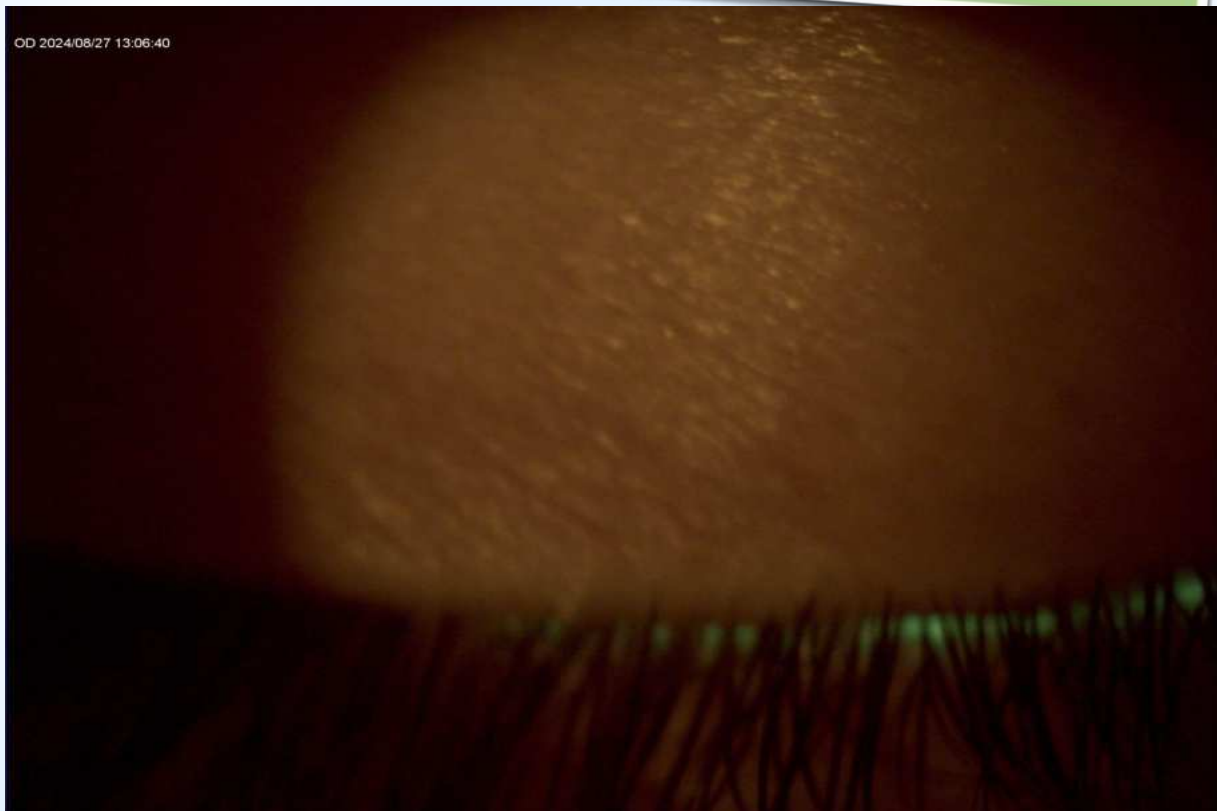


Patient



Patient

OD 2024/08/27 13:06:40



AC and DED Epidemic

- Allergic Conjunctivitis and DED thought to be the epidemics of 21st century.
- Up to 40% of the general US population has reported ocular symptoms consistent with AC.

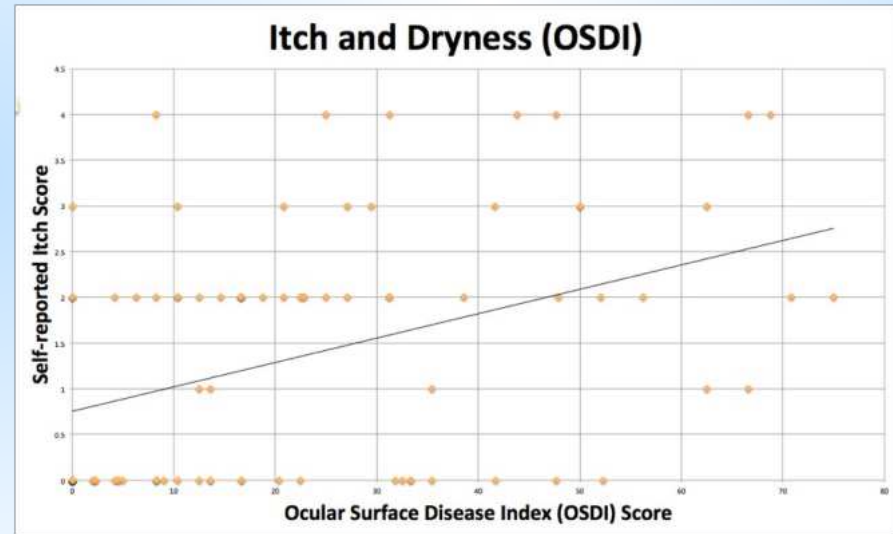


Dry eye syndrome and allergic conjunctivitis--epidemics of XXI century--diagnostic problems and management]. *Przegl Lek.* 2009;66(11):967-71. Polish. PMID: 20297640

Hom MM, Nguyen AL, Bielory L. Allergic conjunctivitis and dry eye syndrome. *Ann Allergy Asthma Immunol.* 2012 Mar;108(3):163-6. doi: 10.1016/j.anai.2012.01.006

AC and DED Epidemic

- As AC symptoms increase, DED symptoms also increase
- Lower tear volume increases concentration of irritants/ inflammatory factors
- Do eyes itch when they are watery or when they are dry?



AC and DED Drops

Drug	Age	Brand
Cyclosporine 0.1%	4 Years	Verkazia
Loteprednol	Birth	Lotemax gel
Tacrolimus 0.02% to 0.1%	2-15 Years	Off Label
Olopatadine 0.1%	2 Years	Pataday
Bepotastine besilate 1.5%	2 years	Bepreve

Cyclosporine

Clinical Trial > Nippon Ganka Gakkai Zasshi. 2011 Jun;115(6):508-15.

[A prospective, observational, all-prescribed-patients study of cyclosporine 0.1% ophthalmic solution in the treatment of vernal keratoconjunctivitis]

Randomized Controlled Trial > Eye (Lond). 2024 Apr;38(5):937-944.

doi: 10.1038/s41433-023-02807-2. Epub 2023 Oct 30.

Exploration of efficacy and mechanism of 0.05% cyclosporine eye drops (II) monotherapy in allergic conjunctivitis-associated dry eye

Xiting Jiao #¹, Yuanyuan Qi #¹, Ning Gao¹, Chen Zhang¹, Shaozhen Zhao², Ruibo Yang³

- Topical CsA can improve VKC and AC.
 - CsA inhibit the activation of mast cells and eosinophils, which is vital in treating the inflammation caused by allergies
- A six-month study of 2,597 patients - significant decrease in symptoms with 0.1% CsA
 - 30% of the patients were able to discontinue steroids within 3 months.

Tacrolimus

[Br J Ophthalmol](#). 2014 Aug; 98(8): 1023–1027.

Published online 2014 Apr 2. doi: [10.1136/bjophthalmol-2013-304453](https://doi.org/10.1136/bjophthalmol-2013-304453)

PMCID: PMC4112440

PMID: [24695688](https://pubmed.ncbi.nlm.nih.gov/24695688/)

Therapeutic effects of 0.1% tacrolimus eye drops for refractory allergic ocular diseases with proliferative lesion or corneal involvement

[Atsuki Fukushima](#),¹ [Yuichi Ohashi](#),² [Nobuyuki Ebihara](#),³ [Eiichi Uchio](#),⁴ [Shigeki Okamoto](#),⁵ [Naoki Kumagai](#),⁶ [Jun Shoji](#),⁷ [Etsuko Takamura](#),⁸ [Yayoi Nakagawa](#),⁹ [Kenichi Namba](#),¹⁰ [Hiroshi Fujishima](#),¹¹ and [Dai Miyazaki](#)¹²

[▶ Author information](#) [▶ Article notes](#) [▶ Copyright and License information](#) [PMC Disclaimer](#)



Contact Lens and Anterior Eye

Volume 38, Issue 5, October 2015, Pages 373-378



Treatment of Sjögren's syndrome dry eye using 0.03% tacrolimus eye drop: Prospective double-blind randomized study

[Bernardo Kaplan Moscovici](#)^{a b}  , [Ricardo Holzchuh](#)^{a b}, [Fernando Eiji Sakasagawa-Naves](#)^{a b}, [Diego Ricardo Hoshino-Ruiz](#)^{a b}, [Marcos Bottene Villa Albers](#)^{a b}, [Ruth Miyuki Santo](#)^a, [Richard Yudi Hida](#)^{a b}

- Tacrolimus is a macrolide with immunomodulatory action
- Developed as an immunosuppressant agent for use following organ transplantation
- Tacrolimus ointment is also marketed for the treatment of atopic dermatitis.
- Reported to inhibit calcineurin 100 times more effectively than CsA
- Shown to be effective for the treatment of DED, VKC and AKC

Dx & Tx - 16 YO B

DX: Lagophthalmos, partial blinking, DED, AC, sleep deprivation

TX:

- Eyeseal at night
- Lotemax QID x 2 week, BID x 1 month, QD x 1 month
- CsA 0.09% BID (start in 2 weeks)
- HAAT

Lifestyle management: Sleep hygiene, Reduce screen time



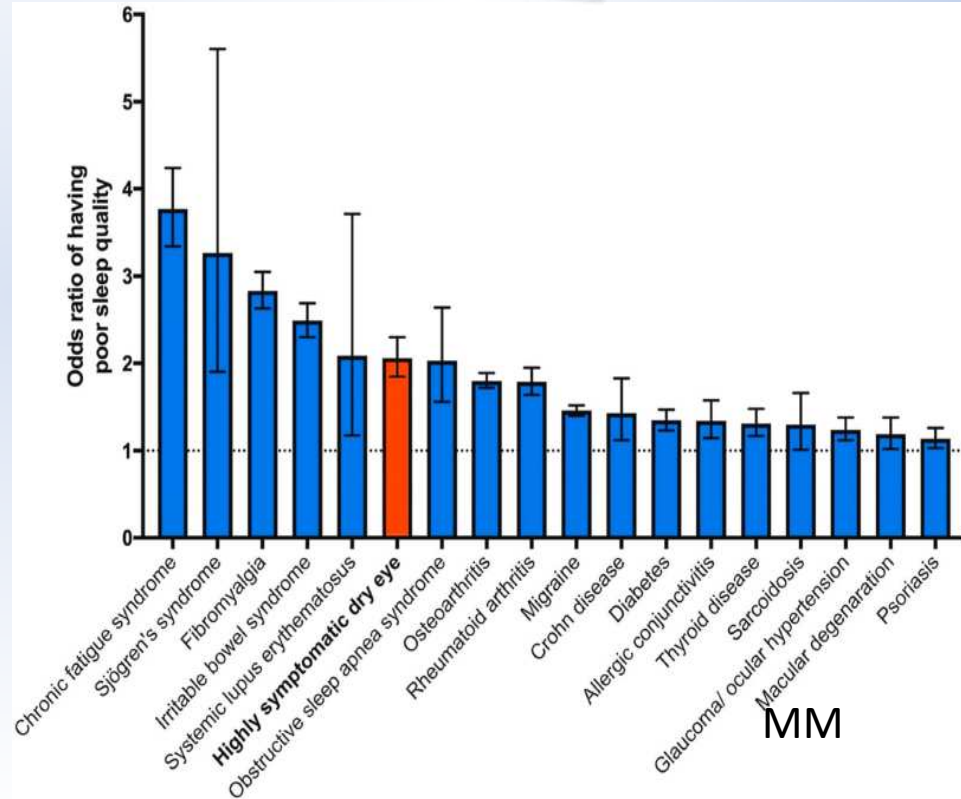
Sleep

"Nearly 30% of adults and 60% of adolescents in the United States fail to obtain sufficient amounts of sleep."

Li, S., Ning, K., Zhou, J. *et al.* Sleep deprivation disrupts the lacrimal system and induces dry eye disease. *Exp Mol Med* 50, e451 (2018). <https://doi.org/10.1038/emm.2017.285>

Sleep Deprivation & DED

- Poor sleep = 50% more likely to suffer from DED
- Sleep disorders are particularly pronounced in patients with dry eyes
- Highly symptomatic DED was rated as one of the top 5 conditions to reduce quality of sleep and its impact on sleep was similar to sleep apnea



Magno MS, Utheim TP, Snieder H, Hammond CJ, Vehof J. The relationship between dry eye and sleep quality. Ocul Surf. 2021 Apr;20:13-19

Conclusions

- Not all eyedrops are created equally
- Inquire about digital device use and educate patients on its negative impact
- DED and Allergic Conjunctivitis are common comorbidities
 - Look for signs and symptoms of both!
- Assess sleep habits and discuss how sleep deprivation can disrupt eye health and overall well being.

thank you!



Milton Hom, OD, FAAO

eyemage@mmineternet.com



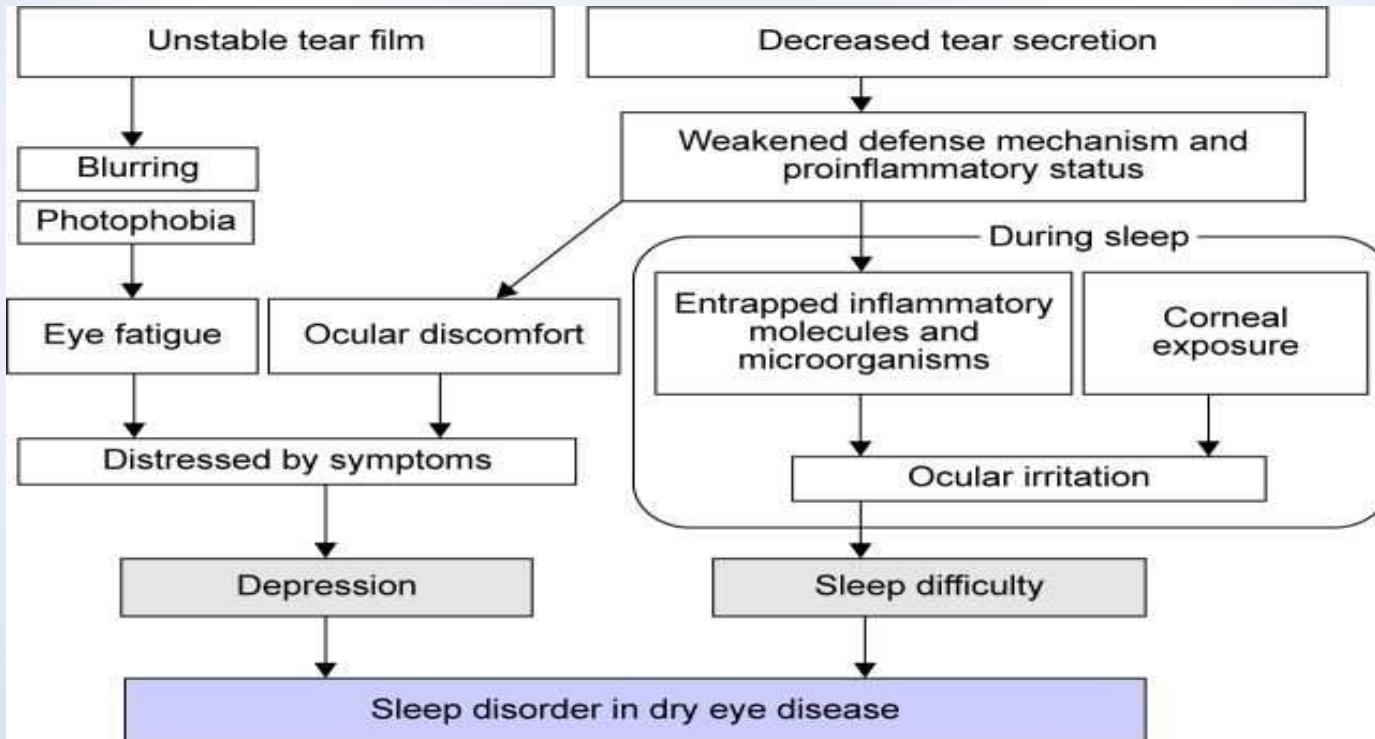
Mahnia Madan, OD, FAAO

@dr.mahnia.madan
www.vancouvereyedr.ca

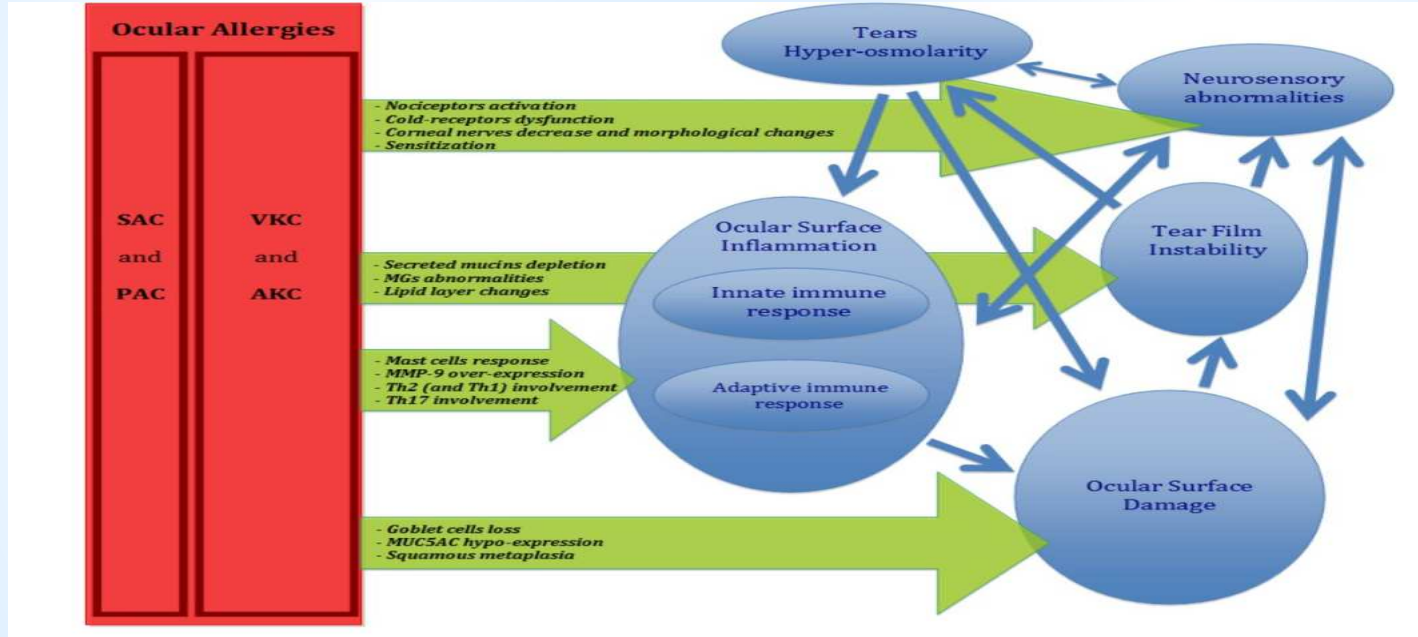
Ocular allergies

<p>Common Allergic Conjunctivitis (AC): Seasonal (SAC) and Perennial (PAC)</p>	<p>Keratoconjunctivitis (KC): Atopic (AKC) or Vernal (VKC)</p>
<ul style="list-style-type: none">● Mild to moderate● Airborne allergens, pollen, mold, dust● Type I (immunoglobulin E mediated)● Itching, swelling, tearing● 80% younger than 30	<ul style="list-style-type: none">● VKC and AKC are severe chronic inflammatory diseases that affect the conjunctiva and cornea● Type IV (T-helper mediated) response● Photophobia and pain● VKC is a paediatric disease, usually subsiding after puberty, while AKC symptoms may appear during childhood but the most frequent onset age ranges from 30 to 50 years old.

Which Came 1st?



AC and DED Epidemic



Villani E, Rabbiolo G, Nucci P. Ocular allergy as a risk factor for dry eye in adults and children. *Curr Opin Allergy Clin Immunol.* 2018 Oct;18(5):398-403. doi: 10.1097/ACI.0000000000000471.

Which Came 1st?

- Sleep deprivation
 - hypertonic tears
 - shortened TBUT
 - reduced tear secretion

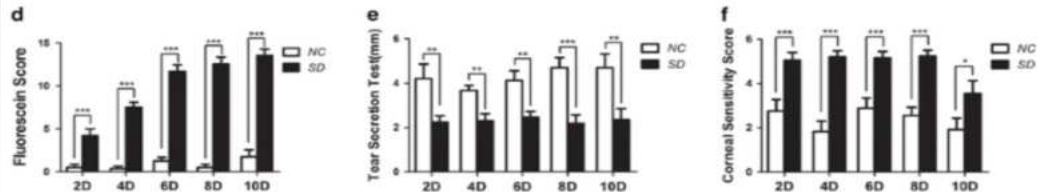
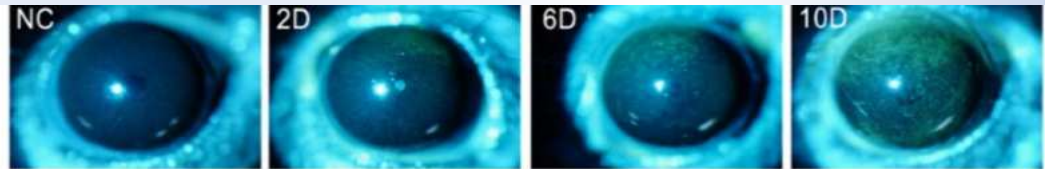
Conjunctival and limbal hyperemia was present after 2 days of SD

Cornea showed diffuse staining after 2 days of SD and became more intensive at days 6 and 10

Original Article | [Open access](#) | Published: 02 March 2018

Sleep deprivation disrupts the lacrimal system and induces dry eye disease

[Sanming Li](#), [Ke Ning](#), [Jing Zhou](#), [Yuli Guo](#), [Houjian Zhang](#), [Yu Zhu](#), [Liyang Zhang](#), [Changkai Jia](#), [Yongxiong Chen](#), [Peter Sol Reinach](#), [Zuguo Liu](#) ✉ & [Wei Li](#) ✉



DED causes SD

- Dry eye leads to poor sleep due to:
 - Discomfort and pain
 - Depression
 - Eye exposure
 - Lagophthalmos
 - Floppy eyelid
 - Eyelid malpositions



Ayaki M, Toda I, Tachi N, Negishi K, Tsubota K. Preliminary report of improved sleep quality in patients with dry eye disease after initiation of topical therapy. *Neuropsychiatr Dis Treat.* 2016; 12: 329–337

Inquire About Sleep

If you are seeing patients with DED, you are most definitely seeing patients with poor sleep

Simple inquiries:

- Struggle to initiate or maintain sleep,
- Subjective evaluation of sleep quality,
- Instances of nocturnal awakenings,
- Disruptions caused by dry eyes
- Sleep apnea,
- Medication usage for sleep support

Name: _____ Date: _____

Pittsburgh Sleep Quality Index (PSQI)

Instructions: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. **Please answer all questions.**

1. During the past month, what time have you usually gone to bed at night? _____
2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night? _____
3. During the past month, what time have you usually gotten up in the morning? _____
4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed.) _____

5. During the <u>past month</u> , how often have you had trouble sleeping because you...	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
a. Cannot get to sleep within 30 minutes				
b. Wake up in the middle of the night or early morning				
c. Have to get up to use the bathroom				
d. Cannot breathe comfortably				
e. Cough or snore loudly				
f. Feel too cold				
g. Feel too hot				
h. Have bad dreams				
i. Have pain				
j. Other reason(s), please describe:				
6. During the past month, how often have you taken medicine to help you sleep (prescribed or "over the counter")?				
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
	No problem at all	Only a very slight problem	Somewhat of a problem	A very big problem
8. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?				
	Very good	Fairly good	Fairly bad	Very bad
9. During the past month, how would you rate your sleep quality overall?				

Manage Sleep & DED

Establishing Healthy Sleep Habits

- Consistent bedtime routine
- Limit screen time
- Screen-free time 1 hr before bed
- Create a sleep-conducive environment:
- Encourage physical activity during the day

Manage DED

- Address exposure
- Manage inflammation
- Appropriate referral for sleep management

[Neuropsychiatr Dis Treat.](#) 2016; 12: 329–337.

Published online 2016 Feb 16. doi: [10.2147/NDT.S94648](https://doi.org/10.2147/NDT.S94648)

PMCID: PMC4

PMID: 26

Preliminary report of improved sleep quality in patients with dry eye disease after initiation of topical therapy

[Masahiko Ayaki](#),¹ [Ikuko Toda](#),² [Naoko Tachi](#),³ [Kazuno Negishi](#),¹ and [Kazuo Tsubota](#)¹

Pediatric dry eye

Average age 9.6 years old
42% had meibomian gland
atrophy

Gupta PK, Stevens MN, Kashyap N, Priestley Y. Prevalence of Meibomian Gland Atrophy in a Pediatric Population. *Cornea*. 2018;37(4):426-430.
doi:10.1097/ICO.0000000000001476

Pediatric DED Prevalence

The prevalence of DED in children ranged from 5.5% to 23%.¹ and more common in girls

Fiona Stapleton, Federico G. Velez, Charis Lau, James S. Wolffsohn,
Dry eye disease in the young: A narrative review,
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