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.

Financial Disclosures

Dr. Lisa Hornick has received an honorarium from the following companies:

Lumenis Inc, Tarsus Pharmaceuticals, Blinkjoy LLC, NuLids LLC, SCOPE Eyecare, and Dompe

She is on the medical advisory board for Myze, LLC.

She is a KOL for Viatris and CSI Dry Eye Software.

She has been given free samples of products from Eyes Are the Story, We Love Eyes, Baush & Lomb and Twenty Twenty Beauty.

All relevant relationships have been mitigated.

Lifestyle Factors

- Sleep Disorders
- Digital Device Use
- Nutrition
- Caffeine, Alcohol and Smoking
- Physical Inactivity and Obesity
- Cosmetics
- Contact Lens Wear
- Mental Health

Hey Doc- What Caused My Dry Eye Disease?

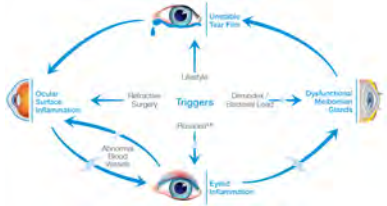


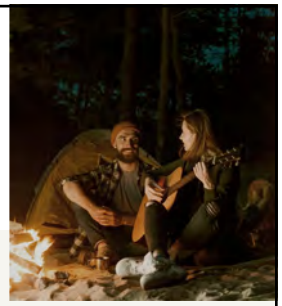
Image courtesy of Lumenis

TFOS Lifestyle Report

In 2023, the Tear Film and Ocular Surface Society released a 400 page report on how lifestyle factors affect OSD patients. This was a global initiative involving 150 eye care providers and researchers worldwide from 23 countries.

01

Sleep Disorders



How Sleep Disorders Affect OSD- A Strong Association

DED patients have :

- poorer sleep quality
- spend less time asleep
- have more sleep disturbances
- have more severe sleep disorders

Factors such as sleep apnea and depression are also connected to DED.

Sleep apnea has also been associated with meibomian gland dropout.

Source: https://pubmed.ncbi.nlm.nih.gov/3705491/

How Sleep Disorders Affect OSD- A Strong Association

Sleep deprivation can increase cellular oxidative stress.

Systemic inflammation and stress hormones can lead to decreased tear production.

Dry eye can be triggered in as little as ONE night of poor sleep!

Studies show that sleep deprivation can cause:

- tear osmolarity to increase
- TBUT to decrease
- a reduced ability for the ocular surface to repair itself

Source: https://pubmed.ncbi.nlm.nih.gov/37054911/

How to Look for Sleep Issues in the Exam

Ask about sleep problems such as sleep apnea and other disturbances such as nights shift work on your intake form or in the exam history.

Looks for signs of lagophthalmos or inadequate lid seal (ILS) that can indicate DED being worse at night- ex. Corneal NaFl staining inferiorly

Do the Korb-Blackie light test to look for inadequate lid seal.

Source: https://www.reviewofoptometry.com/article/night-moves

What to Do Next- How to Treat

If case history reveals possibility of sleep apnea or sleep disorder, refer patient to a sleep specialist or their PCP for evaluation.

Educate your patient about getting good, quality sleep: at least 7-8 hours per night.

Talk about sleep hygiene:

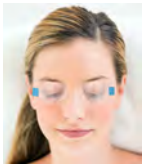
- decrease exposure to blue light 2 hours before bed
- practice a relaxation routine with a bath, tea or meditation
- keep the bedroom cool and dark for better sleep

CPAP users can use special goggles to protect their eyes from exposure- ex. Eyeseals from Eye Eco.

Source: https://eyeeco.pmvision.com/product/eyeseals-original/

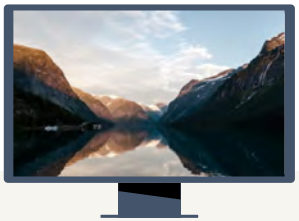
For Inadequate Lid Seal (ILS)

Patients with ILS can be treated at night with moisture seal goggles, ointment or lid tape like (Sleep Tite/ Sleep Rite).



02

Digital Device Use



How Digital Device Use Affects OSD

Our digital device use aka “screen time” continues to increase.

TFOS recommended the the definition of digital eye strain be “the development or exacerbation of recurrent ocular symptoms and/or signs related specifically to digital device screen viewing”.

Our blink rate decreases and we have more incomplete or partial blinks when using digital devices.

Normal blink rate is 15 times per minute, when using a digital device it decreases to 5-7 times per minute.

Source: https://www.sciencedirect.com/science/article/pii/S1542012423001179

More Considerations- Why Digital Device Use Should be Addressed

High cognitive demand activities such a reading a spreadsheet for work or scanning in a fast-paced video game can decrease the blink rate more than passive activities like watching a movie.

Decreasing blink rates and more incomplete blinks can cause an increase in the obstruction of the meibum in meibomian glands.

This can further lead to **long-term problems** such as gland atrophy.

Source: https://pubmed.ncbi.nlm.nih.gov/37062428/
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8048838/

More Considerations- Why Digital Device Use Should be Addressed

Digital eye strain can cause:

- longer time to complete a task
- an increase in the number of errors made
- require the person to take more breaks

A 2021 study found that worse dry eye symptoms were associated with workers being absent more and **decreased work productivity**.

Source: https://pubmed.ncbi.nlm.nih.gov/37062428/
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8048838/

Dry Eye Disease in the Gamer Population

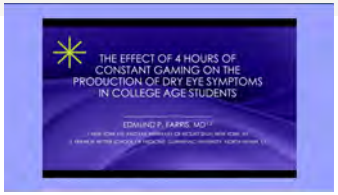
Digital eye strain does not just affect older patients, it affects younger ones also

Take-aways:

36% of the study participants had normal levels of MMP-9 before gaming and **elevated** levels after.

23/41 participants had an **increase in SPEED score** (average 4.82 points increase)

Frequency of symptoms of eye soreness and irritation increased by **3x**



Poster presented at ASCRS meeting 2024

Source: https://modernod.com/significant-findings/prolonged-gaming-and-dry-eye

Dry Eye Disease in a Younger Population

Literature review looking at the prevalence of dry eye among those younger than 18 years old.

Prevalence ranged from **5.5% - 23.1%**, with higher rates among **girls**.

Daily use of a smart phone was identified as a risk for DED. This could be influenced by time outside, sedentary lifestyle and impaired sleep.

Studies have shown meibomian gland function and structure changes in children as young as **6 years old.**

MGD was associated with subsequent development of more severe DED.


Menu Healio

Prevalence of DED in children slightly lower than adults, but underdiagnosis 'conceivable'

Key takeaways:

- The prevalence of DED in children ranged from 5.5% to 23.1%, with higher rates reported among girls.
- There is little research on the safety and efficacy of DED treatment options in children.

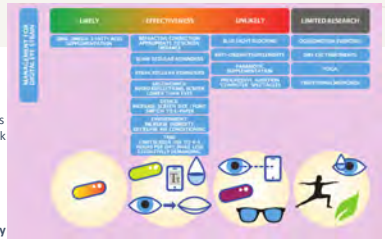
Source: https://www.healio.com/news/optometry/20240711/prevalence-of-ded-in-children-slightly-lower-than-adults-but-underdiagnosis-conceivable

How to Best Manage Digital Eye Strain – TFOS Report

Take-away: a literature review revealed that the best treatment for digital eye strain is **Omega-3 FA supplementation**.

Other effective treatments include taking breaks, blink reminders, increasing humidity and ergonomics.

Blue light blocking glasses and other types of supplements were **unlikely** to be effective.



Source: https://www.sciencedirect.com/science/article/pii/S1542012423001179

03

Nutrition

How Nutrition Affects OSD: Beyond Omega-3s

Nutrition is critical to optimizing how our body functions.

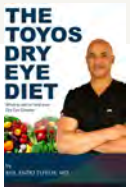
In addition to **Omega-3 fatty acids, Vit A, B12, C and D** are necessary for a healthy ocular surface.

What about **hydration**? There are few studies that show the role that water intake has on the ocular surface. However, we know hydration is essential for the whole body to function properly.

Non-food additives such as emulsifiers and flavor enhancers may play a negative role on the ocular surface.

Source:https://pubmed.ncbi.nlm.nih.gov/37100346/

Which Type of Diet is Best for OSD Patients?



The winner:
The Mediterranean Diet

Source:https://pubmed.ncbi.nlm.nih.gov/37100346/

How to Address Nutrition with Your Patients

Ask your patients about their diet:

Are they eating whole foods or ultra-processed?

Are they eating green, leafy vegetables, fruits, and healthy fats from fish, avocado and nuts?

Are they staying well hydrated?

Are they already taking supplements or would one be helpful?

Something New: Blink NutriTears

Dry eye supplement released June 2024- showed improvement as soon as **2 weeks** after use

Ingredients: Vit D, Leutin, Zeaxanthin and Curcumin
Note: This has no Omega FAs

Clinical studies in 155 patients showed:
After 8 weeks of use, the group treated with the supplement had significantly improved in:

- Shirmer test results
- OSDI score
- TBUT
- Osmolarity
- Corneal and conjunctival staining
- MMP-9 testing
- SPEED score

Source: https://www.frontiersin.org/journals/ophthalmology/articles/10.3389/fopht.2024.1362113/full

04

Caffeine, Alcohol and Smoking

Caffeine, Alcohol and Smoking: The Good, the Bad and the Ugly

Good news: Caffeine

Although caffeine is a diuretic, it does not seem to make dry eye worse.

There may even have a protective role against DED.

In a study with over 85,000 patients, it was determined that caffeine is NOT a risk factor for dry eye disease.

Possible reasons for this include:

- increased lacrimal gland secretions
- the potential antioxidant benefits from coffee beans
- an induced analgesic effect

Source: https://pubmed.ncbi.nlm.nih.gov/35581066/
https://pubmed.ncbi.nlm.nih.gov/37054811/

Caffeine, Alcohol and Smoking: The Good, the Bad and the Ugly

Bad news: Alcohol

Alcohol has been noted in many studies to be a contributing factor to DED.

One study with over 77,000 patients noted that increased alcohol use significantly increased the risk of dry eye symptoms in women but not in males.

Other studies in males and females noted these associations between alcohol use and DED:

- deterioration of the tear film
- decrease in tear volume
- increase in tear osmolarity
- increase in dry eye symptoms

Source: https://pubmed.ncbi.nlm.nih.gov/37054911/

Caffeine, Alcohol and Smoking: The Good, the Bad and the Ugly

The Ugly: Smoking

Studies on tobacco use as it relates to dry eye are limited and inconsistent.

Tobacco use, including vaping, has been most closely linked to **tear film instability**.

Tobacco smoke exposure can also have negative effects on the ocular surface such as:

-lipid layer changes
-apoptosis
-inflammation

Source: https://pubmed.ncbi.nlm.nih.gov/37054911
https://www.sciencedirect.com/science/article/pii/S1542012423001179 /

05

Physical Inactivity and Obesity

Obesity's Link to Dry Eye

Studies on associations between obesity, DED and OSD have been mixed.

However, **obesity has been linked to meibomian gland abnormalities.**

DED, MGD and **floppy eyelid syndrome** have been associated with obstructive sleep apnea which is co-morbid with obesity.

Patients with floppy eyelid syndrome, obesity and sleep apnea are at a greater risk of dry eye due to exposure to the continuous air pressure from the CPAP machine.

Sources: https://pubmed.ncbi.nlm.nih.gov/37054911/
https://www.aao.org/eyenet/article/floppy-eyelid-syndrome-associations-and-etiology

Physical Inactivity, Obesity and Link to Dry Eye

Physical inactivity contributes to our obesity epidemic.

The relationship between physical activity and DED needs more research.

A study in 2023 of over 43,000 revealed that higher sedentary behavior resulted in a higher risk for DED. In addition, computer use was a large confounding factor.

Good news: This study also showed that sufficient physical activity was shown to **reduce** the relationship between the sedentary behavior and the DED risk. Therefore, physical activity may have a protective effect.

Sedentary behavior induced systemic inflammation and oxidative stress were hypothesized to be the mechanism for the relationship with DED.

Sources:https://www.sciencedirect.com/science/article/pii/S1542012423000022

Obesity's Link to Dry Eye- New Study Looking At MGD in children

Study released on July 16th, 2024 looking at MG abnormalities in children concluded that "meibomian gland morphological abnormalities were commonly found in children aged 5 to <18 years. Risk factors for these abnormalities include **elevated body mass index, an unhealthy diet**, and **reduced outdoor activity**."

Results: **Severe meibomian gland atrophy** was found in **31.0%** of participants in at least one eyelid. **Severe meibomian gland tortuosity** was found in **84.0%** of participants in at least one eyelid.

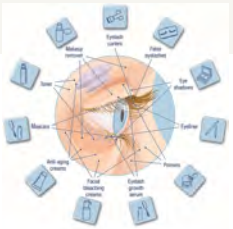
N= 160, mean screen time was 9.4 hours per day and 20% of children consumed sugary drinks and fast food more than 3-5 x per week.

Source: https://www.healio.com/news/optometry/20240722/poor-diet-high-bmi-risk-factors-for-meibomian-gland-atrophy-tortuosity-in-children

06

Cosmetics

What is Considered to be an Ocular Cosmetics?



Soure: https://pubmed.ncbi.nlm.nih.gov/37061220/

Cosmetic Ingredients and DED

The beauty industry is expected to be valued at $670 billion in 2024.

Various cosmetic ingredients can be potentially harmful to the ocular surface. These ingredients can act as allergens, irritants, toxins and carcinogens.

Soure: https://pubmed.ncbi.nlm.nih.gov/37061220/
https://www.cosmoprof.com/en/media-room/news/the-global-beauty-industry-the-markets-to-monitor-in-the-next-future/

Cosmetic Ingredients and DED – TFOS Study

Examples of ingredients that can potentially cause damage to the ocular surface (Top 10 with the most significant adverse effects according to the TFOS report):

*1. **Benzalkonium chloride (BAK)** : toxic, allergen, irritant
2. **Chlorphenesin** : toxic, allergen, irritant, immunosuppressant
*3. **Formaldehyde releasing compounds**: toxic, carcinogen, allergen
4. **Parabens**: toxic, endocrine disruptor, allergen
5. **Phenoxyethanol**: toxic, allergen, irritant
6. **Phthalates**: cytotoxic, endocrine disruptor, neurotoxic, some banned in Europe
*7. **Prostaglandin analogs**: MGD, periorbitopathy, hyperemia, eyelid ptosis
*8. **Retinoids**: toxic to meibomian glands
9. **Salicylic Acid**: irritant, restricted use in Europe
10. **Tea Tree Oil**: toxic to meibomian gland epithelial cells, allergen

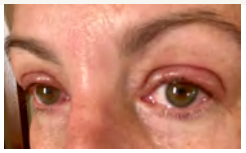
Source: https://pubmed.ncbi.nlm.nih.gov/37061220/

Ingredients- Dr. Hornick's Addition

11. Acrylates

Can be found in **mascara**, eye cream, **eyelash glue**, eyeliner, eyeshadow, glitter, makeup remover, and serum. Also found in nail polish.

Be aware of allergic potential. They can be a significant source of contact dermatitis.



Source: https://pubmed.ncbi.nlm.nih.gov/37061220/
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8501444/

Ingredients- What To Consider

Things that matter with ingredients:

-Dose-dependent (concentration matters)

-Type of study (in-vitro vs in-vivo)?

-How much is absorbed into the skin? What percent can penetrate the skin?

-How long is the ingredient on skin?

-What is the patient allergic to?

More research needs to be done in this area. Use your clinical judgement.

Ingredients- My Makeup Recommendations

My recommendations:

- Remind the patient to remove all eye makeup before bed.

- Be aware of potential **chemical** sensitivities or allergies, this can sometimes be tested by an allergist.

- Don't use expired makeup and replace makeup regularly.

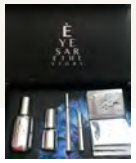
- Never share makeup with friends or family.

- Opt for "eye-friendly" brands that have been vetted by eye care providers or vision scientists to reduce potentially toxic ingredients.

Eye-Friendly Brands:

Optase Life from Scope


We Love Eyes


Eye Are the Story


Twenty/Twenty Beauty


Eye Illuminations from B&L

Ocular Cosmetic Procedures That Can Worsen Dry Eye

Cosmetic procedures done around the eye such as tattoo eyeliner, eyelash extensions, eyelash perming and Botox can exacerbate ocular surface disease.

Source: https://pubmed.ncbi.nlm.nih.gov/37061220/

Ocular Cosmetic Procedures That Can Worsen Dry Eye

Eyelash perming- toxic conjunctivitis or contact dermatitis can occur due to the adhesives and chemical solutions used.

Eyelash tinting/dying- these dyes and other chemicals used can cause blepharoconjuctivitis, eyelid edema and dermatitis.

Eyelash extensions- these can be in a strip form or individual fill. These can be associated with allergic reactions, eyelash loss, blepharitis (including Demodex) and conjunctivitis and keratitis.

Tattoo eyeliner/permanent makeup- this has been associated with tear film instability and meibomian gland loss.

Source: https://pubmed.ncbi.nlm.nih.gov/37061220/

Ocular Cosmetic Procedures That Can Worsen Dry Eye

Botox- originally used in ophthalmology to treat blepharospasm.

Depending on the site of injection, Botox has the potential to cause DED due to reduced aqueous tear production from the spread of the toxin to the lacrimal gland.

Botox can also cause an incomplete blink which can cause tear instability and worsen MGD.

Areas of concern for injection sites are the lateral canthus and orbicularis oculi muscle.

Sources: https://pubmed.ncbi.nlm.nih.gov/37061220/
Open Access: https://link.springer.com/article/10.1007/s40136-020-00308-4

07

Contact Lens Wear

Contact Lens Wear and Dry Eye Disease – TFOS Report

Of course, lifestyle choices impact the success, longevity and safety of CL wearers.

It is critical we continue to educate patients on avoiding risky behaviors such as "sleeping in lenses, failing to comply with instructions from their eye care provider, poor wear and care of reusable lenses, exposure to tap water, sharing contact lenses, purchasing from unregulated vendors, as well as using tobacco, alcohol or recreational drugs in order to avoid adverse consequences".

Daily disposable lenses demonstrated the lowest degree of inflammatory responses thus are the best choice for DED patients.

Source: https://pubmed.ncbi.nlm.nih.gov/37054911/

Contact Lens Wear and Dry Eye Disease – Treatments

One major reason for CL dropout is discomfort. Keeping the ocular surface optimized can help avoid this.

Treatments to consider to avoid CL discomfort are:
-Topical lubricants
-Lid hygiene and other MGD therapies
-Punctal plugs
-Anti-inflammatory medications
-Daily disposable contact lenses
-Scleral lens wear

Source: https://pubmed.ncbi.nlm.nih.gov/37054911/

08

Mental Health

Depression and Dry Eye Disease- a Strong Link

Several studies have associated depression and anxiety, as well as the medications we use to treat these mental health disorders and dry eye symptoms.

A 2017 study looking at the prevalence of depression in patients with all eye diseases, across 28 various studies, found that 25% of patients with all eye disease had depression. Of that 25%, the highest amount (29%) had DED.

Another 2021 study found that 40% of patients with DED had depression.

The association between DED and depression can be found even in people not taking antidepressant medication.

Interestingly, at least three different studies noted that the DED **symptoms**, but **not signs** were associated with depression.

Source: https://pubmed.ncbi.nlm.nih.gov/37054911/

Depression and Dry Eye Disease- How to Treat?

A few studies looked at treating DED patients with **depression**.

One study noted that patients taking **Omega3 FA supplements** improved in their dry eye signs and symptoms but **NOT** depression scores, suggesting improving dry eye symptoms does not directly translate to improved depression.

However, another study found that after follow-up with various DED treatments, both DED and anxiety had significant improvements, suggesting a positive relationship between them. Thus showing that effective DED treatment could have a positive impact on the symptoms of depression and anxiety.

Sources: https://pubmed.ncbi.nlm.nih.gov/37054911/
https://pubmed.ncbi.nlm.nih.gov/30850898/

Depression and Dry Eye Disease- How to Treat

Another study looked the various causes of depression and anxiety in **DED** patients.

The major themes of their depression and anxiety were due to the care they received from the medical community, the effect the disease had on their daily life and the effect it had on their social interactions.

It concluded that patients **with DED,** depression and anxiety needed to be treated with **psychological interventions** to address the causes of the mental health disorders.

Take-away: DED patients with depression and anxiety may need therapy and extra support from a mental health specialist in order to better manage their DED.

Themes	Subthemes
From hospital	Difficulties in diagnosing and seeking medical advice
	Neglect or lack of attention from clinicians
	Low treatment satisfaction
	Complex comorbidities
From daily life	Life satisfaction and well-being
	Changes in lifestyle pattern
	Changes in workstyle pattern
From social	Burden of disease
	Reduction of social interaction

Source: https://pubmed.ncbi.nlm.nih.gov/37054911/
https://www.frontiersin.org/journals/medicine/articles/10.3389/fmed.2022.830986/full

In Summary: Lifestyle Pearls

Sleep Disorders

Ask patient if they have sleep problems and treat appropriately. Look of ILS.

Caffeine, Alcohol and Smoking

Caffeine= The Good
Alcohol= The Bad
Smoking= The Ugly

Digital Device Use

Omega-3 supplements worked well as a tx. Even younger patients can have signs and symptoms.

Physical Inactivity and Obesity

Obesity has been linked to MG abnormalities. It is also linked to floppy eyelid syndrome and sleep apnea.

Nutrition

Mediterranean diet works best. New supplement Blink NutriTears has great potential.

Cosmetics

Ingredients in eye cosmetics and cosmetic procedures can cause harmful effects to the ocular surface.

In Summary: Lifestyle Pearls

Contact Lens Wear

Daily disposable lenses are best.

Mental Health

There is a strong link between DED and mental health disorders. Therapy from a mental health provider may be needed.

THANKS!

Do you have any questions?

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