



# The Foundations of Dry Eye Management

Cope

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# DISCLOSURES

Kimberly Friedman, OD has had a financial relationship or affiliation with the following ineligible companies:

- The PRN Vision Group, Vice President Education & Scientific Affairs
- RVL, Evolve Medical Education, Alcon, Allergan consultant speaking engagements
  - Review of Optometric Business, consultant author

*The content of this cope accredited course was prepared independently  
I have received no financial or commercial support for this presentation  
All relevant financial relationships have been mitigated*

# Dry Eye Disease

One of the most common reasons patients visit an ECP<sup>1</sup>

**344 M**

ESTIMATED WORLDWIDE  
WITH DED<sup>2</sup>

**30 M**

US ADULTS REPORTED DED  
SYMPTOMS<sup>3,4</sup>

**16 M**

DIAGNOSED  
WITH DED<sup>5</sup>

**1.5 M**

TREATED WITH  
A PRESCRIPTION<sup>6</sup>

Dry Eye Disease is  
**under diagnosed**  
and  
**under treated.**



1. Nichols KK et al. *Inv Ophthalmol & Vis Sci.* 2016;57:2975-2982.

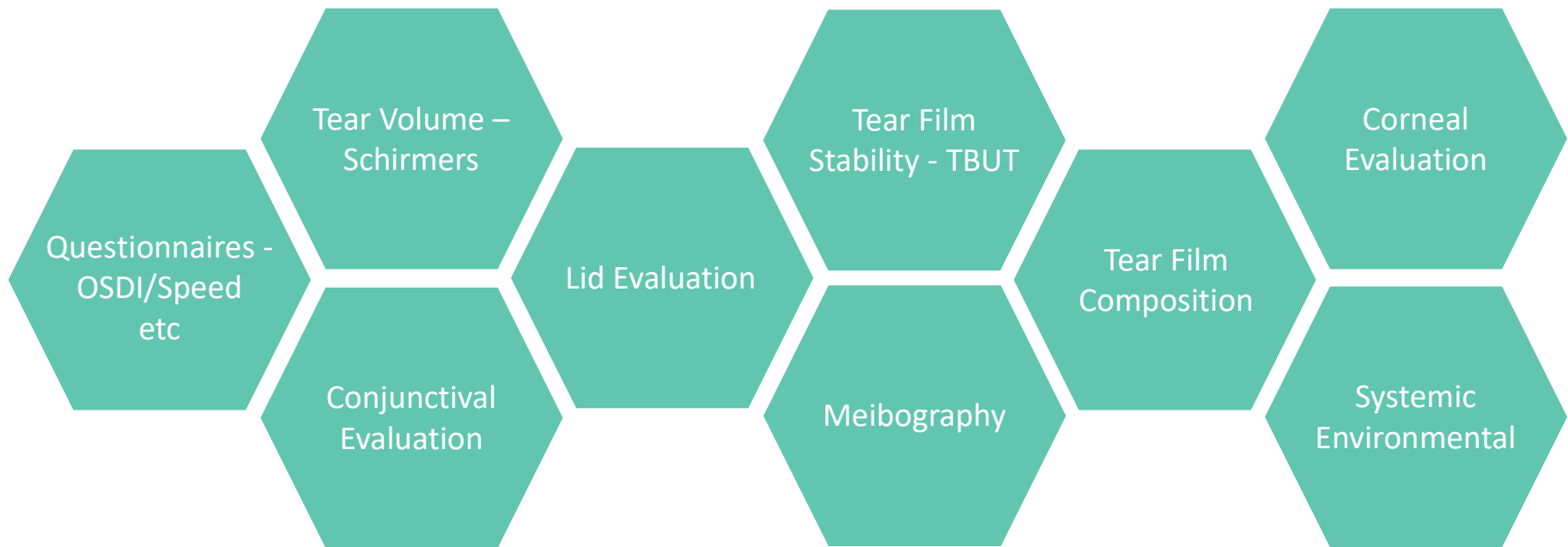
2. 2016 Dry Eye Products Market Scope Report: A Global Market Analysis for 2015-2021. Market Scope. 2016:1-213.

3. Paulsen AJ et al. *Am J Ophthalmol.* 2014;157(4):799-806.

4. US Census Bureau. Annual estimates of the resident population for selected age groups by sex for the United States, States, Counties, and Puerto Rico Commonwealth and Municípios: April 1, 2010 to July 1, 2014. Available at: <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>. Accessed May 4, 2018.

5. Data on file. 6. Steinberg D et al. *Equity Research Americas.* May 18, 2017:1-38.

# Dry Eye Diagnosis

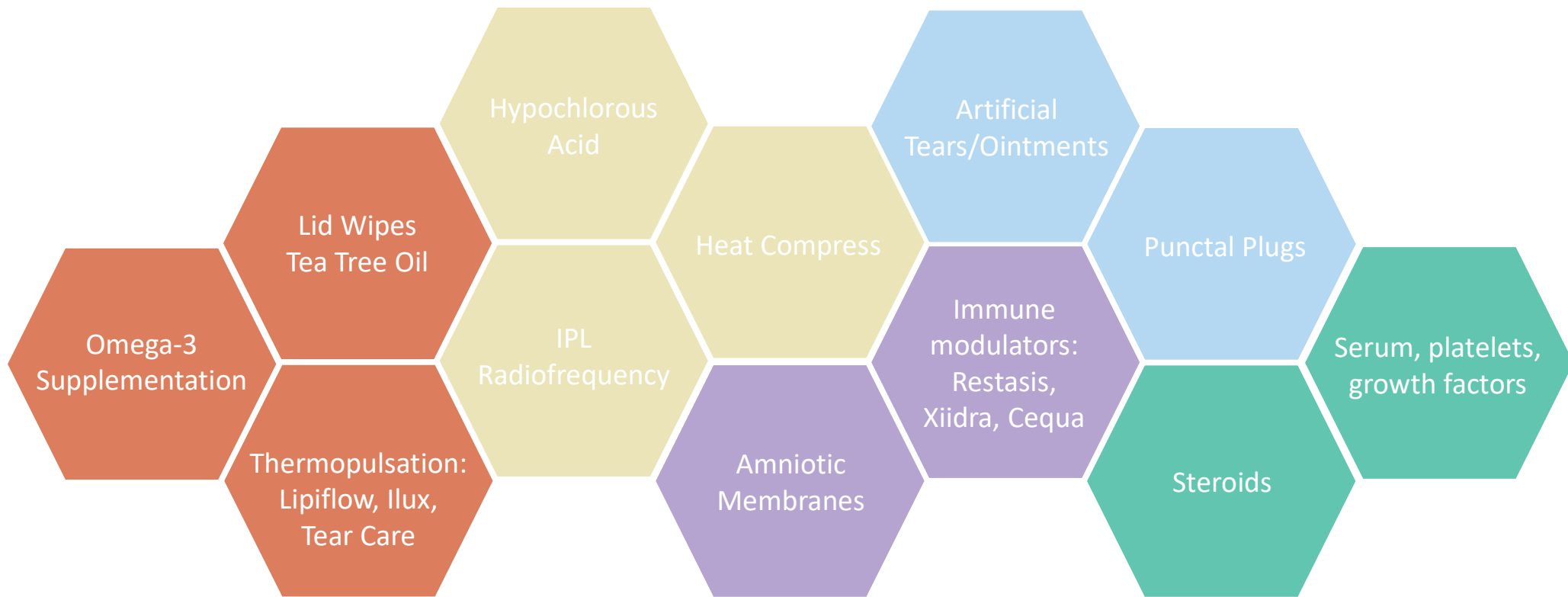




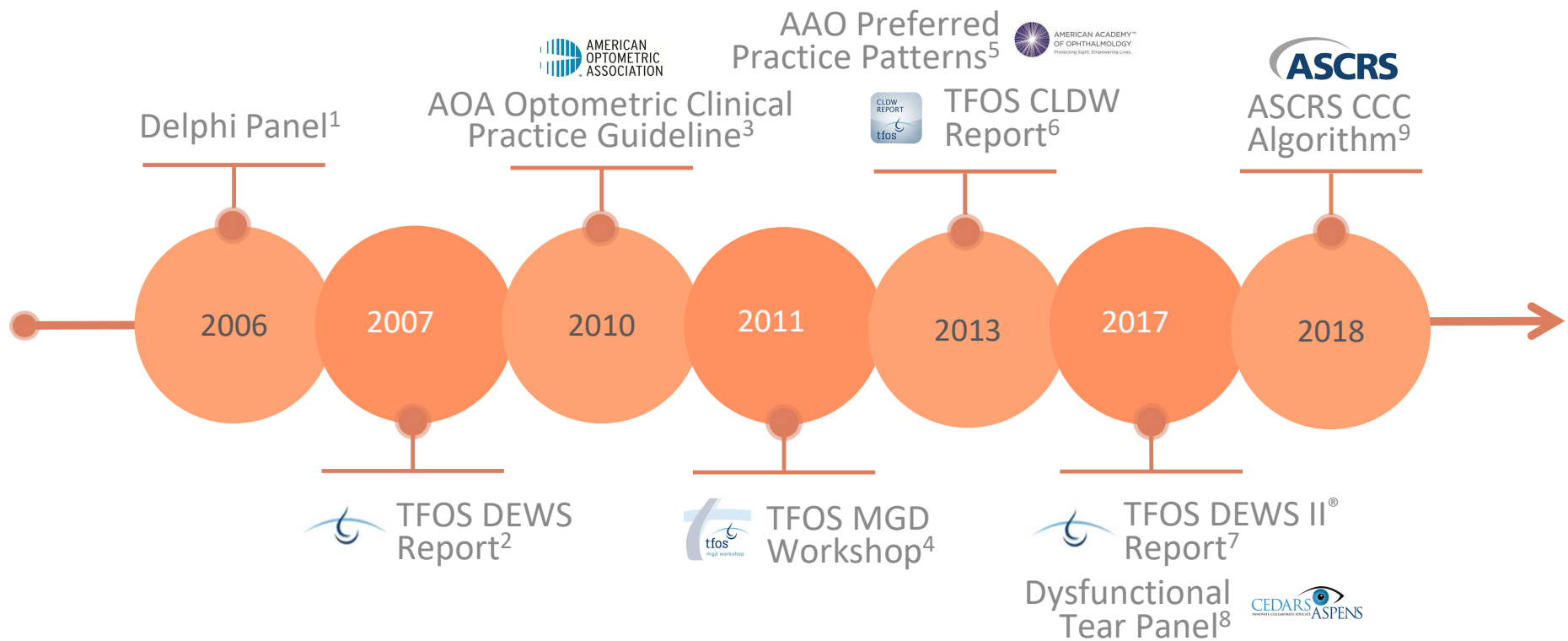
## Empower Technicians to Perform Testing before you come in the room

- Technician can initiate testing based on history before doctor sees patients. Improves ability to diagnose and classify OSD

# Dry Eye Treatment Options – where do we even begin?



# Start with evidence based medicine and treatment algorithms supported by respected medical research



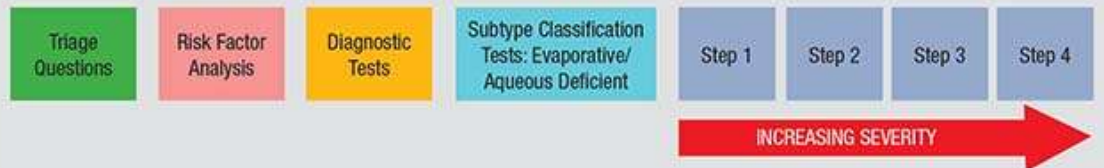
1. Behrens A et al. Cornea. 2006;25(8):900-7. 2. Research Subcommittee of the International Dry Eye WorkShop. Ocul Surf. 2007;5(2):179-93. 3. Optometric Clinical Practice Guideline. 2010. 4. Nichols KK. Invest Ophthalmol Vis Sci. 2011 Mar; 52(4): 1922–1929. 5. American Academy of Ophthalmology Cornea/External Disease Panel. San Francisco, CA: American Academy of Ophthalmology; 2013. 6. Nichols JJ et al. Invest Ophthalmol Vis Sci. 2013;18;54(11):1-6. 7. Nelson JD et al. Ocul Surf. 2017;15(3):269-275. 8. Milner MS et al. Curr Opin Ophthalmol. 2017;27 Suppl 1:3-47. 9. Kim T. ASCRS Annual Meeting; April 13-17, 2018; Washington, DC.



# TFOS DEWS II

## Dry-eye Disease Management Process (TFOS DEWS II)

### Diagnosis:



## TFOS DEWS II Dry-eye Treatment Algorithm

### Step 1:

- Education regarding the condition, its management, treatment and prognosis
- Modification of local environment
- Education regarding potential dietary modifications (including oral essential fatty acid supplementation)
- Identification and potential modification/elimination of offending systemic and topical medications
- Ocular lubricants of various types (if MGD is present, then consider lipid-containing supplements)
- Lid hygiene and warm compresses of various types

### Step 2: If the above options are inadequate, consider:

- Nonpreserved ocular lubricants to minimize preservative-induced toxicity
- Tea tree oil treatment for Demodex (if present)
- Tear conservation
  - Punctal occlusion
  - Moisture chamber spectacles/goggles
- Overnight treatments (such as ointment or moisture chamber devices)
- In-office, physical heating and expression of the meibomian glands (including device-assisted therapies, such as LipiFlow)
- In-office intense pulsed light therapy for MGD
- Prescription drugs to manage DED [Note: The use of prescription drugs needs to be considered in the context of the individual patient presentation, and the relative level of evidence supporting their use for that specific indication, as this group of agents differs widely in mechanism of action.]
  - Topical antibiotic or antibiotic/steroid combination applied to the lid margins for anterior blepharitis (if present)
  - Topical corticosteroid (limited duration)
  - Topical secretagogues
  - Topical nonglucocorticoid immunomodulatory drugs such as cyclosporine
  - Topical LFA-1 antagonist drugs (such as lifitegrast)
  - Oral macrolide or tetracycline antibiotics

### Step 3: If the above options are inadequate, consider:

- Oral secretagogues
- Autologous/allogeneic serum eye drops
- Therapeutic contact lens options
  - Soft bandage lenses
  - Rigid scleral lenses

### Step 4: If the above options are inadequate, consider:

- Topical corticosteroid for a longer duration
- Amniotic membrane grafts
- Surgical punctal occlusion
- Other surgical approaches (e.g., tarsorrhaphy, salivary gland transplantation)

# TFOS DEWS II

## STAGE 1

## TREATMENT

### *Step 1:*

- Education regarding the condition, its management, treatment and prognosis
- Modification of local environment
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- Identification and potential modification/elimination of offending systemic and topical medications
- Ocular lubricants of various types (if MGD is present, then consider lipid-containing supplements)
- Lid hygiene and warm compresses of various types

**Educate, Examine Environmental Factors & Systemic Medications, Ocular Lubricants, Nutrition and supplements, Lid Hygiene, & Warm Compresses**

# Identify Environmental Factors that may exacerbate DED



Visual Tasking  
*(e.g., PC use)*



Make up and lash  
serums



Alcohol  
*(e.g., beer)*



Arid Conditions  
*(e.g., Midwest)*



Windy  
Environments  
*(e.g., AC, forced heat)*



Pollutants  
*(e.g., exhaust, smog)*

# Identify Systemic and Medication Factors that may exacerbate DED

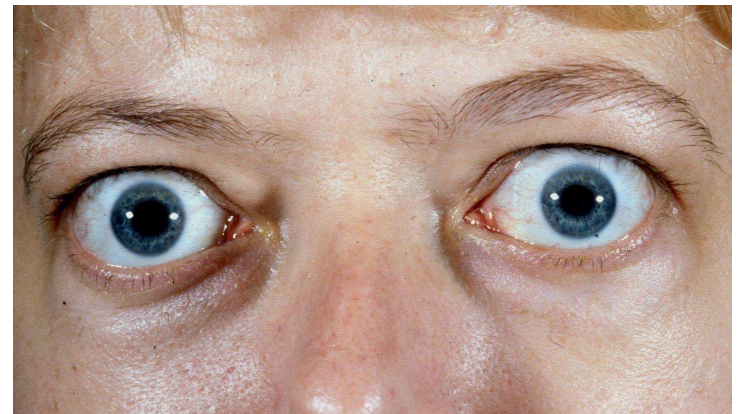
## Other underlying high-risk diseases or medications?

### Thorough medication history

- Antihistamines, decongestants, antidepressants
- Eyedrops – **GLAUCOMA!**

### Systemic history

- Sjogren's
- Rheumatoid
- Rosacea
- Thyroid dysfunction
- Lupus
- Hormonal changes



# Ocular Lubricants

Provide supplemental lubrication for ocular surface. Common options include:

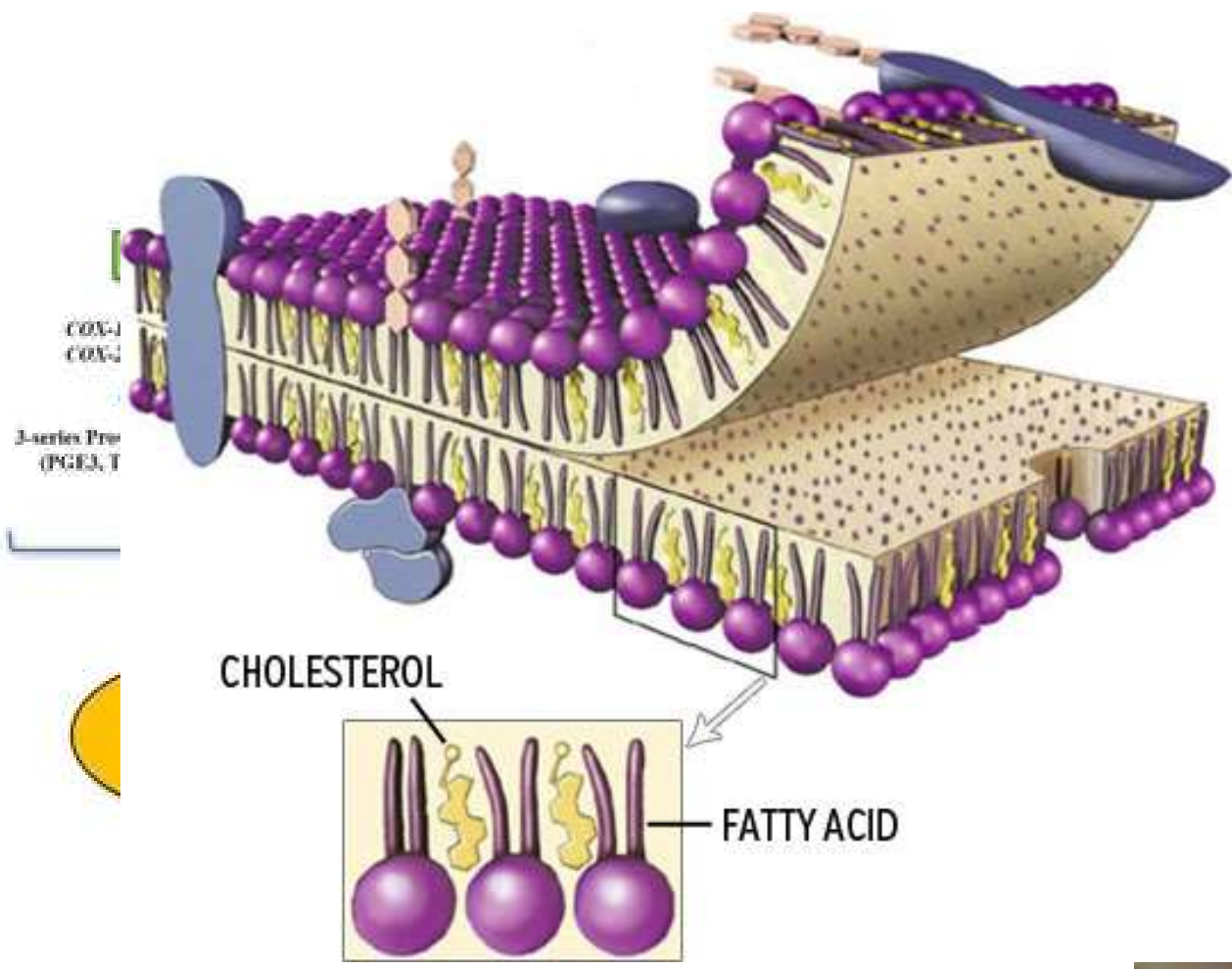
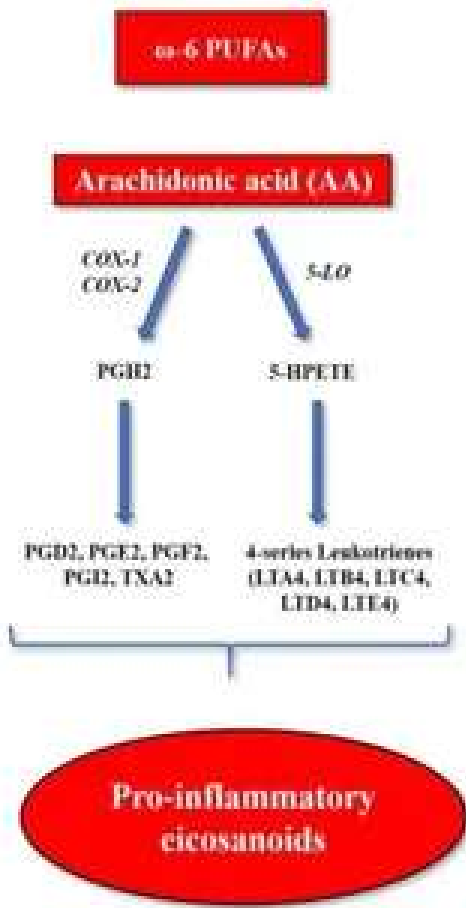
- Carboxymethylcellulose ( refresh brands)
- Glycerin ( Oasis, Refresh Relieve and optive, Biotrue)
- Propylene Glycol ( Systane, Blink)
- Mineral Oil ( Retaine, Soothe)
- Polyvinyl Alcohol ( Freshkote)
- Povidone ( Ivizia)
- Hyaluronic Acid – listed as “other or inactive” because not on the approved FDA monograph for artificial tears



## Nutrition and Dry Eye- WHAT ARE OMEGA FATTY ACIDS?

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# What role does Omega 3 fatty acids play in dry eye ?

- Decrease inflammation; increase quality of tear film<sup>1</sup>
- Reduction of dry eye symptoms<sup>1</sup>
- Faster epithelial healing & visual recovery<sup>2</sup>
- Regeneration of corneal nerves<sup>3</sup>



1. Epitropoulos, Alice T, Donnenfeld, Eric D., et al., Effect of Oral Re-esterified Omega-3 Nutritional Supplementation on Dry Eyes. Cornea 2016 Sep; 35(9): 1185-1196

2. Ong NH, Epithelial healing and visual outcomes of patients using omega-3 oral nutritional supplements before and after photorefractive keratectomy: a pilot study Cornea.2013 Jun;32

3. He J,Bazan HE.Omega-3 fatty acids in dry eye and corneal nerve regeneration after refractive surgery. Prostaglandins Leukot Essent Fatty Acids.2010;82(4-6):319-325.





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## The relationship between dietary n-3 and n-6 fatty acids and clinically diagnosed dry eye syndrome in women<sup>1,2,3</sup>

Biljana Miljanović, Komal A. Trivedi, M. Reza Dana, Jeffery P. Gilbard, Julie E. Buring, and Debra A. Schaumberg

### Abstract

**Background:** Dry eye syndrome (DES) is a prevalent ocular condition, but information on risk or protective factors is lacking.

**Objective:** We aimed to determine the association between dietary intake of n-3 and n-6 fatty acids and their ratio and the presence of DES.

**Design:** Of the 39,876 female health professionals in the Women's Health Study (WHS), we studied cross-sectionally 32,470 women aged 45 to 84 years who provided information on diet and DES. We assessed intake of fatty acids by a validated food frequency questionnaire, and DES using self-reports of clinically diagnosed cases. Of the sample, 1546 (4.7%) subjects reported a clinical diagnosis of DES. We used logistic regression models to estimate the odds ratios (OR) and 95% confidence intervals (CI) to describe the relationships of fatty acid intake with DES. We analyzed the association between consumption of fish and DES in a similar way. **Results:** After adjusting for demographic factors, hormone therapy, and total fat intake, the OR (CI) for the highest versus lowest fifth of n-3 fatty acids was 0.83 (0.70-0.98),  $P[\text{trend}]=0.05$ . A higher ratio of n-6/n-3 fatty acid consumption was associated with significantly increased risk of DES, OR (CI)=2.51 (1.13-5.58) for  $>15/1$  versus  $<4/1$  ( $P[\text{trend}]=0.01$ ). In addition, tuna consumption was inversely associated with DES (OR=0.81, CI=0.66-0.99 for 2-4 113 g (4 oz) servings/week, and OR=0.32, CI=0.13-0.79 for 5-6 servings/week versus  $\leq 1$  servings/week;  $P[\text{trend}]=0.005$ ).

**Conclusion:** These results suggest that a higher dietary intake of n-3 fatty acids is associated with a decreased presence of DES in women. These findings are consistent with anecdotal clinical observations and postulated biological mechanisms.

# Meibum Expression and Analysis

S. Gregory Smith MD, Attending Surgeon Wills Eye Institute  
Presented at 2011 Cornea Society/EBAA Fall Educational Symposium

**Meibum expressed and analyzed before and after supplementation with Omega-3 fatty acids (1680mg EPA/560mg DHA).**

**Results after 8 weeks supplementation:**

- **82% of patients treated showed the EPA and DHA in the meibum**
- **70% of patients became completely asymptomatic! 100% felt better!**
  - **Significant improvement in TBUT, staining, and osmolarity!**

# Peer Reviewed Research



CLINICAL SCIENCE

OPEN

## Effect of Oral Re-esterified Omega-3 Nutritional Supplementation on Dry Eyes

Alice T. Epitropoulos, MD,\* Eric D. Donnenfeld, MD,† Zubin A. Shah, MPH,‡ Edward J. Holland, MD,§  
Michael Gross, MD,‡ William J. Faulkner, MD,§ Cynthia Matossian, MD,¶ Stephen S. Lane, MD,||  
Melissa Toyos, MD,\*\* Frank A. Bucci, Jr, MD,†† and Henry D. Perry, MD†

**Purpose:** To assess the effect of oral re-esterified omega-3 fatty acids on tear osmolarity, matrix metalloproteinase-9 (MMP-9), tear break-up time (TBUT), Ocular Surface Disease Index (OSDI), fluorescein corneal staining, Schirmer score, meibomian gland dysfunction (MGD) stage and omega-3 index in subjects with dry eyes and confirmed MGD.

**Methods:** This was a multicenter, prospective, interventional, placebo-controlled, double-masked study. Subjects were randomized to receive 4 softgels containing a total of 1680 mg of eicosapentaenoic acid/560 mg of docosahexaenoic acid or a control of 3136 mg of linoleic acid, daily for 12 weeks. Subjects were measured at baseline, week 6, and week 12 for tear osmolarity, TBUT, OSDI, fluorescein corneal staining, and Schirmer test with anesthesia. MMP-9 testing and omega-3 index were done at baseline and at 12 weeks.

**Results:** One hundred five subjects completed the study. They were randomized to omega-3 (n = 54) and control group (n = 51). Statistically significant reduction in tear osmolarity was observed in

group experienced a significant reduction in MMP-9 positivity versus control group (67.9% vs. 35.0%,  $P = 0.024$ ) and OSDI scores decreased significantly in omega-3 ( $-17.0 \pm 2.6$ ) versus control group ( $-5.0 \pm 2.7$ ,  $P = 0.002$ ).

**Conclusions:** Oral consumption of re-esterified omega-3 fatty acids is associated with statistically significant improvement in tear osmolarity, omega-3 index levels, TBUT, MMP-9, and OSDI symptom scores.

**Key Words:** dry eyes, omega-3 fatty acid, tear osmolarity, re-esterified omega-3, meibomian gland dysfunction

(*Cornea* 2016;0:1–7)

**D**ry eye disease (DED) is a common, yet complex, multifactorial progressive condition that can lead to visual loss, damage to the ocular surface, discomfort, and overall reduction in quality of life.<sup>1,2</sup> Meibomian gland dysfunction (MGD) results in inadequate and dysfunctional lipid production, which leads to evaporative DED.<sup>3</sup> MGD has also recently been shown to be a sign of hyperchole-

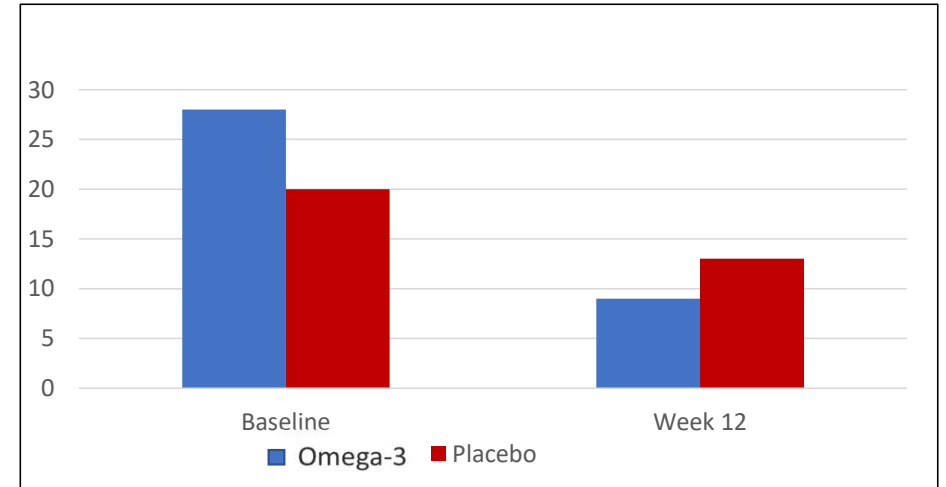
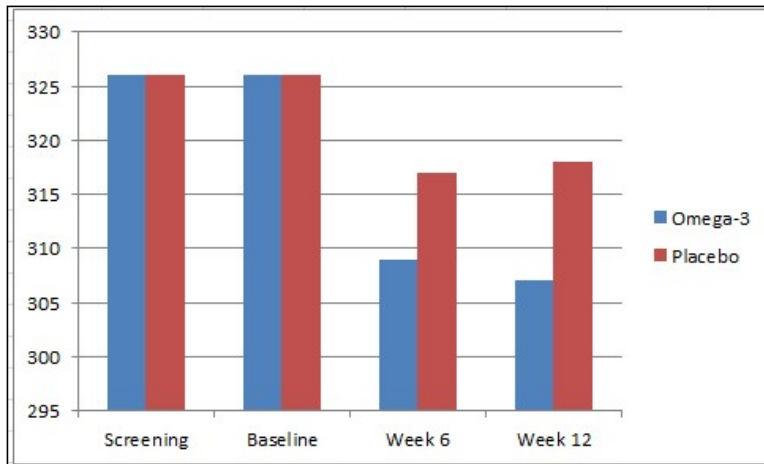
## Study Design

- Multicenter
- Prospective
- Interventional
- Randomized
- Double-Masked
- Placebo Controlled

## Subjects

- 105 completed study
- 54 in treatment group (received 2 grams re-esterified Omega-3)
- 51 in placebo group
- Average Age: 56.8 Years
- Gender: 71.4% female

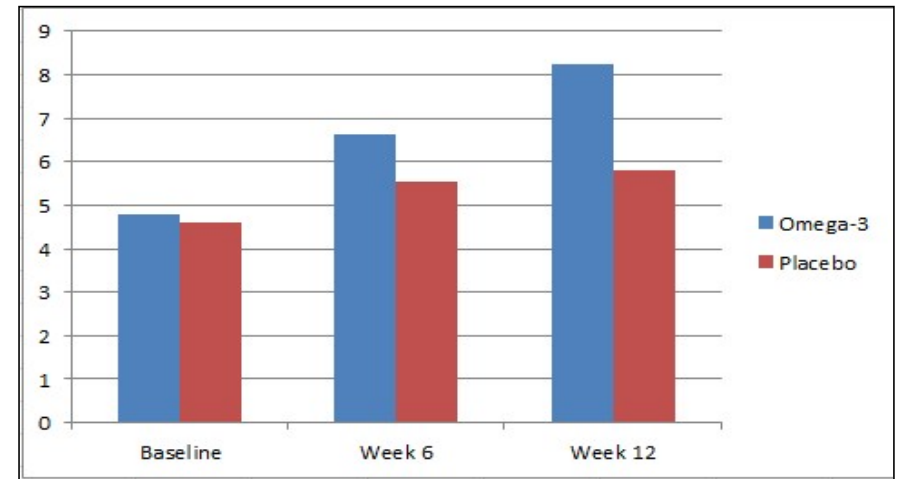
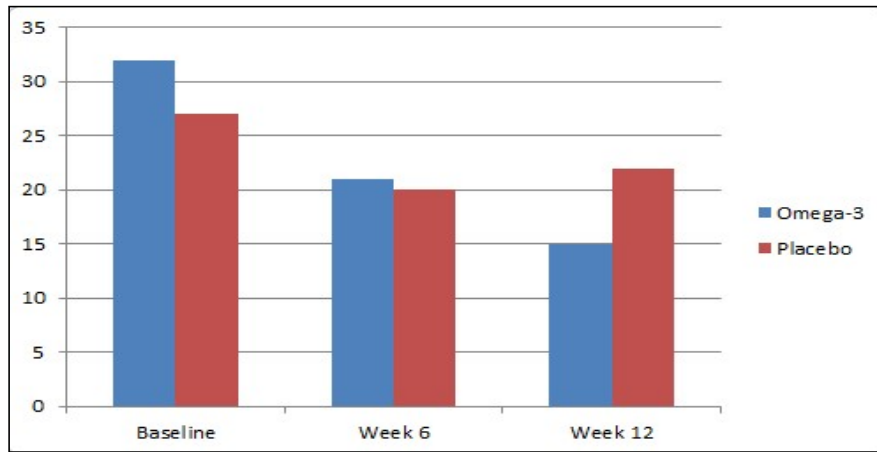
## Tear Osmolarity & MMP-9 Change from Baseline



Tear Osmolarity (N=105)	Screening	Baseline (Week 0)	Week 6	Week 12	Change from Baseline
Omega-3	326	326	309	307	-19
Placebo	326	326	317	318	-8
p-value*			0.042	0.004	0.004

MMP-9 biomarker (N=105)	Baseline	Week 12
Omega-3	28	9
Placebo	20	13
p-value*		0.024

## OSDI & TBUT Change from Baseline by Visit



OSDI (N=105)	Baseline	Week 6	Week 12	Change from Baseline
Omega-3	32	21	15	-17
Placebo	27	20	22	-5
p-value*		0.285	0.002	0.002

TBUT(n=105)	Baseline	Week 6	Week 12	Change from Baseline
Omega-3	4.78	6.64	8.25	3.47
Placebo	4.61	5.55	5.81	1.20
p-value*		0.126	0.002	0.002

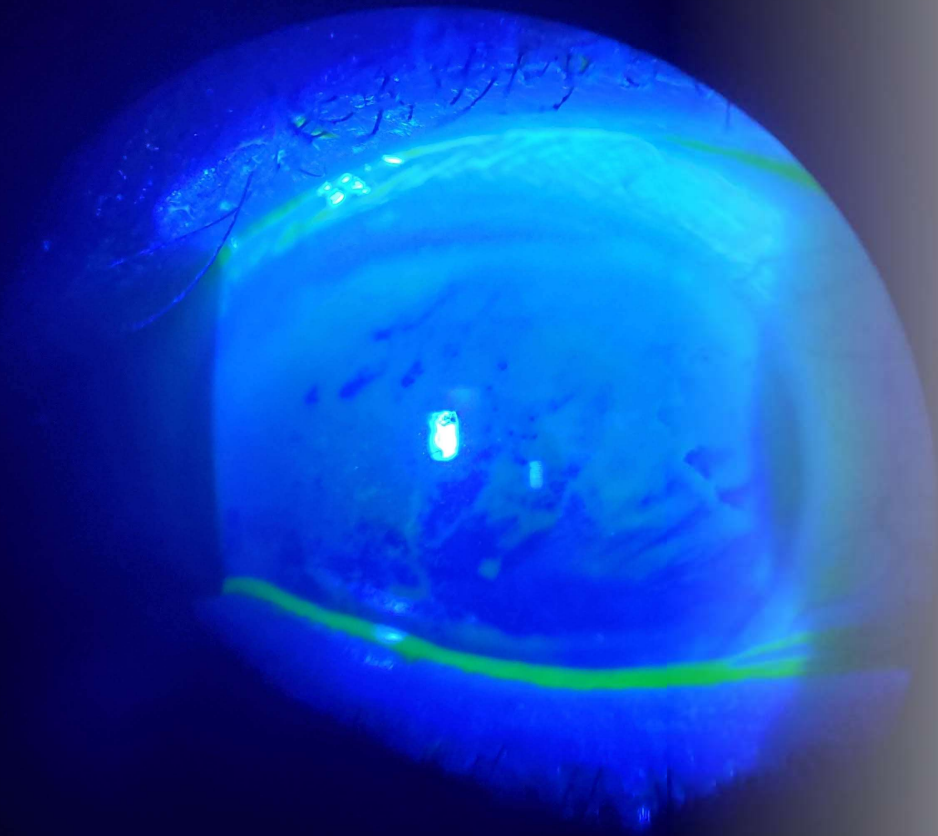
# Published research on Omega 3's in Cataract Surgery Patients

- Prospective comparative cohort study, sept 2020
- 66 participants, Mean age 65.47, 64% female
- New onset dry eye after uncomplicated cataract surgery



Statistically Significant  
improvement in the Omega 3  
Supplemented Group in:

- Oxford Staining Score
- MMP-9 positivity
- DEQ
- OSDI



But what about conflicting data—some studies reveal Omega 3's don't help dry eye signs or symptoms?



OPEN

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Research

JAMA Ophthalmology | Original Investigation

## Efficacy of Marine $\omega$ -3 Fatty Acid Supplementation vs Placebo in Reducing Incidence of Dry Eye Disease in Healthy US Adults: A Randomized Clinical Trial

William G. Christen, ScD; Nancy R. Cook, ScD; JoAnn E. Manson, MD, DrPH; Julie E. Buring, ScD; I-Min Lee, MBBS, ScD; Vadim Bubes, PhD; Georgina Friedenberg, MPH; Rimma Dushkes, PhD; Douglas Smith, BS; Debra A. Schaumberg, ScD, OD, MPH; for the VITAL Research Group

- [Visual Abstract](#)
- [Invited Commentary](#)
- [Supplemental content](#)

**IMPORTANCE** Results of several small randomized clinical trials have suggested that supplements of marine  $\omega$ -3 fatty acids may be beneficial in treating signs and symptoms of dry eye disease (DED). However, randomized clinical trial data to examine whether  $\omega$ -3 fatty acid supplements can prevent DED are lacking.

**OBJECTIVE** To evaluate whether long-term daily supplementation with marine  $\omega$ -3 fatty acids prevents the development of DED.

**DESIGN, SETTING, AND PARTICIPANTS** This was a prespecified ancillary study of the Vitamin D and Omega-3 Trial (VITAL), a nationwide randomized double-blind placebo-controlled  $2 \times 2$  factorial trial of vitamin D and marine  $\omega$ -3 fatty acids in the primary prevention of cancer and cardiovascular disease. Participants in this ancillary study were 23 523 US adults (men 50 years and older and women 55 years and older) who at study entry were free of a previous diagnosis of DED and were not experiencing severe dry eye symptoms. Participants were enrolled from November 2011 to March 2014, and treatment and follow-up ended on December 31, 2017. Data were analyzed from January 2020 to August 2021.

**INTERVENTIONS** Marine  $\omega$ -3 fatty acids, 1 g per day.

**MAIN OUTCOMES AND MEASURES** The primary end point was incident clinically diagnosed DED confirmed by review of the medical records. The secondary end point was a composite of all confirmed incident clinically diagnosed DED cases plus all incident reports of severe DED.

2240 mg rTg form for 3 months

Statistical significance:

- ✓ Tear Osmolarity
- ✓ TBUT
- ✓ OSDI
- ✓ Omega Index
- ✓ MMP-9

1000 mg EE form for 5.3 years

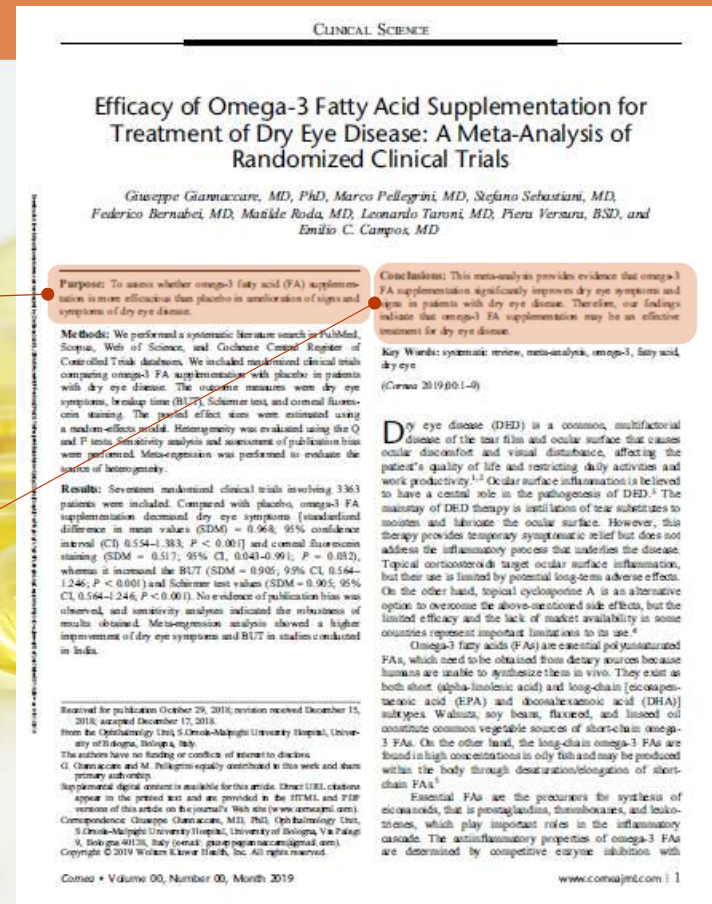
23,523 participants


No significant difference between the supplemented group and the non supplemented group in the incidence of dry eye disease

# Meta Analysis – Cornea 2019

**Purpose:** To assess whether omega-3 fatty acid (FA) supplementation is more efficacious than placebo in amelioration of signs and symptoms of dry eye disease.

**Conclusion:** This meta-analysis provides evidence that omega-3 FA supplementation significantly improves dry eye symptoms and signs in patients with dry eye disease. Therefore, our findings indicate that omega-3 FA supplementation may be an effective treatment for dry eye disease.

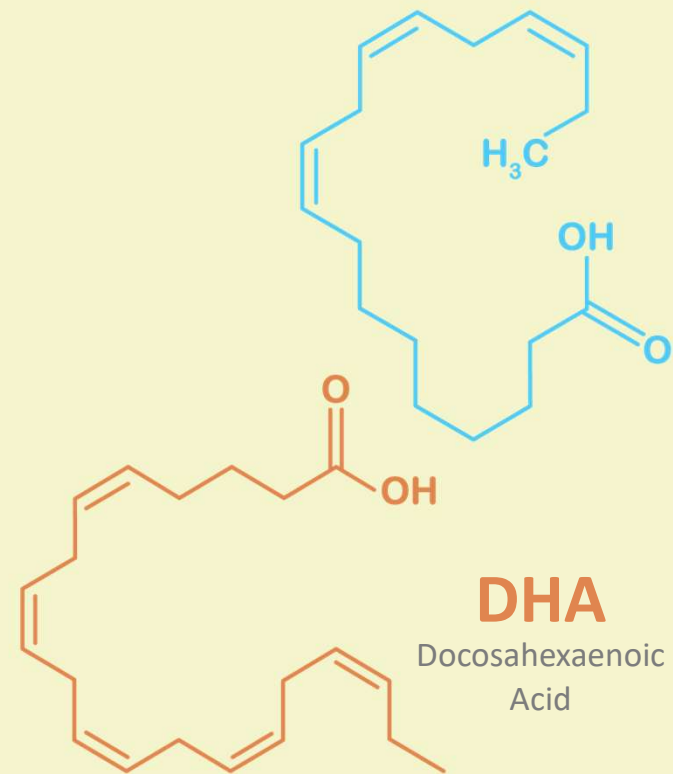


The background is a teal color with a repeating pattern of stylized eyes. The eyes are drawn with simple lines and have varying expressions, some looking forward, some looking down, and some with closed eyelids. The pattern is dense and covers the entire background.

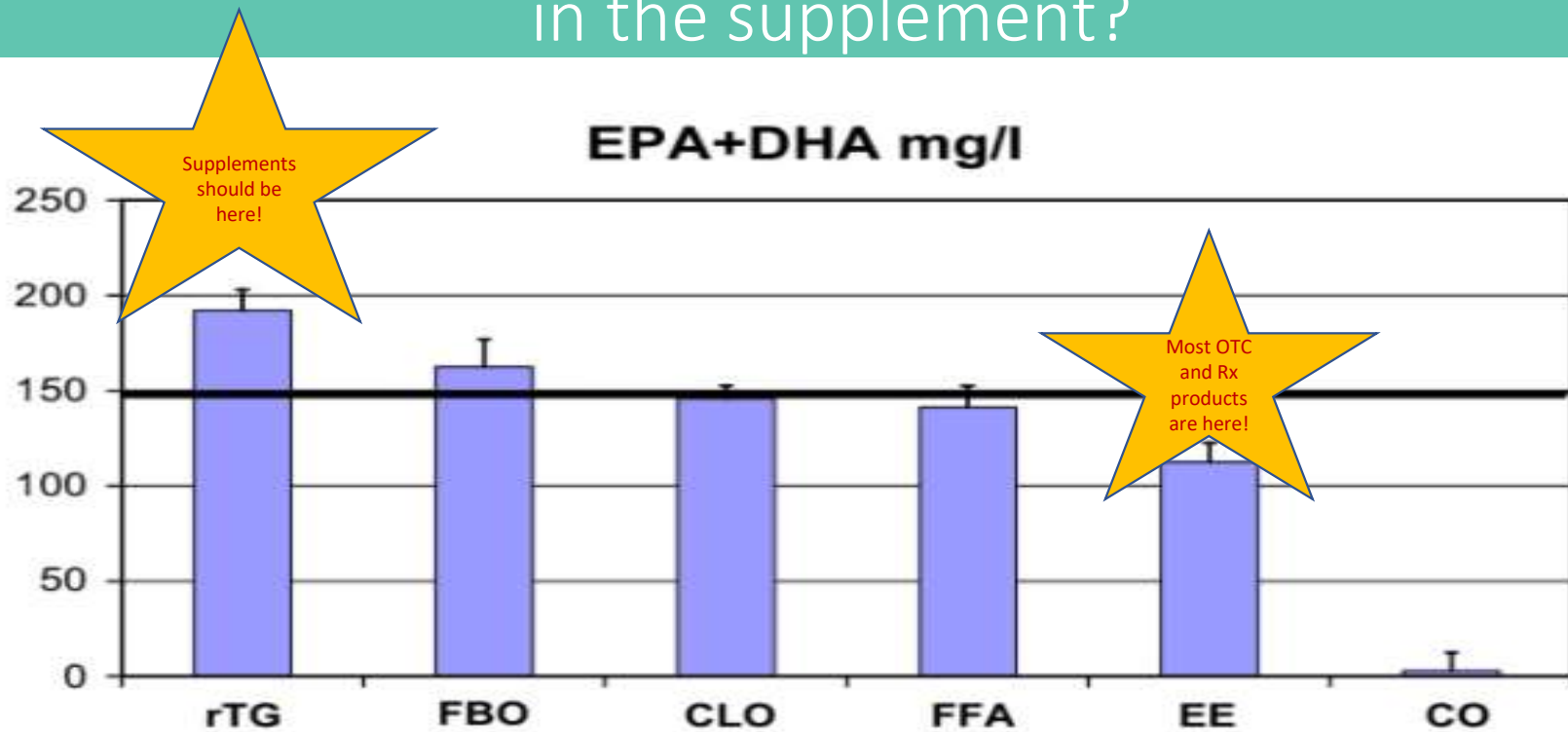
# What to look for in quality supplements

## OMEGA 3'S WE SHOULD SEE IN SUPPLEMENTS: EPA & DHA

- Eicosapentaenoic acid
- Docosahexaenoic acid
- These are the forms of Omega 3s that should be in supplements
- Sometimes you will see DPA too, which is an intermediary step in the conversion btw EPA and DHA
- Always together in nature, sometimes separated by pharma
- Marine Sources - fish, including salmon, tuna, mackerel, sardines, anchovies, shellfish, herring, and algae
- 15-18% lower risk of total mortality comparing the top omega-3 blood level quintiles to the bottom quintiles.\*



# Bioavailability Concerns: What is the FORM of the oil in the supplement?



rTG=re-esterified triglycerides FBO=fish body oil CLO= cod liver oil

FFA= Free fatty acids EE=ethyl esters CO= Corn oil

Dyerberg, J., et al (1995) Bioavailability of n-3 Fatty Acid Formulation. Vol, 20 (Prevention and Treatment in Vascular Disease. Pg 217-225)



## HOW MANY CAPSULES TO RECEIVE THE CLINICALLY VALIDATED DOSE?



2240 mg product in rTG form,  
assuming 90% absorption, would  
require 3 capsules, daily



300 mg in EE form for 1 capsule dose- assuming  
approx. 30-40% absorbs for an EE form - would need  
20 capsules a day to reach 2000 mgs



## **REAL WORLD TAKE HOMES**

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**Talk to your patient about diet, recommend supplements when appropriate based in evidence-based medicine, read the labels.**


# The take home message : Omega 3 Supplements

- Omega-3 in TG dietary form intake is the foundation of dry eye management, but Omega-3s are hard to obtain through diet alone and should be prescribed BEFORE immune modulator drops and procedures!
- Foundational Dry Eye therapy can be provided for our patients at ANY optometric office – no specialized equipment or change in office protocols is required!
- Clinically proven supplements in peer reviewed research include:
  - at least 2000mg of EPA and DHA
  - re-esterified Triglyceride form
  - Ratio of 3:1 EPA : DHA is clinically proven
- 2240 mg a day is 37 cans of tuna a week– tough to get there with diet alone
- Recommending/selling specific brands in your office help avoid the aisle of confusion in big box stores and ensure patient outcomes with clinically proven products
- “Cheaper” and “rx omega 3’s” aren't better if they don't reach therapeutic levels





## **PRACTICE MANAGEMENT ASPECTS**

- Empower your technicians to perform testing before you walk in
  - Messaging in the exam lane
  - The hand-off to staff
  - **STAFF EDUCATION AND WHOLE OFFICE SCRIPTING IS KEY**
  - Use handouts and QR codes to patient educational videos to reinforce what is said in the exam lane
  - Be specific in your recommendation – sell products in your office sell the amount needed to carry thrm through till their next visit- avoid sending patients to the eye aisle of confusion
- 



# Reinforce, reinforce, reinforce

- **Nutritional support of dry eye is a long-term therapy which benefits the entire body, but you will go back into an omega 3 deficiency state if you stop taking them**
  - **Remind the patient – you may not recall how bad your eyes felt in the past because our treatments are working, but if you stop you will go back.**
  - **The body can't make or manufacture omega 3's you must continue to get them through diet and supplementation every day**
  - **Tell the patient what you see... prior to supplementation I couldn't even express the oils from the glands but now I can see clear olive oil like expression which is exactly what I should be seeing.**
-

# TFOS DEWS II

STAGE 1

## TREATMENT

- ✓ Educate
- ✓ Examine Environmental Factors & Systemic Medications
- ✓ Ocular Lubricants
- ✓ Nutrition and supplements

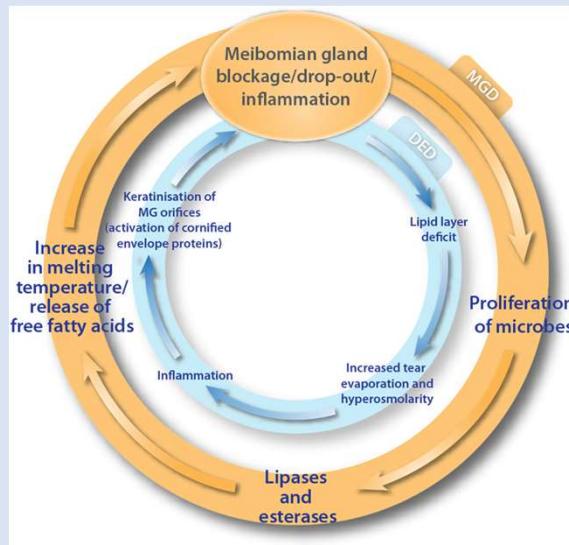
**Next:**

**Lid Hygiene, & Warm Compresses**

MGD is probably caused by a combination of separate conditions:

- Primary obstructive hyperkeratinization of the meibomian gland
- Abnormal meibomian gland secretion
- Eyelid inflammation
- Corneal inflammation and damage
- Microbiological changes
- Dry Eye Disease

Furthermore, skin diseases such as rosacea may play a part in its pathology.



## Emerging strategies for the diagnosis and treatment of meibomian gland dysfunction: Proceedings of the OCEAN group meeting

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### Abstract

**Meibomian gland dysfunction (MGD)** is a common and chronic disorder that has a significant adverse impact on patients' quality of life. It is a leading cause of evaporative dry eye disease (DED), as **meibomian glands** play an important role in providing lipids to the tear film, which helps to retard the evaporation of tears from the **ocular surface**. MGD is also often present in conjunction with primary aqueous-deficient DED. Obstructive MGD, the most commonly observed type of MGD, is the main focus of this article. MGD is probably caused by a combination of separate conditions: primary obstructive **hyperkeratinization** of the meibomian gland, abnormal meibomian gland secretion, **eyelid inflammation**, corneal inflammation and damage, microbiological changes, and DED. Furthermore, skin diseases such as **rosacea** may play a part in its pathology. Accurate diagnosis is challenging, as it is difficult to differentiate between **ocular surface diseases**, but is crucial when choosing treatment options. **Ocular imaging** has advanced in recent years, providing **ophthalmologists** with a better understanding of ocular diseases. This review presents a literature update on the 2011 MGD workshop and an optimized approach to accurate diagnosis of MGD using currently available methods and tests. It also outlines the emerging technologies of **interferometry**, non-contact **meibography**, keratography and *in vivo* **confocal laser microscopy**, which offer exciting possibilities for the future. Selected treatment options for MGD are also discussed.



# MGD Mechanisms

acronym BEISTO

- B -- Bugs & Bacteria
- E – Enzymes
- I – Inflammation
- S – Stasis
- T – Temperature
- O -- Obstruction

Foundational Home Therapy Addresses These 6 issues

# Lid hygiene

- Bacterial overgrowth, demodex infestation and the combination of both can be an cause of blepharitis
- Blepharitis can be an independent finding, or one found in association with MGD and dry eye disease
- Staph, although a part of normal flora, can be an opportunistic pathogen
- Effects of biofilm microbes include inflammation, hyperkeratinization, meibum stagnation, and saponification of tears
- The treatment has to be tailored to the cause and take into consideration patient compliance and ease of use for the individual

- E. Knop, N. Knop, T. Millar, H. Obata, D.A. Sullivan

- The international workshop on meibomian gland dysfunction: report of the subcommittee on anatomy, physiology, and pathophysiology of the meibomian gland Invest Ophthalmol Vis Sci, 52 (2011), pp. 1938-1978

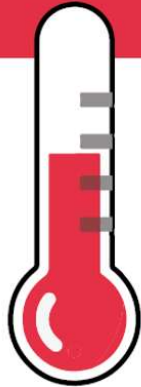
# The take home message : Cleanse

- Foundational care of dry eye and MGD includes managing the biofilm
- Hypochloric acid sprays, lid wipes, cleansing foams, tea tree wipes, etc should all be considered a crucial part of your at home maintenance protocol.
- Have the patient look down and Turn up the mag! And teach patients how to maintain a healthy ocular surface the same way dentists taught us how to clean the biofilm off our teeth



# Warm Compresses

**TEMPERATURE**



**DURATION**



**MOISTURE**





# Not all masks are created equal: 3 criteria for prescribing a heat compress

- **Temperature Matters:** 102-110°F is required
- **Duration Matters:** 5+ min.
- **Moisture Matters:** Humidity Stabilizes Tear Film

2011



**“IW MGD: Report of the Subcommittee on Management and Treatment of Meibomian Gland Dysfunction”**

Gerd Geerling; Joseph Tauber; Christophe Baudouin; Eiki Goto; Yukihiro Matsumoto; Terrence O'Brien; Maurizio Rolando; Kazuo Tsubota; Kelly K. Nichols

2017



**“TFOS DEWS II Management and Therapy Report”**

Lyndon Jones, Laura E Downie, Donald Korb, Jose M Benitez-Del-Castillo, Reza Dana, Sophie X Deng, Pham N Dong, Gerd Geerling, Richard Yudi Hida, Yang Liu, Kyoung Yul Seo, Joseph Tauber, Tais H Wakamatsu, Jianjiang Xu, James S Wolffsohn, Jennifer P Craig

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## Tear Film Lipid Layer Changes Following Combined Effect of Heated Eye Mask with Intense Pulsed Light Therapy for Evaporative Dry Eye: A Randomized Control Study

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### Abstract

**Background:** Dry eye disease (DED) is a complex ocular surface inflammatory disorder with a multifactorial etiology. Therapies such as intense pulsed light (IPL) and heated eye mask (HEM) have been reported to improve the tear film lipid layer (TFLL) and signs and symptoms of DED.

**Methods:** This randomized study aimed to compare the effects of IPL combined with HEM (IPL+HEM) group, IPL group, and control group in participants with evaporative DED. All participants were examined at baseline (D0), day 21 (D21), day 42 (D42), and day 84 (D84) for noninvasive tear breakup time (NITBUT), TFLL, corneal conjunctival staining (CS), meibomian gland quality (MGQ), meibomian gland expressibility (MGEx), and Ocular Surface Disease Index (OSDI).

**Results:** The mean age of participants was IPL+HEM:  $28.06 \pm 3.88$  years, IPL:  $29.88 \pm 4.68$  years, and control:  $28.52 \pm 3.77$  years. At D84, significant improvements in TFLL ( $p < 0.05$ ), noninvasive tear breakup time (NITBUT) ( $p < 0.05$ ), corneal conjunctival staining (CS) ( $p < 0.05$ ), MGQ ( $p < 0.05$ ), MGEx ( $p < 0.05$ ), and OSDI ( $p < 0.05$ ) were found in the IPL+HEM and IPL groups, whereas the control group had no significant improvements. Furthermore,  $\Delta$ TFLL significantly correlated with  $\Delta$ NITBUT ( $r = -0.678, p < 0.001$ ),  $\Delta$ CS ( $r = 0.321, p < 0.001$ ),  $\Delta$ MGQ ( $r = 0.669, p < 0.001$ ),  $\Delta$ MGEx ( $r = 0.598, p < 0.001$ ), and  $\Delta$ OSDI score ( $r = 0.649, p < 0.001$ ).

**Conclusions:** IPL therapy in combination with HEM and IPL therapy only can significantly improve the quality of TFLL and clinically reduce the sign and symptoms of evaporative DED. However, **IPL therapy in combination with HEM was found to be more effective than IPL therapy alone.**

**Keywords:** dry eye, IPL, heated eye mask, combination dry eye therapy

### Introduction

**D**RY EYE DISEASE (DED) is a common ocular disorder and can be grossly categorized as impaired tear production (aqueous-deficient dry eye), excessive tear film evaporation

[evaporative dry eye (EDE)], or a combination of both mechanisms.<sup>1,2</sup> DED is a frequent cause of ocular complaints leading patients to seek ophthalmic care,<sup>3,4</sup> and its severity may range from mild, which leads to occasional discomfort to sight-threatening and severely debilitating disease.<sup>5,6</sup>

Randomized, 150 dry eye subjects, Published August 2023

- Group 1 IPL only - 3 sessions, 3 weeks apart
- Group 2 IPL plus a heat mask - 3 sessions, 3 weeks apart  
20 min daily at home heat mask with non microwavable Asian heat mask – similar to “hot hands” or “instants”
- Group 3 No treatment

- Noninvasive tear breakup time
- Tear film lipid layer
- Corneal conjunctival staining
- Meibomian gland quality
- Meibomian gland expressibility
- Ocular Surface Disease Index

Conclusion:

**IPL therapy in combination with at home heat therapy was found to be more effective than IPL therapy alone**

NITBUT improvement – IPL alone 3.54 sec  
when adding at home heat therapy, 4.79 seconds

TFL score improvement – IPL alone 1.02  
when adding at home heat therapy, 2.02

Staining Score improvement – IPL alone 0.14  
when adding at home heat therapy, .60

MG Quality Score improvement – IPL alone 1.02  
when adding at home heat therapy, 1.32

MG Expression Score improvement – IPL alone .86  
when adding at home heat therapy, 1.06

OSDI Score improvement – IPL alone 8.6  
when adding at home heat therapy, 14.34

Tear Film Lipid Layer Changes Following Combined  
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A Randomized Control Study

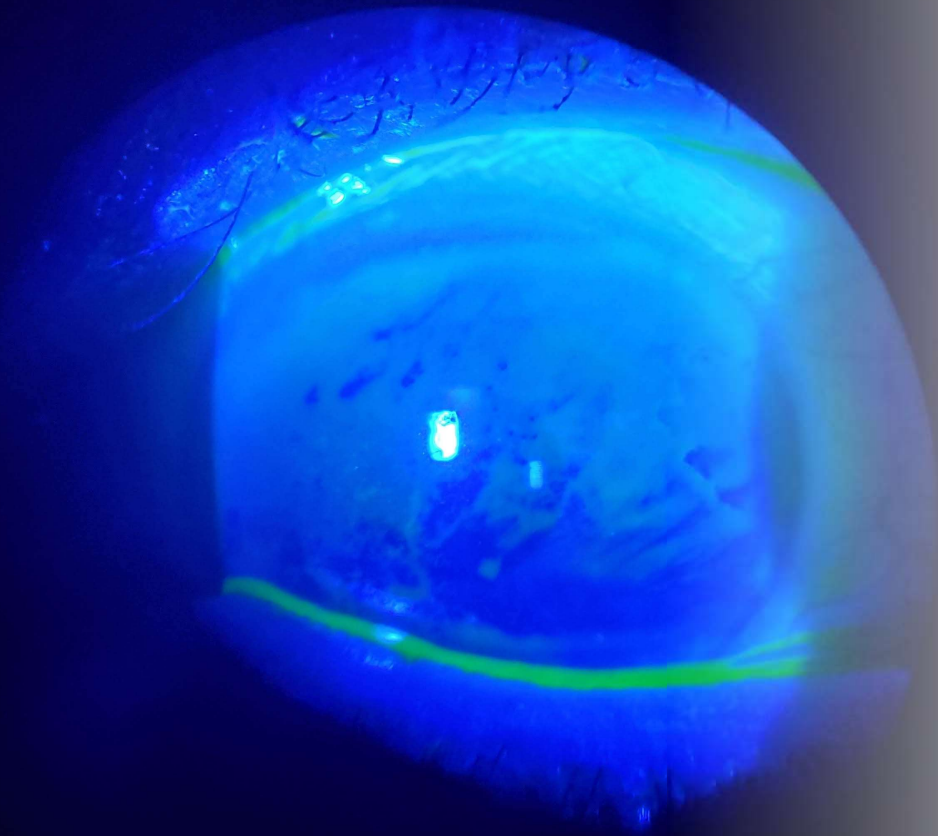
# The take home message : Heat

- Hot compresses are an important part of at home maintenance
- Ideal temperature range of 39 to 42 degrees Celsius ( 102-110 F)
- Duration of Heat 4-6 min for mild MGD, 15 for moderate/severe MGD
- Moist heat better than Dry heat
- Masks that can be washed help maintain hygienic practices and masks that do not require added disposables or maintenance are convenient for patients and improve compliance
- Recommending/selling specific brands in your office help avoid the aisle of confusion in big box stores and ensure patient outcomes with clinically proven products



## Sample hand off to the technician or check out station

“Ann, this is Jane. I want her to get started on our foundational dry eye protocol including the omega 3 fatty acid supplement and warm compresses for at least 5 minutes daily. Please help her get the starter supply of the supplements and the mask at the front desk today and set her up for a follow up appt with me in \_\_\_\_ months. OK jane, I’ll see in in \_\_\_\_ months.”  
and then walk away.



Let's apply this to a  
real-world case





## Just the facts....

40 yr old Caucasian Male, Police Officer

CC: sore dry eyes with blurred vision

Has seen 5 other doctors before me

Has tried artificial tears, restasis, & xiidra

LASIK 15 years ago, symptoms started within a year after

Last doctor ( his lasik surgeon) told him he was complaining too much and to just use artificial tears 4 x a day

Symptoms worse in morning but persist all day

# Beyond the facts....

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- Police Officer
- Just put in for a transfer because he doesn't feel like he can perform the job anymore due to vision
- Very "fit, healthy" appearance
- Literally started to cry when telling me about his history with dry eye





# Examination

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- Acuity : 20/15, fluctuated with blink
- Tear Osmolarity 348 mOsm OD, 375 mOsm OS
- MMP-9 weak positive OU
- Cornea- clear and no staining
- TBUT- 1-2 seconds
- Meibography – not too bad– grade 0 - structure intact
- Meibum expression – maybe 2 glands total expressed
- Structure good/ function terrible



# Initial Treatment

## The Foundations:

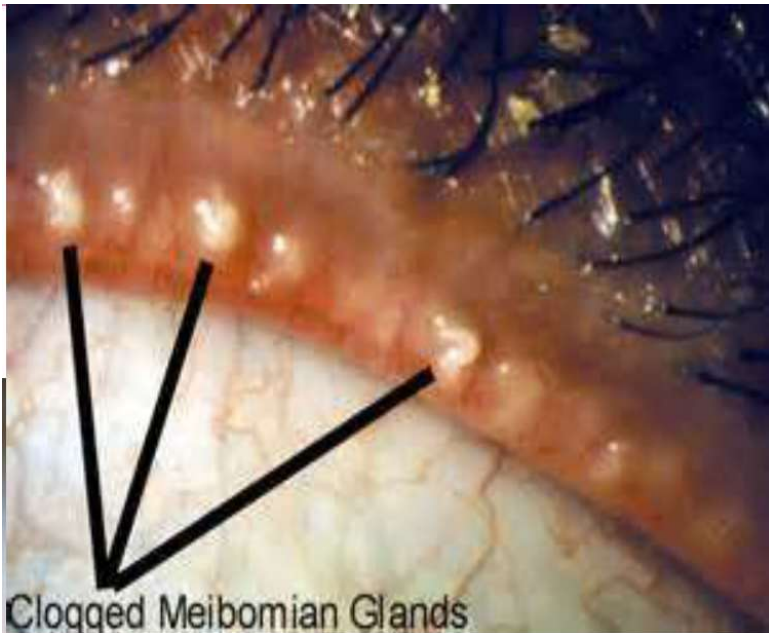
- NOURISH: approx. 2000 mg a day of rTg omega 3 fatty acid supplement
- HEAT: Microwavable heat mask for 10 min /day
- CLEANSE: Lid hygiene hypochlorous acid spray

## The add ons:

- Lotemax BID x 1mo then 1x a day till I see in follow up
- Night goggles for lagophthalmos



# Patient was skeptical- education is crucial



- Explained the healthy meibum composition is Omega 3 fats but if we don't get it from diet the body substitutes omega 6s
- Explained that heat and biofilm control is an important component of healthy tears
- Showed meibum expression video and his meibography
- Discussed osmolarity and MMP 9 findings
- Set up 2 month follow up

# 2 months later

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- Acuity : 20/ 15 stable
- Tear Osmolarity 312 mOsm OD, 310 mOsm OS
- MMP-9 negative OU
- Cornea- clear and no staining
- TBUT- 6 seconds
- “90% of the time I feel fine, but I still have a few bad eye days”
- “ I put my transfer on hold till we see how this works out”
  
- And best part– he brought me Godiva chocolate to say thank you!!!!



Now what...



So...is this all lotemax or is it the omega and goggles--- time for the true test--- d/c lotemax



Nourish (omega 3), Heat (mask), Cleanse (HOCL spray)



Night goggles



Lotemax only on bad eye days up to 2x a day



Recheck 1 mo and give me a report on how you feel and how often you used the lotemax

# 1 month later

---

Asymptomatic 99% of time

---

Used lotemax maybe 2 days in the entire month

---

Meibum now expresses freely

---

TBUT is up to 8 seconds

---

Transfer papers withdrawn

---

And – his old shoulder football injury isn't hurting as much either

---

And we performed an annual ocular health exam and refraction at this visit

---

**A very simple fix and a very happy patient!**



Don't Forget  
Foundational  
Care!

Questions?