



MISCONCEPTIONS SURROUNDING OCULAR NUTRITION FOR DRY EYE



Five common myths and the truths behind them.

BY MILE BRUJIC, OD, FAAO; SEAN MULQUEENY, OD;
ROBERT DAVIS, OD, FAAO; AND LOUISE SCLAFANI, OD, FSLs

Ocular nutrition can provide optometrists with an opportunity to help patients with their ocular conditions using natural methods. Several conditions, including macular degeneration, diabetes, digital eye strain, and ocular surface disease (OSD), leverage our understanding of nutrition and its benefits for the eye. It is therefore critical for us as our patients' eye care providers to understand nutrition's influence on the ocular surface and how we can control this response through direct recommendations to them.

We've personally witnessed positive changes to a patient's ocular surface simply as a result of them following appropriate

nutrition recommendations. These recommended nutraceuticals, dispensed from our office, have demonstrated improvements in ocular health and even systemic diseases. For example, several patients with celiac disease have exhibited substantial reductions in inflammation levels on the surface of their eyes as measured using a test for matrix metalloproteinase-9 levels on the eye when they are avoiding gluten. On the flip side, when these individuals are not following the dietary recommendations and are consuming gluten, they have demonstrated elevated levels of inflammation on the ocular surface.

Although the link between oral consumption of appropriate nutritional recommendations and its potential

effect on the ocular surface might not seem immediately apparent, it's critical to understand the role that appropriate nutrition can play in improving the health of the eyes. Let's examine five common myths about ocular nutrition and then debunk those myths.

THE FIVE MOST COMMON MYTHS ABOUT NUTRITION AND EYE HEALTH No. 1: Nutrition Can't Treat Dry Eye

Several years ago, a large-scale, randomized clinical trial looked into the influence of omega-3 fatty acids on dry eye disease (DED) using two groups of patients who ingested either 3 g of olive oil as a placebo or 3 g of omega-3 fatty acids daily.¹ The study researchers followed the groups over 12 months and

measured ocular surface disease index scores, conjunctival staining, corneal staining, tear film break-up time, and Schirmer test. There were no differences in outcomes between the two groups.

Initial analysis may lead clinicians to dismiss the benefit of omega-3 fatty acids as a DED treatment; however, we need to account for several considerations. For example, although there wasn't a difference between the treatment and placebo groups, there were improvements in both groups compared to the start. This points to the possibility that the placebo may have had more of an antiinflammatory effect than anticipated. Several other studies have demonstrated improvements in signs and symptoms of DED using omega-3s over placebo.²⁻⁴

The relationship between omega-3 ingestion and its ability to improve symptoms and signs of DED is unclear, and some discrepancies occur in the literature. However, there does seem to be evidence that omega-3 ingestion can also help those with ocular rosacea as well as contact lens wearers.^{3,4}

Other nutrients may have additive effects on the benefits of omega-3 fatty acid ingestion. Omega-6, derived from primrose oil and green tea extract, has demonstrated improvement in signs and symptoms of dry eye.⁵⁻⁸ Patients with low vitamin A or D levels can show symptoms of dry eye, and these

levels are important in supporting a healthy ocular surface.^{9,10}

No. 2: Nutrition Has No Effect on Computer-Related Dryness

Physiological changes occur with blink rate when someone is viewing a visual display terminal (VDT). Healthy individuals viewing a VDT demonstrated a blink rate that is reduced by 50% from baseline and a reduced amplitude of the blink.¹¹ Excessive screen time alters blink dynamics, increasing evaporation and creating a new environmental stress, which in turn may trigger significant symptoms and signs of eye dryness.

The initial thought is often to treat these patients by supplementing the ocular surface with additional lubrication. However, more and more patients are asking for ways that we can help them with digital eyestrain—for which additional lubrication may not work. Fortunately, there are helpful nutritional recommendations.

A recent randomized controlled clinical trial enrolled symptomatic VDT users and randomized them to either 2,400 mg of orally ingested omega-3 fatty acids or a placebo formula.² Significant increases in omega-3 index, improved symptoms, reduced tear osmolarity, increased Schirmer test, and increased tear film break-up time and goblet cell density were observed. The improvements were significantly better in patients randomized to the

omega-3 group who entered the study with the lowest levels of omega-3 index, which indicates that the greatest improvements occur in patients with the lowest levels of omega-3s.²

New research has demonstrated that nutrition can positively influence digital eyestrain. Individuals randomized to high quantities of lutein and zeaxanthin ingestion demonstrated improvements in eye fatigue symptoms (a composite score of eight individual factors), improved Schirmer testing, and improved macular pigment optical density over 90 days.¹²

No. 3: All Omega 3s Are the Same

A common misperception regarding ocular nutrition, specifically omega-3 essential fatty acids (EFAs), is that fish oils all have equivalent forms of omega-3 EFAs. Unfortunately, there are significant differences in the amount of omega-3s present in different fish oil formulas.

For example, a 1,000 mg fish oil capsule's nutrition label will show that 1,000 mg is the total fish oil that is present in the capsule, but this doesn't mean that the capsules will contain that amount of omega-3s. In fact, in a low-quality formulation, it's not uncommon to see omega-3 quantities as low as 20% to 30% of the total fish oils (Figure).

It's critical to ensure you're making appropriate recommendations to patients when you want them to use omega-3 EFAs due to the substantial differences among omega-3 formulations.

No. 4: Capsules Can't Help Dry Eyes

As we treat OSD, it's common for us to employ therapies that are placed directly on the eyes, such as eye drops. Intuitively, this makes good clinical sense because we're delivering the therapeutics directly to the affected region. However, we should consider the importance of nutrition and its influence on the ocular surface, including localized benefits of oral nutrition to help improve functionality and reduce inflammation on the ocular surface.

AT A GLANCE

- ▶ Omega-3 and omega-6 fatty acids can improve dry eye disease, as can vitamins A and D.
- ▶ Diabetes, autoimmune conditions, inflammatory disorders, mask wear, and increased digital screen time all increase a child's risk of having dry eye.
- ▶ Several studies have shown localized benefits of oral nutrition to help improve functionality and reduce inflammation on the ocular surface.

Supplement Facts		
Serving Size 2 Softgels Servings Per Container 30		
Amount Per Serving		%DV*
Calories	15	
Total Fat	1.5g	2%
Vitamin A (as Retinyl Palmitate)	300 mcg	33%
Vitamin D (as Cholecalciferol)	50 mcg	250%
Vitamin E (as d-Alpha Tocopherol)	40 mg	267%
Fish Oil	1,480 mg	†
Total Omega-3 Fatty Acids (TG)	1,100 mg	†
EPA (Eicosapentaenoic Acid)	590 mg	†
DHA (Docosahexaenoic Acid)	440 mg	†
Proprietary Blend	220 mg	†
Evening Primrose Oil, Turmeric Root Extract, Green Tea Leaf Extract, Mixed Tocotrienol/Tocopherol Oil		
*Percent Daily Values are based on a 2,000 calorie diet. †Daily Value (DV) not established.		

Supplement Facts	
Serving Size 1 Softgel	
Each Softgel Contains	% Daily Value
Calories 10	
Total Fat 1 g	1%*
Cholesterol 10 mg	3%*
Fish Oil 1000 mg	**
Omega-3 Fatty Acids (EPA+DHA) 250 mg	**
Other Omega-3 Fatty Acids 50 mg	**
*Percent Daily Values are based on a 2,000 calorie diet. **Daily Value not established.	

Figure. An example nutrition label of a quality fish oil (left). The total fish oil is 1,480 mg and the total omega 3s are 1,100 mg. The omega 3s are 74% of the total fish oils. An example nutrition label of a poor quality fish oil (right). The total fish oil is 1,000 mg and the total omega 3s are 300 mg. The omega 3s are 30% of the total fish oils.

As demonstrated in a previous section, omega-3 EFAs, omega-6 EFAs, green tea extract, vitamin A, and vitamin D are all critical nutrients that help support a healthy ocular surface. Thus, capsules containing appropriate nutrition can help dry eyes.

No. 5: Children Don't Have Dry Eyes

A careful case history and assessment of pediatric patients should be performed to rule out dry eye in children. Diabetes, autoimmune conditions, inflammatory disorders, mask wear, and increased digital screen time all increase a child's risk of having dry eye.¹³⁻¹⁶ Although dry eye is seen at lower rates in children, it is equally important to identify it. It is critical to consider appropriate nutritional recommendations in these instances.

THE TRUTH: NUTRITION AFFECTS DRY EYE

We've reviewed several common misperceptions surrounding nutrition and the treatment of DED. Understanding the truth about these will provide your patients with optimized clinical outcomes. ■

1. Dry Eye Assessment and Management Study Research Group; Asbell PA, Maguire MG, et al. N-3 fatty acid supplementation for the treatment of dry eye disease. *N Engl J Med*. 2018;378(18):1681-1690.
2. Bhargava R, Pandey K, Ranjan S, Mehta B, Malik A. Omega-3 fatty acids supplements for dry eye - are they effective or ineffective? *Indian J Ophthalmol*. 2023;71(4):1619-1625.
3. Bhargava R, Chandra M, Bansal U, Singh D, Ranjan S, Sharma S. A randomized controlled trial of omega 3 fatty acids in rosacea patients with dry eye symptoms. *Curr Eye Res*. 2016;41(10):1274-1280.
4. Bhargava R, Kumar P. Oral omega-3 fatty acid treatment for dry eye in contact lens wearers. *Cornea*. 2015;34(4):413-420.
5. Kokke KH, Morris JA, Lawrenson JG. Oral omega-6 essential fatty acid treatment in contact lens associated dry eye. *Cont Lens Anterior Eye*. 2008;31(3):141-146.
6. Aragona P, Bucolo C, Spinella R, Giuffrida S, Ferri G. Systemic omega-6 essential fatty acid treatment and pge1 tear content in Sjögren's syndrome patients. *Invest Ophthalmol Vis Sci*. 2005;46(12):4474-4479.
7. Cavet ME, Harrington KL, Vollmer TR, Ward KW, Zhang JZ. Anti-inflammatory and anti-oxidative effects of the green tea polyphenol epigallocatechin gallate in human corneal epithelial cells. *Mol Vis*. 2011;17:533-542.
8. Nejbat M, Reza SA, Zadmehr M, Yasemi M, Sobhani Z. Efficacy of green tea extract for treatment of dry eye and meibomian gland dysfunction; a double-blind randomized controlled clinical trial study. *Clin Diagn Res*. 2017;11(2):NC05-NC08.
9. Sherwin JC, Reacher MH, Dean WH, Ngondi J. Epidemiology of vitamin A deficiency and xerophthalmia in at-risk populations. *Trans R Soc Trop Med Hyg*. 2012;106(4):205-14.
10. Chan HN, Zhang XJ, Ling XT, et al. Vitamin D and ocular diseases: a systematic review. *Int J Mol Sci*. 2022;23(8):4226.
11. Cardona G, Garcia C, Seres C, Vilaseca M, Gispets J. Blink rate, blink amplitude, and tear film integrity during dynamic visual display terminal tasks. *Curr Eye Res*. 2011;36(3):190-197.
12. Kan J, Wang M, Liu Y, et al. A novel botanical formula improves eye fatigue and dry eye: a randomized, double-blind, placebo-controlled study. *Am J Clin Nutr*. 2020;112:334-342.
13. Wang S, Jia Y, Li T, et al. Dry eye disease is more prevalent in children with diabetes than in those without diabetes. *Curr Eye Res*. 2019;44(12):1299-1305.
14. Alves M, Dias AC, Rocha EM. Dry eye in childhood: epidemiological and clinical aspects. *Ocul Surf*. 2008;6(1):44-51.
15. Fan Q, Liang M, Kong W, et al. Wearing face masks and possibility for dry eye during the COVID-19 pandemic. *Sci Rep*. 2022;12(1):6214.
16. Tonkerdmongkol D, Poyontip T, Poolsanam C, Watcharapalakom 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;18(4):e0284928.

MILE BRUJIC, OD, FAAO

- Partner, Premier Vision Group, Bowling Green, Ohio
- mile@optometricinsights.com
- Financial disclosure: Advisory board member (EyePromise, Zea Vision)

ROBERT DAVIS, OD, FAAO

- Medical Director, Contact Lens Clinic, Davis EyeCare, Oak Lawn, Illinois
- Adjunct Faculty Member, Southern California College of Optometry Marshall B. Ketchum University, Illinois College of Optometry, Pennsylvania College of Optometry at Salus University, Rosenberg School of Optometry, and Pacific University
- eyemanager@aol.com
- Financial disclosure: Advisory board member (EyePromise)

SEAN MULQUEENY, OD

- Founder, Mulqueeny Eye Centers, St. Louis, Missouri
- Associate Clinical Professor, University of Missouri College of Optometry, Saint Louis, Missouri
- Clinical Assistant Professor, Pennsylvania College of Optometry, Salus University
- smulqueeny@mulqueenyeye.com
- Financial disclosure: Speaker/Advisory board member (Alcon, Allergan/Abbvie, EyePromise)

LOUISE SCLAFANI, OD, FSLs

- Private Practice, SoLo Eye Care, Chicago
- Clinical Associate Professor, Illinois Eye Institute, Illinois College of Optometry, Chicago
- Financial disclosure: Head, Specialty Lens Portfolio (CooperVision); Advisory board member (EyePromise)