

# You Are What You Eat

I am one of the most nutritionally challenged individuals I know. In my diet, ketchup is a separate food group. Nutritionists consider the US population's diet to be a major health problem that is completely preventable. We Americans consume 1/50 the amount of omega-3s that we did 100 years ago.<sup>1</sup> We also eat too much processed food and not enough fish and green leafy vegetables. Compounding the problem, cattle, chicken, and even fish today are being fed corn, which contains minimal omega-3s. Additionally, most packaged and processed foods have added vegetable oils such as corn, safflower, or partially hydrogenated soybean, which are predominately omega-6 oils. This increases our ingestion of proinflammatory omega-6s.

In the United States, there is currently an epidemic of dry eye disease (DED), meibomian gland dysfunction, and age-related macular degeneration (AMD). These confounding variables are the most common vision-limiting factors after cataract and refractive surgery. Reducing the risk of these three destructive forces could significantly improve surgical outcomes and patients' quality of life. Could all of these disease processes be tied together? The marine-based omega-3s (eicosapentaenoic and docosahexaenoic acids) have been shown to reduce heart disease, atherosclerotic disease, and cholesterol levels and to improve joint function, hair, and skin. With regard to the eye, omega-3s decrease the incidence of DED and AMD, and they improve meibomian gland function. AMD is the leading cause of blindness in the United States. The Age-Related Eye Disease Study II (AREDS II), sponsored by the National Eye Institute, began in 2006. Investigators added fish oil to the trial's vitamins

and mineral formulation, and they will announce the results of AREDS II in 2013.

I should note that not all fish oils are the same. To purify fish oil and remove toxins such as mercury, polychlorinated biphenyls, and dioxins, most manufacturers add alcohol, which changes the oils from their original triglyceride form to an ethyl ester form. The gastrointestinal (GI) tract does not absorb ethyl esters as effectively as triglycerides, which means the former significantly reduces bioavailability and often results in GI distress, "fish burps," and other GI symptoms. More important,

ethyl esters do not achieve therapeutic levels in the blood stream. A new form of omega-3 is the re-esterified triglyceride, which is purified with alcohol; then, the alcohol is removed, and the oil is converted back to the more natural triglyceride form. Studies show that the re-esterified triglyceride form achieves 200% to 300% better absorption and greater than 70% better bioavailability and that it is better tolerated than ethyl esters,<sup>2,3</sup> resulting in a significant improvement in meibomian gland function and DED.



The past decade brought a revolution in the treatment of ocular surface disease and AMD. Advances in immunomodulation and antivascular endothelial growth factor therapy have improved the vision of millions of patients. As always, however, prevention is preferable to treatment. I therefore recommend that we ophthalmologists consider a holistic approach to patients' ocular and systemic well-being. The data are incontrovertible. Diet matters, and we should be counseling our patients on this issue. ■

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2. Beckermann B, Beneke M, Seitz I. Comparative bioavailability of eicosapentaenoic acid and docosahexaenoic acid from triglycerides, free fatty acids and ethyl esters in volunteers [in German]. *Arzneimittelforschung*. 1990;40(6):700-704.

3. Lawson LD, Hughes BG. Human absorption of fish oil fatty acids as triacylglycerols, free acids, or ethyl esters. *Biochem Biophys Res Commun*. 1988;152(1):328-335.