OMEGA-3 FATTY ACIDS: NATURE’S REMEDY?

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If you were asked to list the top ten preventable causes of death of humans in the United States, what sorts of things would you include? Go ahead, don’t be shy…give it a shot! Obesity, you say? Yep, that’s on there. High blood pressure? Also correct. Smoking? Right at the top of the list. But how about this one: a diet low in omega-3 fatty acids? Believe it or not, it’s true. A Harvard study found that a deficiency in omega-3 fatty acids was one of the leading preventable causes of death in the United States. And as additional research is completed, we have found that omega-3s also play a significant role in the health of our pets and patients.

Fats are often viewed as the unhealthy component of the diet, and are more often associated with causing disease than preventing it. In reality, though, fats are incredibly important in proper nutrition of both humans and veterinary species. Fat is the most energy dense of all nutrients. It is also a significant contributor to the texture and palatability of foods, especially pet foods. And perhaps most importantly, dietary fat supplies essential fatty acids and is crucial for absorption of fat-soluble vitamins.

The dietary fatty acids present in a food are largely dependent upon the fat source utilized. When determining the fat source used in a diet, pet food companies may consider multiple factors: content of essential fatty acids, melting point of the fat, effect on palatability, susceptibility to oxidation, and market price, to name a few. Over the years, much focus has been placed on the fatty acid composition of diets and its relationship to health and disease states.

The focus on fatty acids began in 1783, when Thomas Percival published the use of cod liver oil for rheumatism in the London Medical Journal. But it wasn’t for another 130 years that a true breakthrough occurred in the study of dietary fatty acids. In 1914, August and Marie Krogh traveled to Greenland to study the Eskimos. They observed that the Eskimos ingested large amounts of fat, but did not get diabetes as a result. In 1928, Heinbecker followed up on the Kroghs’ research, and noticed that while the Eskimos ate almost only flesh, most of the animals they consumed came from the sea. And in the 1970s, Danish researchers evaluated the plasma lipid and lipoprotein levels of the Eskimos in comparison with Danish controls. The Eskimos were found to have very high levels of membrane-bound, long-chain, omega-3 fatty acids EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid). At the same time, they had low levels of triglycerides and very-low-density lipoproteins. As further research revealed low rates of cardiovascular disease, cancers, and other inflammatory diseases in the Greenland Eskimos, an association was suspected between their overall health and the high levels of marine-based oils in their diet.
It is important to recognize that all fatty acids are not created equal. There are a number of ways that fatty acids are classified; one of the most common methods of classification is by degree of saturation. Saturation refers to the number of double bonds present within a hydrocarbon chain. Saturated fatty acids contain no double bonds, and are thus “saturated” with hydrogen atoms. Monounsaturated fatty acids (MUFAs) contain a single double bond, and polyunsaturated fatty acids (PUFAs) contain multiple double bonds. Unsaturated fatty acids can further be classified by the location of their first double bond relative to their methyl, or omega, terminus. Both omega-3 (parent compound = alpha-linolenic acid) and omega-6 (parent compound = linoleic acid) fatty acids are considered essential in dogs and cats. In addition, cats require supplementation of arachidonic acid in their diet; dogs can synthesize arachidonic acid from linoleic acid, so do not require dietary supplementation. EPA and DHA, two of the most important omega-3 fatty acids from a health standpoint, are also considered to be essential in dogs and cats and must be supplied directly in the diet.

Much of the benefit of omega-3 fatty acids is suspected to result from competitive inhibition of arachadonic acid in cell membranes and production of less inflammatory eicosanoids. Metabolism of omega-3 fatty acids results in production of eicosanoids of odd-numbered series (e.g., PGE-3, LTB-5), which are anti-inflammatory, while metabolism of omega-6 fatty acids results in production of even-numbered, pro-inflammatory eicosanoids (e.g., PGE-2, LTB-4). A wide range of benefits of dietary omega-3 fatty acids have been described in humans and in animals. Areas affected by fatty acid homeostasis include, but are not limited to: dermatologic conditions, cardiovascular health, neurologic development, renal disease, arthritis and joint health, gastrointestinal health, inflammatory and autoimmune disease, and cancer.

Perhaps the strongest evidence for the health benefit of omega-3 fatty acids relates to their use in patients with osteoarthritis. A number of studies have reported decreases in joint-related inflammation, pain, and lameness in humans, dogs, and cats. More recently, researchers have been able to correlate these clinical improvements with an increased omega-3 saturation of cells, suggesting that dietary supplementation of omega-3s may be beneficial to improve OA-related inflammation.

Unfortunately, in recent years, vegetable oils have been added to many diets as a fatty acid source, shifting the balance of fatty acids away from omega-3s and toward omega-6s. This has led to the development of nutritional supplements for humans and animals designed to increase the body’s levels of omega-3s. Supplements can be found in a variety of forms. Omega-3 fatty acids naturally found in fish are in a highly absorbable triglyceride form. Processing of fatty acids to create many commercially available supplements results in conversion to an ethyl ester form of the fatty acids, which has been shown to be up to 70% less absorbable than the naturally occurring triglyceride form. Only recently have newer supplements become available in a re-esterified, triglyceride form, potentially allowing for improved levels of omega-3s. Preliminary results of recent studies evaluating the clinical effects of omega-3 supplementation have been promising.

So, what recommendations should we make to pet owners with regard to omega-3 fatty acid supplementation? As an example, here is the information I provide to my clients to assist them in their search for the right supplement:
Buyer Beware: Dietary supplements are not regulated by the FDA, meaning there is no guarantee that the ingredients listed on the bottle are actually present in the product. Therefore, it is important to purchase a product from a well-known, reputable company that abides by good manufacturing practices and ensures appropriate quality control.

Fish Oils, Not Plant Oils: Many omega-3 supplements marketed for human use are of plant origin (e.g., flax seed oil) and contain alpha-linolenic acid (ALA) as an omega-3 source. Humans are capable of metabolizing ALA to EPA/DHA, but pets cannot make this conversion efficiently. Therefore, we must directly provide pets with EPA and DHA, which are only found in fish-based sources.

Safety and Efficacy: Supplements obtained from fish oils may also contain other by-products of fish (chemicals, mercury, etc.). Distillation removes the harmful by-products, making the product safer for long-term use. However, processing can also alter the chemical makeup of the fatty acids from the native triglyceride form to an ethyl ester form, reducing their absorption in the GI tract. This can reduce effectiveness and also lead to unwanted side effects (fish breath, burps, etc.). Some companies have developed methods to return the fatty acids in their supplements to the native triglyceride form. If you can find a supplement in the triglyceride form, it should have better efficacy and fewer side effects than a supplement in the ethyl ester form.

Dose: One of the most common questions we encounter is, “What is the appropriate dose for my pet?” Doses in the literature range anywhere from 30 to 200mg/kg/day of EPA and DHA for a variety of conditions (from arthritis, to skin disease, to cardiovascular disease, to ophthalmic disease). A recent study showed that supplementation of an average of 70mg/kg/day of EPA+DHA, supplied in a reesterified triglyceride form, was effective at reducing clinical signs of osteoarthritis in dogs – however, a higher dose would likely be required if the product is in an ethyl ester form. Once again, any reputable company should have done some degree of research on their product(s), and should be able to provide a dose recommendation for your pet. If there is no dose recommendation, this may be an indication that you should choose a different product.

Selected References/Recommended Reading


