

In investigating the nutraceutical properties of fishes in the month of March, we discovered a highly important group of fatty acids called the Omega-3 fatty acids. Omega-3 fatty acids (OM3FAs or *n*-3 PUFAs) are unsaturated fatty acids, and currently, the three most clinically relevant types are α -linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA). Oils containing these fatty acids originate in plant sources and can be found in fish, fish products, seeds, nuts, green leafy vegetables, and beans.

They are responsible for numerous cellular functions, such as signaling, cell membrane fluidity, and structural maintenance. They also regulate the nervous system, blood pressure, haematic clotting, glucose tolerance, and inflammatory processes, which may be useful in all inflammatory conditions. They can influence the exercise and the metabolic response of skeletal muscle, and also the functional response for a period of exercise training.

In addition, their potential anti-inflammatory and antioxidant activity may provide health benefits and performance improvement especially in those who practice physical activity, due to their increased reactive oxygen production. They can reduce inflammation and may help lower risk of chronic diseases such as heart disease, cancer, and arthritis. They also regulate blood pressure, hematic clotting, glucose tolerance, and nervous system development and functions. They are also named “vitamin F” from “fatty acids”.

OM3FAs have been shown to be beneficial for cancer treatment, such as breast cancer, colorectal cancer, leukemia, gastric cancer, pancreatic cancer, esophageal cancer, prostate cancer, head and neck cancer, as well as lung cancer. They have a stabilizing and protecting effect for certain tissues that have high-fat content, like neural and retinal tissue.

Alzheimer’s disease, dementia, and cognitive function are improved by OM3FAs ability to maintain cell membrane integrity of neural tissues because DHA is an essential component of the brain’s phospholipid membranes. Additionally, macular degeneration can be helped with the supplement of DHA for structural support and EPA based eicosanoids for neovascular and cell survival because DHA and EPA are also an integral component of retinal cell membranes, hence they improve good vision.

OM3FAs have some cardioprotective effects that help protect against heart failure in congestive heart failure (CHF) patients. OM3FAs, specifically DHA, decreases mitochondrial oxygen consumption without reducing power generation for the ventricles by altering the mitochondrial membrane phospholipid composition, **protecting the heart from tiring**. Whereas EPA inhibits the apoptotic activity stimulated by saturated fatty acid cardiac lipotoxicity, **protecting the heart from injury**. OM3FAs can **protect from arrhythmia** by inhibiting inward sodium current in a dose-dependent manner, suppressing intracellular calcium (Ca^{2+}) waves, and helping strengthen autonomic tone. OM3FAs can also **vasodilate and decrease blood pressure** or **afterload to help the heart pump easier** because they stimulate the release of nitrous oxide (NO) from vascular endothelial tissue. OM3FAs also protect the heart through its antithrombotic and antiatherosclerotic abilities.

EPA and DHA are found in cold water fishes, which possess a greater quantity of body fat, although their content in EPA and DHA depends on some variables such as climate, the environment, and a fish diet. ALA is found in flaxseeds, canola (rapeseed) oil, soybeans, pumpkin seeds, perilla seed oil, walnuts, and their derivative oils. Healthy effects come mostly from EPA and DHA. ALA from flax and other vegetarian sources needs to be converted in the body to EPA and DHA.

Other important marine sources of Omega-3 Fatty Acids include sea life such as krill, algae, microalgae, and crustaceans. Krill oil, in particular Antarctic krill, is a rich source of both antioxidants, such as marine carotenoids (for example astaxanthin and fucoxanthin), vitamins A and E, and phospholipids containing long-chain *n*-3 PUFAs. In fact, alternative EPA and DHA marine sources such as sponges, bacteria, fungi, plants, and, in particular, autotrophic macroalgae and microalgae, are currently being explored for large-scale commercial omega-3 production. In particular, brown and red algae are characterized by the presence of EPA and ALA as well as green seaweeds, such as *Ulva pertusa*, which are rich in hexadecatetraenoic acid, and octadecatetraenoic acid, which is abundant in *Laminaria* sp. and *Undaria pinnatifida*.

Ongoing research has shown significant and promising role of Omega-3 fatty acids in the treatment of the following conditions and ailments: Cardiovascular disease, Hypertriglyceridemia, Type 2 diabetes, Cancer, Alzheimer disease and dementia, Depression, Visual and neurological/brain development, Maternal health during pregnancy and child health, Conditions benefiting from prebiotics, Heart failure, Intervertebral disc degeneration, Attention deficit hyperactivity disorder, Maternal depression, Menopausal night sweats, Rheumatoid arthritis, Asthma, Periodontal disease, Epilepsy, Diabetic retinopathy, Efficacy, tolerability, and side-effects of chemotherapy, Premenstrual syndrome and Non-alcoholic fatty liver disease.

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