

## **Fish Oil**

**Product is also known as:** Marine Oils, Omega Fatty Acids, N-3 Fatty Acids, Omega 3 Fatty Acid, W-3 Fatty Acids, Fish Oil Fatty Acids.<sup>1-3</sup>

**Scientific names:** None

### **Omega-3 Fatty Acids**

**Common names:** None

**Scientific names:** Alpha-linolenic acid, eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA)<sup>1-3</sup>

**Description:** Omega-3 fatty acids are important nutrients that are involved in many human biological processes. They are essential fatty acids. Three fatty acids compose the Omega-3 family: alpha -linolenic acid, EPA and DHA.<sup>4</sup>

**Description of active ingredients:** Alpha-linolenic acid is a fatty acid formed in oils of certain plants. When ingested converted slowly by body into EPA and DHA.<sup>4</sup>

**MOA:**<sup>2-3</sup> Fish oils contain EPA and DHA, which are long chain n-3 polyunsaturated fatty acids that compete with arachidonic acid in the cyclooxygenase and lipoxygenase pathways. In humans, DHA can be converted into EPA. Antithrombotic activity of fish oil is due to prostacyclin synthesis effects, vasodilation, reduced platelet adhesiveness and platelet counts, and prolonged bleeding time. Improve arterial compliance in people with non-insulin dependent diabetes. Decrease blood viscosity and increase red blood cell deformability. Inhibit leukotriene synthesis, which accounts for their anti-inflammatory effects. For bipolar disorder, the fatty acids in fish oil can slow nerve signaling like lithium or valproate.

**Current indications:**<sup>1-3</sup> **Fish** oil containing EPA and DHA is used orally for atopic dermatitis, Behcet's syndrome, HTN, dyslipidimia, psoriasis, RA, ulcerative colitis, asthma, autoimmune diseases, cancer, dysmenorrhea, lung diseases, hay fever, bipolar disorder, and preventing heart disease.

- **Effectiveness:**

1. **Likely effective:**

In dyslipidimia– omega-3 fatty acids reduce fasting and postprandial TG concentrations by 20-35% via the suppression of hepatic VLDL-triglyceride production

and accelerated chylomicron TG clearance.<sup>5</sup> In patients on statin therapy, high doses of omega-3 fatty acids (3.4 g/d) contribute to increase in HDL-cholesterol of 6%, and added significantly to triglyceride lowering effect of statin.<sup>5</sup> In adult females a mixture of 4g EPA + DHA and 2 g gamma-linolenic acid for 28 days, significantly reduced plasma TG and LDL (11.3%), these results are of considerable interest because fish oil alone (EPA+DHA) typically had no effect or a modest elevating effect on LDL-cholesterol concentrations.<sup>6</sup> Supplements providing 4g EPA + DHA and 2 g gamma-linolenic acid was estimated to have a 43% reduction in the 10-y risk of MI.<sup>6</sup>

In CV diseases – Increasing concentrations of DHA in serum phospholipids have been inversely correlated with CHD.<sup>6</sup> Atherosclerotic plaques readily incorporate fish oil fatty acids, thus inducing changes that can enhance stability of atherosclerotic plaques.<sup>7</sup> Stability of plaques could explain reductions in non-fatal and fatal CV events associated with increased n-3 polyunsaturated fatty acids intake.<sup>7</sup>

In pregnancy and lactation – maternal intake of very-long chain n-3 fatty acids (1183 mg/10ml DHA and 803 mg/10ml EPA in 10 ml of cod liver oil) during pregnancy and lactation may be favorable for later mental development of children but no relation was found with birth weight or gestational length. Measure of intelligence correlated significantly with head circumference at birth ( $r=0.23$ ).<sup>8</sup>

Adjunctive treatment for bipolar disorder – treatment with ethyl-EPA at dosage of 1 g/d was effective in treating depression in patients who remained depressed despite adequate standard therapy.<sup>9</sup>

In HTN – modestly lower systolic and diastolic blood pressure.<sup>2</sup>

2. **Possibly effective:** decreasing post MI mortality, reducing cyclosporin induced HTN after renal and cardiac transplant and decreasing ventricular ectopic beats and risk of sudden cardiac death, for modest symptomatic relief of RA by decreasing morning stiffness and joint stiffness and improving the functional status. Lowering the relapse rate in Crohn's disease, treating dysmenorrhea. Preventing recurrent miscarriages associated with antiphospholipid antibodies, duration of gestation increased significantly when DHA intake was increased during the last trimester of pregnancy<sup>10</sup>, treating symptoms of chronic fatigue syndrome, reducing albuminuria in diabetic nephropathy, when using IV for treating chronic plaque psoriasis and acute extended gutate psoriasis.

**Contraindications:** hypersensitivity to EPA, DHA or fish oils, precautionary use in patients with bleeding disorders (hemophilia, thrombocytopenia), use with caution in diabetes, taking more than 25000 IU of vitamin A or 800 IU of vitamin D per day.<sup>1-3</sup>

**Adverse Effects:** <sup>2-3</sup>

1. Decreased glucose tolerance, increased blood glucose and decreased plasma insulin in type II diabetics
2. Breathing problems or tightness in your throat or chest
3. Diarrhea, abdominal pain, bloating gas
4. Fatigue, somnolence
5. Increased renal clearance
6. Prolonged bleeding, thrombocytopenia
7. Skin irritation
8. Vitamin toxicity, oxidative damage in large doses

**Commonly used Dose:** <sup>2</sup>

Oral - 5 gm fish oil containing EPA and DHA twice daily with food. Encapsulated products can contain 169-563 mg EPA and 72-312 mg DHA. Products can also contain small amounts of vitamin E as an antioxidant, calcium, iron, or vitamins A, B1, B2, B3, C, or D.

IV - insufficient reliable information is available.

**Drug Interactions:** <sup>2-3</sup>

Anticoagulant/Antiplatelet Drugs - increased risk of bleeding due to possible anti-thrombotic affect of fish oil

Cyclosporine - fish oils can attenuate cyclosporin -induced HTN in people with kidney or heart transplants

Antidiabetes Drugs - may interfere with blood glucose control by increasing blood glucose

**Drug-Disease Interactions:** <sup>2-3</sup>

ASA sensitive individuals - fish oil can decrease pulmonary function

Diabetes - use fish oil with caution and monitor blood glucose levels; it may interfere with blood glucose control by increasing the blood glucose

HTN - fish oil can lower blood pressure

**Interactions with Herbs and Other Dietary Supplements:** <sup>2</sup>

Vitamin E - risk of vitamin E deficiency increases with long-term use of fish oils.

Herbs with anticoagulant/antiplatelet potential - herbs with coumarin constituents i.e. onion, garlic, chamomile, ginger, ginkgo, ginseng...

**Safety:**

Safe when taken orally in appropriate amounts. Toxicity is possible with the long-term use of some products due to the vitamin A and D content. <sup>2</sup>

Pregnancy and Lactation - Fish oil should be avoided in amounts greater than contained in dietary consumption of fish, consult physician before adding extra omega-3 to the diet. <sup>1</sup>

Tendency toward anemia in menstruating women. <sup>1</sup>

**Other Comments:**

EPA/DHA omega-3s can be found in highest amount in salmon, mackerel, tuna, and sardine. Plants rich in alpha-linolenic acid are flax seed, chia seed, pumpkin seed, rapeseed, soybean and its products such as tofu and tempeh, walnuts, and dark green vegetables.<sup>4</sup> Cold-water fish are the highest food source of DHA acid in the diet. However, many fish carry advisories against consumption by pregnant and lactating women because of mercury and other environmental contaminants that have the potential to damage the developing fetus.<sup>10</sup> Same advisory should apply to all individuals.

**Reference:**

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- 5) William SH, Yongsoon P, William LI. Cardiovascular disease and long-chain omega-3 fatty acids. *Curr Opin Lipidol* 2003; 14:9-14.
- 6) Laidlow M, Holub BJ. Effects of supplementation with fish oil-derived n-3 fatty acids and gamma linolenic acid on circulating plasma lipids and fatty acid profiles in women. *Am J Clin Nutr* 2003 Jan; 77 (1): 37-42.
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