

Perilla Seed Oil: Excellent Source of Omega-3,6,9 fatty acids

Perilla frutescense is the botanical name of a member of the Lamiaceae family. This paper discusses the importance of balanced omega 3,6,9 fatty acids, and why perilla seed oil is the preferred vegetable formulation to balance this system.

Why Omega Fatty Acids are Important: Definitions

The names “omega 3” or “omega 6” or “omega 9” fatty acids refer to where a double bond occurs in the fatty acid molecule. Omega 3 and omega 6 fatty acids are “essential”, meaning that the body cannot manufacture these fatty acids itself. Instead, we must include them in our diet or through supplements to meet our needs. Omega 9 fatty acids are “conditionally essential”, which means that if we have the other fatty acids in our diet, then our body can manufacture omega 9 fatty acids. Otherwise, omega 9 fatty acids must be consumed or supplemented as well.

DHA (docosahexaenoic acid) and EPA (eicosapentaenoic acid) are the two specific omega 3 fatty acids found in such cold water fish as salmon, cod and mackerel. DHA and EPA are also the two substances the body uses most readily. ALA (alpha-linolenic acid) is another omega 3 fatty acid, and it is found in plant oils such as flaxseed (linseed) and perilla, with lower amounts in walnut, canola and soy. It is converted by your body to DHA and EPA once you consume it. These substances are inserted in cell membranes throughout the body, where cellular machinery converts them into substances which prevent abnormal clotting, reduce inflammation, and relax blood vessels.

The most common omega 6 fatty acid is linoleic acid. It is found in a wide range of foods, like most grains and oils made from grains like corn oil. When omega 6 fatty acids are consumed in the diet, they are inserted in the cell membranes, where the same cellular machinery converts them into substances which promote abnormal clotting and increase inflammation.

Omega 9 fatty acids such as oleic acid, are found primarily in olive oil.

Balance is Key

Many health issues depend on a proper balance of omega 3 and omega 6 fatty acids.¹ While omega 6 fatty acids are necessary for normal immune function and clotting, too much omega 6 fatty acid may promote abnormal clotting and an overactive immune system. It is believed that our ancestors evolved on a diet where these two omega fatty acids were approximately equal. However, modern diets usually have up to 20 times more omega 6 fatty acids than omega 3 fatty acids! Many of the chronic degenerative diseases we experience today are believed to have their origins in an imbalance of omega 3 and omega 6 fatty acids in our diet.

The Most Common Kind of Heart Attack

In the 1970's a Danish researcher, Jorn Dyerberg, wondered why Greenland Eskimos had such a low incidence of heart attacks. It seemed puzzling, because their diet was so high in fat. When the fats in the diet were studied, it appeared that omega 3 fatty acids,ⁱⁱ found in high levels in the cold water fish they were eating, provided protection from heart attacks.ⁱⁱⁱ

How do heart attacks occur? Over time, oxidized cholesterol is inserted into cholesterol plaques beneath the lining of blood vessels. This forms a core which is unstable, with a cap over it. In the most common kind of heart attack, turbulent flow found in diseased arteries ruptures this cap, releasing the inflammatory core into the blood stream. This injury causes a reaction by the cells in the blood stream, causing a clot to form, which blocks the flow of blood. The heart muscle is starved of oxygen, and some or all of the muscle dies.

An imbalance of omega 3 and omega 6 fatty acids contributes to heart attack for several reasons. In different cells of the body, the cellular machinery makes different things. In platelets, the cell products in the blood which aid in clotting, omega 6 fatty acids are converted to thromboxane A2 (TXA2). This makes the platelets more likely to burst (degranulate), releasing their clotting substances and cell messengers. These cell messengers constrict (tighten) blood vessels and tell other platelets to burst—causing a clotting cascade. On the other hand, when omega 3 fatty acids are used in the same machinery in platelets, thromboxane A3 (TXA3) is made, which is inactive. If you have been cut or injured, you want the bleeding to stop with the help of platelets. However, if you have not been cut or injured, clotting is abnormal and may block flow to areas which need it—causing a heart attack or stroke. In white blood cells (WBC's), the infection fighting cells of the body, omega 6 fatty acids make more inflammatory substances. These substances include leukotriene B4, (LTB4), which is a cell messenger responsible for inflammation throughout the body. It is a "call to arms" for other WBC's. LTB4 even tells certain WBC's to get into the wall of the blood vessel. LTB4 actually causes these WBC's to absorb OXIDIZED LDL CHOLESTEROL. This is how a cholesterol plaque is formed! In contrast, when omega 3 fatty acids are used in the same cellular machinery, leukotriene B5 (LTB5) is made. LTB5 is anti-inflammatory.

Health demands normal functioning of both systems. You want to be able to clot when you are cut. And you want your body to be able to fight off invaders. But when the balance is 10 or 20:1 toward the 'pro-inflammatory' side, we have trouble!

Drug companies know about the cellular machinery and the substances they make, and there are medicines which block the machinery or block the receptors which trigger the machinery. Aspirin is used to help prevent heart attacks because it prevents the formation of TXA2 in the platelet. Singulair, Accolyte,

and Zylflo are drugs which help prevent the formation of LTB₄. Pharmaceutical drugs which prevent the formation of LTB₄ have been used in treating asthma, rheumatoid arthritis, colitis, lupus, multiple sclerosis, and psoriasis.

Yet if we increase our intake of omega-3 fatty acids, we may prevent the formation of these inflammatory substances and actually increase the production of anti-inflammatory substances. In fact, there have been a number of clinical trials assessing the benefits of dietary supplementation with omega 3 fatty acids in several inflammatory and autoimmune diseases in humans, including rheumatoid arthritis, Crohn's disease, ulcerative colitis, psoriasis, lupus erythematosus, multiple sclerosis and migraine headaches.^{iv} Most important to people concerned about cardiovascular disease, omega 3 fatty acids have been shown to improve blood pressure and vascular resistance, lower triglycerides, prevent abnormal heart rhythm and sudden cardiac death, and may reduce the risk of heart attack.

So What's the Best Source of Omega Fatty Acids?

In choosing a supplement, one must consider whether the risk of mercury contamination from fish oil is worth the benefit of receiving DHA and EPA. Among plant oils, the balance between omega-3, omega-6 and omega 9 fatty acids must dictate which oil is chosen. Since most Western diets contain too much omega-6 fatty acids, oils which predominate in omega-3 component would be most likely to promote health. While marketing materials for several oils list them as 'rich' sources of ALA, only perilla and flaxseed oil predominate in omega-3 fatty acid. Most would actually contribute to the imbalance of omega-6 fatty acids because they contain more omega-6 than omega-3. Any amount of omega-9 is beneficial, but in balancing these fatty acids, the omega 3 component is the most important.

Perilla is the common name for *Perilla frutescens*, a member of the Lamiaceae/Labiatae family. The applicable parts of perilla plants are the leaf and seed. Perilla contains multiple flavones, present in both the leaf and the seed. The seeds of the Perilla plant are a good source of oil, at approximately 40% oil content. However the leaves are a very poor source of oil, since they contain only 0.2% oil by weight. In addition, only the seed oil contains the omega 3 fatty acid alpha-linolenic acid (ALA).

In comparing perilla seed oil to flaxseed oil, perilla consistently contains the highest proportion of omega-3 fatty acids, at 54-64%. The omega-6 component is usually around 14%, giving an omega-3 to omega-6 ratio of 3.9-4.6:1.^{v vi vii viii ix}

^x For comparison, flax seed oils have ranged as low as 46% omega-3 fatty acids, giving an omega-3: omega-6 ratio of 3.3:1.^{xi xii xiii xiv} Oleic acid (omega-9 component) is also present in perilla oil.

Perilla oil has been studied in humans and is converted into DHA and EPA by the body.^{xv} Due to its anti-inflammatory effects, it has been shown to be beneficial in patients with asthma, resulting in decreased inflammatory markers, and improved ventilatory parameters.^{xvi xvii}

The high content of omega 3 fatty acids, the absence of mercury risk from fish sources, and the beneficial effects of perilla oil are why believe that Perilla Oil is the best supplement to achieve balance in these valuable fatty acids.

About the author:

Dr. Elizabeth Owings is a medical doctor who is board certified in general surgery. She has also received training in Critical Care Medicine in the Department of Pediatric Surgery at Children's Memorial Hospital in Chicago, and in Pediatric Surgery at Cardinal Glennon Children's Hospital. Her research into the use of vitamins, minerals and other natural remedies took her through tens of thousands of articles and published research papers, making her an expert on natural therapies. She currently serves as the Chief Medical Advisor for ForMor, International.

ⁱ Renaud, SC. The importance of the ratio of omega-6/omega-3 essential fatty acids, *Biomed Pharmacother.* 2002 Oct; 56(8):365-79.

ⁱⁱ Bang HO, Dyerberg J, Hjoorne N., The composition of food consumed by Greenland Eskimos. *Acta Med Scand.* 1976; 200(1-2): 69-73.

ⁱⁱⁱ Schacky C, Dyerberg J., omega 3 fatty acids. From Eskimo to clinical cardiology--what took us so long? *World Rev Nutr Diet.* 2001; 88:90-9.

^{iv} Simopoulos AP. Omega-3 fatty acids in inflammation and autoimmune diseases. *J Am Coll Nutr.* 2002 Dec; 21(6): 495-505.

^v Longvah T, Deosthale YG, Kumar PU; Nutritional and shortterm toxicological evaluation of Perilla seed oil, *Food Chem.*, 70:13-16, 2000.

^{vi} Liebing H, Lau J; *Seifen, Oele, Fette, Wachse*; 97:387, 1971.

^{vii} Hagemann JM, *Lipids*; 2:371, 1967.

^{viii} Marin PD, *Phytochemistry*; 30:2979, 1991.

^{ix} Matthaeus B, Vosmann K, Long Quoc Pham, Aitzetmueller K., FA and Tocopherol Composition of Vietnamese Oilseeds, *J Amer Oil Chem Soc*, 80 (10):1013-1020, 2003.

^x Siriamornpun S, Li D, Yang L, Sutajit S, Suttajit M. Variation of lipid and fatty acid compositions in Thai Perilla seeds grown at different locations. *Songklanakarin J Sci Technol.*, 28:17-21, 2006.

^{xi} Sekhon KS, et al., *Oleagineux*, 28:525, 1973.

^{xii} Piorr W, et al., *Z. Unters. Lebensm.* 138:11, 1968.

-
- ^{xiii} Conte LS, et al., Riv. Ital. sostanze Grasse, 56:339, 1979.
- ^{xiv} Klein H, Experience on the investigation of nutrition fats and oils received from trade, Part 1/Part 2; Ernährung/Nutrition 23 (11/12):452-460/496-504, 1999.
- ^{xv} Ezaki O, Takahashi M, Shigematsu T, Shimamura K, Kimura J, Ezaki H, Gotoh T. Long-term effects of dietary alpha-linolenic acid from perilla oil on serum fatty acids composition and on the risk factors of coronary heart disease in Japanese elderly subjects. J Nutr Sci Vitaminol (Tokyo). 1999 Dec; 45(6): 759-72.
- ^{xvi} Okamoto M, Mitsunobu F, Ashida K, Mifune T, Hosaki Y, Tsugeno H, Harada S, Tanizaki Y, Kataoka M, Niiya K, Harada M. Effects of perilla seed oil supplementation on leukotriene generation by leucocytes in patients with asthma associated with lipometabolism. Int Arch Allergy Immunol. 2000 Jun; 122(2):137-42
- ^{xvii} Okamoto M, Mitsunobu F, Ahida K, Mifune T, Hosaki Y, Tsugeno H, Harada S, Tanizaki Y. Effects of dietary supplementation with n-3 fatty acids compared with n-6 fatty acids on bronchial asthma. Intern Med. 2000 Feb; 39(2):107-11.