

# **The Heart Protector**

## **The Power of Omega Fatty Acids**

By Elizabeth Owings, MD

### **Introduction**

News headlines are touting the benefits of omega fatty acids. Every magazine has advertisements offering to sell you supplemental omega-3 fatty acids. But what are these omega 3 fatty acids? How about omega 6 fatty acids? How do they work? Is there a risk of mercury contamination from fish oil? What *are* the best sources? This article will help you decide for yourself.

The story of omega 3 fatty acids began in the 1970's when a Danish researcher, Jorn Dyerberg, wondered why 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**, found in high levels in the cold water fish they were eating, provided protection from heart attacks. Before we talk about why, let's talk about what an omega 3 fatty acid is.

### **Definitions**

Omega 3, 6, 9, EPA, DHA, ALA—what does it all mean? The names “omega 3” or “omega 6” or “omega 9” fatty acids refer to where a double bond occurs in the 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.

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), perilla, 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 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, increase inflammation, and tighten blood vessels.**

### **Balance is Key**

As you may have guessed, many health issues depend on a proper **balance** of omega 3 and omega 6 fatty acids. 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 10 or 20 times **more** omega 6 fatty acids than omega 3 fatty acids! Traditional grain fed beef may have **twenty** 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**

How do heart attacks occur? Over time, oxidized cholesterol is inserted into collections of cholesterol (cholesterol plaques) beneath the lining of blood vessels. This forms a core which is unstable, with a cap over it. Vibratory flow actually may rupture this cap, releasing this highly 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.

How can a dietary imbalance contribute to heart attacks? There are several reasons, and we will examine the role of omega fatty acids in different cells of the body in promoting or protecting against inflammation. First, let's look at **platelets**, which are substances in the blood which aid in clotting. When omega 6 fatty acids are used in the cellular machinery of platelets, a substance called thromboxane A2 (**TXA2**) is made. 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 an abnormal event which can block flow to areas which need it—like the heart resulting in a heart attack or even the brain, which we call a stroke.

Next, let's examine white blood cells (**WBC's**), the infection fighting cells of the body. When omega 6 fatty acids are used in the cellular machinery of white blood cells, inflammatory substances are made. 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, telling them to "come kill invaders", "clean up debris", or "stick around, there's work to do". LTB4 actually tells certain WBC's to attach to the endothelium (lining of blood vessels), and get underneath it. LTB4 actually "activates" these WBC's and they then 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**. You can see that you need 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 in fact 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.*** (Simopoulos, 2002) 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?**

It would seem that the cold water fish which the Eskimos ate would be the best source for all the omega 3 fatty acids we need. But in 2004, the FDA and the EPA issued a warning for all pregnant women, women who may become pregnant, and all children, to avoid certain fish because of the risk of mercury contamination.

Different plant sources have different mixes of omega fatty acids. **Perilla** oil has one of the highest concentrations of the **omega 3 fatty acid ALA**. It has much

smaller concentrations of linoleic acid (an omega 6 fatty acid), and also offers a small amount of oleic acid (an omega 9 fatty acid) as well. As a vegetable source, it has no fishy smell, and stays fresher longer.

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. Omega 9 fatty acids are found primarily in olive oil. Oleic acid is the primary omega 9 fatty acid. Monounsaturated fats, like the oleic acid found in olive oil, may reduce the chances of suffering coronary heart disease, according to the Food and Drug Administration. In research studies, oleic acid blocks the action of a cancer-causing gene called HER-2/neu (“Her-two-new”) which is found in about 30 percent of breast cancer patients. It also improved the effectiveness of the breast cancer drug Herceptin. (Colomer) It also appears to be preventative for colon cancer at all stages of development. (Bougnoux)

In the secondary prevention of cardiovascular disease, a ratio of 4/1 was associated with a 70% decrease in total mortality. A ratio of 2.5/1 reduced rectal cell proliferation in patients with colorectal cancer, whereas a ratio of 4/1 with the same amount of omega-3 PUFA had no effect. The lower omega-6/omega-3 ratio in women with breast cancer was associated with decreased risk. A ratio of 2-3/1 suppressed inflammation in patients with rheumatoid arthritis, and a ratio of 5/1 had a beneficial effect on patients with asthma, whereas a ratio of 10/1 had adverse consequences. (Simopoulos, 2001)

#### **References:**

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

Bougnoux P, Menanteau J Bull Cancer. 2005 Jul; 92(7): 685-96. **[Dietary fatty acids and experimental carcinogenesis]**

Colomer R, Menendez JA. Clin Transl Oncol. 2006 Jan;8(1): 15-21.**Mediterranean diet, olive oil and cancer.**

DOE: Department of Energy website,

[http://www.fossil.energy.gov/programs/powersystems/pollutioncontrols/overview\\_mercurycontrols.html](http://www.fossil.energy.gov/programs/powersystems/pollutioncontrols/overview_mercurycontrols.html)

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.

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. Review.

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

Simopoulos AP, Diet and Stroke. J Nutr Health Aging, 2001;5(3):167-72.

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

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.

Williams CM, Burdge G. Long-chain n-3 PUFA: plant v. marine sources. Proc Nutr Soc. 2006 Feb; 65(1): 42-50.

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