

Importance of Omega-3 EFAs in Health and Disease

by Dr. William Connor



Interest in Omega-3 Essential Fatty Acids (EFA) began some 30 years ago and there are now several thousand papers in the scientific literature supporting their benefits. There is little doubt that Omega-3 essential fatty acids are important in human nutrition. EFAs are significant structural components of the cell membranes of tissues throughout the body and are especially rich in the retina, brain, and sperm, in which docosahexaenoic acid (DHA) constitutes 36.4% of total fatty acids. Membrane fluidity is essential for proper functioning of these tissues. In the retina, where Omega-3 fatty acids are especially important, deficiency can result in decreased vision and abnormal electro-retinogram results.

Omega-3 fatty acids are Essential Fatty Acids, necessary from conception - through pregnancy - and infancy - and, undoubtedly, throughout the rest of our lives.

The ratio of Omega-3 to Omega-6 fatty acids has increased in industrialized societies because of increased consumption of vegetable oils that are very rich in Omega-6 fatty acids (linoleic acid), and a reduced consumption of foods rich in Omega-3 fatty acids. An important feature of Omega-3 fatty acids is their role in the prevention and modulation of certain diseases that are common in Western civilization.

The following is a partial list of diseases that may be prevented, or ameliorated, with Omega-3 fatty acids, in descending order of the strength of the available evidence as perceived by this reviewer:

- **Coronary heart disease and stroke;**
- **Essential fatty acid deficiency in infancy (retinal and brain development);**
- **Autoimmune disorders (e.g., lupus and nephropathy);**
- **Crohn's disease;**
- **Cancers of the breast, colon, and prostate;**
- **Mild hypertension; and**
- **Rheumatoid arthritis.**

Cardiovascular Benefits Of Omega-3 Essential Fatty Acids

The strongest evidence of a relation between Omega-3 fatty acids and disease is the inverse relation between the amount of Omega-3 fatty acids in the diet and in blood and tissues and the occurrence of coronary heart disease and its many complications. Effects of Omega-3 fatty acids on coronary heart disease have been shown in hundreds of experiments in animals, humans, tissue culture studies, and clinical trials.

Omega-3 fatty acids from fish have been shown to be protective of heart disease and, by a variety of mechanisms, prevent deaths from coronary disease, particularly cardiac arrest. The unique properties of these fatty acids in coronary heart disease first became apparent in the investigations of the health status of Greenland Eskimos who consumed diets very high in fat from seals, whales, and fish and yet had a low rate of coronary heart disease. Further studies clarified this paradox. The fat the Eskimos consumed contained large

quantities of the very *long-chain* and highly polyunsaturated fatty acids of EPA and DHA, which are abundant in fish, shellfish, and sea mammals, and are scarce or absent in land animals and plants. EPA and DHA are synthesized by phytoplankton, which are the plants of the waters and the base of the food chain for marine life. Dietary Omega-3 fatty acids act to prevent heart disease through a variety of actions – they:

- **Prevent arrhythmias (ventricular tachycardia and fibrillation),**
- **Prostaglandin and leukotriene precursors,**
- **Have anti-inflammatory properties,**
- **Inhibit synthesis of cytokines and mitogens,**
- **Stimulate endothelial-derived nitric oxide,**
- **Antithrombotic,**
- **Have hypolipidemic properties with effects on triglycerides and VLDLs, and**
- **Inhibit atherosclerosis.**

EPA and DHA have strong anti-arrhythmic action on the heart. In experimental animals and tissue culture systems, EPA and DHA prevent the development of ventricular tachycardia and fibrillation.

Even total mortality has been improved in several studies in which the Omega-3 fatty acid intake was increased. In one study, men who consumed salmon 1 time/wk had a 70% less likelihood of cardiac arrest.

In another study, overall mortality was decreased by 29% in men with overt cardiovascular disease who consumed Omega-3 fatty acids from fish or fish oil, probably because of the reduction in cardiac arrests.

The most recent data on fish consumption and risk of sudden cardiac death were from the Physician's Health Study in the United States in 20551 male physicians. Consumption of 1 fish meal/week was associated with a 52% lower risk of sudden cardiac death compared with consumption of <1 fish meal/month.

Total Death Rate Was Also Lower In Those Who Ate Fish.

Thrombosis, or the tendency to form blood clots, is a major complication of coronary atherosclerosis that can lead to heart attacks. The Omega-3 fatty acids from fish oil have powerful antithrombotic actions. EPA inhibits the synthesis of thromboxane A₂ from arachidonic acid in platelets. This prostaglandin causes platelet aggregation and vasoconstriction.

As a result, fish oil ingestion by humans increases the bleeding time and decreases the stickiness of the platelets for aggregation to glass beads. In addition, the administration of fish oil enhances the production of prostacyclin, a prostaglandin that produces vasodilation and less sticky platelets.

Reduced Atherosclerosis

The EPA and DHA contained in fish oil fed to experimental animals actually inhibited development of atherosclerosis. There is evidence in both pigs and monkeys that dietary fish oil prevents atherosclerosis by actions other than reducing plasma cholesterol concentrations.

Atherosclerotic plaque formation may also be lessened by the reduction in growth factors after fish-oil consumption. Not only is platelet-derived growth factor diminished by fish oil consumption, but its messenger RNA is reduced. Because atherosclerosis begins with cellular proliferation in response to the influx of cholesterol-rich lipoproteins, the inhibition of this proliferation would greatly reduce the growth of the atherosclerotic plaque.

Reduced Cholesterol Levels

The pronounced effect of fish oil on high blood fats or elevated cholesterol levels is especially well documented and is supported by results of precise dietary studies in which the effects of a diet rich in salmon oil were compared with those of a vegetable oil and a diet high in saturated fat.

Fish oil in particular was shown to lower plasma cholesterol and triglyceride concentrations. Apolipoprotein B production is reduced by consumption of fish oil in comparison with vegetable oils such as safflower or olive oil.

Omega-3 Essential Fatty Acids Are Necessary Components Of Cell Membranes In Infancy

There are two critical periods for the acquisition of essential Omega-3 fatty acids: (1) during fetal development, and, 2) after birth until the biochemical development in the brain and retina is completed. As already noted, the Omega-3 fatty acid DHA is an important constituent of the cell membrane of these neural structures. Omega-3 fatty acid deficiency is manifested in both the blood and in tissue biochemistry. Of note is a strikingly low concentration of DHA, which may fall to as much as one-fifth of the normal amount.

In addition, the body attempts to replace the deficient DHA with another highly polyunsaturated fatty acid of the Omega-6 series. In rhesus monkeys, Omega-3 fatty acid-deficient diets, fed to pregnant animals and then continued after birth, induce profound functional changes such as reduced vision, abnormal electro-retinograms, impaired visual evoked potential, more stereotypic behavior (e.g., pacing), and, perhaps, disturbances of cognition.

Some of these findings have been replicated in infants who were fed formulas deficient in Omega-3 fatty acids. Most studies of premature infants have shown visual impairment and abnormal electro-retinograms. A recent study in full-term infants, in which a standard infant formula was compared with human milk and with formulas enriched with DHA, provided unequivocal evidence of considerable differences in visual evoked potential. In all of the human studies, the biochemical evidence in plasma, red blood cells, and, occasionally, in tissues from autopsied infants has substantiated the Omega-3 fatty acid deficiency state. The lower concentrations of DHA in plasma and erythrocytes are mirrored by lower concentrations in the brain and retina. Formula-fed infants have lower concentrations of brain DHA than do infants fed human milk. They also have lower intelligence quotients. During pregnancy, both maternal stores and dietary intake of Omega-3 fatty acids are of importance in insuring that the baby has adequate amounts of Omega-3 fatty acids at the time of birth.

All the polyunsaturated fatty acids, including DHA, are transferred across the placenta into fetal blood. In addition, EPA and DHA in maternal adipose tissue can be mobilized as free fatty acids bound to albumin and be made available to the developing fetus via placenta transport.

Several studies in monkeys have indicated that when the maternal diet is deficient in Omega-3 fatty acids, the infant at birth is likewise deficient, as evidenced by low DHA concentrations in their plasma and red blood cells. In humans, it was shown that the administration of fish oil or sardines to pregnant women led to higher DHA concentrations in both maternal plasma and red blood cells and in cord blood plasma and red blood cells at the time of birth.

Once membrane phospholipids have adequate concentrations of DHA, there is an avid retention of these fatty acids in the brain and the retina, even though the diet may subsequently be deficient. Several studies illustrate clearly the effects of Omega-3 deficiency in both animals and humans.

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Omega-3 EFAs are essential to your health. You can certainly get them from cod liver oil or fish oil.

If you already have significant sun exposure, then you should not take cod liver oil as you may run the risk of overdosing on Vitamin D. So, you should take fish oil capsules. The standard fish oil capsule is around 180 mg of EPA and 120 mg of DHA. You should take approximately one capsule for every ten pounds of body weight - preferably in two divided doses. Therefore, if you weigh 160 pounds you would take 8 capsules twice a day. If you have problems with belching them up, you may want to consider taking them on an empty stomach.

Cod Liver Oil has the benefit of providing Vitamins D and A. A reasonable dose for cod liver oil is one teaspoon for every 30-40 pounds of body weight. If you use cod liver oil during the summer you will need to be careful of Vitamin D toxicity — please review the information on [Vitamin D Testing](#).

When you take fish oil supplements, or cod liver oil, please be sure and take a good Vitamin E supplement every day, as this will help serve to protect the fat from oxidation. This is less of an issue with cod liver oil as the Vitamin D itself is a potent anti-oxidant.

You will also need extra amounts of the "*fourth and unforgotten*" oil soluble vitamin – Vitamin K. If you are juicing plenty of green vegetables and taking the cod liver oil or fish oil with the juice you should absorb the Vitamin K in the vegetable juice. However, if you have osteoporosis or osteopenia, you will want to consider adding an extra 1000 mcg (1 mg) of Vitamin K per day.

Generally, our diet contains far too much Omega-6 fats. Experts looking at the dietary ratio of Omega-6 to Omega-3 fatty acids suggest that in early human history the ratio was about 1:1. However, currently, most Americans eat a dietary ratio that falls between 20:1 and 50:1. The optimal ratio is most likely around 2:1. For most of us this means greatly reducing the Omega-6 fatty acids we consume and increasing the amount of Omega-3 fatty acids

Please recognize that we get ALL the Omega-6 and Omega-9 fats we need from our normal food base. We do NOT need to take any supplements for these fats. Many of the omega fat supplements you see in health food stores will only serve to worsen your health, ***not improve it***, as they contain Omega-6 fats (and sometimes Omega-9) which will worsen the Omega-3 to Omega-6 ratio

I strongly recommend avoiding sunflower, corn, soy, safflower, canola, or products that contain these oils – i.e., NO hydrogenated, or partially hydrogenated, fats, NO margarine, NO vegetable oil, NO shortening. These oils are chock full of Omega-6 fats, and will worsen the Omega-3 to Omega-6 ratio.

Acceptable oils will be a high-quality, extra virgin olive oil, coconut oil, flaxseed oil, avocados, and organic butter, or better yet, grass-fed organic butter.

Another way to improve your Omega 3:6 ratio is to change the type of meat you are eating. You could consume more game meat, like venison, or other game animals that are raised exclusively on grass type foods. However, these are hard to find and generally more expensive than beef. Since nearly all cattle are grain fed before slaughter, if you eat most traditionally raised beef it will typically worsen your Omega-3 to Omega-6 ratio.

To get the necessary Omega-3 fatty acids, you should consider eating meat that is allowed to "free-range", or in the case of cattle, grass-fed. Unfortunately, you cannot buy this grass-fed beef at your local grocery store. You must be careful as many stores will advertise grass-fed beef, but it really isn't. They do this as ALL cattle are grass fed, but the key is what they are fed the months prior to being processed. Most all cattle are shipped to

giant feed lots and fed corn to fatten them up. You will need to call the person who actually grew the beef, NOT the store manager, to find out the truth.

The least expensive way to obtain authentic grass -fed beef would be to find a farmer who is growing the beef who you can trust and buy a side of beef from him. This way, you save the shipping and also receive a reduced rate on the meat.

An inexpensive, yet effective way to determine if the meat is really from a grass fed animal, is to purchase the ground beef from a store. Slowly cook the beef till done, then drain and collect all the fat. Grass fed beef is very high in Omega-3 fats and will be relatively thin compared to traditionally prepared ground beef. It will also be a liquid at room temperature, as it has very few saturated fats, which are mostly solid at room temperature.

However, most of us live in large urban areas and do not have the time for this process – just as it would be ideal to have an organic garden and grow your own vegetables, a lot of people must elect not to do that for time or space reasons. I love having an organic garden, but, my busy schedule makes it difficult to experience that luxury in the way I would like to. So, if you are convinced, like I am, that grass-fed beef is better for you and you would like the convenience of being able to order it via the Internet, you can buy grass-fed beef online, shipped overnight to your door. For Information, contact HealthStyles4URx @: HealthStyles4U@healthstyles4urx.com

The most popular sources of Omega-3 fats are from fish; however, they should be consumed with caution as many of these sources have been linked to high levels of mercury from the ocean waters. Even the conservative FDA advises all pregnant women to avoid fish during pregnancy as 60,000 children suffer brain injury every year in the US from their mothers having consumed mercury from contaminated fish. The safest fish are Summer, Flounder, Wild Pacific Salmon, Croaker, Sardines, Haddock and Tilapia.

OMEGA-3 FROM PLANTS

by Gabe Mirkin, M.D.



Many people know they need Omega-3 fatty acids to prevent heart attacks, and that they can get lots of Omega-3 Essential Fatty Acids (EFA) from fish. But, most people do not know that the Omega-3 fatty acids in seeds, such as whole grains, may be even more important in maintaining good health than the Omega-3 EFAs found in fish.

Omega-3 fatty acids are the least stable fats in our diet. Whole grains contain lots of Vitamin E to keep the Omega-3s fresh and prevent them from turning rancid, but, Omega-3 fatty acids in fish are not protected by Vitamin E, and, therefore, turn rancid much more quickly than the Omega-3 fatty acids obtained in whole grains.

Three studies, “*The Lyon Heart Study*”, “*The GISSI Prevenzione Trial*”, and “*The Dietary Approaches to Stop Hypertension Study*” have established that Omega-3 fish oils help prevent heart attacks and reduce pain and swelling in diseases such as arthritis, psoriasis, and possibly even asthma. Recent research shows that the Omega-3 alpha linoleic acids (ALA) in seeds, nuts, beans and whole grain, may be as necessary as the Omega-3 in fish oils to prevent heart attacks.

Omega-3 found in fish oils are mostly long-chain fatty acids. Omega-3 in plants, particularly seeds, contains much shorter chains and are weaker than the Omega-3 found in fish. However, the short-chain

Omega-3, particularly alpha-linolenic acid (ALA) found in leafy greens and seeds are converted to the long-chain fatty acids in the human body. Long-chain fish Omega-3 enters blood and cells more rapidly and produces more rapid effects than short-chain plant-based Omega-3.

Over the long haul, humans must get Omega-3 from plants, as well as fish, because all Omega-3s break down very quickly when exposed to oxygen in your body, and you need large amounts of Vitamin E to prevent Omega-3 from turning rancid. Fish oils are extremely low in Vitamin E, while virtually every seed and plant source of Omega-3 is loaded with Vitamin E. Your body stores far more short-chain Omega-3 from plants in your body fat.

Dietary fats are classified by their chemical structure into saturated, polyunsaturated and mono-unsaturated. The polyunsaturated fats are further sub-classified into Omega-3, Omega-6 and Omega-9. Omega-6 polyunsaturated fats form prostaglandins that cause clotting, a thickening of the blood and constriction of arteries that cause heart attacks.

On the other hand, Omega-3 polyunsaturated fats prevent heart attacks and high blood pressure by helping thin blood, relax arteries and prevent clotting. Over millions of years, humans have consumed a diet that contained approximately equal amounts of Omega-6 and Omega-3 Essential Fatty Acids, but over the past 150 years, humans have increased their consumption of Omega-6 by taking in vegetable oils from the seeds of corn, sunflower, safflower, cotton and soybeans.

The Omega-6 fats are used in most prepared foods, frozen foods, margarines, French fries, potato chips, and bakery products. Today, Americans eat a diet with a ratio of Omega-6 to Omega-3 fatty acids that is almost 20 times higher in Omega-6 than Omega-3, instead of the traditional ratio of about 2:1. This abnormally high intake of Omega-6 blocks arteries and causes swelling throughout the body. To meet your needs for short-chain Omega-3 fatty acids found in plants, eat lots of green leafy vegetables, and seeds such as flaxseed, whole grains, beans and nuts.

Omega-3 fatty acids in wild plants, nuts and seeds. Asia Pacific Journal of Clinical Nutrition, 2002, Vol 11, Suppl. 6, pp S163-S173. AP Simopoulos. Simopoulos AP, Ctr Genet Nutr & Hlth, 2001 S St, NW, Suite 530, Washington, DC 20009 USA

HealthStyles4U provides a choice in selection of Omega-3 Essential Fatty Acids from high-quality fish oil, and Omega-3 EFAs from plant sources. In addition, we provide top-quality Flaxseed Oil products, and Tropic Coconut Oil. To preview these products, go to: www.HealthStyles4URx.com, click on the products link, and click on Nutrition Protocols.

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