# Omega 3 Fatty Acids

We have all heard that Americans include too much fat in their diet. On average, most fat from a westernized American diet comes directly from fats and oils, such as from fried foods, salad dressings, sauces and gravies. Other typical American food sources of fat are from meat, poultry, and eggs, milk, cheeses and frozen foods. But what most people do not realize is that Americans generally do not consume enough essential fatty acids– those fats the body cannot produce and therefore must be included in the diet.

Omega-3 and omega-6 fatty acids, or linolenic acids are essential polyunsaturated fatty acids, meaning their sources must come from outside the body. They can then be turned into eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which are used mainly for the synthesis of phospholipids. These phospholipids, in turn, are incorporated into the cell membranes of blood platelets, blood cells and central nervous system cells, as well as many others. DHA, in particular, is a vital component of the phospholipids, which make up the cellular membranes of the brain and retina. Omega-3 fatty acids are more polyunsaturated than omega-6 fatty acids, with the numbers "3" and "6" referring to where the hydrogen atoms affect the carbon chain in their chemical structures, which makes omega- 3 fatty acids more liquid or soft in room temperatures.

**Why are omega-3's important?**

These essential fatty acids form the membrane of every single cell in the body, including brain cells. Thus, these fats influence every process in each cell. Most oils Americans use today contain high amounts of omega-6, but very little omega-3 fatty acids. The body works best when these 2 types of fats are combined in balanced proportions. These essential fatty acids can change the structure of cell membranes, affecting the cell fluidity or its ability to let certain materials in and out of the cell.

**What foods have omega-3 fatty acids?**

Most sources of omega-3's are found in higher fat, cold-water variety seafood, including mackerel, albacore tuna, salmon, sardines and lake trout (See Table 2 – Mercury Levels in Commercial Fish and Shellfish). Other sources of omega-3 fatty acids include tofu, soybean oil, canola oil, flaxseed oil and the flaxseed it is made from. Flaxseed oil is unique because it contains

both omega-3 and omega-6 fatty acids. In fact, flaxseed is the world's richest source of omega-3 fatty acids at 50-60%, which makes it an attractive diet supplement—containing about twice the amount found in fish oils.

Based on current research, dietitians are advising Americans to increase intake of omega-3 fatty acids or include flaxseed supplementation. Here are some reasons why ...

**Omega-3 fatty acids & cardiovascular disease**

A significant reduction in heart disease development is seen in people who consume an omega-3 fatty acid rich diet. Reports also show higher incidence of coronary artery disease in individuals with the lowest concentration of omega-3 fatty acids in the fat tissue.

There are several reasons why omega- 3 fatty acids can affect cardiovascular disease. Omega-3 fatty acids have shown significant impacts on lowering blood cholesterol. Omega-3 acids also reduce blood platelet "stickiness" or prevent blood clot formation. Once platelets "stick" to one another, they release compounds that can promote the formation of atherosclerotic plaque. Or they can form a clot that can lodge in a small artery to cause a heart attack or stroke. Much of the heart research is based on the Greenland Eskimos, who consume large amounts of dietary fat, mostly made up of omega-3 fatty acids. These acids are thought to contribute to their low serum cholesterol and low blood fats, or triglycerides. Their blood was neither sticky nor

## Omega 3 Fatty Acids *continued*

thick, and they had a lower incidence of heart attacks. Thinner blood leads to better circulation. However, it should be noted that high intakes could cause excessive bleeding in some people. Omega-3 fatty acids also increase the flexibility of red blood cell membranes, making it easier for blood to flow through tiny capillaries. Heart attack recurrence with insufficient omega-3 intake has also been shown. Essential fatty acids may also reduce blood pressure, one of the major risk factors involved with cardiovascular disease.

**Omega-3 fatty acids and inflammation**

Omega-3 fatty acids also form chemicals called prostaglandins, thromboxanes and leukotrienes, which control inflammation. Changing dietary fat can either increase or decrease inflammation.

**Table 1**

# Mercury Levels in Commercial Fish & Shellfish

| SPECIES | MERCURY CONCENTRATION (PPM) Mean | Median | STDEV | Min. | Max. | NO. OF SAMPLES | SOURCE OF DATA |
|---|---|---|---|---|---|---|---|
| Fish and Shellfish with the **Highest** Levels of Mercury | | | | | | | |
| MACKEREL KING | 0.730 | N/A | N/A | 0.230 | 1.670 | 213 | GULF OF MEXICO REPORT 2000 |
| SHARK | 0.988 | 0.830 | 0.631 | ND | 4.540 | 351 | FDA 1990-02 |
| SWORDFISH | 0.976 | 0.860 | 0.510 | ND | 3.220 | 618 | FDA 1990-04 |
| TILEFISH (Gulf of Mexico) | 1.450 | N/A | N/A | 0.650 | 3.730 | 60 | NMFS REPORT 1978 |
| Fish and Shellfish with **Lower** Levels of Mercury | | | | | | | |
| ANCHOVIES | 0.043 | N/A | N/A | ND | 0.340 | 40 | NMFS REPORT 1978 |
| BUTTERFISH | 0.058 | N/A | N/A | ND | 0.360 | 89 | NMFS REPORT 1978 |
| CATFISH | 0.049 | ND | 0.084 | ND | 0.314 | 23 | FDA 1990-04 |
| CLAM * | ND | ND | ND | ND | ND | 6 | FDA 1990-02 |
| COD | 0.095 | 0.087 | 0.080 | ND | 0.420 | 39 | FDA 1990-04 |
| CRAB 1 | 0.060 | 0.030 | 0.112 | ND | 0.610 | 63 | FDA 1990-04 |
| CRAWFISH | 0.033 | 0.035 | 0.012 | ND | 0.051 | 44 | FDA 2002-04 |
| CROAKER (Atlantic) | 0.072 | 0.073 | 0.036 | 0.013 | 0.148 | 35 | FDA 1990-03 |
| HADDOCK (Atlantic) | 0.031 | 0.041 | 0.021 | ND | 0.041 | 4 | FDA 1990-02 |
| HERRING | 0.044 | N/A | N/A | ND | 0.135 | 38 | NMFS REPORT 1978 |
| LOBSTER (Spiny) | 0.09 | 0.14 | ‡ | ND | 0.27 | 9 | FDA SURVEY 1990-02 |
| MACKEREL (N.Atlantic) | 0.050 | N/A | N/A | 0.020 | 0.160 | 80 | NMFS REPORT 1978 |
| OYSTER | 0.013 | ND | 0.042 | ND | 0.250 | 38 | FDA 1990-04 |
| PERCH OCEAN * | ND | ND | ND | ND | 0.030 | 6 | FDA 1990-02 |
| POLLOCK | 0.041 | ND | 0.106 | ND | 0.780 | 62 | FDA 1990-04 |
| SALMON | 0.014 | ND | 0.041 | ND | 0.190 | 34 | FDA 1990-02 |
| SARDINE | 0.016 | 0.013 | 0.007 | 0.004 | 0.035 | 29 | FDA 2002-04 |
| SCALLOP | 0.050 | N/A | N/A | ND | 0.220 | 66 | NMFS REPORT 1978 |
| SQUID | 0.070 | N/A | N/A | ND | 0.400 | 200 | NMFS REPORT 1978 |
| TILAPIA | 0.010 | ND | 0.023 | ND | 0.070 | 9 | FDA 1990-02 |
| TROUT (Freshwater) | 0.072 | 0.025 | 0.143 | ND | 0.678 | 34 | FDA 2002-04 |
| TUNA (Canned, light) | 0.118 | 0.075 | 0.119 | ND | 0.852 | 347 | FDA 2002-04 |
| WHITEFISH | 0.069 | 0.054 | 0.067 | ND | 0.310 | 28 | FDA 2002-04 |

# Omega 3 Fatty Acids *continued*

Prostaglandins are regulatory chemicals, which actually inhibit inflammation. Clinical studies have shown benefits in the treatment of many chronic allergies and inflammations including rheumatoid arthritis, asthma, eczema, psoriasis, lupus and ulcerative colitis. Omega-3 intake may affect inflammation by decreasing stickiness of blood platelets, decreasing an autoimmune response, reducing total saturated fat intake, and normalizing the essential fatty acid levels found in the blood. The overall goal is to lower arachidonic acid levels in tissue while increasing omega-3 levels.

**Omega-3 fatty acids and cancer**

Cancer and diet have demonstrated a strong link in certain cancers, especially in breast, colon and prostate. Omega-3's and prostaglandins are vital to a strong immune system. Prostaglandins also affect the liver's efficiency to detoxify cancer-causing substances. Omega-3 fats appear to delay the development of tumors and decrease the rate of growth, size and numbers of tumors. Flaxseed supplementation appears to especially lower cancer risk because of the fiber content of flaxseed. Omega-3 fats are also one of the largest sources of lignans, special plant compounds with anticancer properties.

**Omega-3 fatty acids and diabetes**

Without healthy cell membranes, cells lose their ability to hold water and nutrients, as well as their ability to communicate with one another. Simply, cells do not function properly. As previously mentioned, omega-3 fatty acids affect cell membrane structure. Studies show that omega-3 fatty acids can prevent the development of insulin resistance, which may indicate that membrane fluidity may play a vital role in the development of diabetes. Omega-3's also appear to improve insulin action. Dietary profiles linked to non-insulin diabetes (NIDDM) reflect a high level of saturated fat and insufficiency of essential fatty acids.

**Conclusion**

Omega-3 fatty acids are not only important to the prevention and treatment of chronic diseases, they are to prevent drying,

**Table 2**

## American Heart Association

*Recommendations for Omega-3 Fatty Acid Intake*

| Population | Recommendation |
|---|---|
| Patients without Coronary heart Disease (CHD) | Eat a variety of fish (preferably fatty fish) at least twice a week. Include oils and foods rich in canola alpha-linolenic acid (flaxseed, and soybean oils; flaxseed and walnuts) |
| Patients with CHD | Consume about 1 g of EPA + DHA per day, preferably from fatty fish. EPA + DHA supplements could be considered; consult with physician |
| Patients who need Lower triglycerides | 2-4 g of EPA + DHA per day provided as capsules under a physician's care |

## Omega 3 Fatty Acids *continued*

flaking, and general deterioration of skin, and to ensure normal growth and development in infants and children. They also produce prostaglandins, chemicals that regulate a wide variety of body processes, including cardiovascular and kidney function, cell healing and repair processes, immune system function, inflammatory and nervous system function, as well as other cellular systems. Omega-3 fatty acid intake should be combined with a healthy diet and a goal of maintaining a healthy body weight. Overall dietary intake of fat should only be 30% of total calories, with saturated fat contributing to 10% of total calories.❖

Written by Catherine Hahn, MS RD – Dietitian at Rainbow Rehabilitation Centers, Inc.



RainbowVisions Magazine
Rainbow Rehabilitation Centers, Inc.
5570 Whittaker Road, Ypsilanti, MI 48197, USA
E-mail: rainbowvisions@rainbowrehab.com