

Fish Oil and Your Health

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Introduction

The discovery that fish oil may have unique benefits in the fight against coronary heart disease has stimulated a tremendous amount of research which this publication summarizes. Although the subject is complex, the study of fish oils is very worthwhile because it provides a totally new perspective on the relationship of diet to coronary heart disease.

We have been inundated with oversimplified information about the effects of diet on blood cholesterol. It has led most people to believe that low blood cholesterol achieved by eating a low cholesterol diet is the one and only key to good health, particularly good heart health. Because of this, when the health benefits of fish oil were first reported, most people assumed that its primary benefit is the lowering of blood cholesterol. The health benefits of fish oil, however, are primarily related to the reduction of platelet activity, not the reduction of blood cholesterol. While some studies do show that fish oil moderately reduces blood cholesterol, it has been shown to increase blood cholesterol in many other studies. While attaining a low blood cholesterol is considered healthy, it is only one of many factors affecting heart disease which must be considered. This publication explains more fully the relationship of diet to coronary heart disease and the health benefits of fish oil.

The Benefits of Fish Oil

Fish oil has many names. One of the most common is omega-3 fatty acid or its scientific abbreviation, N-3. N-3 fatty acids are found mostly in fish, but are contained in other foods as well. Fish oil is the best food source of these fatty acids.

The primary benefit of N-3 fish oil is the reduction of platelet activity (blood clotting) and plaque formation which in turn can prevent heart attacks. Here's how it works.

Platelets are clot-forming blood cells which prevent excessive bleeding. Overly active platelets, however, may speed the build-up of plaque, a deposit of fatty or fibrous material which narrows a blood vessel wall. Elevated blood cholesterol also contributes to the acceleration of plaque formation. When plaque narrows an artery it is easier for a blood clot to get stuck in the artery and this can cause a heart attack. Because platelets also form blood clots, this is likely to occur. That's why it is desirable to reduce platelet activity and why N-3 fatty acid, fish oil, is beneficial.

Atherosclerosis

Plaque build-up and narrowing of an artery is called atherosclerosis. It is a disease of aging which begins early in life. The process of this disease is complicated, involving monocytes (white blood cells), platelets, various tissue cells, low-density lipoproteins (LDL), as well as cholesterol. Plaque itself is made not just of cholesterol, as commonly believed, but also fat, smooth muscle cells, calcium, and other components.

Atherosclerosis starts when the cells which cover the inner surface of a blood vessel become injured. Monocytes and platelets, both found in plaque, adhere to the injured area and attempt to repair it. Monocytes encourage the formation of foam cells and platelets stimulate the movement of smooth muscle cells into the

injured area. All of these cells begin to accumulate in the blood vessel and it becomes progressively more narrow.

Fish oil, N-3 fatty acid, reduces the activity of monocytes and platelets, cell production, narrowing of the arteries, and the chance of blood clots and heart attack. Some research indicates that fish oil reduces the risk of heart attack even in people who already have extensive atherosclerosis.

Polyunsaturated, Saturated, N-6, and N-3 Fatty Acids

There are more than twenty different types of fatty acids commonly found in food. In general, all foods contain most of the twenty types of fatty acids to some degree. Saturated and polyunsaturated fatty acids are two types we hear a lot about. As all foods and oils contain most of the different types of fatty acids to some extent, even polyunsaturated vegetable and fish oils contain some saturated fat. Fish oil, the most polyunsaturated of all oils, contains 15% to 30% saturated fat. Thus the terms polyunsaturated and saturated are inadequate to accurately describe fat or oil.

All polyunsaturated fatty acids are different and so have different health effects. And all fats, polyunsaturated or saturated, have both health benefits and drawbacks. For example, vegetable oil, an N-6 polyunsaturated oil, is often promoted for lowering blood cholesterol and undesirable low-density

lipoproteins (LDL). However, it may increase the chance of heart attack by lowering high-density lipoproteins (HDL) which keep arteries clean, and by increasing the activity of platelets and monocytes, which is reduced by N-3 oils (von Schacky 1987). Advertisements which promote the health benefits of one oil over all others are again providing over simplified information. Every oil has its health benefits and drawbacks. None is a cure-all. The important N-3 and N-6 fatty acids of foods are shown in the table below.

How N-3 and N-6 Fatty Acids Affect Your Health

N-3 and N-6 fatty acids have negative and positive health effects. N-6 fatty acids encourage the formation of eicosanoids called prostaglandins and leukotrienes. These are potent chemicals which can increase platelet and monocyte activity respectively, thus increasing the risk for heart attack. The good news is that both N-6 and N-3 fatty acids reduce certain lipoproteins which carry plasma lipids (fatty materials) in the blood plasma. Plasma lipids consist partly of cholesterol and triglycerides. The reduction of lipoproteins in effect reduces plasma lipids and ultimately helps prevent atherosclerosis and heart disease.

N-6 and N-3 fatty acids compete with each other. Therefore, the amount of N-6 and N-3 fatty acids, the N-6/N-3 ratio, is very important. Americans eat 17 times as much N-6 fatty acid, usually in the form of vegetable oil, as they eat N-3, which is very

Some Important N-3 and N-6 Fatty Acids of Foods

Fatty Acid	Type	Abbreviation	Major Food Sources
α-linolenic	N-3	α-LA	flax, canola, fish oil
eicosapentaenoic	N-3	EPA	oily fish
docosahexaenoic	N-3	DHA	oily fish
linoleic	N-6	LA	soybean, safflower, sunflower, corn oils
arachidonic	N-6	AA	traces in meat, fish, poultry

unhealthy. Ideally people should eat approximately 5 times as much N-6 fatty acid as N-3 fatty acid, a 5/1 ratio. The health benefits are an increase in prostacyclin and a decrease in thromboxane. Prostacyclin reduces platelet activity (clotting) and prevents heart attacks by preventing arterial spasms. A decrease in thromboxane is also desirable because it increases platelet activity and arterial spasms, the opposite effect of prostacyclin.

The N-3 Fatty Acid in Fish

The amount of N-3 oils varies in different types of fish. It is commonly believed that only saltwater fish contain significant levels of N-3 fatty acids. This is not true. Freshwater fish from cold northern waters, including Lake Superior, can have significant levels as well (Wang et al. 1990).

For maximum benefits, fish with a high N-3 oil content should be prepared without additional oil by baking, broiling, or grilling. Preparing fish with batter, breading, or by frying reduces health benefits significantly. The result is a less desirable N-3/N-6 ratio when vegetable oil (N-6) is added during preparation.

Fish oils, like any food, have disadvantages as well as benefits. Because fish oils are highly polyunsaturated they become rancid quickly.

Although this usually has no effect on the nutritional value, eating rancid fish is obviously not a good idea. Because rancid fish smell fishy, they are not very appetizing. Proper storage and short storage periods can alleviate the problem of rancidity.

Alternative Sources of N-3 Fatty Acids

There are other sources of N-3 fatty acids such as fish oil capsules, canola oil, and flax oil. Use of fish oil capsules should be done only with the recommendation of your doctor, who should also specify the brand. Canola and flax oils have less potent forms of N-3 fatty acids and would need to be eaten in approximately 20 times the amount to get comparable benefits of consuming fish oil rich in N-3 fatty acids.

Dietary Recommendations

It is best to eat a variety of oils in moderate quantities given the wide range of effects of different oils. In general, you should eat more N-3 fatty acids and less N-6 vegetable oil to attain a more balanced N-3/N-6 ratio. Recent studies suggest that eating 0.5 to 1 gram of fish oil daily reduces the risk of heart disease death in middle-aged American men by 40 percent. The most efficient way to add these important oils to your diet is to eat two meals per week of fish rich in N-3 fatty acids prepared without additional oil.

The following are recommended saltwater and freshwater fish with a high N-3 oil content:

albacore	lake trout
black bass	mackerel
bluefish	pompano
carp	salmon
channel catfish	tuna (water-packed)
herring	whitefish
lake herring	

Fish not recommended are those with low levels of N-3 oils. They are:

cod	shark
flounder	snapper
haddock	sole
halibut	walleye
grouper	whiting
pike	

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