Fish, Omega-3 Fatty Acids and You

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Fat is often a word that has negative health implications, but it is becoming increasingly evident that some fats can be good for you - particularly those known as Omega-3 fatty acids.

The health benefits of Omega-3 fatty acids are being praised by medical professionals and nutritionists; they are known to play important roles in preventing cardiovascular disease, and recent scientific evidence reveals that they can relieve symptoms of chronic disorders such as depression and arthritis as well.

Most of this evidence points towards one particular Omega-3 fatty acid, Docosahexanoic acid (DHA), as being the most important for the body. It has also been found to be crucial for the proper development and functioning of neural and eye tissue, especially for pre-term infants, and infants that are not breastfed.

Although many grain products and plant foods are dietary sources of Omega-3 fatty acids, only one food can naturally give you the recommended dietary amount of DHA: fish.

What are Omega-3 fatty acids?

Omega-3's are unique long-chain polyunsaturated fatty acids (PUFA's). There are three types of Omega-3 fatty acids, and each type differs in its chemical structure and physiological role. The major types of Omega-3 fatty acids are:

- Alpha linolenic acid (ALA)
- Eicosapentanoic acid (EPA)
- Docosohexaenoic acid (DHA)

Each Omega-3 fatty acid has been scientifically proven to be necessary for the proper maintenance of human and animal health. A deficiency in any or all of the Omega-3 fatty acids can result in scaly skin, kidney malfunction, reproductive problems, cardiovascular problems and heart arrythmias. A deficiency in DHA can also result in visual or neurological disorders, particularly in infants.

Omega-3 fatty acids are considered 'heart healthy' fats – they are highly unsaturated, and scientific studies show that unsaturated fats do not promote hardening of the arteries, which can lead to high blood pressure, weakened heart and arterial tissue, and strokes.

Most importantly, Omega-3 fatty acids are nutritionally essential. Humans lack the enzymes required to produce Omega-3 fatty acids from other types of ingested fatty acids, so Omega-3 fatty acids must be acquired from the diet.

RICHARD MOCCIA

Farmed trout and salmon are excellent sources of essential fatty acids like DHA.

The Health Benefits of DHA

DHA has been the focus of intense scientific study in recent years, and these studies indicate that in addition to reducing the risk of cardiovascular disease, DHA can also be beneficial (when consumed at the recommended levels, or greater) for the following:

- Relief of symptoms from depression, schizophrenia, anxiety, bi-polar disorders and inflammatory diseases such as rheumatoid arthritis
- Improved immune function
- Protection against breast cancer in postmenopausal women
- Improved learning ability and visual performance in infants

DHA and EPA, and to a much lesser extent, ALA are accumulated in the membranes of the heart, blood cells, and other tissues. These fatty acids help keep the membranes fluid, aiding in the normal functioning of cells and tissues. DHA and EPA levels are high in these tissues, but DHA is the most abundant Omega-3 found in the brain and retina, accounting for more than 50% of the total unsaturated fatty acids present.

Dietary Importance of DHA

It is important that people consume foods that are rich in DHA. ALA is naturally present in vegetable and plant foods, because unlike humans, plants are able to synthesize ALA. Humans are able to make small quantities of DHA and EPA from ingested ALA, but the conversion is thought to be very inefficient. In fact, a very recent study could not detect any conversion from ALA to DHA and EPA in adults.

Did you know...

Long-term consumption of oily fish (2-3 servings per week) has been shown scientifically to reduce the risk of heart attack and death from cardiovascular disease.

In infants, the conversion is also low – about 1%. This has serious implications for the proper development of infants in the womb, and after birth. Infants receive DHA from their mothers, and it is therefore important that pregnant and nursing mothers receive ample dietary DHA. Premature infants are at the greatest risk; accumulation of DHA in brain and retinal tissue is greatest in the last trimester of pregnancy.

Infants that are fed formulas, rather than breast milk are also at risk – infant formulas lack sufficient levels of DHA, or provide DHA that is less readily absorbed than that found in breast milk. Clinical studies have shown that infants not receiving the recommended amount of DHA perform poorly on learning and visual acuity tests.

Recommended Dietary Intakes of DHA

At this time, Health Canada does not have specific recommendations for DHA intake. However, in a workshop held in 1999, the National Institutes of Health concluded that healthy adults should consume 650 mg/day of EPA and DHA (combined). For those with existing coronary disease, the American Heart Association recommends a daily intake of 900 mg of EPA and DHA combined.

However, most Canadians do not achieve either recommendation. It has been estimated that the typical daily intake of EPA/DHA is approximately 100-150 mg/day (15% of the National Institutes of Health recommended amount), and that EPA and DHA only account for 10% of total ingested Omega-3 fatty acids.

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Retail grocery stores continue to expand and improve their fresh seafood display counters.

Fish – The Best Source of DHA

Given the fact that DHA is a major component of brain and eye tissue, there may be some truth to the old wives' tale that fish is 'brain-food'. Fish is naturally rich in DHA, especially cold-water species such as salmon, trout, mackerel, halibut, and tuna. Due to their high DHA content, these fish are sometimes called 'oily'. Consuming two to three servings of 'oily' fish per week will help to achieve the National Institutes of Health dietary recommendation for DHA.

Although plant and vegetable foods and oils are richest in ALA, they are completely lacking in both DHA and EPA. Meats (pork, beef, chicken, and lamb) and dairy products provide only trace amounts.

Did you know...

Despite the fact that their cholesterol levels are comparable to North Americans, the Japanese and Inuit of Greenland have a significantly lower rate of death by heart attack, heart disease and atherosclerosis. These people eat diets containing higher amounts of oily fish and marine mammals (rich sources of EPA and DHA) than do North Americans.

The reason cold-water fish species contain high levels of DHA is simple – they eat other fish, algae and zooplankton, which are also extremely high in DHA. This Omega-3 fatty acid thus accumulates in their muscle tissue, making the fillets we eat high in DHA. The high levels of DHA is of biological significance to fish; this fatty acid keeps their membranes fluid and functioning properly in the cold temperatures in which they live, allowing them proper movement and survival. It can also be used as an energy source, allowing them to grow, or survive periods of starvation when food is unavailable.

Other popular meats – beef, pork, chicken, and lamb- cannot have high levels of DHA because these animals are fed plant-based diets. Consequently, their tissues are high in ALA, but low in EPA and DHA.

Farmed fish - A High Quality Source of DHA

With the decline in capture fisheries in North America, the aquaculture industry, or fish farming, has grown rapidly – and provides consumers with fresh, high-quality fish. Canadian aquaculture produces 30-40% of the fish you will find at your local grocery store seafood counter. Two cold-water 'oily' fishes, Atlantic salmon and rainbow trout, are the most dominant species produced in Canada, and each of these species is not only an excellent dietary source of DHA, but protein as well.

Farmed fish is a high quality food product – these fish are fed diets containing fishmeal and fish oils, meaning that they are constantly receiving a supply of DHA that can be deposited in their muscle tissue, ensuring that levels of DHA remain consistent. Fish caught in the wild can sometimes vary in their DHA content due to the availability of food, and what time of year they are caught.

Table 1: Comparison of Omega-3 fatty acid levels in selected foods (g per 100 g serving)

Food Type	DHA	EPA	ALA
Seafood (Cooked)			
Salmon (farm-raised)	1.45	0.69	0.1
Trout (farm-raised)	0.82	0.3	0.08
Halibut	0.4	0.1	0.1
Mackerel	0.7	0.5	0.1
Cod	0.17	0.1	0.04
Tuna (canned in water)	0.2	0.05	trace
Meat and Poultry (Cooked)			
Beef	Trace	Trace	0.03
Pork	Trace	Trace	0.38
Lamb	Trace	Trace	0.06
Veal	Trace	Trace	0.03
Chicken (Breast)	Trace	Trace	0.03
Chicken (Leg)	Trace	Trace	0.08
Plant-derived foods			
Flaxseed	0	0	22.7
Walnuts	0	0	6
Canola Oil	0	0	10
Soya Oil	0	0	7
Beans (Legumes)	0	0	0.4
Sweet Potatoes	0	0	3
Dairy Products			
Butter	0	0	0.25
Cow's Milk	0	0	0.68

To reap the benefits of DHA, make fish a regular part of your diet.

Further Reading

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