

"Integrating the Nutrition-Health connection"

Vol 9, #1

## ***Health Benefits of Fish oil: Chronic pain, disc herniation, osteoarthritis, cardiovascular disease, depression etc.***

Dan Murphy (DC, DABCO) is a renowned lecturer and highly respected authority on the importance of omega 3 fatty acids in our diet. Modern diets are lacking in these essential nutrients, and working them back into diets can impact many health aspects. Wild game has the omega 3's incorporated in the fat, since the animals derive alpha linolenic acid naturally from leafy plants, however this is difficult for modern man to do without eating fish. Dr. Murphy has presented recent and comprehensive research on this subject, and in this newsletter, we delve into the enormous possibilities of the health benefits for the omega 3 fats found in fish oil.

*"The type of fat you eat changes the tiny structures of brain cells. This minor change, when multiplied by the billions, alters your brain functioning and consequent behavior...Omega 3 essential fatty acids are especially critical for the development and function of our nervous system and brain...I believe that the primary effects of a chiropractic adjustment are neurological. Neurological function is dependent upon omega 3's. Consequently, I believe that understanding and incorporation of omega-3's into chiropractic clinical advice will enhance the neurological benefits of the adjustment, benefiting the patient, the society, and the species." Dr. Dan Murphy*

### **Areas of health benefits include:**

Chronic pain/swelling  
Inflammation  
Immunoregulatory  
Disc herniation  
Osteoarthritis  
Depression  
Autoimmune (i.e. RA, Lupus, etc.)  
Diabetes  
Insulin Sensitivity  
Alzheimer's  
Colitis

Anti-Aging  
Cardiovascular  
Cholesterol  
Triglycerides  
Plaque prevention  
MS  
Asthma  
Allergies  
Psoriasis, dermatitis  
Organ transplant survival  
Kidney function  
Vaccination

**Horrocks, L.A. & Young, K.Y. Health benefits of docosahexaenoic acid. Pharmacological Research 1999 Sep;40(3):211-25 (as cited by Dr. Dan Murphy).**

DHA is taken up in the brain in preference to other fatty acids, and the turnover is extremely fast. DHA is essential for infant brain development and adult brain/nerve function. It also increases learning ability and visual acuity, and decreases cholesterol and triglycerides. DHA deficiencies are associated with ADHD, dyslexia, behavioral problems, unipolar depression, aggressive hostility, cystic fibrosis, Alzheimer's, dementia, schizophrenia, and cognitive impairment, among other disorders. "DHA is the principal active component in fish oil for cardiovascular protection...DHA selectively attenuates expression of pro-atherogenic and pro-inflammatory proteins, possibly explaining a positive effect of DHA on atherosclerosis, whereas EPA is apparently the more potent inhibitor of platelet aggregation".

Dr. Murphy also points out that DHA regulates normal neural functions. The outgrowth of neurites (synaptogenesis/neuroplasticity) is induced by nerve growth factor and is promoted by DHA and suppressed by arachidonic acid. Part of the unique function of DHA in the nervous system is to relate to the synthesis of phospholipids for membranes needed for neurite elongation. \*The stress connection: chronic stress mobilizes the fatty acids from the neuronal membrane and increases peroxidation of the fatty acids.

The shorter chain omega 3, alpha linolenic acid (found in flax oil for example), is not readily converted to DHA. Ten to 40 g of flaxseed oil are necessary for the production of 200 mg. of DHA (lower end of recommended intake).

*DHA is associated with reduced C reactive protein, which is an independent risk factor for heart disease, and a marker of inflammation that is becoming important as it relates to several diseases with suspected inflammation etiology. "The inverse correlation between CRP and DHA may reflect an anti-inflammatory effect of DHA in patients with stable coronary artery disease and suggest a novel mechanism by which fish consumption may decrease the risk of coronary artery disease"* (Madsen T et al. C-reactive protein, dietary n-3 fatty acids, and the extent of coronary artery disease. Am J Cardiol 2001 Nov 15;88(10):1139-42).

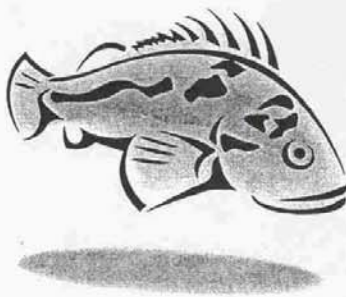
## **COMPLETE OMEGA-3 ESSENTIALS™:**

*Researched by and formulated for Dr. Dan Murphy*

Omega 3 oil is molecular distilled, pharmaceutical grade, from wild fish and has been independently tested for mercury, PCB's, Dioxins, Furans and rancidity and complies with the CRN Monograph. These are the absolute freshest oils available, and have been encapsulated in opaque capsules (colored with natural carob) to further preserve this unique freshness.

Each two soft gel capsules contain: EPA 600 mg, DHA 300 mg, ALA (Alpha-Linolenic Acid) 100 mg, Vitamin E, D-Alpha Tocopherol (natural) 100 i.u., Mixed Natural Tocopherols 2 mg.





## Fish Oil – Why does it work?

Fish oil contains the two most highly unsaturated and flexible fatty acids – EPA (eicosapentaenoic acid) and DHA (docosahexanoic acid). These fatty acids get incorporated into cell membranes, and from there they influence a wide variety of cellular functions. They do this mainly by:

1. Increasing flexibility in the cell membrane, allowing for better communication, cell function, and communication with other cells.
2. Increasing ability to regulate physiological functions by creating a unique composition of the receptor environment (for hormones, neurotransmitters, bioactive peptides (proteins), etc.).
3. Increasing therapeutic effects from a beneficial ratio of fatty acid metabolites, or eicosanoids (prostaglandins, thromboxane, leukotrienes, etc.)
4. Increasing signaling power for the immune system, i.e. influence on cytokines, macrophages, prostaglandins, leukotrienes, MHC complex, etc.
5. Altering gene expression of cytokines, adhesion molecules, nitric oxide synthase, etc.
6. Long chain fatty acids, especially DHA, are needed for development and maintenance of the brain and nervous system.

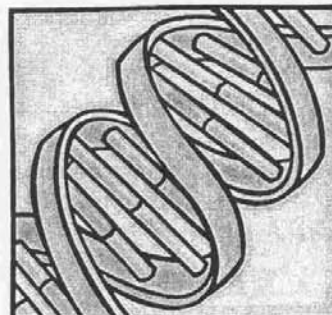
### Increased flexibility and ability to regulate physiological functions cellular/intercellular communication:



**Membrane flexibility:** Saturated fat and trans-fat make a cell membrane rigid and inflexible, however fish oil makes the membrane fluid and better able to carry out cellular functions. For instance, insulin receptors migrate to the surface more easily when the membrane is fluid, and consequently increase insulin sensitivity. Insulin insensitivity is a major health problem at the root of Syndrome X, and results in diabetes type 2 when it is not controlled. Unsaturated fatty acids such as those found in fish oil can act favorably upon receptor-operated calcium channels, preventing an intracellular build-up of free calcium (calcium

channel blockers are drugs that lower high blood pressure).

**Unique receptor environment:** Our bodies produce chemical messengers, such as hormones, neurotransmitters, and other bioactive proteins that influence cell physiology by attaching to receptor sites on the membrane. While the receptors are made of protein, they are embedded into a lipo-protein structure that determines the structure and function of the receptor, and consequently the interaction with bioactive messengers, and ultimately the cell's physiological function. The more fluid the membrane, the better the interaction between the messenger and the receptor.



# PAIN/INFLAMMATION AND THE IMMUNE SYSTEM



**Fish oil and eicosanoids:** The fatty acids in fish oil, EPA and DHA, have beneficial effects when they are broken down into metabolites in the eicosanoid pathway. The omega 3 oils make eicosanoids that possess therapeutic properties, and they have the ability to counteract some of the "not-so-beneficial" eicosanoids made from arachidonic acid. The "not-so-beneficial" eicosanoids include thromboxane A<sub>2</sub> (TxA<sub>2</sub>) (potent blood clotter), prostaglandin E<sub>2</sub> (PGE<sub>2</sub>) (pain and inflammation, affects immune system), and leukotriene B<sub>4</sub> (LTB<sub>4</sub>) (pro-inflammatory). The effect of fish oil on reducing pain and inflammation, and thinning the blood and creating a healthy heart profile, is attributed mostly to this eicosanoid pathway.

Many degenerative diseases, such as atherosclerosis and heart disease, are suspected of being caused, at least in part, by an inflammatory state. **PGE<sub>2</sub> is a major eicosanoid involved in chronic pain syndromes, herniated discs, and all conditions associated with pain and/or inflammation!**

**Fish oil and signaling power for the immune system:** The fatty acids in fish oil can influence the immune system, and the autoimmune system, by their effect on cytokines, macrophages, and the MHC complex. Cytokines and macrophages are immune defense molecules highly involved in the inflammatory response, and the MHC class II complex is a genetically set cell coding system that determines susceptibility to autoimmune disease.

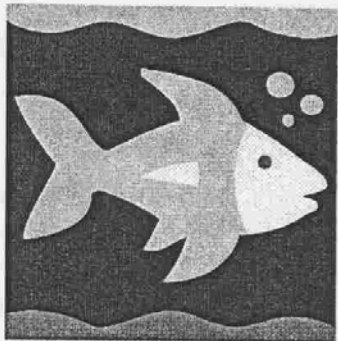
"Inclusion in the diet of high levels of omega 3's significantly reduces the movement of human monocytes towards chemotactic agents and the production of proinflammatory cytokines by human mononuclear phagocytes... Such omega 3-induced effects may be of use as a therapy for acute and chronic and for disorders which involve an inappropriately-activated immune response" (Kremer, JM (ed.) Progress in Inflammation Research: Medicinal fatty acids in inflammation. Birkhauser Verlag, 1998, as cited by Dan Murphy, DC, DABCO).

Additionally, fish oil affects T-cells, adhesion molecule expression, signal transduction and MHC class II expression (autoimmune expression) (Immunoregulatory and anti-inflammatory effects of omega 3 polyunsaturated fatty acids. Brazilian Journal of Medical and Biological Research 1998 Apr;31(4):467-90, as cited by Dan Murphy, DC, DABCO).

**Inflammatory Joint Disease:** "Whereas the eicosanoids may mediate much of the early pathology of inflammatory joint disease, such as swelling, pain, and leukocyte infiltration, cytokines have been implicated in the late, destructive phase of the disease, which includes cartilage loss, bone resorption, and, ultimately, joint failure... A beneficial clinical effect of dietary supplementation with fish oil on rheumatoid arthritis was observed in at least 11 double-blind, placebo-controlled studies" (James, MJ et al. Dietary polyunsaturated fatty acids and inflammatory mediator production. AJCN 71(1);343S-348S, Jan 2000.)



# The Research on Fish Oils *(as cited by Dan Murphy, DC)*



One long (23 pages) detailed article, containing 172 references, touts some of the many health benefits of fish oil. The benefits include positive influences on: **Inflammation, pain, swelling, kidney function, MS, rheumatoid arthritis, psoriasis, autoimmune diseases, cardiovascular disease, organ transplant, asthma, diabetes, inflammatory bowel, hypersensitivity/allergy, non-rheumatoid joint inflammation, gene expression, immune cells, fever, erythma, vascular permeability, edema, and others** (Calder PC. Immunoregulatory and Anti-inflammatory Effects of n-3 Polyunsaturated Fatty acids. *Brazilian J Med and Biol Res* 1998;31(4):467-90.)

This article also pointed out that fish oil acts on receptor operated calcium channels. Calcium channel blocker drugs, used to regulate **high blood pressure**, operate on a similar mechanism. Additionally, the effect on gene expression, of factors such as cytokines, adhesion molecules, and nitric oxide synthase, can affect cell membrane receptor proteins which alters the membrane's sensitivity to inflammatory mediators. This is yet another way in which fish oil can modulate the inflammatory response.

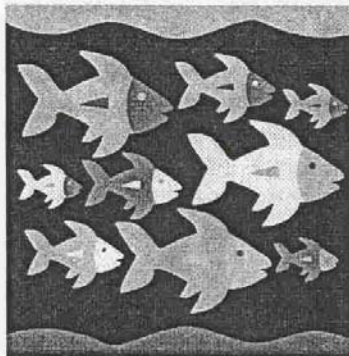
**Allergy:** Dietary intake of the omega 6's (arachidonic acid) was positively associated with seasonal allergic rhinoconjunctivitis (Wakai, K. et al. Seasonal allergic rhinoconjunctivitis and fatty acid intake: A cross-sectional study in Japan. *Ann Epidemiol* 2001 Jan;11(1):59-64.) Omega 3's from fish oil competitively inhibit the production of all the inflammatory modulators from omega 6's. Other atopic diseases such as bronchial asthma and atopic dermatitis are characteristically associated with an imbalance between different types of T cells and cytokines, leading to an increase of IgE and histamine, which gives rise to allergic symptoms (Strannegard O and Strannegard I.L. *Allergy* 2001;56(2):91-102).



**Stroke:** In a study of almost 80,000 women in the Nurses' Health Study, those with higher intakes of fish had a lower risk of stroke. In a subgroup of the study, significantly reduced risk of thrombotic infarction was found in the women who ate fish 2 or more times per week. Mechanisms may include: inhibition of platelet aggregation, lowered blood viscosity, suppressed formation of leukotrienes, reduction of plasma fibrinogen blood pressure levels, and reduction of insulin resistance (Hiroyasu I, et al. Intake of fish and omega 3 fatty acids and risk of stroke in women. *JAMA* 2001;285(3) Jan 17:304-312).

**Prostate cancer:** Studies support an inverse association between omega 3 fatty acids from fish and prostate cancer. It is supposed that the mechanism may have something to do with the high concentration of EPA in people who consume fish, and that the EPA **"can lead to important changes in relative concentrations of tumor growth-enhancing prostaglandins"** (Terry, P. et. al. Fatty fish consumption and risk of prostate cancer. *The Lancet* 2001;357 June 2:1764-1766).

## The Research on Fish Oils (cont'd)



**Bipolar disorder/depression:** Omega 3 fatty acids improved the short-term course of illness in a preliminary study of patients with bipolar disorder. The omega 3 group performed better for nearly every outcome measure (Stoll, A.L. et al. Omega 3 fatty acids in bipolar disorder: a preliminary double-blind, placebo-controlled trial. *Arch Gen Psychiatry* 56(5):407-12).

"Fish oil blocked the abnormal signaling in the brain which we think is present in mania and depression" – Andrew Stoll, lead researcher in a study published by the *Am Med Assoc Arch Gen Psychiatry* (Fatty oil in fish eases depression. *Reuters* May 14, 1999). Also, "Stoll said **omega 3 fatty acids boost levels of the neurotransmitter serotonin in the brain** – similar to the effect of

popular anti-depressants such as Prozac". One of the mechanisms may be that the omega 3's replenish the lipid bilayer surrounding brain cells that receive signals from chemical transmitters. As Dr. Murphy points out, the fat we eat affects the ability of neurotransmitters like serotonin and dopamine to dock on membrane receptor sites and initiate their respective physiological functions.

**Cholesterol/Triglycerides:** Omega 3's lower LDL cholesterol, and have a favorable effect on reducing triglycerides also (Hu, F.B. *JAMA* 2002;288(20):2569-2578).

**Sudden death/arrhythmia:** A randomized trial suggested that dietary supplements of omega 3's might reduce the risk of sudden death among survivors of a heart attack. The main cause of sudden death among these men is cardiac arrhythmia. Other evidence supports the association of the omega 3's with reduced risk of sudden death among men who have not experienced prior cardiovascular disease (Albert, C. et al. Blood levels of long chain n-3 fatty acids and the risk of sudden death. *NEJM* Apr 11, 2002;346(15):1113-118.)

**Brain development/regeneration of nerve cells:** Consumption of omega 3's by eating fish once a week significantly reduces risk of Alzheimer's (Barberger-Gateau, P. et al. *British Medical Journal* 2002;325 Oct 26:932-933). This article also noted a specific role of the omega 3 fatty acids in the regeneration of nerve cells.

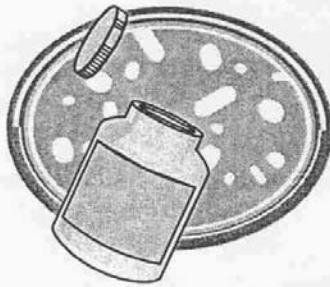
**Osteoarthritis:** Supplementation with omega 3's reduced the release of proteoglycan metabolites from articular cartilage and abolished aggrecanase and collagenase activity (Curtis, C.L. *Arthritis and Rheumatism* 2002;46(6):1544-1553). Also, as Dr. Murphy points out, supplementation of omega 3's can be important in both quiescent and active osteoarthritis.



**Back Pain/Disc Herniation:** PGE2 is the principal mediator related to the induction of sciatica and low back pain. It provokes ectopic firing of nerve roots, indicating that it may play a part in the chemical irritation of nerve roots. Dorsal root ganglion neurons can be sensitized by PGE2. "PGE2 possesses the capability of causing pain, or enhancing pain-inducing substances such as bradykinin...It is suggested that COX-2 may be involved in the pathogenesis of lumbar disc herniation through upregulation of PGE2 production" (Miyamoto, H et al. *Spine* 2002;Nov. 15;27(22):2477-2483).

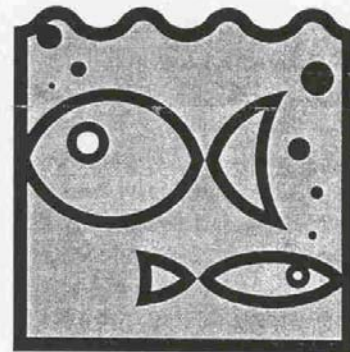


## Why Pharmaceutical Grade Fish Oil?



Pharmaceutical grade fish oil is concentrated, and has undergone advanced technology that begins with the removal of most of the saturated fat in the oil by fractional distillation. Further, a sophisticated molecular distillation removes virtually all of the PCBs. The resulting oil delivers a concentrated amount of long chain omega 3 fatty acids without unwanted by-products like chemical contaminants or saturated fatty acids

In natural fish oil, about 5-20% of the fatty acids are a combination of EPA and DHA, the beneficial fatty acids in fish oil. Fractional distillation is necessary to concentrate these fatty acids, to remove the saturated fat, and also to remove the arachidonic acid, because the idea is to improve (reduce) the AA/EPA (arachidonic acid to eicosapentaenoic acid) ratio. Molecular distillation removes PCBs, DDT, mercury, etc.



### COMPLETE OMEGA-3-CO-FACTORS™:

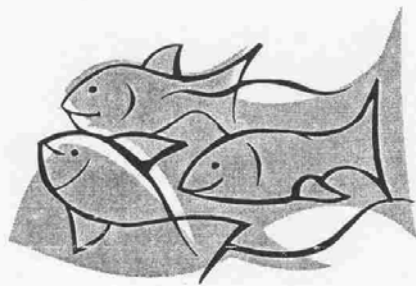
*Researched by and formulated for Dr. Dan Murphy*

**Co-factors provide for the proper absorption and utilization of Omega 3 fatty acids. Co-factors also support the heart, normal cholesterol levels and the mitochondria, in addition to being an excellent anti-oxidant/anti-aging formula.**

Each two tablets contain: Methylcobalamin (B-12) 400 mcg, Reduced L-Glutathione 50mg, Vitamin C 500 mg, Riboflavin 50mg, B-6 50mg, Folic Acid 800 mcg, Co-Enzyme Q-10 5mg, Alpha Lipoic Acid 5mg, Policosanol Extract 90% 5mg Selenium Methionine 100 mcg, Magnesium chelate 150mg (elemental)

# Can you trust your fish?

"Preliminary examination of contaminant loadings in farmed salmon, wild salmon and commercial salmon feed; Chemosphere 2002 Feb;46(7):1053-74; Easton MD, Luszczniak D, Von der GE", (as cited by Dan Murphy, DC, DABCO).



Your fish oil supplement should come with a clean bill of health, i.e. tested for heavy metals and pesticides, insecticides, and other toxins. What about metal toxicity from fresh fish sources? The U.S. Environmental Protection Agency recommends that a 120 lb. Person not ingest more than 38.5 mcg. of mercury per week, and yet 6 oz. of canned albacore tuna a week provides 35 mcg., 6 oz. fresh tuna provides 68 mcg., and 6 oz. swordfish provides a whopping 170 mcg. of mercury, more than 4 times the amount recommended! Salmon provided only 6.46 mcg of

mercury. (Dr. Jane Hightower, FDA, EPA and the National Academy of Sciences).

Think the answer is farmed fish? Think again. Farmed salmon are treated with pesticides to control parasites and antibiotics to treat disease in crowded pens, they sometimes contain the same amount of mercury, and they can have up to 10 times the amount of toxic PCB's, have chemicals such as canthaxanthin added to them (shown to cause damage to human vision). Farmed salmon contain more fat, but much fewer of the omega 3 fats, than wild fish. Salmon farming can also spread highly infectious, mutating salmon diseases, causing large-scale environmental pollution.

## CHILDREN'S CHEWABLE OMEGA 3 ESSENTIALS™

*Researched by and formulated for Dr.  
Dan Murphy*

### *Including:*

EPA  
DHA  
ALA (Alpha-Linolenic Acid)  
Vitamin E, D-Alpha Tocopherol  
(natural)  
Mixed Natural Tocopherols

## CHILDREN'S COMPLETE OMEGA-3-CO- FACTORS™

*Researched by and formulated for Dr.  
Dan Murphy*

### *Including:*

Methylcobalamin (B-12)  
Reduced L-glutathione  
Vitamin C  
Riboflavin  
Vitamin B-6  
Folic acid  
Co-enzyme Q 10  
Alpha lipoic acid  
Selenium methionine  
Magnesium chelate