Eicosamax®
Highly Purified Omega-3 Fatty Acids from Fish Oil

DESCRIPTION

Eicosamax® is a highly purified, concentrated fish oil from mackerel, sardines, and anchovies containing close to 70% omega-3 fatty acids. Natural lemon oil adds a delicate lemon scent and taste to the fish oil. Eicosamax® is available in both liquid and softgel capsule delivery forms. Each teaspoon of Eicosamax® Liquid supplies 4.6 grams of fish oil containing 1,663 mg of eicosapentaenoic acid (EPA) and 1,247 mg of docosahexaenoic acid (DHA) by weight. Each Eicosamax® softgel supplies 1 gram of fish oil containing 360 mg of EPA and 270 mg of DHA by weight. Omega-3 fatty acids favorably regulate inflammatory responses, modulate serum triglyceride levels, and support heart, lung, joint, brain and nerve functions.

OVERVIEW

Omega-3 Fatty Acids

Omega-3 fatty acids are polyunsaturated fatty acids. Fatty acids are carboxylic acids with a hydrocarbon tail of varying length. Saturated fatty acids have no double bonds between any of the carbon atoms in the tail. Each carbon is bonded to four other atoms saturating its bonding capacity. Unsaturated fatty acids are monounsaturated if they contain only one double bond and polyunsaturated if they contain two or more double bonds. Polyunsaturated fatty acids are classified by the location of the first double bond counting from the methyl end of the hydrocarbon tail. Omega-3 fatty acids have the first double bond at the third carbon from the end. Omega-6 fatty acids have the first double bond at the sixth carbon from the end. Omega-3, and -6 fatty acids are also called n-3 and n-6 fatty acids. Eicosamax® is comprised of nearly 70% omega-3 fatty acids mostly in the form of EPA and DHA. EPA (20:5n-3) is a 20-carbon polyunsaturated fatty acid containing 5 double bonds with the first double bond located 3 carbons from the methyl end. DHA (22:6n-3), the most unsaturated naturally occurring fatty acid, is composed of 22 carbons with 6 double bonds. The first double bond is found 3 carbons from the methyl end.

Polyunsaturated Fatty Acid Metabolism

Although the body requires omega-3 and -6 fatty acids for normal function, mammalian cells lack the ability to insert a double bond into the omega-3 and -6 position of a fatty acid chain. For this reason, the omega-3 alpha-linolenic acid (18:3n-3) and the omega-6 linoleic acid (18:3n-6) are essential fatty acids and must be acquired from the diet. These essential fatty acids may be transformed in the liver into longer chain fatty acids. Alpha-linolenic acid is the precursor of EPA and DHA. Linoleic acid is the precursor of the omega-6 arachidonic acid (20:4n-6). Alpha-linolenic acid and linoleic acid compete for entry into metabolic pathways. The metabolic conversion of alpha-linolenic acid into EPA and DHA occurs slowly. The synthesis of EPA and DHA is particularly inefficient in the brain and in the production of breast milk. Adequate dietary intake of EPA and DHA is important to meet the body's need for omega-3 fatty acids. Eicosamax® is a rich source of omega-3 fatty acids.

Polyunsaturated Fatty Acid Physiology

Cellular membranes contain both omega-3 and omega-6 fatty acids. Membrane omega-3 and omega-6 fatty acids should ideally be in a near one-to-one balance to maintain health. An increased omega-3 content is associated with a decrease in membrane thickness, an increase in membrane fluidity and compressibility, and enhanced membrane permeability. Membranes normally rich in DHA such as neuronal synaptic vesicles, retinal rod outer segments of the eye and spermatozoa show less stability with "bleb" formation (vesicle exfoliation), fusion and translocation of phospholipids from the inner layer of the membrane bilayer to the outer layer ("flip-flops"). These membrane properties are important for normal cellular functions.

Aside from the effects on cell membrane physics, omega-3 fatty acids affect cell membrane channels and receptors. Omega-3 fatty acids modulate L-type calcium channels acting effectively as calcium channel blockers and shift the voltage required for sodium channel activation. DHA regulates certain potassium channels in a zinc-dependent fashion. Omega-3 fatty acids affect cell signaling and DHA plays a critical role in mediating programmed cell death (apoptosis) in a wide variety of primary cancer cell lines.

A variety of traumas release polyunsaturated fatty acids from cell membranes to give rise to locally acting hormone-like substances regulating host defense, inflammation, coagulation and blood vessel tone. Released DHA, present in high concentrations in brain and retinal tissue, is a precursor for potent neuroprotective docosanoids and docosatrienes. EPA and omega-6 arachidonic acid act as precursor molecules for eicosanoids, which include prostaglandins, thromboxanes, leukotrienes and lipoxins. The arachidonic acid-derived eicosanoids increase vascular permeability, mediate the synthesis of inflammatory factors, promote platelet aggregation, enhance vasoconstriction and activate polymorphonucleocyte white cells. Eicosanoids derived from EPA have lower biological activity than equivalent arachidonic acid derivatives. EPA-derived eicosanoids modulate and antagonize arachidonic acid derivatives, hinder early inflammatory signal transduction and blunt excessive inflammatory responses. The net result is that EPA-derived eicosanoids have anti-inflammatory, vasodilatory and antithrombotic effects. Omega-3 and omega-6 fatty acids compete for the same pool of metabolic enzymes. An imbalance between omega-3 and omega-6 fatty acids appears to underlie many chronic disorders.

Omega-3 and -6 Fatty Acid Balance & Diet

Studies of Paleolithic nutrition and modern hunter-gatherer groups suggest that people have traditionally consumed a diet lower in saturated fat with small and equally balanced amounts of omega-3 and -6 polyunsaturated fatty acids. Since the mid-19th century, the consumption of omega-6 fatty acids has increased enormously. The ratio of omega-6 to omega-3 fatty acids in the present Western diet is 20-30:1 compared to an optimal ratio of 1-2:1 The overwhelming predominance of omega-6 fatty acids is primarily due to an increased intake of corn, soybean, cottonseed, sunflower seed and safflower seed oils containing high concentrations of omega-6 fatty acids. Contemporary diets contain lesser amounts of fish and seafood and greater quantities of industrially produced meats from animals raised on feeds with high amounts of omega-6 rich grains. Modern agricultural techniques have reduced the omega-3 fatty acid content of cultivated vegetables. Farmed fish and mass produced eggs have diminished amounts of omega-3 polyunsaturated fatty acids. The modern Western diet with its excessive omega-6 and diminished omega-3 polyunsaturated fatty acid consumption shifts the body to a proinflammatory, prothrombotic and vasoconstrictive physiologic state with wide and profound implications for health. Diet supplementation with Eicosamax® is a highly effective strategy to restore polyunsaturated fatty acid balance and maintain health.

Omega-3 Fatty Acids & Reduction of Cardiovascular Disease Events

Inuit people in northern Canada and Alaska consuming their customary fish-rich diet have low death rates due to cardiovascular disease. The same observation holds true for Japanese eating a traditional seafood-rich diet. Most, but not all, large cohort studies have found that fish consumption is associated with a reduction in general (all cause) death rates and in cardiovascular events such as heart attack. The largest relative risk reduction of cardiovascular disease outcomes has been found in studies reporting on fish consumption and the incidence of sudden cardiac death. Compared to placebo, omega-3 fatty acid supplementation for two years was associated with modest improvements in coronary artery blocking plaque as assessed by arteriography in patients with coronary artery disease. Another study randomized patients awaiting carotid artery surgery (endarterectomy) to fish oil, sunflower oil or placebo and assessed the morphology of the plaque removed from the carotid at surgery. Omega-3 fatty acids were incorporated into the plaque in the patients receiving fish oil and resulted in thicker, fibrous plaque caps and less inflammatory infiltrate. These findings suggest that omega-3 fatty acids may decrease arterial plaque burden and facilitate formation of more stable plaque less likely to rupture resulting in heart attack or stroke.

Omega-3 Fatty Acids & Risk Reduction after Heart Attack

Among the first studies to assess the protective effects of omega-3 fatty acids from fish after heart attack was the diet and reinfarction trial (DART). It found that increased fatty fish consumption was associated with a 29% reduction in all cause mortality at 2 years after heart attack. The largest trial yet published on the fish oil mediated reduction of death rate following heart attack involving over 11,000 patients with a recent heart attack is the Italian GISSI-prevention study. This study found that 1 gram daily of fish oil (850 mg of EPA and DHA as ethyl esters) resulted in a 15% reduction in the aggregate end point of total death, non-fatal recurrent heart attack and non-fatal stroke. Secondary analyses showed that fish oil reduced the risk of cardiac death by 30% and the risk of sudden cardiac death by 45%. A meta-analysis of 10 randomized, controlled trials involving over 14,000 patients with a daily intake of omega-3 fatty acids for a mean duration of 37 months found that fish oil decreased mortality from all causes by 16% and reduced the incidence of death due to heart attack by 24%.

Omega-3 Fatty Acids & Arrhythmias
Fish oil has its greatest cardiovascular impact by reducing the risk of sudden cardiac death, which is nearly always due to a ventricular arrhythmia. Four prospective, randomized clinical trials have found that fish oil or other interventions to boost intake of omega-3 fatty acids is associated with a reduced risk of sudden death. In addition to ischemia-induced ventricular arrhythmias, omega-3 fatty acids have been found to reduce the incidence of atrial arrhythmias and have been suggested as a possible treatment for atrial fibrillation. Omega-3 polyunsaturated fatty acids have been found to have significant arrhythmic properties. Omega-3 polyunsaturated fatty acids protect against ischemia-induced ventricular arrhythmias in both dog and rat models. Basic research has shown that omega-3 fatty acids electrically stabilize the cardiac myocyte by modulating membrane (sarcolemma) ion channel conductance, especially the voltage-dependent sodium current and the L-type calcium channel. Omega-3 fatty acids affect the membrane bilayer microdomain in juxtaposition to the ion channels and directly affect the ion channel. However, in people with a history of ventricular tachycardia or fibrillation, implantable cardiac defibrillators and significant left ventricular pump dysfunction, fish oil may increase the risk of ventricular arrhythmias, especially ventricular tachycardia.

Omega-3 Fatty Acids & Lipids
EPA and DHA have consistently been shown to reduce triglyceride levels. A meta-analysis of 36 crossover and 29 parallel design studies found that fish oil omega-3 fatty acids decrease serum triglyceride concentrations by 25-30%. Fish oil was found to increase low-density-lipoprotein (LDL) cholesterol concentrations by 5-10% and high-density-lipoprotein (HDL) cholesterol by 1-3%. Lipid subfraction analysis suggests that although fish oil may increase LDL, the increase is in the larger, less dense, less atherogenic LDL fraction and not in the smaller, more atherogenic fraction. High doses of DHA (4 g/day) have been found to increase HDL2, a more cardioprotective HDL fraction. Omega-3 fatty acids appear to provide support for a cardioprotective lipid profile.

Omega-3 Fatty Acids & Endothelial Dysfunction
Endothelial dysfunction reflects an imbalance between vasoconstriction and vasodilation and is observed in people with high cholesterol levels, high blood pressure, diabetes, atherosclerotic vascular disease and aging. It may be a critical early event in the development of atherosclerosis and cardiovascular disease. Serum EPA and DHA levels are inversely associated with indicators of endothelial dysfunction. Long-term treatment with EPA is known to improve impaired endothelial-dependent relaxation of blood vessels in animals and humans. Omega-3 fatty acids cause endothelial relaxation and increase arterial compliance. They lower blood pressure in people with both normal and high blood pressure.

Omega-3 Fatty Acids & Mental Health
One out of every three fatty acids in the central nervous system is a polyunsaturated fatty acid. Omega-6 arachidonic acid and omega-3 DHA are the major polyunsaturated fatty acids found in the brain. DHA affects membrane fluidity, excitability and synaptic function. Several studies have assessed the use of omega-3 fatty acids to treat major depression and bipolar disorder. A study of patients with persistent depression despite standard medication found that 1 g/day of EPA improved depression scores compared to placebo. But, 2 g/day of EPA had no benefit. However, another study did find that 2g/day of EPA significantly reduced Hamilton depression scores in medicated patients with persistent depression. A small, short-term pilot study in patients with bipolar disorder revealed that high-dose (9.6 g/day) omega-3 fatty acids stabilized mood and prolonged remission compared to placebo.

Omega-3 fatty acids may be beneficial for people suffering from schizophrenia. In symptomatic schizophrenic patients on stable antipsychotic medication, 2 grams EPA, but not DHA, significantly improved disease severity scores compared to placebo. In a second study, 2 g/day EPA for 3 months as a sole treatment for schizophrenia made disease severity scores significantly better.

Omega-3 Fatty Acids & Neurological Disorders
Given the importance of omega-3 fatty acids, especially DHA, in brain and nerve metabolism, the effect of fish and fish oil consumption on neurological disorders has been evaluated. Three studies have assessed the effect of omega-3 fatty acids on the incidence of dementia. In only one of these three studies was fish intake associated with a significant decrease in the incidence of non-Alzheimer's dementia. All three studies found that fish intake reduced the risk of developing Alzheimer's disease, but the finding was statistically significant in only one study. Total omega-3 and DHA consumption, but not alpha-linolenic acid or EPA intake, significantly reduced the incidence of Alzheimer's disease. DHA has been found to cause a small improvement in dementia rating scores in people with established Alzheimer's disease. The promise of DHA for the prevention and even treatment of dementias, especially Alzheimer's disease, remains to be explored.

The role of omega-3 fatty acids in other neurological disorders appears less promising except for multiple sclerosis. One study has found that fish consumption was associated with a lower risk of developing multiple sclerosis. Two studies have found no link between omega-3 fatty acid intake and the incidence of multiple sclerosis. Two of three studies have reported that omega-3 fatty acids significantly reduce disability and improve an index of disease progression in patients with multiple sclerosis.

Omega-3 Fatty Acids & Eye Health

The eye is greatly enriched with omega-3 fatty acids that accumulate during late fetal development and early after birth. Very high levels of DHA are present in the retina especially in the outer portions of photoreceptor cells. DHA may facilitate the dynamics of the light absorbing pigment, rhodopsin. An ample dietary supply of omega-3 fatty acids appears to be essential for the optimal development of vision. Children age 6 to 12 months supplemented with DHA (130 mg/day) developed significantly better visual acuity than did children fed a control diet.

Unfortunately, the possible role of omega-3 fatty acids in supporting eye health has not been well examined. Studies on the effect of fish consumption and the risk of age-related macular degeneration (ARMD) have yielded conflicting results. One prospective cohort study found that fish intake did not protect patients against progression to advanced ARMD. Inconclusive studies suggest omega-3 fatty acids may slow progression in patients with retinitis pigmentosa. Meaningful research on omega-3 fatty acid intake and eye health remains to be done.

Omega-3 Fatty Acids & Inflammatory Diseases

The modulating effects of omega-3 fatty acids have been proposed as a mechanism by which fish oil may favorably support people with chronic inflammatory diseases. A meta-analysis of 10 trials studying the use of fish oil for rheumatoid arthritis found that omega-3 fatty acids improved morning stiffness and the number of tender joints. The greatest benefit was seen at doses of 3 g/day although some trials found benefit with a daily dose of 2.6 g. In patients with inflammatory bowel disease such as Crohn's disease and ulcerative colitis, omega-3 fatty acids have been found to reduce the need for immunosuppressant therapy and to decrease inflammatory markers. Doses up to 4.5 and 5.4 g/day have had limited effect on preventing disease relapse.

Omega-3 Fatty Acids & Skin Health

Human skin is constantly exposed to internal and external factors that may lead to photoaging, inflammation, immune dysfunction, imbalanced epidermal homeostasis or other skin disorders. Several studies have found large doses of fish oil appear to be photoprotective. Omega-3 fatty acids in relatively low doses (60 to 75 mg of fish oil containing 180 mg EPA and 120 mg DHA per gram) have been found to reduce erythema, scaling, and itching in patients with psoriasis. In one study of people with severe psoriasis, 12 g/day of EPA reduced redness and scaling in 8 of 10 people. Doses of 1.8 g daily of EPA in people with moderate to severe atopic dermatitis reduced itching and scaling after 12 weeks in a placebo-controlled trial. More studies are needed to fully elucidate the effects of fish oil on skin function, nevertheless omega-3 fatty acids appear important for maintaining healthy skin.

Omega-3 Fatty Acids & Asthma

Inflammation is important in the development of asthma. An imbalanced omega-6 to omega-3 fatty acid dietary ratio promotes inflammation and may contribute to the increased prevalence of asthma. Although short-term trials with fish oil have found no effect on asthma symptoms, long-term studies have found fish oil effective. A 10-month study using 84 mg of EPA and 36 mg DPA in children with bronchial asthma improved asthma scores and increased acetylcholine response thresholds. Another study found supplementing with 3.2 g EPA and 2.2 g DHA for 3 weeks improved post-exercise lung function in people with exercise-induced asthma. EPA and DHA also significantly decreased levels of inflammatory mediators such as leukotriene E4, TNF alpha, and IL-1beta. Diets enriched with EPA and DHA omega-3 fatty acids may prove to be supportive of normal lung function in people with asthma.

Omega-3 Fatty Acids & Cancer

Numerous epidemiologic studies have shown that high fish consumption is associated with a lower incidence of cancer especially cancers of the colon, breast, pancreas and prostate. Animal and in vitro experiments show that omega-3 fatty acids inhibit carcinogenesis. Multiple anti-carcinogenic properties have been proposed for omega-3 fatty acids. The chief mechanisms involve suppression of arachidonic acid-derived eicosanoids that modulate apoptosis, metastasis, and angiogenesis. Omega-3 fatty acids may also inhibit carcinogenesis by influencing transcription factor activity, gene expression, signal transduction and estrogen metabolism leading to changes in metabolism, cell growth, and differentiation. The exact role of omega-3 fatty acids in the clinical prevention of cancer remains to be elucidated.

Eicosamax® Summary.
Eicosamax® is a highly purified, concentrated fish oil containing close to 70% omega-3 fatty acids. Eicosamax® efficiently restores omega-3 to omega-6 fatty acid balance. It modulates inflammation, vascular tone and thrombogenic equipoise. Eicosamax® supports normal cardiac, brain, joint, lung and skin functions.

INDICATIONS

Eicosamax® is intended for individuals who desire to increase dietary amounts of omega-3 polyunsaturated fatty acids and restore a natural balance of omega-3 to omega-6 fatty acids.

FORMULA

Supplement Facts

Serving Size 1 Softgel

Amount Per Softgel			% Daily Value
Calories		10	
Calories from Fat		10	
Total Fat		1 g	2%†
Saturated Fat		0 g	0%†
Polyunsaturated Fat		1 g	*
Marine Fish Oil Concentrate		1,000 mg	*
Supplying the following omega-3 fatty acids:	Compound Weight**	FFA Weight***	
Eicosapentaenoic acid (EPA)	360 mg	330 mg	*
Docosahexaenoic acid (DHA)	270 mg	250 mg	*

†Percent Daily Values are based on a 2,000 calorie diet.
*Daily Value not established.

Other ingredients: Gelatin, glycerin, natural mixed tocopherol vitamin E from soy, natural lemon oil, rosemary extract, and water.

**Amounts reported as weight of the fatty acid compound.
***Amounts reported as free fatty acid (FFA) equivalents by weight in accordance with voluntary CRN Monograph.

Supplement Facts

Serving Size 1 Teaspoon (approx. 5 ml) • Servings Per Container 24

Amount Per Serving			% Daily Value
Calories		40	
Calories from Fat		40	
Total Fat		4 g	6%†
Saturated Fat		0 g	0%†
Polyunsaturated Fat		4 g	*
Marine Fish Oil Concentrate		4,620 mg	*
Supplying the following omega-3 fatty acids:	Compound Weight**	FFA Weight***	
Eicosapentaenoic acid (EPA)	1,663 mg	1,524 mg	*
Docosahexaenoic acid (DHA)	1.247 mg	1,155 mg	*

†Percent Daily Values are based on a 2,000 calorie diet.
*Daily Value not established.

Other ingredients: Natural mixed tocopherol vitamin E from soy, natural lemon oil, rosemary extract.

**Amounts reported as weight of the fatty acid compound.
***Amounts reported as free fatty acid (FFA) equivalents by weight in accordance with voluntary CRN Monograph.

SUGGESTED USE

Softgel: One to 6 softgels daily with food or as directed by a physician. Liquid: 1 teaspoon daily with food or as directed by a physician.

ADVERSE REACTIONS

No adverse reactions to Eicosamax® have been reported. Sophisticated molecular distillation accomplishes virtually complete purification of fish oil omega-3 fatty acids from fish protein. Individuals with a history of allergic reaction to fish and fish products have consumed Eicosamax® without any reaction.

DRUG INTERACTIONS

Although no bleeding episodes have been reported, consuming high amounts of fish oil could theoretically increase the risk of bleeding in people taking antiplatelet or anticoagulant medications. Persons taking antiplatelet or anticoagulant medications should not take Eicosamax® without first consulting a physician.

CONTRA-INDICATIONS

People with a history of ventricular tachycardia or fibrillation, implantable cardiac defibrillators and significant left ventricular pump dysfunction should not use Eicosamax®. Fish oil may increase the risk of ventricular arrhythmias, especially ventricular tachycardia in this population.

HOW SUPPLIED

Softgel: Sixty or 120 softgels per bottle with full-bottle shrink-wrap. Packaged 12 bottles per case. Liquid: Four fluid ounces per bottle with full-bottle shrink-wrap. Packaged 12 bottles per case.

STORAGE

Store in a cool, dry place (59°F-85°F) away from direct light. For long-term storage up to two years, the product should be stored at a temperature between 36°F-46°F. Keep out of reach of children.

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These statements have not been evaluated by the Food and Drug Administration.
This product is not intended to diagnose, treat, cure, or prevent any disease.

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