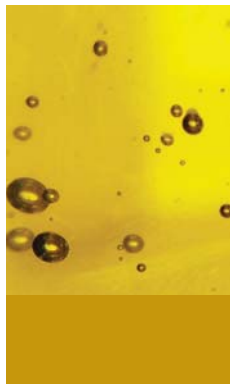




PRODUCT DOCUMENTATION

# VITAMARIN





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# Text of the leaflet

**Vitamarin** is a bioinformation product containing unique fish oil from the *Engraulis japonicus* sea fish.

## Use:

The balanced composition of active substances contained in Vitamarin has beneficial effects on general health. It helps in the treatment of **cardiovascular diseases** – it reduces the risk of myocardial infarction and stroke, it is suitable for the treatment of arrhythmias, atherosclerosis and **high blood pressure**. It reduces blood cholesterol and fat levels. It works well as a complement in the treatment of chronic inflammatory conditions, such as **rheumatoid arthritis, Crohn's disease, ulcerative colitis, asthma, and psoriasis**. It also plays a role in **weight** reduction. Vitamarin has also positive effects on the function of the **brain**; it enhances **memory** and helps combat anxiety and depression.

## Other positive effects of Vitamarin:

- It enhances the immune system
- It supports proper retina function
- It has beneficial effects on the quality of bones and teeth
- It helps in the prevention and treatment of breast cancer, colon cancer, prostate cancer and lung cancer
- It is excellent in preparing the body for planned pregnancy

- It has positive effects on foetal development and helps to sustain pregnancy
- It enhances mental capacities and general mental health
- It eliminates chronic fatigue
- It improves the general condition of diabetic patients
- It stimulates blood flow
- It protects and improves the condition of the skin
- It attenuates menstrual spasms and alleviates the signs of premenstrual syndrome

## Composition:

### Fish oil

It is an important natural source of omega-3 unsaturated fatty acids, iodine and vitamins A and D. Essential fatty oils have a major role in a number of vital processes in the human body. They are involved particularly in the control of blood pressure and coagulation, and influence the immunity and fat metabolism. They have anti-inflammatory effects and positive effects on the function of the nervous system. Iodine is an element important for the proper function of the thyroid gland and for the development of CNS. Vitamin D enhances the absorption of calcium and phosphorus in the intestine and it is essential for bone and teeth development and mineralisation. Vitamin A stimulates the immunity of the body, and it is necessary for the proper growth and development of bones. It influences the quality of the skin, hair, and any mucosa; it has beneficial effects on eyesight. It has provable anticancer effects.

The requirement for these substances increases in particular during the growth period and in adolescence, and therefore suitable supplementation, including that with Vitamarin, is recommended.

### **Bioinformation**

Bioinformation represents frequencies which simulate the control frequencies of subcortical brain centres, which regulate the vegetative nervous system and the function of viscera. Bioinformation acts to offset negative information and induce a new regenerative process.

The presence of bioinformation in Energy products is essential – compared to other products of similar nature the effects of Energy products are several times higher.

### **Recommended dosage:**

2 capsules 1-3 times a day

Do not exceed the recommended daily dose!

### **Warning:**

The product is not intended for children under 3 years of age. Not suitable for persons with sea product hypersensitivity. Dietary supplements must not be used to substitute all-day varied diet.

Store at 10–25°C in a dry and dark place; do not freeze.

Store out of reach of children!

# Introduction to the topic

## Cardiovascular diseases

Diseases affecting the heart and blood vessels are currently rightfully considered to be typical civilisation disorders. This group of diseases includes, with the exception of congenital developmental cardiovascular defects, any **cardiac insufficiency** (arrhythmias, ischemic heart disease), **cardiac arrest** (myocardial infarction, ventricular fibrillations), **brain events** (strokes), **atherosclerotic vascular alterations** (atherosclerosis, thrombosis), and **high blood pressure**.

Cardiovascular disease mortality in the Czech Republic ranges around 600 deaths per 100,000 inhabitants per year and is still much more pronounced than in other countries of Western Europe. More than 50% of patients admitted to hospital internal medicine departments are patients with cardiovascular conditions. Myocardial infarction is the most frequent cause of death and disability in men of working age. Cardiovascular diseases in the Czech Republic represent more than 50% of deaths (specifically 55.1% in 1998), i.e. more than all other diseases together. A rather morbid saying that every other person dies of cardiac arrest is based on statistical facts. Prevention therefore has a major role in combating these diseases. The essential principle of primary prevention is the change of improper lifestyle and provision of sufficient information about the causes of cardiovascular diseases and possible prophylaxis to the public.

## Major principles of cardiovascular disease prevention:

- 1) Non-smoking – long-term, heavy smoking in particular has extremely negative effects on the condition of the heart and blood vessels; it reduces vessel patency and hence also proper blood flow into any body organs, of which the most sensitive to oxygen deficiency is the heart and brain;
- 2) healthy diet – one of the major causes of cardiovascular disease development is the high content of unhealthy fats in food and high blood levels of LDL cholesterol, which is the main cause of atherosclerotic plaque formation on the internal vessel wall surface;
- 3) physical activity – sufficient exercise acts as prevention of practically any civilisation disease, but it is particularly important for cardiovascular diseases, as the strengthening of the heart muscle safeguards its better function and extended viability.

## Source of fish oil

**Latin name:** *Engraulis japonicus*

**English name:** Japanese anchovy/Pacific anchovy

**Family:** Engraulidae (anchovies)

**Order:** Clupeiformes (herrings)

**Class:** Osteichthyes (ray-finned fishes)

This 13–16cm fish is found along the warm coastline of the entire West Pacific, from the South of the Sakhalin Island through the Japanese sea, along the coastline of Japan and Thai-wan to that of Philippines. It feeds on small plankton crustaceous, their larvae and on the eggs of other fish, but also on small marine algae. The oil is obtained from the entire fish and hence it contains lower amounts of vitamins A and D and higher amounts of unsaturated fatty oils compared to the oil of Nordic and deep sea fishes, which is usually obtained only from the fish liver.

# Vitamarin composition

**Product form:** soft gelatinous capsule

**Capsule weight:** 681 mg

## Unsaturated fatty acids

Name of the acid	Abbreviation	Carbon and double chemical bond count	Content	Remark
Docosahexaenoic acid	DHA	C 22:6	18,9 %	Essential n-3 PUFA
Eicosapentaenoic acid	EPA	C 20:5	11,2 %	Essential n-3 PUFA
Oleic acid	OA	C 18:1	11,6 %	n-9 MUFA
Linoleic acid	LA	C 18:2	1,9 %	Essential n-6 PUFA
Alpha linoleic acid	ALA	C 18:3	0,9 %	Essential n-3 PUFA
Arachidonic acid	AA	C 20:4	1,24 %	Essential n-6 PUFA

Legend: PUFA = polyunsaturated fatty acid  
MUFA = monounsaturated fatty acid

## Vitamins and trace elements

Name	Abbreviation	Content in 100 g	Content in 1 capsule (approx. 0.5g of oil)
Iodine	I	1,03 mg	5,1 µg
Retinol	vitamin A	0,112 mg	0,56 µg

Name	Abbreviation	Content in 100 g	Content in 1 capsule (approx. 0.5g of oil)
Cholecalciferol	vitamin D3	0,085 mg	0,425 µg
Tocopherol	vitamin E	–	2,5 mg

## Recommended dosage

Vitamarin should be taken in the long-term, at least for the period of two months. Two capsules taken 1-3 times a day are sufficient to enhance immunity, cardiovascular system and help in inflammatory conditions; for a pronounced effect on mental enhancement, 8 capsules per day are necessary (2-2-4).

**Recommended daily dose:** 2 capsules taken 1-3 times a day, ideally after meals. Do not exceed the recommended daily dose.

**Warning:** Dietary supplements must not be used to substitute all-day varied diet. Not suitable for persons with sea product hypersensitivity. The product is not intended for children under 3 years of age.

## Storage method

Due to the high number of double chemical bonds in unsaturated fatty acids it is necessary to protect the product from oxidation. This role is fulfilled by vitamin E, yet it is not advisable to expose the product to bright light and high temperatures. Ideally, the products should be stored at 10–25°C. Do not freeze.

## Approval of the Czech Ministry of Health

HEM –350 – 22.7.05 – 24808

# Description of effects of individual ingredients

## **IODINE**

A trace element essential for the production of thyroid hormones – thyroxin (T4) and triiodothyronine (T3), which regulate the metabolism and consumption of energy in all cells of the body. Thyroid hormones are vital especially in the period of intrauterine foetal development and in the first years of the child's life, as they enable proper brain development. Iodine deficiency in prenatal period and childhood may in general adversely affect intelligence, perception, learning capabilities, and, in more severe cases, result even in mental retardation, so called cretinism. The lack of iodine, and hence also lack of thyroid hormones in adolescence and adulthood demonstrates as thyroid gland enlargement (goiter) and results in increased and more frequent fatigue, concentration disorders, sexual development disorders, fertility disorders, increased risk of abortion, and risk of breast cancer and thyroid gland cancer. Substances present in cigarette smoke have been also reported to “steal” iodine from the body, thus causing thyroid gland insufficiency.

## **VITAMIN A**

A vitamin soluble in fats. It enhances the immune system of the body, as it has the ability to activate the production of T-lymphocytes; it is important for the production of light-sensing retina cells which means it is essential for the quality of eyesight. It improves the condition of any mucosa in the body; it keeps bones, teeth, gums, skin, nails and hair healthy. Vitamin A

has also the ability to control cell division, and thus is involved in reducing the risk of cancer.

## **VITAMIN D**

A vitamin soluble in fats. It enhances the absorption of Ca and P in the gastrointestinal tract; it is important for the proper development of bones and teeth as well as for their growth and optimal mineralisation; it acts as prevention of fractures, osteoporosis and rachitis.

## **VITAMIN E**

It enhances the absorption rate of vitamin A and protects unsaturated fatty acids from oxidation. Thanks to its antioxidative properties it destroys undesirable free oxygen radicals in the body, thus effectively combating the ageing process. Vitamin E protects the skin from damage caused by sunrays and generally stimulates the immune system, which means that it is involved, besides other, in the prevention of autoimmune diseases and cancer. Vitamin E enhances male fertility and reduces the risk of cardiac diseases.

## **FATTY ACIDS SYSTEM**

Fatty acids are the essence of any fats; they are found in fats in the form of esters together with glycerol. They are organic compounds with unbranched carbon chain of various length, solely with even number of carbon atoms and one carboxyl group (-COOH) at the end of the molecule.

# Description of effects of individual ingredients

- 1) Saturated fatty acids contain only single bonds in their chain; their major source is animal fat (meat and dairy products). Although the human body does need these acids as a source of energy and for the production of fat reserves, they should represent only one third of the intake of fatty acids in food, as they are much involved in increasing cholesterol levels and hence also in the risk of cardiovascular diseases.
- 2) Unsaturated fatty acids typically have double bonds in the carbon chain; they come from oils of vegetable and fish origin. They should represent two thirds of the intake of fatty acids in food. They are classified as follows:
  - a) Monounsaturated (MUFAs) with one double bond in the chain - n-9 (omega 9): oleic acid (OA);
  - b) Polyunsaturated (PUFAs) with two or more double bonds in the chain
    - n-6 (omega 6): linoleic acid (LA) and arachidonic acid derived therefrom (AA) – our food contains plenty of these acids, as they are present practically in all vegetable oils (sunflower oil, soy oil, maize oil, etc.);
    - n-3 (omega 3) alpha linoleic acid (ALA) – (nuts, flaxseed), and eicosapentaenoic acid (EPA) and docosahexanoic acid (DHA) derived therefrom – fish oil.

## Why is fish oil unique?

The uniqueness of fish oil is based particularly on its high content of n-3 PUFAs, which belong to the group of essential substances (the human body cannot produce them itself). The presence of large amounts of n-3 PUFAs in fish oil is caused by the fact that fish feed a lot on water algae which are, besides linseed oil, the richest source of ALA. And this acid is then transformed into DHA and EPA in the fish body. The human body is also capable of enzymatic transformation of ALA to EPA and, to a smaller degree also DHA, but in some stages of life (prenatal period, childhood, old age) and with a high intake of n-6 PUFAs this system does not work properly. And it is the very EPA and DHA which are the biologically most active acids with a number of vital functions in the human body – they are involved in the prevention as well as treatment of a range of diseases and enable proper function of the entire organism. It is necessary to point out that EPA and DHA are present only in fish oil, nowhere else!

## Oleic acid

Besides fish oil, this monounsaturated fatty acid (MUFA) is also present in olive oil. Its relatively high percentage in the *Engraulis japonicus* oil should be emphasised particularly with a view to its protective influence in breast cancer development. Oleic acid has been reported to have the ability to inhibit the Her-2/neu oncogen expression, whose high levels

are directly proportional to the aggressiveness of the tumour and its very bad prognoses. This oncogen is present (expressed) in every fifth patient with breast cancer. Oleic acid, moreover, has the ability to improve the metabolism of people with increased blood fat and cholesterol levels, thus helping to reduce the incidence of cardiac and vascular complications particularly in diabetic patients and patients with fat metabolism disorders.

# Role of fish oil in the prevention and therapy of various diseases

## Fish oil and cardiovascular diseases

Cardiovascular diseases are generally known to be the most frequent cause of death at present. Yet it is interesting that to some nations, these diseases are practically unknown. A typical example is the Greenland Eskimo, whose risk of myocardial infarction is approx. 400 times lower than in the Euro-American population, despite the fact that much fat and protein is consumed by these Eskimos. Nevertheless, their diet compared to ours contains as much as ten times more unsaturated fatty acids which act as protection from cardiac diseases.

In the human body, the prostaglandin-type of tissue hormones are produced from n-3 PUFAs and they effectively prevent blood platelet clustering and decrease blood viscosity – they have so called antithrombotic effects, i.e. they prevent the formation of blood clots which may obstruct coronary arteries in the heart and thus cause a myocardial infarction or which may block small brain vessels and result in a stroke. The same prostaglandins have also vasodilatation effects; they dilate blood vessels which enhances blood flow into all organs in the body. Good blood flow and sufficient supply of oxygen is most important especially for the heart and brain function. The vasodilatation effect of prostaglandins is also valuable for individuals with insufficient peripheral blood flow (Raynaud's disease) and men with erectile dysfunction.

Latest research has shown that thanks to the content of EPA and DHA regular daily administration of fish oil

(for at least 11 months) to patients who have suffered a myocardial infarction and patients with ischemic heart disease statistically significantly reduces the risk of ventricular arrhythmia (a heart rhythm disorder occurring in the ventricles), which may result in sudden death due to cardiac arrest caused by ventricular fibrillation.

Another risk factor for the development of cardiac diseases is high LDL (“low density lipoprotein”) cholesterol and triacylglycerides (TAG) blood levels. These substances depositing on vessel walls form so called atherosclerotic plaques and cause the hardening of vessels – atherosclerosis. Both n-3 PUFAs, which decrease in particular TAG levels, and n-6 PUFAs, especially LA, which regulates LDL metabolism, are involved in the reduction of these atherosclerotic factors. Furthermore, n-3 acids are involved in the protection of the cardiovascular system also by increasing the levels of the “good” HDL (“high density lipoprotein”), which participates in the elimination of cholesterol from tissues and protects people from the development of atherosclerosis.

## Summary of fish oil effects on the cardiovascular system:

It reduces the risk of myocardial infarction, stroke, cardiac arrhythmias and atherosclerosis as well as the risk of sudden death due to cardiac arrest; it decreases high blood pressure and supports blood flow in the entire body. As n-3 PUFAs inhibit blood clotting, products containing fish oil should not be

taken two days before planned surgeries and two days after.

## **Fish oil and cancer**

Epidemiological studies conducted in the recent years in animals as well as in people suggest that the proportion n-6 / n-3 PUFAs received in food plays a major role in reducing the risk of cancer. In our population, this proportion is approx. 20-70/1, which is caused by copious use of sunflower, maize and soy oils; it should, however, be approx. 5/1, ideally 3/1. While high consumption of n-6 PUFAs supports tumour growth, the effect of n-3 PUFAs is exactly the opposite. The anticancer effects of n-3 PUFAs (particularly DHA) are based on the regulation of the apoptotic cell programme. Apoptosis (or so called planned cell death) is a very important control mechanism which ensures that cells with any major disorder are destroyed.

In cancer cells, this mechanism gets out of control, besides other and primarily because of the presence of the anti-apoptotic protein BCL-2. And DHA has the very ability to inactivate the production of this protein, and thus recovers the control mechanisms of the cell. Furthermore, n-3 PUFAs suppress the production of COX-2, which results in slowing down or even halting of cancer cell growth – this has been described in lung, colon, breast and prostate cancer. Fish oil hence has its role not only in reducing the risk of cancer, but also, as has been shown by scientific

studies, also directly in its treatment. Moreover, n-3 PUFAs have been observed to alleviate adverse effects of chemotherapy.

### **Summary of fish oil effects on cancer:**

It reduces the risk of cancer in general, it slows down the growth of lung, colon, breast and prostate tumours, and alleviates adverse effects of chemotherapy.

NOTE: Czech Republic comes first in the colon and rectal cancer incidence and mortality worldwide!!!

## **Fish oil and neuropsychiatric disorders**

The n-3 PUFAs (EPA and DHA) present in fish oil not only play an essential role in the development of brain, but are also involved in a number of nervous system functions – they influence the production of neurotransmitters (serotonin, acetylcholine, dopamine), the fluidity of nervous membranes, and they regulate the enzymatic activity and gene expression. Due to these properties they influence mental processes in the brain.

It has been discovered that n-3 PUFAs have the ability to inhibit some of the neural transmission paths in a similar manner as lithium... In a number of psychiatric disorders, very low concentrations of n-3 acids in blood (or in the membranes of red blood cells) have been reported and based on this finding, scientists have begun to test the impact of n-3 PUFAs

# Role of fish oil in the prevention and therapy of various diseases

on psychiatric treatment. Positive therapeutic effects of EPA and DHA have been reported in patients with schizophrenia, depression and borderline personality disorder. Other studies have shown the positive impact of n-3 PUFAs on the stabilisation of mood in premenstrual syndrome, bipolar disorders (manic-depressive psychosis), anxiety and ADHD. At present, the therapeutic effects of EPA and DHA on multiple sclerosis, senile dementia and Alzheimer's disease are being studied.

## Summary of fish oil effects in the field of psychiatry:

The use of fish oil has provable effects on improving the mood (due to the enhanced production of serotonin) and works in the treatment of depressive and anxiety conditions and behavioural disorders.

## Fish oil and brain

The “fattest” organ of our body is the brain; if we eliminate water, we can find out that two thirds of its weight are formed by fat – specifically phospholipids. The basic structural substance involved in the development of the nervous tissue is DHA. It forms especially the phospholipid membranes of the central nervous system whose proper structure is essential for flawless transmission of impulses. DHA safeguards the integrity and elasticity of these membranes. It is also involved in the production of neurotransmitters which mediate communication among individual neurons; it increases the levels of the hormone serotonin,

which improves one's mood as well as the levels of acetylcholine, which has its role in enhancing the memory. Furthermore, EPA and AA are involved in the development of brain. No wonder there are theories which suggest that the development of brain in the phylogenesis of the human race occurred thanks to the consumption of fish by our ancestors.

The development of human brain is most rapid in the last three months of intrauterine development and in the first months after delivery and is completed in the fifth or sixth year of the child's life. In these periods, the ability of metabolic transformation of the more available ALA to the needed DHA is much restricted and it is therefore essential to provide this very substance in these important periods of brain development, through the mother's body in pregnancy and lactation and in the form of dietary supplements or fish products in the early age. Many a study has evidenced that sufficient intake of DHA in pregnancy and lactation (100–300mg/day) has had a major impact on the mental health of the child. Children of mothers who use DHA achieve statistically significantly better mental and motor development, their coordination of movements is better, and they have better hearing and eyesight (as DHA is a major component of the retina) and they achieve better results in intelligence tests. Further administration of DHA in preschool age acts as the prevention of ADHD (Attention Deficit and Hyperactivity Disorder); it helps to offset dyslectic signs and improves the learning capacity and all cognitive functions. The intake of DHA is equally important for the mother whose

own DHA reserves are, especially in the last months of pregnancy, depleted, and their insufficiency correlates with the incidence of postpartum depressions. Significant are also the reported effects of n-3 PUFAs on the alleviation of signs of pregnancy toxicosis (increased production of saliva, vomiting) and on reducing the risk of premature birth.

#### **Summary of fish oil effects on the brain and pregnancy:**

It provides material for the development and proper function of the brain, it supports smooth development of mental capacities of a child, it protects the mother from postpartum depressions and has positive effects on sustaining the pregnancy.

#### **Fish oil and obesity**

A permanently high intake of fats through diet, so typical for the modern society of our time, soon results in so called leptin resistance. Leptin is a tissue hormone which is sometimes also called the hormone of fullness, as it activates the centre of food intake in the hypothalamus and informs hypothalamus about the status of fat reserves in the body. Obese people with leptin resistance actually never feel full, and so they consume more and more food, which further deteriorates this condition. In people suffering from obesity as well as in diabetic patients, lower insulin sensitivity (so called insulin resistance) is also common. Due to this resistance glucose does

not adequately penetrate into cells, and cells hence do not have enough energy and give the signals which lead only to further overeating. Latest studies have shown that in addition to aerobic exercise, the administration of fish oil is the means which may help these people escape from this vicious circle.

#### **Summary of fish oil effects on obesity:**

It helps to combat leptin and insulin resistance and controls blood sugar and fat levels.

#### **Fish oil and inflammatory autoimmune diseases**

Possible association of n-3 PUFAs and inflammatory responses has been also suggested by the epidemiological monitoring of Greenland Eskimos which has pointed out the low incidence of inflammatory autoimmune disorders in this population. n-3 PUFAs have provable immunomodulating properties. Autoimmune diseases are characterised by high levels of the inflammatory interleukin (IL-1) as well as of the inflammatory leukotriene LTB<sub>4</sub>, which is the product of n-6 PUFA metabolism. Traditional Western diet with significantly higher proportion of n-6 PUFAs compared to n-3 PUFAs results in releasing these inflammatory metabolites and scientists think that this very fact is associated with the increasing incidence of inflammatory diseases in our population. The n-3 PUFAs contained in fish oil competitively inhibit the metabolism of the arachidonic acid; they modulate the

# Role of fish oil in the prevention and therapy of various diseases

production of prostaglandins, and hence reduce the production of inflammatory agents. Pro-inflammatory agents whose production is significantly reduced by the n-3 unsaturated fatty acids include interleukins (IL-1, IL-2, IL-6, TNF- $\alpha$ ) and E2 prostaglandins. As autoimmune conditions affect 5–7% of the population, in particular young people and especially women of working age, it is a medically very serious group of diseases.

## Chronic autoimmune disorders include the following:

Autoimmune disorder	Signs
Rheumatoid arthritis	An inflammatory joint disease, affecting more often women; it demonstrates as pain, swellings and the risk of deformations; it often occurs in the period around menopause, initially on the small joints of the hand.
Crohn's disease	An inflammatory disease of the intestines associated with the development of ulcers and fistulae
Ulcerative colitis	An inflammatory disease of the colon accompanied by ulcerations
Coeliacia	An intestinal absorption disorder associated with gluten intolerance
Psoriasis	A chronic skin disease with skin surface layer cornification disorder
Lupus erythematoses	A very serious systemic condition affecting usually middle-aged women

Autoimmune disorder	Signs
Asthma	A disease in which attacks of dyspnoea caused by sudden constriction of the bronchi is typical
Type I diabetes mellitus	A congenital disease caused by the lack of insulin or its inadequate efficacy, which results in improper utilisation of glucose in the body
Multiples sclerosis	A chronic disease of the CNS caused by the damage of nervous fibre sheaths, affecting more often younger and middle aged individuals
Migraine	Attacks of headache, usually accompanied by nausea, vomiting and mental symptoms

All of these autoimmune diseases have been studied in placebo-controlled clinical trials on the basis of which it has been discovered that the administration of fish oil reduces inflammatory processes (reduced production of inflammatory markers), and hence the need for the administration of anti-inflammatory medicines (usually corticoids) with undesirable adverse reactions.

## Summary of fish oil effects on inflammatory autoimmune conditions:

It reduces the production of inflammatory agents in autoimmune disorders.

# Literature

Prevention of fatal arrhythmias in high-risk subjects by fish oil n-3 fatty acid intake

Leaf A, Albert CM, Josephson M, Steinhaus D, Kluger J, Kang JX, Cox B, Zhang H, Schoenfeld D;

DIETARY n-6 AND n-3 FATTY ACID BALANCE AND CARDIOVASCULAR HEALTH

Visuki Wijendran, K.C.Hayes

Prediction of Cardiovascular Mortality in Middle-aged Men by Dietary and Serum Linoleic and Polyunsaturated Fatty Acids

Laaksonen D.E., Nyyssonen K., Niskanen L. et. All

Benefits of long chain fatty acids (EPA, DHA): Help protect against Heart Diseases

Anette Dicinson

Leptin sensitivity in skeletal muscle is modulated by diet and exercise.

Dyck DJ.

Fish oil control diabetes and prevent degenerative diseases

Karen Kaufman, MS, CCN

Dietary omega-3 polyunsaturated fatty acid supplementation and airway hyperresponsiveness in asthma.

Mickleborough TD.

Omega-3 fatty acids in inflammation and autoimmune diseases.

Simopoulos Ap.

J Am Coll Nutr. 2002 Dec;21(6):495–505

Omega-3 fatty acids and neuropsychiatric disorders.

Young G, Conquer J.

Eicosapentaenoic acid in the treatment of schizophrenia and depression: rationale and preliminary double-blind clinical trial results.

Peet M.

Prostaglandins Leukot Essent Fatty Acids. 2003 Dec; 69(6): 477–85.

Two double-blind placebo-controlled pilot studies of eicosapentaenoic acid in the treatment of schizophrenia.

Peet M, Brind J, Ramchand CN, Shah S, Vankar GK.

Schizophr Res. 2001 Apr 30; 49(3): 243–51.

Omega 3 fatty acids in bipolar disorder: a preliminary double-blind, placebo-controlled trial.

Stoll AL, Severus WE, Freeman MP, Rueter S, Zboyan HA, Diamond E, Cress KK, Marangell LB. Arch Gen Psychiatry. 1999 May; 56(5): 407–12.

Omega-3 fatty acids in major depressive disorder: A preliminary double-blind, placebo-controlled trial.

Su K-P, Huang S-Y, Chiu C-C, Shen WW.

Eur Neuropsychopharmacol 2003;1 3:267–271.

Omega-3 polyunsaturated fatty acid levels in the diet and in red blood cell membranes of depressed patients

Edwards R, Peet M, Shay J, Horrobin  
J Affect Disord 1998 Mar; 48(2–3):149–55

Docosahexanoic acid and omega-3 fatty acids in depression

Mischoulon D, Fava  
Psychiatr Clin North Am 2000 Dec; 23(4):785–94

Omega-3 fatty acids to augment cancer therapy.

Hardman WE.  
J Nutr. 2002 Nov;132(11 Suppl):3508S–3512S.

(n-3) fatty acids and cancer therapy.

Hardman WE.  
J Nutr. 2004 Dec;134(12 Suppl):3427S–3430S

Essential fatty acids, DHA and human brain

Singh M.  
Indian J Pediatr. 2005 Mar, 72(3):239–42

Randomized clinical trials of fish oil supplementation in high risk pregnancies. Fish oil trials in pregnancy team.

Olsen S., Secher N., Tabor A.  
BJOG, 2000 Mar, 107(3):382–95

Polyunsaturated fatty acids in the central nervous system: evolution of concepts and nutritional implication throughout life.

Alessandri J., Guesnet P., Vancassel S.  
Reprod Nur Dev. 2004, Nov–Dec, 44(6):509–38

Maternal Supplementation with very-long-chain n-3 fatty acids during pregnancy and lactation augments children's IQ at 4 years of age.

Helland I., Smith L., Saarem K.  
Pediatrics. 2003 Jan, 111(1):39–44

The utilization of fish protein and oil from anchovy (*Engraulis japonicus*) for human consumption

Changhu Xue, Cao Y., Liu Y., Wang C.  
Faculty of Fishery, Ocean University of Qingdao





**CHIEF HEAD-OFFICE AND HEAD-OFFICE  
FOR THE CZECH REPUBLIC**

**ENERGY GROUP, a. s.**

Trojská 201/39, 171 00 Praha 7  
Czech Republic

**tel. / fax:** +420 283 853 853/54

info@energy.cz, www.energy.cz