Cod Liver Oil SAP

Science-based Cod liver oil for optimal health

Cod liver oil is a complex mixture of triacylglycerols and valuable nutrients. The major distinguishing factor that sets it apart from most other fish oils is the fatty acid profile, especially omega-3 fatty acids and the high level of vitamins A and D3. Cod liver oil has been traditionally used throughout centuries for various purposes, as an ingredient in ointments and as a food supplement. Cod liver oil has multiple physiological benefits including its role in helping maintain optical health, skin membranes and immune function and enhancing cognitive health.

Cod Liver Oil SAP may help improve optical health including glaucoma and can help mitigate the risk of type 1 diabetes by improving inflammation. **Cod Liver Oil SAP** can be used to prevent the risk of cancer, osteoporosis, ameliorate symptoms of autism spectrum disorder (ASD) and infantile depression. **Cod Liver Oil SAP** may help foster cognitive development in children.

ACTIVE INGREDIENTS

Each 4.3 ml contains:

| 3985 mg |
|--------------|
| |
| 399 mg |
| 359 mg |
| 1200 mcg RAE |
| 10 mcg RAE |
| |

Liver from species of Gadidae (Cod family)

Other ingredients: Mixed tocopherols concentrate (from non-GMO sunflower).

Contains no: Gluten, soy, wheat, corn, eggs, dairy, yeast, citrus, preservatives, artificial flavour or colour, starch, or sugar.

This product is non-GMO.

Cod Liver Oil SAP contains 500 ml per bottle.

DIRECTIONS FOR USE

Adults: Take 4.3 ml daily or as directed by your healthcare practitioner.

INDICATIONS

Cod Liver Oil SAP may help:

- Improve optical health including glaucoma.
- Prevent the risk of type 1 diabetes and promote a healthy inflammatory response.
- Prevent the risk of cancer, osteoporosis, improve bone health and immune function.
- Improve symptoms of autism spectrum disorder (ASD) and infantile depression.
- Improve neurological and cognitive development in children.

KEY ATTRIBUTES

Cod Liver Oil SAP contains vitamin E as an antioxidant, ensuring freshness and stability of the oil through to expiration.

PURITY, CLEANLINESS, AND STABILITY

All ingredients listed for each **Cod Liver SAP** lot number have been tested by an ISO 17025 accredited third-party laboratory for identity, potency, and purity.



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Scientific Advisory Panel (SAP): adding nutraceutical research to achieve optimum health

INTRODUCTION

Cod liver oil is a complex mixture of triacylglycerols and valuable nutrients. The major distinguishing factor that sets it apart from most other fish oils is the fatty acid profile, especially omega-3 fatty acids and the high level of vitamins A and D3. Cod liver oil has been traditionally used throughout centuries for various purposes, as an ingredient in ointments and as a food supplement. Cod liver oil has multiple physiological benefits including its role in helping maintain optical health, skin membranes and immune function and enhancing cognitive health.

VITAMIN A

Vitamin A is an essential nutrient for pre- and postnatal development, eyesight and reproduction, in addition to its important role in the maintenance of the immune system.^[1] Vitamin A is taken up in the form of retinol or retinyl esters from animal-derived food sources or in the form of precursors such as carotenoids. Vitamin A is stored mainly in the liver. In liver cells, retinol is oxidized to retinal by alcohol dehydrogenases and metabolized to its main active metabolite retinoic acid (RA).^[1] Vitamin A helps in the development and maintenance of night vision.^[1]

VITAMIN D3

The importance of vitamin D has been thoroughly researched, and it has been found to be a critical vitamin D has been thorougnly researched, and it has been found to be a critical vitamin to overall human health. Vitamin D has 2 forms: vitamin D2, called ergocalciferol, and D3, cholecalciferol. Cholecalciferol is produced in the skin after exposure to UVB sunlight and can also be found in the diet in foods including liver, fatty fish such as salmon, sardine and cod.^[2]

Vitamin D3 Benefits

Bone health

The function of vitamin D is to maintain serum calcium and phosphorus concentrations through regulating calcium absorption from the intestine or calcium concentrations into by regulating calcular base provides the interval of calcular reabsorption from bone. The role of vitamin D insufficiency in osteoprovides is strongly recognized. For men and women over 50 years of age, evidence suggests that the plasma level of 25(OH)D needed to minimize fracture risk is \geq 50 nmol/L, with 75 nmol/L being a more optimal level, and that an intake of 800–2000 IU/day of vitamin D3 is needed to bring the population average to this level.^[3, 4]

Immune Function

Vitamin D may contribute to the prevention and perhaps the treatment of both infections and autoimmune diseases. 1,25 Dihydroxyvitamin D [1,25(OH2)D] has both immunoregulatory and anti-inflammatory properties. Several observational studies support that vitamin D insufficiency leads to an increased risk of various autoimmune diseases, such as type 1 diabetes mellitus, psoriasis, rheumatoid arthritis and multiple sclerosis.^[5]

Cancer

Vitamin D is known to promote cellular differentiation, arrest cell proliferation and decrease the growth of various tumours in laboratory animals.^[2] A meta-analysis of case-controlled studies of patients with or without colon cancer demonstrated that for every 20 ng/ml increase in serum 25(OH)D levels, the chances of colon cancer were reduced by more than 40%.^[2]

Cardiovascular Disease

Hypertension is a major risk factor for cardiovascular disease. In a meta-analysis that compared the results of 18 studies, it was concluded that the serum levels of 25(OH)D were inversely associated with hypertension.^[6] A reduction in overall cardiovascular mortality has been demonstrated in patients with 25(OH)D levels greater than 40 ng/ml compared with patients whose values were less than 10 ng/

OMEGA-3 POLYUNSATURATED FATTY ACIDS (ω -3 PUFAs)

Omega-3 polyunsaturated fatty acids (ω -3 PUFAs), especially docosahexaenoic acid (DHA), and eicosapentaenoic acid (EPA) have recently gained increased attention (b) is their crucial role in supporting cardiovascular health by reducing blood triglycerides, platelet aggregation, and irregular heart beating, and by improving arterial wall tone.^[7] Other health benefits of ω -3 PUFAs may include maintenance of healthy inflammatory response and anticarcinogenic effects towards breast, prostate, and colon cancers. In addition, substantial research suggests that ω -3 PUFAs may be the platelet aggregation of the support of the supervised extended by the supervised extended extende PUFAs offer greater support towards central nervous system health and alleviation of neurological irregularities.^[7] DHA is found in very high levels in the central nervous system and retina, especially in gray matter and photoreceptors, which underscores its vital role in the optimal development of these regions.^[8] While EPA is not found structurally in brain and retinal tissues, it plays an important function as a lipid mediator and eicosanoid precursor, regulating neurobehavioral and immune function. $\ensuremath{^{[8]}}$

ω-3 PUFA Benefits

Inflammation

EPA and DHA have important implications in the prevention and treatment of chronic inflammatory conditions, such as rheumatoid arthritis and asthma.^[9] EPA produces the eicosanoids PGE3 and LTB5, which reduce the duration and intensity of inflammation. DHA reduces transcription of the proinflammatory cytokines, interleukin 18, and tumour necrosis factor- α ^{[3][A]} Scientific evidence suggests that α 2 DIFA $\omega\text{-}3$ PUFA intake may reduce rheumatoid arthritis risk and can alleviate the signs and symptoms of rheumatoid arthritis. $^{[10]}$

Cancer

Cancer There is both epidemiological and experimental evidence that ω -3 PUFAs EPA and DHA may reduce the risk of breast, colon, and prostate cancer.^[11] The possible chemoprotective mechanisms through which ω -3 PUFAs act are suppression of neoplastic transformation, cell growth inhibition, and enhanced apoptosis and antiangiogenicity.^[5] These biological effects are associated with the inhibition of omega-6 FAs (AA)-derived eicosanoids during ω -3 PUFAs supplementation.^[11] **Central Nervous System Health and Mental Disorders** The central nervous system (CNS) is highly concentrated with long chain fatty acids, specifically DHA and AA. A deficiency of DHA markedly affects neurotransmission, membrane-bound enzymes and ion channel activities, gene expression, intensity of inflammation and immunity, and synaptic plasticity.^[12] Increased intake of fish oils may help to improve signal transduction processes and reduce neuronal changes,

Research Monograph

symptoms and risk of schizophrenia, depression, stroke, and Alzheimer's disease.^[12]

symptoms and risk of schizophrenia, depression, stroke, and Alzheimer's disease.^[12] During pregnancy and lactation, DHA supplementation is crucial for optimal fetal neuronal development and visual acuity through to infancy.^[8] **Infant development and growth** Human milk is a natural source of DHA, providing around 7 mg/dl DHA with 12-month lactation.^[13] It is known that 50-60% of the dry adult brain weight is fatty acids, with ω -3 PUFAs representing a large proportion of it. The availability of specific fatty acids during development is likely to be important in neurocognitive function.^[7] Evidence suggests that post-natal DHA supplementation results in improved neurodevelopmental outcomes for preterm infants.^[14]

AUTISM

Autism spectrum disorder (ASD) is a neurodevelopmental disorder and the clinical symptoms of ASD individuals vary widely, suggesting it's multi-factorial etiological nature.^[15] Vitamin A deficiency is prevalent in autistic children. A clinical study reported that vitamin A supplementation in children with ASD resulted in significant improvement in autism symptoms. In addition, serum retinol concentrations and serum 5-HT levels were decreased.^[16] Strong mechanistic evidence suggests that vitamin D and ω -3 PUFAs, specifically docosahexaenoic acid (DHA), have the potential to significantly improve the symptoms of ASD.^[11] DHA is necessary for normal development and functioning of the brain and auditory and visual processing system.^[17] Evidence shows that children with ASD have an increased omega-6 to omega-3 ratio in blood and low blood concentrations of ω -3 PUFAs.^[16]

INFANTILE DEPRESSION

Depression in children and teenagers is often linked with panic attacks, anxiety, obsessive behavior, and various behavioral abnormalities. A study supplemented 600 mg/d of EPA+DHA in children with infantile major depression for 16 weeks and observed a significant decrease in assessment scales for depression symptoms as compared with control.^[18]

TYPE I DIABETES MELLITUS

Type I (insulin-dependent) diabetes mellitus is a multifactorial disease, primarily genetic and environmental factors such as diet playing a major role in the pathogenesis.^[19] Breastfeeding has been suggested to reduce risk of Type I diabetes. Recent knowledge of untraditional roles of vitamin D has unearthed its beneficial effects in preventing Type I diabetes.^[30] Vitamin D influences the immune system which could be of potential relevance in the pathogenesis of Type I diabetes.^[19] and has been shown to protect against autoimmune diabetes in experimental animals. ^[19] In addition, evidence from multicentre case control study has shown that vitamin D supplementation in the first year of life is linked to reduced risk of Type I diabetes.^[19] Notably, EPA and DHA have been regarded to be potentially relevant in

the etiology of Type I diabetes.^[19] Cod liver oil taken during pregnancy was associated with reduced risk of Type I diabetes in the offspring, suggesting that vitamin D or the n-3 fatty acids in the cod liver oil, or both, have a protective effect against Type I diabetes.^[20] Overall, cod liver oil may reduce the risk of type 1 diabetes, perhaps through the antiinflammatory effects of long-chain n3 fatty acids and being a rich source of vitamin D.

COD LIVER OIL AND GLAUCOMA

Glaucoma, the second leading cause of blindness in the world is an optical neuropathy characterized by a specific structural alteration of the optic nerve head that leads to progressive deterioration of the visual field. Vitamin A and omega-3 fatty acids in cod liver oil has been suggested to play a protective role in the treatment of glaucoma. $\ensuremath{^{[21]}}$

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