

This scientific information is intended for healthcare professionals.

Vegan EPA and DHA from algal oil, the underutilized or even missing ingredients in plant-based diets

- EPA and DHA contribute to the normal **function of the heart**¹
- DHA helps maintain normal **brain function and vision**²
- EPA and DHA contribute to the maintenance of normal blood **triglyceride levels**³ and **blood pressure**⁴
- Docosahexaenoic acid (DHA) maternal intake contributes to the normal development of **brain and eyes of the fetus and breastfed infants**⁵

With a daily intake of ⁽¹⁾ at least 250 mg EPA+DHA, ⁽²⁾ 250 mg DHA, ⁽³⁾ 2 g EPA+DHA, ⁽⁴⁾ 3 g EPA+DHA, ⁽⁵⁾ 200 mg DHA on top of a daily 250 mg EPA+DHA

Typical indications for EPA+DHA

Cardiovascular health

Prevention myocardial infarction

Prevention coronary heart disease

Optimization of cognitive functions (attention, memory, learning)

Prevention and improvements in early Alzheimer's and Parkinson's diseases

Pregnancy and lactation

Prevention postnatal depression

Combination with drugs

EPA+DHA may be combined with a cardio-aspirin, β -blockers, ACE-inhibitors, fibrates, sartans, diuretics, statins, antidepressants and/or mood stabilizers.

Interactions and precautions

The European Food Safety Authority (EFSA) considers the long-term use of **5 g EPA+DHA/day** to be safe for adults, **without increasing the risk of spontaneous bleeding or bleeding complications** (even with concomitant use of low-dose acetylsalicylic acid or anti-coagulants).¹

Omega-3 fatty acids do **not** have a **clinically relevant effect on LDL cholesterol levels**. At daily doses of 2-6 g EPA+DHA may induce a small increase in LDL-cholesterol concentrations of about 3%, which does not have an adverse effect on cardiovascular disease risk.¹

Omega-3 fatty acids do **not** have a **clinically relevant effect on blood sugar control** (no changes in HbA1c, possibly small increases of 2-6 mg/dl in fasting glucose).²⁻⁴

Scientific information

Good sources of EPA and DHA include fish and seafood. However, vegan diets do not include animal-origin foods. Unless vegans consume algal omega-3 supplements, they completely rely on endogenous production of EPA and DHA from the parent omega-3 fatty acid alpha-linolenic acid (ALA). Plant sources sufficiently high in ALA are few, i.e. flaxseed oil, hempseed oil, flax seeds, hemp seeds, chia seeds.

Of concern is that vegan diets **typically have high intakes of the omega-6 fatty acid linoleic acid** (LA, e.g. from safflower oil, corn oil and sunflower oil) as compared to omnivore/non-vegetarian diets.⁵ Even the ALA-containing soybean products that are commonly used by vegans do contain a lot of LA (e.g. soybean oil contains 50% LA versus 6% ALA).⁵ High intakes of LA prevents endogenous conversion of ALA into EPA and DHA, through competitive use of conversion enzymes.⁵ As a result, vegans are even **more reliant on the consumption of preformed EPA and DHA** to compensate for the reduced conversion capacity.⁵

A human body's status in EPA and DHA is preferably measured by the standardized Omega-3 Index, which is the percentage of EPA plus DHA in a total of 26 specific fatty acids in red blood cell membranes. When using this original Omega-3 Index a target range of 8-11% is correlated with improved cardiovascular health, complex brain functions and better pregnancy outcomes.^{6,7} Vegans who do not consume algal omega-3 supplements typically have an **Omega-3 Index of 3,1% to 4,8.**^{6,8} Hence, there is room for improvement.

Cardiovascular health

EPA and DHA are known to lower blood triglycerides, blood pressure, platelet aggregation and inflammation, while improving heart rate variability and endothelial function in the blood vessel walls. Higher levels of EPA plus DHA in the body lower the risk of developing coronary heart disease, myocardial infarction and cardiovascular mortality.^{9,10} Moving from an Omega-3 Index of 4% towards one of 8% has been calculated to reduce one's risk of fatal coronary heart disease by 30%.¹¹ Dose response relationships were identified in a meta-analysis of 13 randomized controlled trials involving as many as 127477 participants, for example: every 1 g/d of EPA+DHA corresponded to a 9% and 7% lower risk of myocardial infarction and coronary heart disease, respectively.¹⁰

Brain health

DHA constitutes 10-20% of total lipids in the brain and is able to modulate physiological processes such as membrane fluidity, release of neurotransmitters, myelination and neuronal growth. EPA helps soothing neuroinflammation.¹² A substantial amount of DHA is accreted in the brain's frontal cortex involved in attention, memory, emotional regulation, impulse control and social behavior.¹³ Upon analysis of 33 randomized controlled omega-3 supplementation trials involving over 4500 children and adolescents (4-25 years of age) researchers were able to identify better cognitive skills (focus, attention, memory, learning) only in participants with an Omega-3 Index >6%.¹⁴ EPA+DHA supplementation has also been shown to confer benefits such as slower cognitive decline, less motor dysfunctions and improved mood in the elderly with "early "Alzheimer's and Parkinson's diseases.^{12,15}

Pregnancy and lactation

European guidelines indicate that pregnant and lactating women should consume at least 200 mg DHA per day, higher intakes of 1 or 2,7g/day are also well-tolerated. DHA supports brain, nervous system and eye development of both the fetus (via the placenta) and infant (through breastmilk).¹⁶ An adequate intake of EPA+DHA is associated with reduced preterm delivery (DHA), reduced risk of low birth weight (DHA) and reduced risk of postnatal depression (EPA).^{16,17} In a Belgian cohort study of 72 healthy women, those with an Omega 3-Index <5% in early pregnancy had a 5-fold increased risk of a depressive episode during the year after childbirth than women with an Omega-3 Index ≥5%.¹⁸ Note that EPA also has positive effects on its own¹⁶, suggesting that vegans should look for algal oils containing not only DHA, but EPA as well.

Referenties

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