

Omega-3 fatty acids in krill and fish oil

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Omega-3 fatty acids play an important role in various functions in the organism and therefore have a very wide range of applications in the prevention and treatment of various diseases. Omega-3 fatty acids are essential, so it is imperative that the requirement is covered by the diet. The biologically most active omega-3 fatty acids EPA and DHA are contained in high quantities in fish and krill oil.

What are omega-3 fatty acids?

Omega-3 fatty acids belong to the so-called unsaturated fatty acids and are essential for the organism. This means that they cannot be produced by the human body itself and must therefore be taken in with food.

Omega-3 fatty acids are found in various plants, algae and above all in fatty sea fish and krill: as α linolenic acid and its derivatives.

α -linolenic acid (also known as ALA) is found in vegetable oils such as linseed or rapeseed oil, in the lesser-known oils from the chia and



perilla plants, and in algae, walnuts and leafy vegetables. This fatty acid is the precursor of the biologically most active omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). EPA and DHA are mainly found in oily sea fish, krill and certain types of algae. The human body can convert ALA into EPA and DHA, but only to a limited extent.

What is the purpose of omega-3 fatty acids?

Omega-3 fatty acids fulfil a variety of functions. They are important for various metabolic processes, are components of the cell membrane and play an important role in the growth and development of children, even in the womb.

Omega-3 fatty acids protect the heart

A healthy cardiovascular system ultimately benefits all organs! Omega-3 fatty acids protect against cardiovascular diseases and their consequences. In human studies, the following effects have been shown for EPA and DHA:

They have an anti-arrhythmic effect (prevent cardiac arrhythmia) both at the level of the atrium and the ventricle.

- They stabilise unstable vascular areas that could otherwise cause myocardial infarction ("unstable plaques").
- They slow down the progression of changes in the coronary vessels and thus have a preventive effect on coronary heart disease (CHD).
- They lower triglyceride levels, which can pose a risk of thrombosis or arteriosclerosis, and improve blood flow.

- They inhibit platelet aggregation ("clumping" of blood platelets).
- They have many other beneficial effects on vascular function, blood pressure and inflammatory mediators.

Omega-3 fatty acids are important for the brain

Long chain unsaturated fatty acids such as EPA and DHA are very important for normal brain function. How well nerve cells work depends, among other things, on the proportion of omega-3 fatty acids in the cell membranes. This is why omega-3 fatty acids are extremely important for the brain development of the unborn child and babies. In the case of neurological diseases such as AD(H)S, it is also important to ensure a high intake of omega-3 fatty acids. People suffering from AD(H)S often have low omega-3 levels (1). However, symptoms such as concentration and attention disorders, excessive impulsiveness or inner restlessness can be significantly reduced by appropriate omega-3 intake. It has been found that the dose of EPA in particular is crucial for the positive effects to occur. Meanwhile, there have been numerous studies on omega-3 fatty acids in AD(H)S and possible effects on those affected (2).

Omega-3 fatty acids can further reduce the risk of dementia, such as Alzheimer's disease. It has been observed that people who eat an omega-3-rich diet are less likely to get Alzheimer's disease. High levels of EPA and DHA are related to increased brain volume.

(1) <https://pubmed.ncbi.nlm.nih.gov/7572706/>

(2) <https://pubmed.ncbi.nlm.nih.gov/21961774/>

Omega-3 fatty acids support the immune system

Omega-3 fatty acids have a positive effect on acute but also chronic inflammation. The topic of inflammation, as well as the influence of omega-3 fatty acids on it, is highly complex! In short and simple terms, the aim of inflammation is actually to eliminate harmful stimuli (e.g. the penetration and spread of pathogens that cause illness). Inflammatory processes can get out of balance and chronic inflammation can develop, as is the case with many chronic diseases, e.g. autoimmune diseases. Omega-3 fatty acids together with vitamin D help to regulate the immune system, which can influence the number of white blood cells (immune cells). So-called macrophages (giant eating cells) have receptors for omega-3 fatty acids. If they dock to these receptors, they block the inflammation inside the macrophage. They also influence the inflammation by promoting basic building blocks for various inflammation-dissolving substances. This explains how omega-3 fatty acids work against excessive inflammatory processes in the organism.

A team of researchers from the Friedrich Schiller University of Jena and the Harvard Medical School in Boston has published study results on this topic in the journal "Nature Communications". The cellular mechanisms of the dissolution phases of inflammation are described in detail:

<https://www.nature.com/articles/s41467-017-02538-5>

For these reasons, the omega-3 fatty acids EPA and DHA are attributed a high therapeutic effect in numerous chronic degenerative and inflammatory diseases. They are generally recommended to accompany autoimmune and cancer diseases. For example, in the autoimmune disease multiple sclerosis, the damaged myelin sheaths, which in the healthy body protectively surround the nerve fibres, can be at least partially rebuilt with omega-3 fatty acids and coenzyme Q10. However, people who suffer from recurrent infections can also counteract them with omega-3 fatty acids.

Possible uses of omega-3 fatty acids

- Cell structure
- Strengthening the immune system
- Chronic inflammatory diseases
- Autoimmune diseases
- Prevention or improvement of cardiovascular diseases such as arteriosclerosis, heart attack, angina pectoris, coronary heart disease, thromboses and embolisms.
- Neurological diseases (dementia, Alzheimer's, multiple sclerosis, Parkinson's, AD(H)S, Asperger's syndrome, autism)

The HS-Omega-3 Index

HS stands for "High Sensitivity" or "Harris Schacky" (Prof. Dr. Clemens von Schacky Head of Preventive Cardiology, University of Munich and Prof. Dr. W.S. Harris). The omega-3 index provides information about the content of the two omega-3 fatty acids EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) and is measured together with 24 other fatty acids in the red blood cells (erythrocytes) using a patented and standardised procedure, which allows an exact statement to be made. Good values are between 8% and 11%, but too low values are very common. A low HS-Omega-3 Index means a high risk of cardiovascular diseases and their consequences.

Nutrition Recommendation

Experts recommend including fatty sea fish in the menu twice a week. As "landlocked" people, we are usually not used to this, but even if you are a sea fish lover, the choice of fresh, suitable and not heavy metal-laden fish can be very limited. Therefore it may be appropriate to choose a high quality fish oil or krill oil as a dietary supplement.

What is the difference between krill oil and fish oil?

Fish oil does have higher concentrations of omega-3 fatty acids than krill oil. However, the omega-3 acids in krill oil can be better absorbed by the body. This is due to the fact that the omega-3 acids in fish oil are only present in fat-soluble form (bound to triglycerides). In krill oil, on the other hand, they are fat and water soluble because they are bound to phospholipids. This has an effect on the tolerance, digestion and absorption of the oil.

What speaks for krill oil - what fish oil?

- The ratio between omega-3 fatty acids and omega-6 fatty acids is 3 times higher in krill oil than in fish oil.
- Unlike fish oil, krill oil contains natural astaxanthin. However, there are also high-quality fish oil on the market to which astaxanthin is added.
- Krill is at the beginning of the food chain. This means that there is hardly any accumulation of heavy metals and other toxins in the animal's body. Fish, however, are higher up the food chain. The risk of enrichment is greater.
- In contrast to fish, the risk of overfishing is very low for krill. The krill stock is estimated at around 500 million tonnes. No other species in the world produces more mass than krill. The total annual catch is about 200,000 tonnes, which represents less than 0.1% of the stock. Nevertheless, it is important to use only krill from sustainable sources.
- Omega-3 fatty acids in high-quality fish oil are cheaper than those in krill oil.

What is astaxanthin?

Astaxanthin is a natural, reddish colouring agent that belongs to the carotenoids. It is mainly produced by green algae and is responsible for the red colouring of crustaceans such as krill, which consume these algae. Astaxanthin is a powerful antioxidant that helps the body eliminate dangerous free radicals. Astaxanthin does not only unfold its protective effect in the body, but also preserves the krill or fish oil during storage (e.g. in the capsule/bottle).



What to look for when buying krill or fish oil?

For environmental reasons, krill and fish oil should only be purchased from sustainable and controlled sources. Krill oil should be processed as soon as possible after capture. If a fish oil is preferred, it is important that it has been tested for heavy metals and, if applicable, cleaned appropriately.

Dosage recommendations

Fish oil: 1-2g omega-3 fatty acids daily

Krill oil: 0.4-0.8g omega-3 fatty acids daily

For better absorption, it is best taken with a meal.