German Federal Institute for Risk Assessment

FAQ

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Omega-3 fatty acids: Important – but in moderation

Omega-3 fatty acids are a type of polyunsaturated fatty acid. The best-known examples are alpha-(α)-linolenic acid (ALA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). ALA cannot be produced by the human body itself, but must be taken up from food. It is found primarily in plant-based foods such as walnuts, soya beans, rapeseed and linseed, as well as in oils made from these.

The human body can convert ALA into EPA and DHA. However, the conversion rate is relatively low and can also be influenced by various factors (e.g. nutrition, metabolism and gender). DHA and EPA can be taken up directly and in higher amounts primarily from oily sea fish. These include, for example, mackerel, herring and salmon.

In addition, DHA and EPA are also commercially available as dietary supplements in the form of preparations containing fish oil, marine microalgae oils or highly purified fatty acid ethyl esters. The dosages are in some cases as high as those of medicines. The German Federal Institute for Risk Assessment (BfR) considers the use of these supplements unnecessary for healthy people, particularly if they consume fish regularly. For people with heart disease – or with corresponding risk factors – taking high doses may even pose health risks. People with heart disease or corresponding risk factors should therefore only take supplements containing omega-3 fatty acids after consulting a doctor.

What are omega-3 fatty acids?

Omega-3 fatty acids belong to the group of long-chain, polyunsaturated fatty acids. The most important examples include the triple-unsaturated alpha-(α)-linolenic acid (ALA), the five-fold unsaturated eicosapentaenoic acid (EPA) and the six-fold unsaturated docosahexaenoic acid (DHA).

ALA is essential for humans. This means they must take it up from food, as the human body cannot produce it itself.

However, the human body can convert ALA into EPA and DHA. That said, the conversion rate is relatively low and can also be influenced by individual factors (e.g. nutrition, metabolism, gender).

What does the body need omega-3 fatty acids for?

Alpha-(α)-linolenic acid (ALA) is particularly important in human nutrition as a precursor to docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA).

DHA is an important component of cell membranes in the body and influences their structure and function. DHA also plays an important role in maintaining normal triglyceride and cholesterol levels.

Furthermore, DHA and EPA are precursors for certain tissue hormones which, as signalling molecules, regulate various processes in the body and, amongst other things, have an anti-inflammatory effect.

DHA is also important for the normal development and growth of the foetus and the breastfed infant. Therefore, an adequate supply of DHA during pregnancy and breastfeeding is particularly important.

Which foods are good sources of omega-3 fatty acids?

In particular, oily fish such as salmon, mackerel, herring, tuna and sardines have high concentrations of docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA). Furthermore, DHA and EPA are also found in seaweed, albeit with very varying amounts.

Alpha-(α)-linolenic acid (ALA), on the other hand, is found almost exclusively in plant-based foods, such as walnuts, soya beans, rape and linseed, as well as the oils produced from them.

Both ALA and DHA and EPA (in the form of fish oil, marine microalgae oils or highly purified fatty acid ethyl esters) are also commercially available as dietary supplements.

What amount of omega-3 fatty acids should I consume?

The German Society for Nutrition (DGE) has established recommended intake levels for alpha-linolenic acid (ALA). According to these guidelines, the daily intake of this fatty acid should amount to 0.5% of total energy intake. Based on an average energy intake of 2,400 kcal per day, this corresponds to an ALA intake of approximately 1,300 mg. This intake can be achieved with just about one tablespoon of linseed (6 to 7 g) or one tablespoon (15 millilitres (ml)) of rapeseed oil, or by consuming about 13 g of walnut kernels (about four walnuts).

For pregnant and breastfeeding women, the DGE recommends an intake of 200 mg of docosahexaenoic acid (DHA) per day – an amount that can be achieved by consuming 1-2 portions of oily fish such as salmon, mackerel or herring each week. However, pregnant and breastfeeding women should avoid eating fish species with potentially high concentrations of methylmercury, such as for example large predatory fish (including tuna).

How can I ensure an adequate intake of omega-3 fatty acids?

An adequate intake of EPA and DHA can be achieved by eating 1-2 portions of oily fish such as salmon, mackerel or herring each week.

In principle, it is possible to ensure a good supply of DHA and EPA even without eating fish. For one thing, the body can produce them itself from ALA. However, the amounts of DHA and EPA produced in this way are generally lower than those that would result from a fish meal.

To improve the conversion rate, it is advisable to choose foods with a high ALA concentration (e.g. rapeseed oil, walnut oil, linseed) and to limit the consumption of foods with a high concentration of omega-6 fatty acids (e.g. sun flower or maize germ oil).

Microalgae and seaweed also contain DHA and EPA, albeit in very varying amounts. Due to the highly fluctuating, and in some cases very high, iodine content of seaweed, algae (and algae products) cannot be recommended per se to meet the requirement for omega-3 fatty acids. As a general rule, only algae products should be consumed that are labelled with their iodine content and the maximum recommended daily intake.

In certain cases, however, supplementation may be advisable. For example, pregnant and breastfeeding women who do not eat fish are advised to take DHA supplements. They should seek advice from their gynaecologist.

How well is the population supplied with omega-3 fatty acids?

As part of normal nutrition, adults in Germany take up an average of between 127 mg (young women) and 295 mg (older men) of docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) per day. In the 95th percentile, intake ranges from 369 mg to 827 mg per day.

The data suggest that an adequate supply of long-chain omega-3 fatty acids – even taking into account the body's own production from ALA – can be achieved through balanced and varied nutrition, particularly if this includes regular consumption of fish.

Is it advisable to take additional eicosapentaenoic acid (EPA) and/or docosahexaenoic acid (DHA) via food supplements?

Overall, there is currently no evidence to suggest that taking additional omega-3 fatty acids via food supplements would be beneficial for the healthy general population.

In large intervention studies such as the VITAL study from the USA, involving more than 25,000 participants, the daily administration of 1 g of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) over a period of five years did not lead to a reduction in cardiovascular disease or cancer. Similarly, in the large-scale DO-Health study involving over 2,000 older participants from various European cities, the additional intake of 1 g of DHA and EPA showed no positive effect on blood pressure.

The BfR considers the intake of food supplements containing DHA and EPA to be unnecessary for healthy people – particularly if they consume fish regularly.

Do fish oil capsules contain omega-3 fatty acids?

Fish oil capsules contain the omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Depending on the product, they may contain other ingredients, such as vitamin E as an antioxidant.

Do people following vegetarian or vegan nutrition need to pay attention to their omega-3 fatty acid intake?

People who follow a vegetarian or vegan diet, or who do not eat fish for other reasons, can produce the omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) from ALA themselves by specifically consuming plant-based foods with a high alpha-linolenic acid (ALA) concentration (such as rape and walnut oil or linseed) to produce the omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) from ALA themselves, albeit to a lesser extent than would be possible through the direct consumption of fish.

Microalgae and marine algae also contain DHA and EPA, albeit in very varying amounts. Due to the highly fluctuating, and in some cases very high, iodine content of marine algae, algae (and algae products) cannot be recommended per se to meet the requirement for omega-3 fatty acids. As a general rule, only algae products should be consumed that are labelled with their iodine content and the maximum recommended daily intake.

Do pregnant and breastfeeding women need to pay attention to their omega-3 fatty acid intake?

The long-chain omega-3 fatty acid docosahexaenoic acid (DHA) is important for the normal development and growth of the foetus and the breastfed infant.

The German Nutrition Society (DGE) recommends that pregnant and breastfeeding women take up an average of 200 milligrams (mg) of DHA per day; this can be achieved by eating one to two portions of fish per week. Oily fish such as mackerel, herring or salmon are particularly suitable. However, pregnant and breastfeeding women should avoid eating fish species with potentially high concentrations of methylmercury, such as large predatory fish (including tuna).

Pregnant and breastfeeding women who do not eat fish are advised to take DHA supplements. They should seek advice from their gynaecologist.

Are there any health risks associated with taking food supplements containing omega-3 fatty acids?

Food supplements containing omega-3 fatty acids are available in the form of fish oil, algae oil or highly purified fatty acid ethyl esters, and some contain similarly high doses of docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) as medicinal products. Unlike medicines, food supplements need only be notified to the German Federal Office of Consumer Protection and Food Safety (BVL) and are freely available on the market. They are not officially tested for safety before being placed on the market.

Studies have observed elevated cholesterol levels and an increased tendency to bleed, as well as an impairment of the natural immune defence system—particularly in older people—when omega-3 fatty acid intake was significantly higher than that found in normal nutrition. Such high intake levels are not usually achieved through conventional foods, but only through the combined consumption of enriched foods and/or food supplements containing omega-3 fatty acids (further information can be found at here).

Furthermore, the intake of supplements containing omega-3 fatty acids may be associated with an increased risk of atrial fibrillation, a heart rhythm disorder, in people with existing or impending heart disease. This effect was most pronounced at doses of around 4 g per day, but was also evident at doses of around 2 g per day over a period of two years (further information can be found here.

The BfR therefore recommends that consumers with heart disease or relevant risk factors only take supplements containing omega-3 fatty acids, such as fish oil capsules, in consultation with a doctor, particularly when taken over a prolonged period.

The intake levels of omega-3 fatty acids associated with the health risks described are not reached through normal fish consumption.

What does the BfR recommend regarding omega-3 fatty acids?

In Germany, typical nutrition provides a daily intake of up to approximately 800 mg of docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) when consumption is high. Fortifying various foods with DHA and EPA, or taking appropriate food supplements, can lead to a significant increase in the intake of these fatty acids. Studies have observed elevated cholesterol levels, impairment of natural immune defences – particularly in older people – and an increased tendency to bleed when intake levels are high. Furthermore, the long-term effects of increased intake of DHA and EPA have not yet been conclusively clarified.

In view of this, the German Federal Institute for Risk Assessment (BfR) issued an opinion in 2009 recommending that no more than 1.5 grams (g) of DHA and EPA per day should be taken up from all sources. This view is further supported by the fact that recent data from randomised controlled trials suggest that, in people with heart disease or risk factors for it, an additional intake of omega-3 fatty acids (DHA and EPA in combination or EPA ethyl ester alone) of approximately 1.8 g per day or more over a prolonged period may increase the risk of atrial fibrillation in a dose-dependent manner.

Further information on omega-3 fatty acids

BfR recommends the setting of maximum levels for the fortification of foods with omega-3 fatty acids
https://www.bfr.bund.de/cm/349/bfr_recommends_the_setting_of_maximum_levels_for_the_fortification_of_foods_with_omega_3_fatty_acids.pdf

Omega-3 fatty acid supplements can increase the

risk of atrial fibrillation in heart patients
https://www.bfr.bund.de/cm/349/omega-3-fatty-acid-supplements-can-increase-the-risk-of-atrial-fibrillation-in-heart-patients.pdf

Information page: omega-3-fatty acids
https://www.microco.info/other-substances/essentielle-fettsaeuren/omega-3-fettsaeuren/

About the BfR

The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH). It protects people's health preventively in the fields of public health and veterinary public health. The BfR provides advice to the Federal Government as well as the Federal States (‘Laender’) on questions related to food, feed, chemical and product safety. The BfR conducts its own research on topics closely related to its assessment tasks.

About microco-wissen.info

The internet portal www.microco.info provides information on vitamins, minerals and numerous other substances that we ingest with food or that are offered as food supplements. In addition, the individual pages contain the maximum levels of vitamins and minerals in food supplements and in fortified foods as recommended by the German Federal Institute for Risk Assessment (BfR).

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