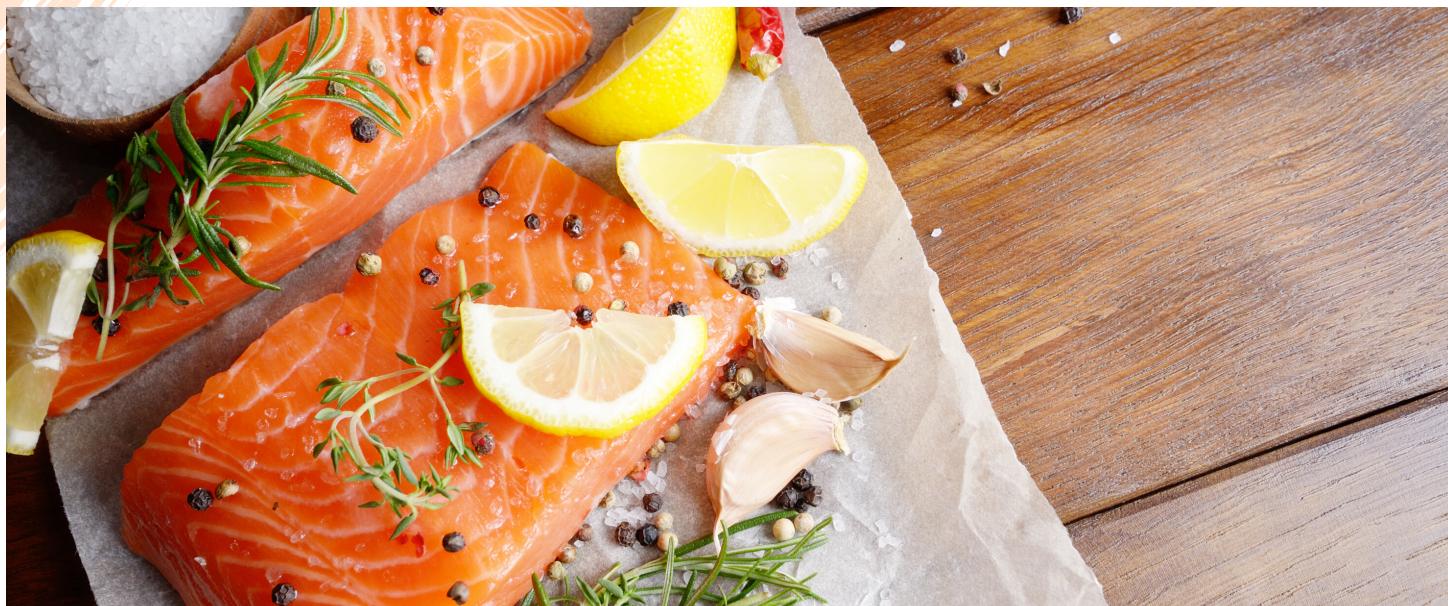




Omega-3 Fats



Omega-3 fats are a type of polyunsaturated fatty acid (PUFA). Unlike saturated or monounsaturated fats, they contain more than one double bond in their chemical structure. Omega-3 fats are one of two essential fatty acids (the other being omega-6), which means our body cannot produce them on its own and we must get them through our diet. There are three types of omega-3 fatty acids:

- Alpha-linolenic acid (ALA)
- Eicosapentaenoic Acid (EPA)
- Docosahexaenoic Acid (DHA)

ALA is the plant-based omega-3 fat found in foods such as walnuts, flaxseed, and chia seeds. EPA and DHA are marine sources of omega-3 found primarily in oily fish, pastured eggs and grass-fed red meat. Most physiological health benefits of omega-3 found in the scientific literature include EPA and DHA. Though some of the ALA we consume can be converted to EPA and DHA in the body, it is an extremely inefficient process.

Omega-3 can help you achieve Food Freedom

Omega-3 fats are essentially anti-inflammatory and therefore reduce inflammation in the body, particularly by balancing out the effect of omega-6 fats which are essentially pro-inflammatory. A standard diet, high in packaged food and processed carbohydrate, typically contains an omega-3 to omega-6 ratio of 1:16. This type of diet is "pro-inflammatory" in nature because the omega-6 fats takeover the omega-3 fats. A ratio of 1:4 or even lower (omega-3 to omega-6) is thought to be more optimal for improved health and reduced risk of disease, considering that inflammation is an underlying issue in many disease states. This ratio might be achieved by limiting the intake of highly processed omega-6 fats and increasing dietary intake of omega-3 fats. A sheer lack of omega-3 in the diet has been linked to scaly and dry skin, dermatitis as well as reduced growth in infants and children (1). A regular intake of omega-3s through our diet is recommended by almost all major health organisations due to their cardio-protective properties, such as reducing serum triglycerides (unhealthy fat in the blood) and increasing HDL-cholesterol (heart-protective cholesterol) in the blood.

DHA, one of the two long-chain omega-3 fats, is the main structural fatty acid in the adult brain, making up one third of its total fat content (2). Research shows strong links between dietary intake of long-chain omega-3 fatty acids and risk of depression. As you may have guessed, a poor intake of EPA and DHA is associated with an increased risk of depression, while supplementation of EPA and DHA in individuals affected by depression has been shown to effectively improve it (3).

Additionally, there is evidence to suggest that regular DHA supplementation of 900 mg per day can improve memory and learning through neurogenesis (creation of new brain cells), and lower your risk of Alzheimer's disease (4, 5). The importance of DHA doesn't stop there, as it is also important for eye health and our central nervous system (2).



Lastly, DHA is essential for the growth and development of the brain in infants and therefore extremely important in pregnancy (6).

Conversion of ALA to EPA and DHA

As mentioned before, ALA (plant-based food sources) can be converted to EPA and DHA (marine food sources) in the body. However, this conversion is extremely inefficient (7). The conversion of ALA to EPA in men is estimated to be about 8%, and then further to DHA to be even lower (<0.1%) (8). For women, the conversion of EPA to DHA is much higher in a relative sense (9%), partly due to higher levels of oestrogen and the need in pregnancy (8). Having an excessive intake of pro-inflammatory omega-6 fats can also reduce the rate of conversion between ALA to EPA and DHA (8).

This creates a nutritional challenge for individuals who follow a vegetarian or vegan diet. There are extremely limited sources of plant-based DHA and EPA, with the main (and only) commonly consumed food source being seaweed, which still contains only a small amount of EPA. As a result, it is common for poorly formulated vegetarian and vegan diets to be inadequate in essential long-chain omega-3 fats. Maintaining a high intake of plant-based omega-3 fats (see below for food sources) and regular supplementation with microalgae (plant-based DHA and EPA supplement) can be beneficial for individuals following a vegetarian or vegan diet (9).

How much do you need?

One serving of fish is roughly 100 grams (cooked weight) or 115grams (raw weight). According to World Health Organisation, 1-2 servings of fish per week providing 200-500 mg of EPA and DHA per day is recommended to protect against heart disease (10). In addition, the Heart Foundation recommends a daily intake of ALA (plant-based omega-3) of at least 1 gram per day (10). According to a national survey conducted in 2011, most Australians are not meeting these basic requirements (11).

In saying that, omega-3 intake has improved somewhat since the 1995 survey due to increased popularity surrounding supplementation (e.g., fish oil capsules) (11).

Consuming omega-3 fat through diet and/or supplementation is unlikely to cause adverse effects. However, the subsequent intake of other harmful substances such as mercury (toxic heavy metal) should be considered when consuming high amounts of fish and seafood. Selenium is a mineral also found in fish and seafood that can help bind to mercury.

Cooking and handling

Though long-chain omega-3 fats are the perfect structure for our cell membranes (their many double bonds allow them to be flexible and fluid), they are also extremely delicate and prone to oxidation (12). Heat is a major contributor to oxidation of unstable fats. Therefore, using low heat to cook fish and other seafood is essential to better preserve the omega-3 fats they contain, and preventing them from becoming oxidised. We already know the process of deep-frying our food creates known unhealthy fats, such as trans fats, but it also destroys the omega-3 content of that food – yet another reason to avoid fried foods.

Plant-based sources	Serving size	ALA (g)
Oil – Linseed or flaxseed	5 mL (1 tsp)	2.7
Chia seeds	15 mL (1 tbsp)	2.7
Walnuts	30 g (1 handful)	1.9
Mixed seeds	30 g (1 handful)	0.7
Tofu, cooked	150 g (2/3 cup)	0.4
Edamame, cooked	125 mL (1/2 cup)	0.3
Hemp seeds	15 mL (1 tbsp)	0.2

N.b., highly processed vegetable oils (i.e. canola oil and margarine) are also good sources of ALA. However, they contain significantly high amounts of omega-6, which reduces the conversion of ALA to EPA/DHA and makes them pro-inflammatory.

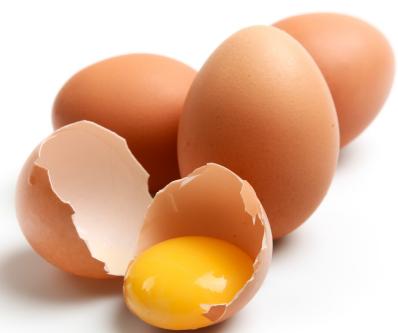
Marine-based sources	EPA + DHA (g)/100 g
Salmon, cooked	1.7
Salmon, canned	1.5
Sardines, canned	2.4
Mackerel, raw	1.5
Tuna, canned	0.7
Tuna, raw	0.4
Snapper	0.3
Barramundi	0.2
Anchovies, canned	2.0
Prawns	0.3
Oysters	0.5
Crab, cooked	0.5
Seaweed nori, dried	2.0 (EPA only)



Marine-based sources	Serving size	EPA + DHA (g)/100 g
Microalgae supplement (vegan True, available on iHerb)	1-2 capsules/day	0.3-0.6
Fish oil (BioCeuticals, available in most health stores)	1-2 capsules/day	0.5-1.0
Krill oil (Swisse, available at pharmacies and health food stores)	1 capsule/day	0.3

Other Food Sources

Grass-fed meat and pasture-raised eggs contain a small amount of omega 3 fats. Offal meat (liver) provides 0.4g of EPA+DHA per 100 grams.



Take-home messages

- Omega-3 fats are essential fatty acids that cannot be produced by the body and we therefore need to consume them through the diet daily;
- Long-chain omega-3 fats (EPA and DHA) reduce inflammation in the body and have been shown to positively impact our brain, eyes, central nervous system and heart;
- The requirement for DHA is much higher during pregnancy for optimal fetus brain growth, and it is also a major component in breast milk.
- Consuming 200-500 mg of combined DHA and EPA each day is likely sufficient for most individuals, however you should always consult a qualified health professional for individual recommendations best suited to you;
- Supplementing with fish oil, krill oil or microalgae may be necessary if dietary intake is not possible or insufficient;
- Reduce intake of unhealthy sources of omega-6 fatty acids such as potato chips, deep fried foods, cakes, biscuits and highly processed vegetable- and seed oils. This will allow for a better conversion rate of ALA to EPA and DHA.



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