



What this fact sheet covers:

- What is omega-3?
- How has our dietary intake of omega-3 changed over time?
- Evidence for an association between omega-3 depletion and mood disorders
- How does omega-3 affect mood?
- Omega-3 for heart health
- Recommendations for dietary intake
- Sources of omega-3

What is omega-3

- Omega-3 and omega-6 fats are both polyunsaturated fatty acids.
- The main forms of omega-3 are the “parent” molecule, Alpha Linolenic Acid (ALA), which can be found in a variety of plant based sources such as walnut, hemp, soy, flax and canola oil and the two longer-chain omega-3 molecules, docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA).
- DHA and EPA are “essential” fatty acids, which means that our bodies can’t synthesise them and we need to consume them in our diets.
- A small percentage of the ALA consumed can be converted into DHA and EPA in our bodies but the richest source of these essential fatty acids is seafood.

How has our dietary intake of omega-3 changed over time?

- Over the last 150 years or so rapid expansion in Western populations and large scale industrialization has been associated with a major change in diet.
- Much less omega-3 (from fish, wild game and plants) is now eaten, with a corresponding large increase in consumption of saturated fats and omega-6 fatty acids from mass produced vegetable oils such as corn and safflower oils.
- It is thought that we once consumed roughly equivalent amounts of omega-6 and omega-3 but now, people in countries like Australia tend to consume 15 times more omega-6 than omega-3.
- Omega-3 consumption varies considerably between different countries with people in countries such as Japan and Norway eating a lot more fish than the average Australian.

Evidence for an association between omega-3 depletion and mood disorders

There are several lines of evidence that suggest that omega-3 consumption may be associated with mood disorders.

How does omega-3 affect mood?

Research suggests that omega-3 is related to a number of biological processes that have been found to be associated with depression.



- Omega-3 and omega-6 are both metabolized by the same pool of enzymes. Some of the products of omega-3 metabolism are anti-inflammatory, while the products of omega-6 metabolism are pro-inflammatory. Increased inflammatory processes have been found to be associated with both depression and other chronic diseases such as cardiovascular disease.
- Omega -3 concentrations influence the production of “neurotrophic factors” which regulate the growth of new brain cells.
- Omega-3 concentrations can affect gene expression in the brain.
- DHA is a major structural component of the brain and the ratio of DHA to omega-6 and other fats in the brain affects the ability of the brain cells to communicate with each other

Omega-3 for heart health

- There has been a lot of research into the cardio-protective effects of omega-3, with those who consume very little long-chain omega-3 found to have higher rates of cardiovascular disease.
- The Australian Heart foundation recommends that people without a pre-existing heart condition consume at least two servings of fish per week, preferably oily fish. This provides the equivalent of approximately 0.3 - 0.5 g per day of omega-3.
- For those who have an existing cardiac condition, the Heart Foundation recommends the consumption of 1gm per day of omega-3.

Recommendations for dietary intake

- With regard to recommendations for omega-3 intake for the prevention and treatment of mood disorder, there are still no definitive guidelines.
- In the clinical trials conducted to date, the ratio of DHA to EPA and the total amount of omega-3 provided has varied considerably.
- It appears, however, that EPA is the more important of the omega-3 fatty acids in the treatment of depression, with a recent meta-analysis of omega-3 supplementation trials finding that pure/majority EPA had a much bigger effect size than pure/majority DHA.
- There has only been one study to date that has compared different doses of omega-3 for depression. In this study participants received doses of 0, 1, 2 or 4 g per day of pure ethyl-EPA. Those who received 1 g per day demonstrated the greatest improvement in mood.
- Thus the evidence is currently strongest for the efficacy of a relatively low dose (1g/day) of pure or majority EPA for the treatment of depression.

Safety note

As omega-3 can have blood thinning effects at high doses, you should seek medical advice before taking doses of 3 g or more per day. It is also recommended that you seek medical advice about omega-3 supplementation if you are taking an anticoagulant medication such as Warfarin.



Sources of omega-3

Seafood

- Seafood is the richest source of long-chain omega-3 with oiler fish such as Anchovies, Sardines, Mackerel, Herring, Atlantic Salmon, Trout and Swordfish providing greater concentrations of omega-3.

Note about Contaminants

- Some fish contain high levels of methyl-mercury and other contaminants such as organochlorines. This is particularly the case for large, carnivorous, long living fish such as swordfish and shark/flake.
- Consuming large amounts of fish may therefore lead to the ingestion of unacceptably high levels of contaminants.
- To prevent this, Food Standards Australia and New Zealand have proposed the following guidelines.

Number of different types of fish that can be safely consumed

Pregnant women and women planning pregnancy 1 serve equals 150 g [#]	Children (up to 6 years) 1 serve equals 75 g	Rest of the population 1 serve equals 150 g [#]
2 – 3 serves per week of any fish and seafood not listed below		2 – 3 serves per week of any fish and seafood not listed in the column below
OR		OR
1 serve per week of Orange Roughy (Sea Perch) or Catfish and no other fish that week		1 serve per week of Shark (Flake) or Billfish (Swordfish / Broadbill and Marlin) and no other fish that week
OR		
1 serve per fortnight of Shark (Flake) or Billfish (Swordfish / Broadbill and Marlin) and no other fish that fortnight		

A 150 g serve for adults and older children is equivalent to approximately 2 frozen crumbed fish portions.

A 75 g serve for children is approximately 3 fish fingers (Hake or Hoki is used in fish fingers).

Canned fish is sold in various sizes; for example, the snack size cans of tuna are approximately 95 g.



Omega-3 Supplements

- In Australia, the Therapeutic Goods Administration requires that omega-3 supplements be tested to ensure that they do not exceed the acceptable level of contaminants.
- There are numerous over-the counter fish oil supplements available and these are typically 1g fish oil capsules containing doses of omega-3 ranging from 0.3 to 0.6 g per capsule. The typical ratio of EPA/DHA is 3/2
- Often small amounts of Vitamin E are added to prevent oxidation of the omega-3.

Supplemented Food

- There are a number of omega-3 enriched foods on the market including, milk, eggs, bread and margarine.
- The nutrition information panel will state how much omega-3 is provided per serve.

Vegetarian Sources of Omega-3

- Flaxseed, canola, soybean oils, hemp and walnut oils are all rich in ALA, the 'parent' omega-3 molecule.
- This can be metabolized into EPA and DHA in the liver but this conversion is limited in humans and factors such as stress, aging, illness and diet can impair the process.

Relevant journal articles

- Parker G, Gibson NA, Brotchie H, Heruc G, Rees A-M, Hadzi-Pavlovic D (2006). Omega-3 fatty acids and mood disorder. *American Journal of Psychiatry* 163:969–978.
- Rees A-M, Austin M-P, Parker G (2005). Role of omega-3 fatty acids as a treatment for depression in the perinatal period. *Australian and New Zealand Journal of Psychiatry* 39:274–280.
- Owen C, Rees A-M, Parker G (2008). The role of fatty acids in the development and treatment of mood disorders. *Current Opinion in Psychiatry* 21:19–24.

Where to get more information

- www.blackdoginstitute.org.au

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