Science.
Compassion.
Action.

Omega-3 and mood disorders

What the fact sheet covers:

- What is omega-3?
- How has our dietary intake of omega-3 changed over time?
- 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 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, docosahexanoic acid (DHA) and eicosapentaenoic acid (EPA). DHA and EPA are 'essential' fatty acids (which means that our bodies cannot synthesise them and we need to include 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 in seafood.

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

Over the last 150 years or so rapid expansion in western populations and large scale industrialisation 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 developed countries like Australia tend to consume 15 times more omega-6 than omega-3. Omega-3 consumption varies considerably between different countries. For example, omega-3 intake in Japan is five-fold higher than intake in western countries like Australia.

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

Black Dog Institute

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 grams per day of omega-3. For those who have an existing cardiac condition, the Heart Foundation recommends the consumption of one gram per day of omega-3.

How does omega-3 affect mood?

There are several lines of evidence that suggest that omega-3 consumption may be associated with mood disorders. Research suggests that omega-3 is related to a number of biological processes that have been found to be associated with brain functioning, these include:

- Omega-3 concentrations have shown to impact the production of 'neurotrophic factors' which regulate the growth of new brain cells as well as play an important role in human cognition and emotion.
- Omega-3 concentrations can affect gene expression in the brain.
- Omega-3 and omega-6 are both metabolised 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.
- DHA is a major structural component of the brain. Certain levels of dietary DHA are crucial for optimal brain performance, battling neurological disorders and building long-term neuronal resilience.

Dietary intake recommendations

With regard to recommendations for omega-3 intake for the prevention and treatment of mood disorder, there are still no definitive guidelines. Omega 3 and 6 supplementation is sometimes recommended in clinical practice for its neuroprotective properties, particularly in young people. In 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 greater 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 grams per day of pure ethyl-EPA; those who received one gram per day demonstrated the greatest mood improvement.

A meta-analysis of the studies looking into the antidepressant effects of omega-3 fatty acids concludes that the optimal dosage of EPA and DHA needs further research. However, several recent studies have found that neither EPA or

DHA treatments were superior to the placebo for the treatment of MDD suggestive of the need for further research.

Safety note

As omega-3 can have blood thinning effects at high doses, you should seek medical advice before taking doses of 3 grams 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

1. **Seafood:** the richest source of long-chain omega-3. Oily fish such as anchovies, sardines, mackerel, herring, atlantic salmon, trout and swordfish provide 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 some fish may therefore lead to the ingestion of unacceptably high levels of contaminants. To prevent this, Food Standards Australia and New Zealand have proposed dietary guidelines. Where to find more information: http://www.foodstandards.gov.au/consumer/chemicals/mercury/pages/default.aspx.

2. **Omega-3 supplements:** the Australian 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 one gram fish oil capsules containing doses of omega-3 ranging from 0.3 to 0.6 grams per capsule. The typical ratio of EPA/DHA is 3/2. Often small amounts of Vitamin E are added to prevent oxidation of omega-3.

3. **Supplemented Food:** there are a number of omega-3 enriched foods on the market including milk, eggs, bread \nd margarine. The nutrition information panel will state how much omega-3 is provided per serve.

4. **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 metabolised 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.

Bibliography

1. Parker, G, Gibson, N. A., Brotchie, H, Heruc,G, Rees, A. M. and Hadzi-Pavlovic, D. (2006). Omega-3 Fatty Acids and Mood Disorders. Am J Psychiatry, 163(6), 969-978.

2. Simopoulos, A.P. (2006). The importance of the ratio or omega-6/omega-3 essential fatty acids. Biodmedicine & Pharmacotherapy, 58(8), 365-379.

3. Meyer, B. J. (2011). Are we consuming enough long chain omega-3 polyunsaturated fatty acids for optimal health?. Prostaglandins, Leukotrienes & Essential Fatty Acids, 85(5), 275-280

4. Gomez-Pinilla, F., and Tyagi, E. (2013). Diet and cognition: interplay between cell metabolism and neuronal plasticity. Current Opinion in Clinical Nutrition and Metabolic Care, 16(6), 726–733.

5. Lotfizadeh, A. (2005). Omega-3 Fatty Acids and Mood Disorders: An Analysis of Epidemiological and Clinical Data. Nutrition Noteworthy, 7(1).

6. Bhatia, H, Agrawal, R, Sharma, S, Huo, Y, Ying, Z and Gomez-Pinilla, F. (2011). Omega-3 fatty acid deficiency during brain maturation reduces neuronal and behavioural plasticity in adulthood. 6(12), doi: 10.1371/journal.pone.0028451.

7. Heart Foundation. (2012) Fish Oil Program. Available from: http://www.heartfoundation.org. au/healthy-eating/Pages/fish-oil-program.aspx

8. Martins, J. G. (2009). EPA but not DHA appears to be responsible for the efficacy of omega-3 long chain polyunsaturated fatty acid supplementation in depression: Evidence from a meta-analysis of randomized Controlled trials. Journal of the American College of Nutrition. 28(5), 525-542.

9. Peet, M. and Horrobin, D.F. (2002). A dose-ranging study of the effects of ethyl-eicosapentaenoate in patients with ongoing depression despite apparently adequate treatment with standard drugs. Archives of General Psychiatry, 59(10), 913-919

10. Lin, P. and Su, K. (2007). A meta-analytic review of double-blind, placebo-controlled trials of antidepressant efficacy of omega-3 fatty acids. Journal of Clinical Psychiatry, 68(7), 1056-1061.

11. Sauder, K. A., Skulas-Ray, A. C., Campbell, T. S., Johnson, J. A., Kris-Etherton, P. M., & West, S. G. (2013). Effects of Omega-3 Fatty Acid Supplementation on Heart Rate Variability at Rest and During Acute Stress in Adults With Moderate Hypertriglyceridemia. Psychosomatic Medicine. 75(4), 382–389. doi:10.1097/ PSY.0b013e318290a107

12. Mischoulon, D, Nierenberg, A. A., Schettler, P. J., Kinkead, B. L., Fehling, K, Martinson, M. A. and Rapaport, M. H. (2014). A double-blind, randomised controlled clinical trial comparing eicosapentaenoic acid versus docosahexaenoic acid for depression. The Journal of Clinical Psychiatry

13. Therapeutic Goods Administration. (2010). Australian Public Assessment Report for Omega-3-acid ethyl esters 90. [Report]. Canberra: Department of Health and Ageing.

14. Food Standards Australia and New Zealand. (2011). Mercury in fish. Canberra: Food Standards Australia and New Zealand

15. National Heart Foundation of Australia. (2012). Omega-3 meal planner. [Brochure]. ABN 98 008 419 761 CON-140.

For more information

Visit our website blackdoginstitute.org.au
Find us on social media @blackdoginst

Black Dog Institute