

Healthy Hearts Position Statement

Fish and seafood

People who regularly consume diets high in fish tend to have lower risks of a range of conditions including heart disease, stroke, macular degeneration and dementia in older adults.¹ Fish provides energy (kilojoules), protein, selenium, zinc, iodine and vitamins A and D, as well as omega-3 long-chain polyunsaturated fatty acids (omega-3) to the diet.¹

This position statement outlines the Heart Foundation's stance on fish and seafood as part of a healthy eating pattern for the primary prevention of heart disease. It is informed by a summary of evidence commissioned by the Heart Foundation², other reputable guidelines and an analysis of Australian dietary intake.

Heart Foundation position

As part of a heart-healthy diet based on a variety of foods including vegetables, legumes, fruit, wholegrain cereal, lean meats and their alternatives, reduced fat milk, cheese and yoghurt and alternatives, nuts, seeds and healthier oils, and limiting salt, the Heart Foundation recommends:²

- all Australians aim to include 2–3 servings of fish (including oily fish) per week which provides about 250–500 milligrams of marine-sourced omega-3s, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), per day.

The Heart Foundation recommends people with existing heart disease should also aim for 2–3 servings of fish and seafood as part of a heart-healthy diet.

Evidence overview

Nestel et al² present an assessment of the evidence for omega-3 consumption and cardiovascular health published between 2007 and 2013, and this informs the Heart Foundation recommendations. This review assessed and graded the evidence, using the National Health and Medical Research Council (NHMRC) framework, in relation to fish consumption and omega-3 supplementation.

There were two distinct aspects to the review. The first considered the evidence for preventing a first heart attack in those without prior heart disease and then in those with existing heart disease who were at risk of further heart attacks. The second aspect was a review of separate studies that investigated the benefit of eating adequate amounts of fish and clinical trials of the value of taking fish oil supplements. In people without existing coronary heart disease (CHD), a meta-analysis of 17 cohorts³ found that compared with the lowest fish intake (<1 serving/month or 1–3 servings/month), either low (1 serving/week) or moderate (2–4 servings/week) consumption of fish was associated with a significant reduction in CHD mortality (0.84, 95%CI 0.75–0.95; 0.79, 95%CI 0.67–0.92 respectively) consistent with other studies also confirming this inverse association.^{4–8} A daily intake of 250–500 mg omega-3 from fish was associated with reduced CHD risk.^{3, 8} Based on these data,

the evidence remains supportive of fish consumption, including oily fish, to reduce the risk of CHD (Grade C).

The evidence was limited in people with existing CHD (as a broad category),^{9, 10} but when heart failure was the primary outcome, a modest inverse association between fish consumption and incidence of heart failure was observed. A meta-analysis of seven prospective cohort studies that involved 176,441 subjects with 5,480 incident cases of heart failure showed that high fish intake was protective against developing heart failure.¹¹ The Cardiovascular Health Study examined 4,738 US adults older than 65 and free of heart failure at baseline.¹² After 12 years, 955 patients developed heart failure. There was an inverse relationship between fish intake and incidence of heart failure. The highest quintile had a 32% lower risk compared to those who consumed fish less than or equal to once a month (p trend 0.009). However there was insufficient convincing evidence for the use of fish oil supplements (the assumed beneficial component in fish) to prevent further heart attack in secondary prevention. Nevertheless further trials are being awaited with interest.

Table 1 summarises the evidence by NHMRC levels and grade.

Table 1. Evidence statements for fish and dietary patterns with omega-3 polyunsaturated fatty acids

Evidence statement	Level of evidence	Grade of evidence
In the studies published since 2008, there is good evidence that increased consumption of fish or dietary patterns with omega-3 are associated with the primary prevention of CHD. ⁴⁻⁸	III	B
There is insufficient evidence (n = < 3 studies) published since the 2008 paper to assess the relationship between fish consumption or dietary patterns with omega-3 in secondary prevention of CHD.	n/a	n/a
There is some evidence for a modest benefit from eating fish and omega-3 supplementation in addition to standard therapy in heart failure. ¹¹⁻¹⁵	II	C

In view of the summary of evidence, and the evidence statements, the Heart Foundation recommendations for the primary prevention of coronary heart disease are:

- As part of a heart-healthy eating pattern, aim for 2–3 serves of fish (150–200g), including oily fish, per week to achieve about 250–500 mg per day of combined DHA and EPA.

You can access the evidence review and recommendations on omega-3 and cardiovascular disease, including omega-3 supplementation, at [www.heartlungcirc.org/article/S1443-9506\(15\)00167-5/abstract](http://www.heartlungcirc.org/article/S1443-9506(15)00167-5/abstract)

National and international guidelines

The *Australian Dietary Guidelines* recommend at least two serves of (any) fish per week¹ in the *Australian Guide to Healthy Eating*. The guidelines acknowledge that the protective effect of fish consumption is most likely mediated through omega-3, however due to the guideline reviewing the evidence for food only, they do not specifically make a recommendation for omega-3 supplements.

Internationally, guidelines published in the last five years reflect similar conclusions. European guidelines recommend the consumption of fish at least twice a week, with one of the serves as oily fish.^{16–18} The European Society of Cardiology recommends increasing omega-3 through fish consumption, rather than from supplements, for patients with stable heart disease.¹⁷ The National Institute of Clinical Excellence (NICE) recommends the consumption of at least two servings of fish, one being oily, per week and advises against routine recommendation of omega-3 supplements.⁹

These international guidelines are consistent with the recommendations made by Nestel et al² and reflect the Heart Foundation recommendations outlined in this position statement.

Practical considerations for fish and seafood consumption

Omega-3 content of fish and seafood

The EPA and DHA composition of common fish and seafood in Australia has seen some modest changes since the last Heart Foundation review of evidence.²⁰

The amount of EPA and DHA in fish is a reflection of their diet and environment. Changes in fish feed ingredients has a direct impact on the EPA and DHA content of farmed fish and seafood. For example, recent Australian research reveals the omega-3 content of farmed Atlantic salmon and barramundi has decreased significantly in the last decade, although they still remain a rich source.²¹ Updated Heart Foundation resources and composition tables reflect the highest quality food composition data currently available in Australia.^{22, 23} The Heart Foundation resource 'Sources of omega-3s' outlines the levels of omega-3 in different fish and seafood types. The ideal range for omega-3 consumption was updated to 250–500 mg of EPA and DHA per day, so there is a wider variety of fish and seafood that can be eaten to meet this goal.

Mercury in Australian fish and seafood species

The Heart Foundation supports the Food Standards Australia and New Zealand (FSANZ) recommendations to avoid mercury contamination. Due to the higher presence of mercury in some species of fish, these should be limited, especially during pregnancy.²⁴ The Heart Foundation consumer resources do not list any high-risk species such as flake, swordfish and orange roughy.

FSANZ recommendations to reduce the risk of mercury exposure are 2–3 serves per week of any fish except the following, which should be eaten infrequently:

- One serve per week of orange roughy (deep sea perch) or catfish. No other fish that week.
- One serve per fortnight of shark (flake) or billfish (swordfish/broadbill or marlin). No other fish that fortnight.

Sustainability of Australian fish and seafood species

Sustainability of our food supply is an important part of making food choices. The Heart Foundation advises people interested in making sustainable fish and seafood choices to consult other national guidelines for more information.

Fish consumption in Australia

The *Australian Health Survey*² 2011–2012 reports that around 1 in 5 Australians ate fish or seafood products.* Fish and seafood products (including fresh fish, packed, canned fish and fish from takeaway outlets) are the main contributors to omega-3 intake, and provide the largest proportion of omega-3 compared with any other food group.† It is difficult to measure whether Australian's are reaching the Heart Foundation's recommendations for omega-3 intake (250–500 mg of EPA and DHA per week) as current dietary survey data does not report the frequency of fish consumption over an entire week.

*Nineteen per cent of adults (> 19 years old) reported eating fish or seafood on the day of the survey. †For all surveyed adults (>19 years old) approximately 58% of the total daily omega-3 intake came from 'fish and seafood products and dishes'.

Omega-3 supplements

Because our bodies cannot produce omega-3s, we need to source them through diet. The scientific evidence supports fish as the best dietary source of omega-3s and found higher fish intake was consistently associated with lower rates of heart disease (heart failure and sudden cardiac death) and stroke.² For people who do not eat fish, supplements will provide some level of marine-sourced omega-3s.

You can access the evidence review and recommendations on omega-3 and cardiovascular disease, including omega-3 supplementation, at [www.heartlungcirc.org/article/S1443-9506\(15\)00167-5/abstract](http://www.heartlungcirc.org/article/S1443-9506(15)00167-5/abstract)

Heart Foundation key messages

- The Heart Foundation recommends all Australians should aim to include 2–3 serves of fish (including oily fish) per week as part of a heart-healthy diet. This provides around 250–500 milligrams of marine omega-3s (EPA and DHA) per day.^{1,2}
- The Heart Foundation's recommendations for fish are consistent with the recommendations of FSANZ and the NHMRC.^{1,2,24}
- Omega-3s are an essential part of a heart-healthy diet. As an essential fatty acid, the human body requires, but cannot make, omega-3 and so they need to be sourced through the diet. Omega-3s can come from marine, animal and plant sources. The scientific evidence supports fish as the best dietary source of omega-3s and found higher fish intake is consistently associated with lower rates of heart disease (heart failure and sudden cardiac death) and stroke.
- Fish with the highest levels of omega-3 include salmon, blue-eye trevalla, blue mackerel, herring, canned sardines, canned salmon and some varieties of canned tuna. Other good sources of marine-sourced omega-3s include barramundi, bream, flathead, squid, scallops and mussels.
- People can safely eat 2–3 serves a week of most types of fish. However, because of the presence of higher levels of mercury in some fish there are a few types that should be limited, especially if you are pregnant.²⁴ FSANZ recommends 2–3 serves per week of any fish except the following, which should be eaten infrequently:
 - One serve per week of orange roughy (deep sea perch) or catfish. No other fish that week.
 - One serve per fortnight of shark (flake) or billfish (swordfish/broadbill or marlin). No other fish that fortnight.
- The Heart Foundation guide to omega-3 levels in fish and seafood and recipes do not list any species for which there is a higher risk of mercury contamination, such as flake, swordfish and orange roughy.

Omega-3 supplements (EPA and DHA)

- Supplements will provide people who do not eat fish with some level of marine-sourced omega-3s.
- There is evidence omega-3 supplements can play a beneficial role in the treatment of patients with high triglyceride levels and patients with existing heart disease, specifically heart failure.

Plant-sourced omega-3s (ALA)

- The Heart Foundation recommends that all Australians should aim for 1 gram of plant-sourced omega-3 (ALA) each day.
- Plant-sourced omega-3s are related, but slightly different, to marine-sourced omega-3s however both types are important parts of a healthy diet. Sources of ALA omega-3 includes walnuts, linseed/flaxseed, chia seeds and oils such as canola and soybean.

Glossary

Omega-3s – Omega-3 fatty acids are a type of polyunsaturated fat that, like other dietary polyunsaturated fats, reduce your risk of heart disease.

Omega-3s come from marine, animal and plant sources. The evidence for heart health is much stronger for marine-sourced omega-3s (EPA, DHA). While plant-sourced omega-3s (ALA) can be converted in our bodies to EPA and DHA, the conversion rate is low. Therefore it is important to include marine-sourced and plant-sourced omega-3s from a variety of foods as part of a heart-healthy diet.

Marine-sourced omega-3s – DHA and EPA are omega-3s found primarily in oily fish, such as salmon, blue-eye trevalla, blue mackerel, herring, canned sardines, canned salmon and some varieties of canned tuna. Other fish such as barramundi, bream or flathead, and seafood such as arrow squid, scallops and mussels, are also good sources of omega-3.

Plant-sourced omega-3s – ALA is derived from plants and is found mainly in plant-based fats and oils, such as canola oil and soybean oil, and linseeds (flaxseeds), chia seeds and walnuts.

Animal-sourced omega-3s – Docosapentaenoic acid (DPA), along with small amounts of EPA and DHA, is found in animal products, such as free range eggs, chicken and beef.

Acronyms

ALA – Alpha-linolenic acid

CHD – Coronary heart disease

DHA – Docosahexaenoic acid

DPA – Docosapentaenoic acid

EPA – Eicosapentaenoic acid

References

1. National Health and Medical Research Council. Health Australian Dietary Guidelines. Canberra: National Health and Medical Research Council; 2013.
2. Nestel P, Clifton P, Colquhoun D, et al. Indications for omega-3 long chain polyunsaturated fatty acid in the prevention and treatment of cardiovascular disease. *Heart Lung Circ* 2015;24(8):769–79.
3. Zheng J, Huang T, Yu Y, et al. Fish consumption and coronary heart disease mortality: an updated meta-analysis of seventeen cohort studies. *Public Health Nutr* 2012;15(4):725–37. Epub 2011/09/15.
4. de Goede J, Geleijnse JM, Boer JM, et al. Marine (n-3) fatty acids, fish consumption, and the 10-year risk of fatal and nonfatal coronary heart disease in a large population of Dutch adults with low fish intake. *J Nutr* 2010;140(5):1023–28. Epub 2010/03/26.
5. Mozaffarian D, Lemaitre RN, King IB, et al. Plasma phospholipid long-chain omega-3 fatty acids and total and cause-specific mortality in older adults: a cohort study. *Ann Intern Med* 2013;158(7):515–25. Epub 2013/04/03.
6. Streppel MT, Ocke MC, Boshuizen HC, et al. Long-term fish consumption and n-3 fatty acid intake in relation to (sudden) coronary heart disease death: the Zutphen study. *Eur Heart J* 2008;29(16):2024–30. Epub 2008/07/22.
7. Joensen AM, Overvad K, Dethlefsen C, et al. Marine n-3 polyunsaturated fatty acids in adipose tissue and the risk of acute coronary syndrome. *Circulation* 2011;124(11):1232–38. Epub 2011/08/24.
8. Musa-Veloso K, Binns MA, Kocenas A, et al. Impact of low v. moderate intakes of long-chain n-3 fatty acids on risk of coronary heart disease. *Br J Nutr* 2011;106(8):1129–41. Epub 2011/07/09.
9. Manger MS, Strand E, Ebbing M, et al. Dietary intake of n-3 long-chain polyunsaturated fatty acids and coronary events in Norwegian patients with coronary artery disease. *Am J Clin Nutr* 2010;92(1):244–51. Epub 2010/05/21.
10. Pottala JV, Garg S, Cohen BE, Whooley MA, Harris WS. Blood eicosapentaenoic and docosahexaenoic acids predict all-cause mortality in patients with stable coronary heart disease: the Heart and Soul study. *Circ Cardiovasc Qual Outcomes* 2010;3(4):406–12. Epub 2010/06/17.
11. Djousse L, Akinkuolie AO, Wu JH, Ding EL, Gaziano JM. Fish consumption, omega-3 fatty acids and risk of heart failure: a meta-analysis. *Clin Nutr* 2012;31(6):846–53. Epub 2012/06/12.
12. Mozaffarian D, Bryson CL, Lemaitre RN, Burke GL, Siscovick DS. Fish intake and risk of incident heart failure. *J Am Coll Cardiol* 2005;45(12):2015–21. Epub 2005/06/21.
13. Tavazzi L, Maggioni AP, Marchioli R, Barlera S, Franzosi MG, Latini R, et al. Effect of n-3 polyunsaturated fatty acids in patients with chronic heart failure (the GISSI-HF trial): a randomised, double-blind, placebo-controlled trial. *Lancet* 2008;372(9645):1223–30. Epub 2008/09/02.
14. Yamagishi K, Nettleton JA, Folsom AR. Plasma fatty acid composition and incident heart failure in middle-aged adults: the Atherosclerosis Risk in Communities (ARIC) Study. *Am Heart J* 2008;156(5):965–74. Epub 2008/12/09.
15. Macchia A, Levantesi G, Franzosi MG, Geraci E, Maggioni AP, Marfisi R, et al. Left ventricular systolic dysfunction, total mortality, and sudden death in patients with myocardial infarction treated with n-3 polyunsaturated fatty acids. *Eur J Heart Fail* 2005;7(5):904–9. Epub 2005/08/10.
16. McMurray J, Adamopoulos S, Anker SD, Auricchio A, Bohm M, Dickstein K, et al. ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2012: The Task Force for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2012 of the European Society of Cardiology. Developed in collaboration with the Heart Failure Association (HFA) of the ESC. *Eur Heart J* 2012;33(14):1787–847.

17. Montalescot G, Sechtem U, Achenbach S, Andreotti F, Arden C, Budaj A, et al. 2013 ESC guidelines on the management of stable coronary artery disease: the Task Force on the management of stable coronary artery disease of the European Society of Cardiology. *Eur Heart J* 2013;34(38):2949–3003.
18. Reiner Z, Catapano AL, De Backer G, et al. ESC/EAS Guidelines for the management of dyslipidaemias: the Task Force for the management of dyslipidaemias of the European Society of Cardiology (ESC) and the European Atherosclerosis Society (EAS). *Eur Heart J* 2011;32(14):1769–818.
19. National Institute of Clinical Excellence. Primary prevention of cardiovascular disease. London: NICE, 2010.
20. National Heart Foundation of Australia. Position statement on fish, fish oils, n-3 polyunsaturated fatty acids and cardiovascular health. Melbourne: National Heart Foundation of Australia; 2008.
21. Nichols PD, Glencross B, Petrie JR, Singh SP. Readily Available Sources of Long-Chain Omega-3 Oils: Is Farmed Australian Seafood a Better Source of the Good Oil than Wild-Caught Seafood? *Nutrients* 2014; 6:1063–79.
22. Australian Bureau of Statistics. Australian Health Survey: Nutrition First Results – Food and Nutrients, 2011–12. Canberra: ABS, 2014.
23. Food Standards Australia New Zealand. AUSNUT 2011–13 – Australian Food Composition Database. Canberra: FSANZ, 2014. Available at www.foodstandards.gov.au/science/monitoringnutrients/ausnut/Pages/about.aspx (Accessed July 2014).
24. Food Standards Australia New Zealand. Mercury in Fish: Food Standards Australia and New Zealand. Canberra: FSANZ, 2015. Available at www.foodstandards.gov.au/consumer/chemicals/mercury/pages/default.aspx. Accessed 20 Feb 2015.

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