Fish and omega-3: Questions and answers for health professionals

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 (mg) of marine-sourced omega-3s (EPA, DHA) per day. The Heart Foundation also recommends that all Australians should aim for 1 gram of plant-sourced omega-3 (ALA) each day.

The Heart Foundation based these recommendations on a scientific review of evidence. For more information, you can access the full text article in the journal *Heart, Lung and Circulation,* available at www.heartlungcirc.org/article/S1443-9506(15)00167-5/abstract

Marine-sourced and plant-sourced omega-3s should be included as part of a heart-healthy diet that includes vegetables and legumes, fruit, wholegrain cereals, lean meats and their alternatives, fish, nuts and seeds, reduced fat milk, cheese and yoghurt, healthier fats and oils, and limits salt.

Key messages

Fish

- 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 mg of marine-sourced omega-3s (EPA, DHA) per day.
- Because the body cannot produce omega-3s they need to be sourced 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.
- 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.

Omega-3 supplements (EPA & 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-3 (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-based 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.

Heart Foundation recommendations

- **For primary prevention of coronary heart disease (CHD)** – Eat 2–3 serves of fish (150–200 g), including oily fish, per week to achieve 250–500 mg per day of combined docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA).
- **For patients with existing heart disease (i.e. secondary prevention of CHD)** – Eat 2–3 serves of fish (150–200 g), including oily fish, per week to achieve about 250–500 mg per day of DHA and EPA. Consider omega-3 (marine-sourced) supplementation as an additional therapy for patients with heart failure.
- **Hypertriglyceridaemia** – Consider up to 4,000–5,000 mg of EPA and DHA per day as the highest dose alone or with a fibrate for moderately severe hypertriglyceridaemia.
- **Alpha-linolenic acid (ALA)** – Eat at least 1 g per day of ALA consistent with National Health and Medical Research Council (NHMRC) recommendations.

We encourage health professionals to read the full review article in *Heart, Lung and Circulation*, available at www.heartlungcirc.org/article/S1443-9506(15)00167-5/abstract

How do these recommendations differ from previous Heart Foundation recommendations?

These recommendations have been partially updated based on the outcomes of our review of the most up-to-date, credible scientific evidence.

The literature review found higher fish intake was consistently associated with lower rates of sudden cardiac death, stroke, heart failure and myocardial infarction (heart attack). Studies of omega-3 supplements in people without heart disease did not find a clear benefit for reducing their risk of developing heart disease. The review found evidence that omega-3 supplements can play a beneficial role in the treatment of patients with high triglyceride levels and in patients with existing heart disease (specifically heart failure).

Accordingly, we have strengthened our recommendation that Australian adults should eat 2–3 serves of fish per week for the primary prevention of CHD by making it the standalone preferred source of marine-sourced omega-3s. The clear message is that eating fish is the best way to achieve the recommended daily level of marine-sourced omega-3.

Our recommendations for plant-sourced omega-3s (ALA) remains; we have adjusted the amount to 1 g of ALA per day to be consistent with the *Nutrient Reference Values for Australia and New Zealand*.

For more information on the recommendations, including a discussion of the evidence, read the full review article in *Heart, Lung and Circulation*, available at www.heartlungcirc.org/article/S1443-9506(15)00167-5/abstract

Does the Heart Foundation recommend fish oil supplements to meet the daily requirements for omega-3s?

Based on the outcomes of our recently published literature review, we recommend that food sources – including 2–3 serves of fish per week and 1 g per day of plant-sourced omega-3s – are the best way to meet the recommended daily levels of omega-3s to assist in the primary prevention of CHD. Supplements will provide people who do not eat fish with some level of marine-sourced omega-3s (EPA, DHA).

We recommend that health professionals consider supplements with EPA and DHA as part of a broader strategy to reduce high triglyceride levels. We also recommend that you consider supplements with 1 g of EPA and DHA, in addition to standard therapy, for patients with heart failure.

For more information on the recommendations, including a discussion of the evidence, read the full review article in *Heart, Lung and Circulation*, available at www.heartlungcirc.org/article/S1443-9506(15)00167-5/abstract

How do the Heart Foundation's recommendations compare with those of other health authorities?

The Heart Foundation's recommendations for fish consumption are consistent with the *Australian Dietary Guidelines* and those of Food Standards Australia and New Zealand (FSANZ), the American Heart Association (AHA) and the World Health Organization (WHO).

Our recommendations for omega-3 supplements align with international guidelines, such as the European Society of Cardiology, the National Institute of Clinical Excellence (NICE), the AHA and the American College of Cardiology. These guidelines do not advise routine recommendation of omega-3 supplements for heart health, but do recommend omega-3 supplementation for patients with high triglyceride levels and as an adjunct therapy for heart failure treatment.

What resources can I access for more information on omega-3 for heart health?

The Heart Foundation provides a range of recommendations and guidelines for health professionals for the prevention, treatment and management of heart disease. For specific advice on omega-3s, we recommend:

- Nestel P, Clifton P, Colquhoun D et al. Indications for Omega-3 Long Chain Polyunsaturated Fatty Acids in the Prevention and Treatment of Cardiovascular Disease. Heart, Lung and Circulation 2015; 24:769–79. Available at www.heartlungcirc.org/article/S1443-9506(15)00167-5/abstract

  This summary of evidence discusses and assesses evidence published between 2007 and 2013, and provides guidance to health professionals on dietary intake of fish and omega-3 long-chain polyunsaturated fatty acid (LCPUFA) supplements for the prevention and treatment of cardiovascular disease.

- National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand (Chronic Heart Failure Guidelines Expert Writing Panel). Guidelines for the prevention, detection and management of chronic heart failure in Australia. Updated October 2011.

  This guideline discusses and assesses the evidence published up to 2010 on the prevention, detection and management of chronic heart failure.

What resources can I provide to my patients who want more information on omega-3s for heart health?

The Heart Foundation developed a series of resources for the community on fish and omega-3 for heart health.

- *Fish and omega-3: Questions and answers* – A patient resource with more detailed questions and answers on the Heart Foundation's recommendations for fish and omega-3s in relation to heart health.
- *Sources of omega-3* – An overview of the marine-sourced omega-3 (EPA, DHA) content of common Australian fish and seafood species, and the ALA content of commonly consumed Australian foods. The table was developed using data from the AUSNUT 2011-2013 Australian Food Composition database, supplemented with expert comment, and considerations of sustainability of some fish and seafood species.
- *Tips to include marine-sourced omega-3s in your diet* – This resource provides options to include fish in weekly meals to meet a goal intake of 250–500 mg of marine-sourced omega-3s (EPA, DHA) per day.
- Recipe database – Visit www.heartfoundation.org.au/recipes to check out our range of fish recipes and meal ideas for fresh, frozen and tinned fish.

For more information, please encourage patients to contact the Heart Foundation's Health Information Service on 1300 36 27 87 (for the cost of a local call), email health@heartfoundation.org.au or visit www.heartfoundation.org.au.

Development of Heart Foundation recommendations

Why did the Heart Foundation review the relationship between omega-3 consumption and heart health again?

There has been ongoing and extensive scientific research into the consumption of omega-3 for cardiovascular health since our previous position update in 2008. The literature review of the most recent and credible scientific studies consolidated the evidence from these findings into clear and relevant heart health recommendations for Australians.

How did the Heart Foundation develop these new recommendations?

The Heart Foundation engaged experts in cardiology, nutrition and cardiovascular disease to conduct a scientific review of the evidence. This expert group undertook an extensive literature review of contemporary scientific research in 2013–2014.

Using the NHMRC guidelines, the group assessed the research according to factors such as quality, risk of bias and applicability to the Australian population. The full literature review was published in *Heart, Lung and Circulation*, available at www.heartlungcirc.org/article/S1443-9506(15)00167-5/abstract

What data sources were used to develop the new recommendations?

Our expert group used a variety of recent, credible sources including databases of peer-reviewed research and national and international guidelines. We also consulted government and agency reports for information on sustainability and mercury in fish. For Heart Foundation resources that discuss omega-3s in food, we consulted the recently updated FSANZ AUSNUT 2011–2013 Australian Food Composition database, peer-reviewed research and experts in the field.

Recommendations for specific patient groups

What are the current recommendations for fish and omega-3s for patients without heart disease?

Omega-3s are essential fatty acids that need to be sourced from food as the body doesn't make them.

The NHMRC recommends an adequate intake for general health in adults to be around:

- 90 mg of marine-sourced omega-3s (EPA, DHA), and 0.8 gm of plant-sourced omega-3s (ALA) per day for women
- 160 mg of marine-sourced omega-3s (EPA, DHA), and 1.3 gm of plant-sourced omega-3s (ALA) for men.

These are the amounts needed to reduce the risk of essential fatty acid deficiency.

The Heart Foundation makes recommendations to reduce the risk of heart disease and our recommendations build on the NHMRC advice. We recommend:

- 1 g per day of plant-sourced omega-3 (ALA)
- 250–500 milligrams per day of marine-sourced omega-3 (EPA, DHA), which is higher than the NHMRC advice.

Our recommendations align with the NHMRC target to reduce the risk of chronic disease by aiming for 610 mg/day of EPA and DHA for men, and 430 mg/day for women.

The Heart Foundation recommends the best way to reach these targets is through a heart-healthy diet that includes 2–3 serves of fish per week, and a variety of nuts, seeds and oils including soybean, canola, flaxseed/linseed, chia seeds and walnuts.

What are the current recommendations for patients at high risk of heart disease?

The Heart Foundation recommends people at high risk of heart disease should aim for 250–500 mg per day of marine-sourced omega-3s (EPA, DHA), and 1 g of plant-sourced omega-3s (ALA).

The Heart Foundation recommends the best way to reach these targets is through a heart-healthy diet that includes 2–3 serves of fish per week, and a variety of nuts, seeds and oils including soybean, canola, flaxseed/linseed, chia seeds and walnuts.

For patients with moderate–severe hypertriglyceridaemia, omega-3 supplementation (combined EPA and DHA) may assist in reducing triglyceride levels. You can consider up to 4,000–5,000 mg of combined EPA and DHA per day as the highest dose alone or with a fibrate for moderately severe hypertriglyceridaemia.

What are the current recommendations for patients with existing heart disease?

The recommendations for patients with existing heart disease are the same. They should aim to eat 2–3 serves of fish, including oily fish, per week which provides about 250–500 mg/day of marine-sourced omega-3s (EPA, DHA). They should aim to include 1 g per day of plant-sourced omega-3s (ALA). Good sources of ALA include walnuts, linseeds/flaxseeds, chia seeds, and canola and soybean oils.

Marine-sourced and plant-sourced omega-3s should be included as part of a heart-healthy diet that includes vegetables and legumes, fruit, wholegrain cereals, lean meats and their alternatives, fish, nuts and seeds, reduced fat milk, cheese and yoghurt, healthier fats and oils, and limits salt.

For patients with heart failure, you should consider 1 g of omega-3 supplementation (combined EPA and DHA) as an additional therapy.

What are the recommendations for pregnant women or breastfeeding women?

The Heart Foundation advises all Australian adults aim to eat 2–3 serves of fish per week, and follow the advice from FSANZ on mercury in fish.

FSANZ recommends 2–3 serves per week of any fish, EXCEPT the following, which should be eaten infrequently:

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

Current Heart Foundation guides for seafood and recipes do not list any species that have a higher risk of mercury contamination (e.g. flake, swordfish and orange roughy).

What are the recommendations for children?

The Heart Foundation makes recommendations for Australian adults to reduce the risk of heart disease. The Heart Foundation supports the NHMRC recommendation for food and nutrient intake for children.

According to the *Australian Dietary Guidelines* and *Nutrient Reference Values for Australia and New Zealand,* one small serve (100 g) of a fish such as flathead, plus two small cans of sandwich tuna a week, will provide a child up to age 14 with an adequate intake of omega-3s.

Note: Adequate intake is 40–70 milligrams per day for children up to 13 years of age.

Are there other health benefits, apart from reducing the risk of heart disease, from consuming fish or omega-3s?

Yes. The focus of our review was cardiovascular health and, as such, the Heart Foundation recommendations are specific to heart health. The *Australian Dietary Guidelines* reviewed the evidence for general health and to reduce the risk of other chronic diseases. Please refer to these guidelines for further information, www.eatforhealth.gov.au

What is a heart-healthy diet?

The Heart Foundation recommends that marine-sourced and plant-sourced omega-3s should be included as part of a heart-healthy diet that includes vegetables and legumes, fruit, wholegrain cereals, lean meats and their alternatives, fish, nuts and seeds, reduced fat milk, cheese and yoghurt, healthier fats and oils, and limits salt.

Omega-3 supplements

What is the Heart Foundation position on omega-3 supplements?

Our review concludes that eating fish is the best, and the recommended, way to consume essential omega-3 nutrients for heart health. Supplements will provide people who do not eat fish with some level of marine-sourced omega-3s (EPA, DHA).

The literature review also found an important role of omega-3 supplements in the management of hypertriglyceridaemia and heart failure. You can read the literature review in *Heart, Lung and Circulation* for more information.

The Heart Foundation recommends all Australians aim for 2–3 serves of fish (including oily fish) per week, and that specific patient groups at high risk or with heart disease may benefit from omega-3 supplementation.

Are there any benefits in using omega-3 supplements for heart health?

Yes. There are specific indications for the use of omega-3 supplements in the management of heart disease.

For patients with high triglyceride levels, the evidence supports the consideration of supplements with combined EPA and DHA as part of a strategy to reduce triglyceride levels. For patients with heart failure, you can consider supplements with 1 gram of combined EPA and DHA in addition to standard therapy.

For people who don't eat fish, supplements will provide some level of marine-sourced omega-3s.

The Heart Foundation recommends that the use of supplements is safe and merits consideration by health professionals for patients who cannot or will not include fish regularly in their diet and/or for whom increasing the intake of omega-3s is advisable for a particular indication (e.g. hypertriglyceridaemia, heart failure).

For more information, read the full literature review in *Heart, Lung and Circulation*.

Is there any evidence that omega-3 supplements are harmful?

No. The literature review found no indication of harm with omega-3 supplementation in either the primary or secondary prevention of heart disease. You should use your clinical judgement to determine whether omega-3 supplementation is contraindicated in specific patients.

Does the type of omega-3 supplement matter?

Marine sources of omega-3 originate in algae, which is then eaten by various seafood species along the fish food-chain. Thus marine sources of omega-3 (EPA, DHA) can be found in a variety of foods and supplements such as algal oil, krill oil, calamari oil and fish oil.

Our scientific review found no compelling evidence that one type of marine oil is better than another. However, the varying types of oil products vary dramatically in total marine-sourced omega-3 (EPA, DHA) content and this is an important consideration when attempting to achieve combined EPA and DHA targets. Therefore, you need to consider the total EPA and DHA per capsule (and the price) when recommending supplements.

Omega-3 polyunsaturated fat

How do omega-3s reduce the risk of heart disease?

As an essential fatty acid, our bodies use omega-3s in many ways. Specific to heart health, they can:

- lower heart rate and improve heart rate rhythm
- decrease the risk of clotting (antithrombotic and anti-platelet effects)
- lower triglyceride levels
- reduce blood pressure
- improve blood vessel function and delay the progression of atherosclerosis.

How much omega-3 is in a piece of fish?

This varies depending on the species and diet of the fish. A 150-gram serving of salmon may provide more than 500 mg of omega-3 (EPA, DHA), while the same size serving of ling may provide less than 160 mg. A 150-gram serving of some canned salmon or sardines may provide more than 1,500 mg. The Heart Foundation's resource *Sources of omega-3* has been updated to reflect the most recent data available on omega-3 levels in the most common Australian fish and seafood species.

Has the amount of omega-3 in fish in Australia changed?

Marine sources of omega-3 originate in algae, which is then eaten by various seafood species along the fish food-chain. Therefore the omega-3 content of fish depends on the particular species as well as the type of food that it eats. Farmed fish, which may have different diets to wild fish, may have more or less omega-3 depending on their diet.

In Australia, there has been some research of particular fish species that suggests omega-3 levels are declining, but they remain a rich source of omega-3 (EPA, DHA).[1] The most up-to-date data on the omega-3 content of fish species readily available can be accessed through the AUSNUT 2011–13 nutrient database.[2] The Heart Foundation used this database to update our resources on fish and seafood levels of omega-3.

References

1. 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.
2. 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.

Mercury

Should patients be concerned about mercury levels in fish?

The evidence is clear that the health benefits of eating fish far outweigh any risks. The Heart Foundation recommends fish and seafood that has safe mercury levels and our recommendations align with advice from FSANZ.

FSANZ recommends 2–3 serves per week of any fish, EXCEPT the following, which should be eaten infrequently:

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

Current Heart Foundation guides for seafood and recipes do not list any species that have a higher risk of mercury contamination (e.g. flake, swordfish and orange roughy).

The Therapeutic Goods Administration (TGA) requires all fish oil supplements sold in Australia to contain zero or near zero mercury levels.

Can fish caught locally be eaten?

Yes. Generally speaking. The risk of environmental contamination of fish caught in Australia is low. However we recommend checking with local government authorities to identify any specific recommendations for consuming fish in your area, because conditions vary.

People living in tropical reef areas with warm ocean waters, such as Queensland, the Northern Territory and Western Australia, need to be aware that some fish species found in these areas (for example, coral trout and Spanish mackerel) have high levels of ciguatera. Ciguatera is a toxin commonly found in the flesh of progressively larger fish. If you eat just one large serve of infected fish, you can get ciguatera poisoning. Contact your state or territory food safety government department for more information on ciguatera poisoning, and your state or territory government department for fisheries for more information on fishing in your area.

Sustainability

What does the Heart Foundation recommend as sustainable choices?

While we recognise the importance of sustainability of our food supply, we cannot provide advice on sustainable fish and seafood choices as this is not our speciality area. The Heart Foundation focuses on recommendations to reduce the risk of cardiovascular disease for all Australians. If patients are interested in making sustainable fish and seafood choices, they should consult with other national guides for more information.

Definitions and acronyms

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 (EPA, DHA) – Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are omega-3s that are 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) – Alpha-linolenic acid (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 (ALA) – Docosapentaenoic acid (DPA), along with small amounts of EPA and DHA, is found in animal products, such as free range eggs, chicken and beef.

DPA was not included in this most recent scientific review and, as such, the Heart Foundation does not make specific recommendations about the intake of DPA.

Polyunsaturated fats

Polyunsaturated fats are fats that have more than one double-bonded (unsaturated) carbon in the molecule. Polyunsaturated fats are one type of unsaturated fat, another being mono-unsaturated fat (which has only one unsaturated carbon in the molecule).

There are two types of polyunsaturated fats that influence heart health, omega-3 and omega-6, both of which are essential fatty acids. Refer to the Q&A *Dietary fats, dietary cholesterol and heart health* for more information on omega-6 polyunsaturated fats.

Fatty acids

Essentially fatty acids are fats that the human body requires but cannot make itself. The human body naturally produces saturated fat, cholesterol and monounsaturated fats which means they are not essential parts of our diets. The human body cannot make omega-3 and omega-6 polyunsaturated fats naturally, and so these must be sourced from a healthy diet to avoid deficiency and are thus essential parts of our diets.

Acronyms

ALA – Alpha-linolenic acid

DHA – Docosahexaenoic acid

DPA – Docosapentaenoic acid

EPA – Eicosapentaenoic acid

Further information

For more information, please contact the Heart Foundation's Health Information Service on 1300 36 27 87 (for the cost of a local call), email health@heartfoundation.org.au or visit www.heartfoundation.org.au.

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

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