Fish oil

**Description**

There are two types of fish oil: fish liver oil (generally derived from the liver of the cod, halibut or shark) and fish body oil (generally derived from the flesh of the herring, sardine or anchovy).

**Constituents**

Both fish oil and fish liver oil are sources of omega-3 long-chain polyunsaturated fatty acids (LCPUFAs): eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). They also contain vitamin E. Fish liver oil contains vitamin A (750–1200 mcg/daily dose) and vitamin D (2.5–10 mcg/daily dose).

**Human requirements**

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Recommended intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK Food Standards Agency (FSA)</td>
<td>Two portions of fish/week (including one oily); equivalent to 450 mg omega-3 LCPUFAs/day</td>
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<tr>
<td>British Dietetic Association</td>
<td></td>
</tr>
<tr>
<td>People with heart disease</td>
<td>Two to three portions of high omega-3 (oily) fish/week or 0.5–1 g omega-3s (EPA and DHA) daily Follow FSA recommendation</td>
</tr>
<tr>
<td>Everyone else</td>
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<tr>
<td>American Heart Association</td>
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<tr>
<td>People without documented coronary heart disease (CHD)</td>
<td>Eat a variety of fish (preferably oily) at least twice a week</td>
</tr>
</tbody>
</table>

*continued*
Fish oil

(continued)

| People with documented CHD | 1 g EPA/DHA daily preferably from fatty fish or consider supplement 1 g EPA + DHA/daily (with medical advice) 2–4 g/daily of EPA + DHA (with medical advice) |
| International Society for the Study of Fatty Acids and Lipids (ISSFAL) | Minimum of 500 mg/daily EPA + DHA for cardiovascular health |
| National Institute for Health and Clinical Excellence (NICE) | Post-myocardial infarction: 1 g daily LCPUFAs (preferably from oily fish, but from supplements if oily fish not consumed) |
| World Health Organization (WHO) | Two portions of fish/week; equivalent to 250–500 mg/daily EPA + DHA |

EPA and DHA can also be synthesised in the body from alpha-linolenic acid (found in vegetable oils, e.g. soyabean, linseed and rapeseed oils, and nuts and seeds, e.g. walnuts, hemp and pumpkin), but conversion is poor (about 4%).

Dietary sources

Oily fish: mackerel, herring, kippers, pilchard, sardines, tuna, salmon.

Action

Fish oils have several effects, which are thought to result from a reduction in inflammatory and thrombotic prostaglandins, and leukotrienes and inflammatory cytokines. Effects include:

- Alteration of lipoprotein metabolism: reduced triglycerides; mixed effects on low- and high-density lipoprotein (LDL- and HDL)-cholesterol.
- Inhibition of atherosclerosis.
- Prevention of thrombosis.
- Reduction in heart rate.
- Influence of arrhythmias.
- Inhibition of inflammation.
- Inhibition of immune response.

Possible uses

<table>
<thead>
<tr>
<th>Health effect or disease risk</th>
<th>Strength of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular disease:</td>
<td></td>
</tr>
<tr>
<td>Reduced risk of CHD (primary)</td>
<td>PR</td>
</tr>
<tr>
<td>Reduced risk of CHD (secondary)</td>
<td>P</td>
</tr>
<tr>
<td>Reduced risk of stroke</td>
<td>P</td>
</tr>
<tr>
<td>Reduced mortality</td>
<td>PR</td>
</tr>
</tbody>
</table>
Dietary Supplements Pocket Companion
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Lowers triglycerides C
Reduced blood clotting C
Inhibition of arrhythmia P
Lowers blood pressure C
Reduced angina I

Arthritic conditions:
Rheumatoid arthritis (management) PR
Osteoarthritis (management) P

Inflammatory bowel disease:
Crohn’s disease (management) P
Ulcerative colitis (management) P

Psoriasis (management) I
Asthma (management) I

Diabetes mellitus:
Lowers triglycerides C
Glycaemic control I

Cognitive health:
Development of brain in infancy C
Dementia/Alzheimer’s disease P

Behavioural problems in children:
Attention deficit hyperactivity disorder I
Developmental coordination disorder P

Visual acuity
Infant visual acuity P
Reduced risk of age-related macular degeneration P

Depression and mood disorders I
Schizophrenia I
Systemic lupus erythematosus I
Cancer prevention I

C, convincing; I, insufficient; P, possible; PR, probable.

Bioavailability
Supplements of fish oil and fish liver oil typically provide 100–2000 mg EPA + DHA per daily dose, sold as liquid oil or in softgel capsules. Studies have shown that concentrations of EPA and DHA in tissues,10 chylomicrons11 and serum12 are increased in response to supplementation with pure oils.

Precautions/contraindications
- Monitor patients on anticoagulants (e.g. aspirin, warfarin).
- Stop supplementation before surgery.
**Fish oil**

- Vitamin A and D concentrations (if other supplements are taken concomitantly).
- Contaminants (e.g. dioxins, polychlorinated biphenyls); maximum contaminant level regulated by UK Committee on Toxicity (COT) and EU Scientific Committee on Food (SCF).

**Pregnancy/breastfeeding**

Avoid fish liver oils (vitamin A content).

**Adverse effects**

Possibly increased risk of bleeding (>3 g/day EPA + DHA).

**Interactions**

Anticoagulants (e.g. aspirin, warfarin): possibly increased risk of bleeding. 
* Bilberry, bromelain, dong quai, feverfew, flaxseed, garlic, ginger, gingko, ginseng, glucosamine, vitamin E: possibly increased risk of bleeding.

**Dose**

- See human requirements: follow recommendations for fish intake.
- If oily fish is not consumed:
  - healthy adults, EPA + DHA, up to 450 mg daily
  - people with cardiovascular disease, EPA + DHA, 0.5–1 g daily.
- Studies in arthritic conditions have used doses of EPA + DHA of 2–3 g daily. Studies in depression and other mental conditions have used doses of 1–10 g daily. Such doses should be used under medical supervision.

**References**


