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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

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

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People with documented CHD People with raised triglycerides	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 vegetables 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^{1–9}

Health effect or disease risk	Strength of evidence
Cardiovascular disease:	
Reduced risk of CHD (primary)	PR
Reduced risk of CHD (secondary)	P
Reduced risk of stroke	P
Reduced mortality	PR

Lowers triglycerides Reduced blood clotting Inhibition of arrhythmia Lowers blood pressure Reduced angina	C C P C I
Arthritic conditions: Rheumatoid arthritis (management) Osteoarthritis (management)	PR P
Inflammatory bowel disease: Crohn's disease (management) Ulcerative colitis (management)	P P
Psoriasis (management)	I
Asthma (management)	I
Diabetes mellitus: Lowers triglycerides Glycaemic control	C I
Cognitive health: Development of brain in infancy Dementia/Alzheimer's disease	C P
Behavioural problems in children: Attention deficit hyperactivity disorder Developmental coordination disorder	I P (improved reading, spelling, behaviour)
Visual acuity Infant visual acuity Reduced risk of age-related macular degeneration	P 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.

- 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, ginkgo, 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

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