Dyslipidaemia

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<th>Practice points</th>
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• Omega-3 fatty acids dose-dependently reduce plasma triglyceride (TG) levels in those with elevated TGs, may increase high density lipoprotein-cholesterol (HDL-c) when TG level is high, reduce risk of cardiac death, coronary events and overall mortality in those at high risk for cardiovascular disease and are generally safe and well tolerated. Any side effects are mild (gastrointestinal discomfort, fishy reflux)
• Plant sterols reduce total and low density lipoprotein-cholesterol (LDL-c) and can be used as an adjunct to cholesterol-lowering medication
• Oat beta-glucan reduces total and LDL-c, improves blood lipid profile and may assist with regulation of postprandial insulin response
• Coenzyme Q10 (CoQ10) is important for endothelial function, heart health and energy production. It may replenish plasma CoQ10 levels reduced by statin therapies

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• A major modifiable risk factor for the development of atherosclerosis and consequent cardiovascular diseases; defined as elevation of total plasma cholesterol (TC), TGs, or both, or low HDL-c that contributes to the development of atherosclerosis.
• A rise in LDL-c directly influences the development of atherosclerosis, and LDL-c oxidation is an independent risk factor for cardiovascular disease.
• Low plasma HDL-c is a strong and independent risk factor for cardiovascular disease. Every 1mg/dL increase in HDL-c may lead to a reduction in the incidence of coronary heart disease by 2-3% independent of other factors.

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Medical management includes the following goals:
• LDL-c <1.8 mmol/L
• HDL-c > 1.0 mmol/L
• TG <2.0 mmol/L
• Education on the modifiable behavioural risk factors of diet and lifestyle

Complementary medicines

Primary recommendations
OMEGA-3 FATTY ACIDS: EPA AND DHA

Mechanism of action
• Decrease hypertriglyceridaemia, alone or as adjunctive therapy
• Attributed to activation of hepatic transcription factors resulting in increased β-oxidation of fatty acids and decreased activity of TG-synthesising enzymes resulting in a smaller fatty acid pool in the liver for very low density lipoprotein (VLDL) synthesis and lower VLDL-TG secretion

Research
Reviews of randomised controlled trials have found:
• A dose-response relationship exists. The higher the baseline TG level, the greater the response. There appears to be no effect at doses below 2 g/d, with increasing effect at higher doses
• Reductions of TG at optimal doses may be from 25–35% up to 45% in the presence of severely elevated TG levels
Dosage and formulation
Dosing should be based on EPA+DHA, not total fish oil. Optimal TG-lowering doses of EPA+DHA are 3-4 g/day.\textsuperscript{19}

Adverse effects
Up to 3 g/d EPA+DHA is generally recognised as safe (GRAS).\textsuperscript{23}

Interactions
Clinical studies with surgical patients find no clinically significant bleeding risk when omega-3 supplements are taken with aspirin or warfarin.\textsuperscript{33} Unlikely: Doses >3 g/d EPA+DHA may increase the risk of bleeding with warfarin, aspirin, antiplatelet drugs.\textsuperscript{23} Beneficial effect with statin medication.\textsuperscript{22} Possible additive effect with antihypertensive drugs. Can be used together with monitoring.\textsuperscript{23}

PLANT STEROLS (phytosterols)
Mechanism of action
• Reduce intestinal absorption of cholesterol by partly inhibiting cholesterol absorption in the gut.\textsuperscript{24}

Research
• A meta-analysis of randomised controlled trials found decreases in TC and LDL-c concentrations.\textsuperscript{24}
• The Australian Heart Foundation concludes a daily intake of around 2 g/d may reduce LDL-c levels by approximately 10%.\textsuperscript{25}

Dosage and formulation
2 g/d from dietary or supplemental forms
No benefit from taking >3 g/d\textsuperscript{24,25,26}

Adverse effects
Not recommended in pregnancy or breastfeeding.
Interactions
Possible beneficial effect with statin medication: may increase drug effect.\textsuperscript{26}

| Secondary recommendations |

OAT BETA-GLUCAN (OBG)

Mechanism of action
• Forms a viscous layer at the absorptive surface of the small intestine which decreases uptake of dietary cholesterol and reabsorption of bile acids.\textsuperscript{31}
• Slows gastric emptying and lowers the rate of glucose absorption.\textsuperscript{27}
• Behaves as a prebiotic, supporting growth of beneficial intestinal microbial flora which may support cholesterol metabolism.\textsuperscript{27,28,30}

Research
Meta-analysis of randomised controlled trials found:\textsuperscript{29}
• OBG may decrease LDL-c 0.25 mmol/L and TC 0.30 mmol/L
• LDL-c lowering greater with higher baseline levels
• Greater effect in subjects with diabetes
• No significant effect on HDL-c or TGs
• No evidence that higher doses or duration of treatment (range: 2–12 wk) influenced results

Dosage and formulation
≥3 g/d\textsuperscript{29}

Adverse effects
No adverse effects expected at recommended dose.

Interactions
May increase the glucose-lowering effect of anti-diabetic medications.
May have an additive effect with lipid-lowering medications which may be beneficial.
Oats contain gluten. The majority of adults and children with coeliac disease can tolerate oats however some cannot. It is recommended that there is regular follow-up if a patient with coeliac disease chooses to consume oats.

COENZYMIE Q10 (CoQ10)

Mechanism of action
• May improve endothelial function at high doses (300 mg) by increasing activity of antioxidant enzymes (glutathione peroxidase, catalase and superoxide dismutase).\textsuperscript{8,34}
• Inhibits the oxidation of LDL-c.\textsuperscript{34}

Research
Several reviews have found CoQ10 supplementation may help replenish plasma/serum Co Q10 levels reduced by statin therapies with a daily dose of ≥100 mg/day.\textsuperscript{33,35,36}

Dosage and formulation
100-300 mg/day.\textsuperscript{8,33}

Adverse effects
Well tolerated – adverse effects reported in <1% of patients (dizziness, GI upset)

Interactions
May increase or decrease the anti-coagulant effect of warfarin. A clinical trial found no interaction but case reports exist of changes to INR. Monitor patients or avoid combination.\textsuperscript{23} HMG-CoA-reductase inhibitors decrease plasma CoQ10. Supplementation may be beneficial.\textsuperscript{23} May have additive effects with antihypertensive drugs. Supplementation may be beneficial.\textsuperscript{23}
REFERENCES


The Mediterranean Diet may reduce cardiovascular events via reducing blood pressure; improving glucose metabolism, lipid profile, and lipoprotein particle characteristies; and decreasing inflammation and oxidative stress. 11. Include high intake of extra virgin olive oil, nut, fruits, vegetables, legumes, and whole grain cereals; a moderate intake of fish, poultry, dairy and wine (always with meals); and a low intake of red meat, sweets and industrial bakery products13,15

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