

same amount that is recommended for the general population.

- The recommendation for the general public to eat a serving of fish (particularly fatty fish) at least two times per week is also appropriate for people with diabetes.

Does comprehensive diabetes nutrition therapy support cardiovascular risk factor reduction?

Nutrition therapy that includes the development of an eating plan designed to optimize blood glucose trends, blood pressure, and lipid profiles is important in the management of diabetes and can lower the risk of CVD, CHD, and stroke (9). Findings from clinical trials support the role of nutrition therapy for achieving glycemic targets and decreasing various markers of cardiovascular and hypertension risk (9,24,291–293).

What are considerations for fat intake for people who are at risk for or have CVD and diabetes?

Total Fat

There has been increasing research examining the effects of high-fat, low-carbohydrate eating patterns on cardiometabolic risk factors, with two systematic reviews showing benefits of low-carbohydrate eating plans compared with low-fat eating plans on glycemic and CVD risk parameters in the treatment of type 2 diabetes (see the section LOW-CARBOHYDRATE OR VERY LOW-CARBOHYDRATE EATING PATTERNS) (106,111).

Saturated Fat

The 2015–2020 DGA recommend consuming less than 10% of calories from saturated fat by replacing it with monounsaturated and polyunsaturated fatty acids (8). The scientific rationale for decreasing saturated fat in the diet is based on the effect of saturated fat in raising LDL-C, a contributing factor in atherosclerosis (294).

In a Presidential Advisory on dietary fat and CVD, the American Heart Association concluded that lowering intake of saturated fat and replacing it with unsaturated fats, especially polyunsaturated fats, will lower the incidence of CVD (295). A meta-analysis of randomized trials not focused on people with diabetes showed a 17% reduction (hazard ratio 0.83 [95% CI 0.72–0.96]) in risk of CVD

events in studies that reduced saturated fat intake from about 17% to about 9% of energy, but reductions in stroke, cardiovascular mortality, or overall mortality were not found. Subgrouping of the studies suggested that benefit occurred by replacing saturated fat with polyunsaturated fat but not with carbohydrate or protein (296). In a systematic review of observational studies, saturated fats were not associated with all-cause mortality, CVD, CHD, ischemic stroke, or type 2 diabetes, but limitations common to observational studies were noted (297). Further, in a more recent large, prospective study including 7% of participants with self-reported diabetes, higher intake of saturated fat was associated with lower risk of total mortality (hazard ratio 0.86 [0.76–0.99], *P* for trend = 0.0088) (298). In the PREDIMED study, which included close to 50% of people with diabetes, intakes of monounsaturated and polyunsaturated fats were associated with a lower risk of CVD and death, whereas intakes of saturated fat and *trans* fat were associated with a higher risk of CVD. The replacement of saturated fat with monounsaturated or polyunsaturated fat in food or replacement of *trans* fat with monounsaturated fat in food was inversely associated with CVD (299).

In general, replacing saturated fat with unsaturated fats, especially polyunsaturated fat, significantly reduces both total cholesterol and LDL-C, and replacement with monounsaturated fat from plant sources, such as olive oil and nuts, reduces CVD risk. Replacing saturated fat with carbohydrate also reduces total cholesterol and LDL-C, but significantly increases triglycerides and reduces HDL-C (299,300).

Monounsaturated Fats

A recent meta-analysis of nine RCTs showed that, compared with control, the Mediterranean-style eating pattern, which is high in monounsaturated fats from plant sources such as olive oil and nuts, improved outcomes of glycemia, body weight, and cardiovascular risk factors in participants with type 2 diabetes (301). A systematic review and meta-analysis of 24 studies and including 1,460 participants compared the effect of eating plans high in monounsaturated fat with that of eating plans high in carbohydrates. The eating plans high

in monounsaturated fat showed significant reductions in fasting glucose, triglycerides, body weight, and systolic blood pressure along with significant increases in HDL-C. The systematic review and meta-analysis also reviewed four studies with a total of 44 participants comparing eating plans high in monounsaturated fat with those high in polyunsaturated fat. The eating plans high in monounsaturated fat led to a significant reduction in fasting plasma glucose (63).

Polyunsaturated Fats

As is recommended for the general public, an increase in foods containing the long-chain omega-3 fatty acids EPA and docosahexaenoic acid (DHA), such as are found in fatty fish, is recommended for individuals with diabetes because of their beneficial effects on lipoproteins, prevention of heart disease, and associations with positive health outcomes in observational studies (302,303). For people following a vegetarian or vegan eating pattern, omega-3 α -linoleic acid (ALA) found in plant foods such as flax, walnuts, and soy are reasonable replacements for foods high in saturated fat and may provide some CVD benefits, though the evidence is inconclusive.

Evidence does not conclusively support recommending omega-3 (EPA and DHA) supplements for all people with diabetes for the prevention or treatment of cardiovascular events. In the most recent ASCEND (A Study of Cardiovascular Events in Diabetes) trial, when compared with placebo, supplementation of omega-3 fatty acids at the dose of 1 g/day did not lead to cardiovascular benefit in people with diabetes without evidence of CVD (68a, 304–305). Omega-3 fatty acid supplements have not reduced CVD events or mortality in randomized trials but may have utility in people who require triglyceride reduction (304,306). The Vitamin D and Omega-3 Trial (VITAL), in which 13% of the participants had type 2 diabetes, supplementation with 1 g of omega-3 fatty acids did not result in a lower incidence of major cardiovascular events (305). However, in the Reduction of Cardiovascular Events With Icosapent Ethyl—Intervention Trial (REDUCE-IT), in which 57% of 823 participants had diabetes, 2 g of prescription icosapent ethyl twice daily (total daily dose, 4 g) significantly reduced