Editorials

Diet Low in Saturated Fat and Cholesterol for Diabetes

More than 35% of all patients with diabetes mellitus in the United States die of atherosclerotic cardiovascular disease, particularly coronary heart disease. Recent data from the Joslin Clinic showed that by age 55 yr, >35% of male and female patients with insulin-dependent diabetes mellitus (IDDM) have already died of coronary artery disease, compared to <8% of male controls without diabetes (1). These astonishing statistics underscore the necessity for physicians who treat patients with diabetes mellitus to focus on measures that can be instituted early in the course of the disease to ameliorate or even prevent the emergence of macrovascular disease. Because hypercholesterolemia and hypertriglyceridemia are major risk factors for atherosclerosis in the general population and lipid levels can be influenced by dietary manipulations, dietary recommendations for patients with diabetes have evolved to focus on measures that can be instituted early in the course of the disease to ameliorate or even prevent the emergence of macrovascular disease. Because hypercholesterolemia and hypertriglyceridemia are major risk factors for atherosclerosis in the general population and lipid levels can be influenced by dietary manipulations, dietary recommendations for patients with diabetes have evolved to attempt to reduce their levels of cholesterol- and triglyceride-rich lipoproteins over the long term. Because subjects with diabetes have been excluded from every intervention study designed to test whether a decrease in lipid levels is associated with a reduction in coronary heart disease, inferences have been made from studies of nondiabetic subjects and then applied to patients with diabetes.

Two articles in this issue focus on the short-term metabolic responses of lipids and lipoprotein levels to high-carbohydrate low-fat diets in a small number of patients with non-insulin-dependent diabetes mellitus (NIDDM). Both studies compared high- and low-fat diets in which the decrease in fat was replaced by carbohydrate, and in both studies, high-carbohydrate low-fat diets were associated with a decrease in low-density lipoprotein (LDL) cholesterol levels. However, the dietary design differed between the two studies. Abbott et al. (p. 102) compared a typical western diet with one in which saturated fat calories were replaced by carbohydrate. This diet changed the polyunsaturated-to-saturated fat ratio from 0.3 to 1.2, doubled the fiber content, and held dietary cholesterol intake constant. Plasma triglyceride and high-density lipoprotein (HDL) cholesterol levels were not affected adversely. Coulston et al. (p. 94) compared two candidate diets for diabetic patients both with a high polyunsaturated-to-saturated ratio (1.0) and very low cholesterol content. One diet contained 40% fat and 40% carbohydrate and the other 20% fat and 60% carbohydrate in which complex carbohydrate was substituted for fat. Cholesterol, fiber, and sucrose content were the same in both diets. This low-fat high-carbohydrate diet was associated with increased triglyceride and lowered HDL cholesterol levels, potentially undesirable effects. Nevertheless, LDL cholesterol levels were significantly reduced. Neither of these studies was designed to evaluate the effects of a diet reduced in saturated fat and cholesterol with calories simultaneously replaced by polyunsaturated fat, monosaturated fat, and carbohydrate (as recommended by the American Heart Association) with a concomitant increase in soluble fiber content. A practical approach to the diet for the diabetic patient would be to decrease intake of eggs, dairy-product fat, and red and organ meats. This could be supplemented with calories from complex car-
bohdyrads found in vegetables and grains, vegetable oils, fish, and poultry.

The important issue for physicians is how to apply the knowledge gained from controlled in-depth metabolic studies on a small number of subjects to dietary advice aimed at ultimately reducing the severe and accelerated atherosclerotic cardiovascular disease in the diabetic patient. Dietary recommendations, whether for individual patients or for whole populations, have been based not only on the metabolic studies of the type presented in these articles but also on several lines of evidence gleaned from cross-sectional and longitudinal population studies and from animal studies. The recent recommendations that patients with diabetes consume a low--saturated fat, low-cholesterol, high-carbohydrate diet (and low calorie for obese patients with NIDDM) are based partly on population studies showing that individuals with diabetes who chronically consume low-fat diets with carbohydrate content as high as 60–70% of total calories, such as those in Japan and China (2), have a remarkably low incidence of coronary heart disease. However, when they adopt a western life-style including higher--saturated fat lower-carbohydrate diets (e.g., Japanese diabetic subjects living in Hawaii; 3), the prevalence of coronary heart disease increases markedly. These recommendations are also based on metabolic studies, such as those of Abbott et al., that indicate that substitution of complex carbohydrate for saturated fat in obese subjects with NIDDM lowers total and LDL cholesterol without raising triglyceride levels or having adverse metabolic effects on glucose homeostasis when glucose control is optimized by standard therapeutic measures. This effect is based on lowering the saturated fat and cholesterol content of the current American diet.

Coulston et al. raise the issue that because most patients with diabetes mellitus have normal LDL cholesterol levels, and because increased triglyceride levels are more prevalent even among well-controlled patients, dietary management should focus on avoidance of increased triglyceride levels. In their study, they show that if total cholesterol and LDL cholesterol are reduced in two comparison diets with a polyunsaturated-to-saturated ratio of 1.0 and low-cholesterol content, triglyceride levels will remain increased for as long as 6 wk in response to high-carbohydrate feeding. On this basis, current dietary recommendations for patients with diabetes are questioned because hypertriglyceridemia is a known risk factor for coronary heart disease among individuals with diabetes. Recent data published from the 6-yr Multiple Risk Factor Intervention Trial study of >360,000 men between age 35 and 57 yr, >5000 of whom had overt diabetes mellitus, are persuasive. With regard to the increasing exponential gradient of the risk of coronary heart disease as a function of cholesterol level in the general population, individuals with diabetes had more than a threefold increase in risk of coronary heart disease death at every serum cholesterol level throughout the normal range, even at the lowest levels (4,5). Evidence suggests that LDL cholesterol levels are needlessly higher than they could be in both patients with IDDM and NIDDM because better control of glucose metabolism by intensive insulinization or other measures will lower normal LDL cholesterol levels. Hypercholesterolemia and hypertriglyceridemia should not be overlooked, and triglyceride levels should be monitored over the long term. Clearly, patients with genetic forms of hyperlipidemia coexisting with diabetes mellitus may need individual diets and other approaches appropriate to their disorder.

We suggest that total cholesterol, and particularly LDL cholesterol levels that are considered borderline for nondiabetic individuals, are cause for concern in patients with diabetes. Attempts should be made to maximally lower these levels by diet. Thus, the recommendation of the American Heart Association and the National Cholesterol Education Program regarding the most appropriate diet to lower risk of coronary heart disease for adult patients with elevated total serum cholesterol and LDL cholesterol levels in the general population apply even more to patients with diabetes mellitus (6).

REFERENCES