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Editorial

The Search for the Perfect Heart-Healthy Diet

For the past 2 decades, obesity has steadily increased in the United States and is now paralleled with an obesity-driven increase in type 2 diabetes in both adults and children.[1] At the same time, the National Cholesterol Education Program (NCEP) of the American Heart Association, the American College of Cardiology, the American Medical Association, and other medical groups have developed extensive guidelines to decrease low-density lipoprotein (LDL) cholesterol and modify other risk factors with the hope of decreasing the incidence of heart disease. Despite the documented decrease in LDL cholesterol and total cholesterol nationally as a result of these efforts, obesity and diabetes have continued to increase progressively, primarily because of a marked decrease in physical activity and exercise as well as an increase in caloric intake in the American population.

These realizations have resulted in a wide spectrum of diets designed to decrease cardiovascular disease and to decrease weight. The philosophies behind these diets are as far-reaching as the swing of a pendulum, with the extremes of swing representing the "fringe diets." At one extreme is the very low-fat Dean Ornish diet, with the other extreme, the contralateral swing, being the high-fat and carbohydrate-restricted Atkins diet. Clearly, both the Ornish and the Atkins diets lead to weight loss without caloric restriction, whereas all the other more "common-sense" diets require caloric restriction to achieve weight loss. Many well-documented studies have confirmed that long-term adherence to extremely low-fat diets decreases cardiovascular events, produces weight loss, and improves lipid profiles. Supporters of the Atkins diet also claim good weight reduction, and this claim seems to be supported by the studies that have been presented. Weight loss with the Atkins diet is related to ketosis, the resultant decreased appetite, and the further resultant decrease in caloric intake. Much debate in the literature has focused on the possible benefit of the Atkins diet in cardiovascular risk reduction, but to date, there are no clear long-term studies. There are extremely few long-term data and few published studies in which patients were monitored for more than 90 days. Most of these studies involved small groups with no randomization and extremely poor diet compliance. In a recent article, Samaha et al[2] examined 132 obese patients (39% with diabetes and 43% with "metabolic syndrome," a triad of hypertriglyceridemia, low high-density lipoprotein [HDL] levels, and insulin resistance associated with increased risk of atherosclerosis) with a mean body mass index (BMI) of 43. Physicians prescribed either a high-fat fixed-carbohydrate restriction diet with less than 30% of calories from carbohydrates or the standard NCEP low-fat diet with less than 30% of calories from fat. Only 79 of the 132 patients complied with the protocol during the 6-month study. Hence, there was poor diet adherence and only small patient numbers in this trial. Weight loss was more evident with a low-carbohydrate diet, 6.7 kg vs 2.3 kg, with only modest changes. Blood triglyceride (TG) concentrations declined, and insulin resistance improved. In a study by Foster et al,[3] 63 obese subjects (mean BMI, 34) were randomized to the Atkins diet or the NCEP low-fat diet with less than 30% of calories from fat. Weight loss was more substantial in the Atkins group at 3 months but not significant at 12 months. The absolute difference in weight was only 4%. Triglyceride and HDL levels increased; however, total cholesterol and LDL cholesterol levels also increased. As with the Samaha et al study, adherence to prescribed diets was poor, and the number of study subjects was small.[3]

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In the current issue of the *Mayo Clinic Proceedings*, Hays et al[4] report an observational study in a small number

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of patients—17 men and 6 women. This study examined morbidly obese patients (mean ± SD BMI, 39.0±7.3 kg/m^2). All patients had atherosclerotic heart disease. Diabetic patients and patients taking hypoglycemic agents were excluded. Patients were treated with statin drugs to bring their LDL cholesterol to goal levels before they entered the trial. A high saturated fat and starch-avoidance diet was used, with one half the calories from saturated fat, red meat, cheese, eggs, and low-fat protein. Fresh fruit and nonstarchy vegetables were allowed, but specific limitations or content are not reported. This was not intended to be an Atkins restriction diet, and ketosis was induced in only 5 patients. Calories were limited to less than 7500 kJ/d (1800 kcal/d), and weight loss was due to caloric restriction. The duration of this study was short (6 weeks), and weight loss was modest (5.2%±2.5%; mean ± SD body weight decreased 5.5±2.1 kg). Fasting glucose, fasting insulin, and TG levels decreased. Nuclear magnetic resonance (NMR) spectrographic analysis of lipids revealed a decrease in very low-density lipoprotein (VLDL) TG levels and large VLDL and medium VLDL concentrations. Small VLDL concentrations did not seem to change. Overall, there was a decrease in VLDL size. Total cholesterol and HDL cholesterol did not show any specific change. However, HDL cholesterol particle size and LDL size increased slightly. The effect of this diet on particle size is of interest, but the number of study patients is small, and possible variation in the diet and diet compliance are unclear. Long-term follow-up and larger numbers of patients are needed for more definitive information. Of note, plasma homocysteine concentrations and C-reactive protein increased in the short-duration study. The 1 long-term study comparing the Atkins diet with various low-fat diets for 1 year showed that with the Atkins diet, homocysteine concentrations, C-reactive protein, and lipoprotein(a) all increased.[5] This study also showed that with a high-fat diet, LDL cholesterol and TG levels increased, HDL levels decreased, and the cholesterol-to-HDL ratio became abnormal, all suggesting that this diet may have important long-term limitations.

Long-term adherence to fringe diets is often limited because these diets may be tolerated poorly. When patients return to a more common-sense diet, such as the Mediterranean diet or the NCEP Step II diet, body weight tends to increase again because participants may not have learned how to control caloric intake.

A profusion of data has been published regarding the Mediterranean diet with the use of ω-3 fatty acids and the American Heart Association and NCEP-type diets, all of which require caloric restriction. These diets, particularly the Mediterranean diet, offer far more in terms of protection from coronary artery disease and intuitively make more sense.[6-11] The fact that these and related "common-sense" diets are well tolerated may contribute to their long-term success. We do not know what role a modified carbohydrate-restricted Atkins diet should have in weight reduction, but I am concerned about the long-term cardiovascular risk shown in the published studies. I recommend that we keep an open mind regarding the role of the Atkins diet and continue to study its metabolic effects. We should continue to examine the risk-benefit profiles of caloric-restricted, more rational diets such as the Mediterranean diet, which recently was associated with a striking decrease in cardiovascular risk, as noted in the study from Greece[12] that followed up adherence to this diet.

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