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Revisiting the effectiveness of the National Cholesterol Education Program's Step I and Step II diets: cholesterol-lowering diets in a pharmaceutically driven world[1,2]

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INTRODUCTION

Cholesterol-lowering diets are the mainstay of therapy for hypercholesterolemia. In this issue of the Journal, Kris-Etherton et al present an important meta-analysis summarizing the effectiveness of the National Cholesterol Education Program's Step I and Step II diets in free-living subjects. Average reductions in LDL were substantial—12% with the Step I diet and 16% with the Step II diet.

Despite its effectiveness, enthusiasm for dietary therapy has waned in favor of therapy with statins, the 3-hydroxy-3-methylglutaryl coenzyme A reductase class of cholesterol-lowering drugs. Statin therapy is safe and has few side effects. Because pharmaceutical companies are intensely marketing the benefits of statin therapy directly to consumers, dietary therapy just cannot compete. However, dietary therapy historically has been the primary treatment of hypercholesterolemia because no other low-risk, high-benefit alternatives were available (1). Diet and lifestyle modifications were promoted as a prudent, an inexpensive, and a safe way to reduce the risk of cardiovascular disease.

Although cholesterol-lowering diets will always be prudent, whether they are advantageous in terms of cost and safety remains unclear. Evidence that a cholesterol-lowering diet adds little expense to the food budget is based on the minimal costs of switching to lean meats, low-fat dairy products, and reduced-fat baked goods (2). In my experience counseling patients and families, most people who require dietary modification need to change their unhealthy diet to a healthy one. An unhealthy diet is often less expensive than a healthy one because unhealthy diets have fewer servings of vegetables and fruit (3). Cholesterol-lowering diets can be as expensive as statin therapy when one considers the additive costs of visits to a registered dietitian, increased food expenses, and measurements of lipid concentrations to monitor effectiveness (Table 1).

The safety advantage of dietary therapy must be compared with the proven safety of statin therapy. The West of Scotland Primary Prevention Trial (4), which studied the effectiveness of pravastatin, and the 4S (Scandinavian Simvastatin Survival Study) secondary prevention trial (5), which studied the effectiveness of simvastatin, both showed that these cholesterol-lowering drug treatments reduced all-cause mortality and that few patients withdrew from therapy because of side effects. Although trends in the reduction of cardiovascular disease by dietary modification have been seen, no study has shown a benefit on all-cause mortality; therefore, drug therapy with statins appears safe and more efficacious than dietary therapy.

Despite the apparent advantages of drug therapy, dietary therapy remains a unique and important tool for reducing cardiovascular disease for the following reasons: *1*) it augments the lipid-lowering effect of drug therapy, *2*) in some individuals it is as effective as drug therapy, *3*) it provides other cardiovascular benefits besides LDL lowering, and *4*) it has benefited from advances in biotechnology, eg, the introduction of canola oil into the food supply, the production of olestra-containing snacks, and the development of palatable substitutes for foods high in saturated fats.

Several clinical trials have shown that the cholesterol-lowering effect of dietary therapy is additive to the cholesterol-lowering effect of drug therapy. When a drug company–sponsored outpatient diet study compared the efficacy of a cholesterol-lowering diet (a 6% reduction in LDL) with the efficacy of the cholesterol-lowering drug lovastatin (a 24% reduction in LDL), drug therapy was clearly more efficacious (6). However, the study also proved dietary therapy to be additive to drug therapy. Concomitant diet and lovastatin therapy achieved LDL reductions equivalent to doubling the dose of the drug (7). Thus, cholesterol-lowering diets augment the cholesterol-lowering effect of statin therapy and permit use of less of the drug.

Cholesterol-lowering dietary therapy is subject to profound individual variation in response. From metabolic ward studies of subjects with unselected cholesterol concentrations, 5% of individuals had absolutely no cholesterol-lowering response to dietary modification. The percentage of nonresponders to dietary therapy increased to 10–25% in outpatient studies, causing a significant underestimation of the power of dietary therapy when only the mean response is considered. Drug therapy has the advantage of a relatively homogeneous response—most patients will achieve significant reductions in LDL. However, in 15–25% of the population, dietary therapy produces a reduction in LDL equivalent to that of drug therapy (8).

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TABLE 1
Comparison of annual costs of diet and drug therapy

	Dietary therapy	Drug therapy
Initiation costs	$120: initial visit to registered dietitian ($60) plus two follow-up visits ($30 each)	$840: ($70/mo)
Monitoring costs	$120: lipid testing at 3 and 6 mo and 1 y ($40/test)	$240: lipid testing ($40/test) and liver function testing ($40/test) at 3 and 6 mo and 1y
Potential additional costs	$1/d ($365/y): consumption of fruit and vegetables	
Anticipated LDL reduction[1]		
Without change in food costs	6%: $22 per mg/L ($240 per 11 mg/dL) $850 per mmol/L	20%: $28 per mg/L ($1080 per 38 mg/dL) $1108 per mmol/L
	12%: $10 per mg/L ($240 per 23 mg/dL) $340 per mmol/L	30%: $19 per mg/L ($1080 per 57 mg/dL) $736 per mmol/L
	16%: $8 per mg/L ($240 per 30 mg/dL) $304 per mmol/L	
With change in food costs	12%: $26 per mg/L ($605 per 23 mg/dL) $1014 per mmol/L	
	16%: $20 per mg/L ($605 per 30 mg/dL) $758 per mmol/L	

[1] Assuming an LDL concentration of 4.90 mmol/L (190 mg/dL).

Dietary therapy has other benefits besides LDL lowering. The Dietary Alternatives to Stop Hypertension (DASH) study has shown that additional servings of low-fat dairy products, fruit, and vegetables produce small but significant reductions in blood pressure (9). Enrichment of the diet with plant products will enrich the diet with antioxidant substances, including vitamin C, carotenoids, vitamin E, and flavonoids. Cholesterol-lowering diets should help prevent other chronic diseases, such as dietary-modifiable cancers, and visits to a registered dietitian should help promote weight loss in motivated patients.

Advances in food technology will improve our ability to lower cholesterol with diet and will also improve our ability to meet recommended micronutrient intakes. Folate-fortified flour, oat-fiber products, and low-energy, olestra-containing snacks are already in our food supply. Psyllium-enriched products, soy protein products, stanol ester–containing margarines, and genetically engineered plants with superior nutritional profiles are poised for introduction into our food supply (10, 11). All of these changes in the marketplace will provide consumers with more options for implementing a cholesterol-lowering diet, and some will enhance the cholesterol lowering achieved by saturated fat reduction alone.

Reductions in saturated fat intake, reductions in body weight, and the addition of exercise to lifestyle modification programs have all produced substantial benefits (12). Dietary therapy may not be less costly than drug therapy, when calculated as dollars spent per mmol reduction in LDL, but it should have far-reaching benefits affecting known and suspected risk factors for cardiovascular disease. The benefits of diet will be enhanced as improvements in biotechnology change our food supply. Cholesterol-lowering diets are not therapeutic dinosaurs of the 20th century. Cholesterol-lowering diets are meeting the challenges of the 21st century.

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