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Viscous fibers, health claims, and strategies to reduce cardiovascular disease risk[1,2]

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In this issue of the Journal, Anderson et al (1) report their meta-analysis of 8 studies that compared the effects on serum lipids of consumption of the viscous soluble fiber psyllium with those of a placebo. Their meta-analysis showed a 7% reduction in LDL cholesterol and a significant reduction in the ratio of apolipoprotein (apo) B to apo A-I. The meta-analysis singled out only those studies that used a cellulose control and a standard daily psyllium dose of 10.2 g. The LDL reduction is essentially the same as that reported in 2 other recent meta-analyses of the effects of psyllium consumption (**Table 1**) (2, 3). One meta-analysis was restricted to psyllium-fortified breakfast cereals and used a unique set of studies, whereas the larger meta-analysis involved some overlap with the studies analyzed by Anderson et al (1).

Viscous fibers have been recognized since the 1960s as having cholesterol-lowering properties. They have also been shown to reduce postprandial glycemia and insulinemia. Their primary mechanism of action is likely to be related to their ability to increase bile acid loss (4). In addition, they may possibly increase the molar ratio of propionate to acetate on colonic fermentation of fiber (5), dampen postprandial insulin surges (6), alter postprandial liproprotein synthesis, and stimulate reverse cholesterol transport through an alteration in the rate of nutrient absorption, all of which may contribute to reducing serum cholesterol concentrations.

However, the thrust of this meta-analysis and its take-home message was the often asked question, Why is an increased viscous fiber intake not part of the stepwise approach to the dietary therapy of hypercholesterolemia? Indeed, the current National Cholesterol Education Program (NCEP) guidelines stress the importance of an adequate trial of diet before proceeding to drug therapy. Nevertheless, the modifications focused on include only dietary saturated fat and cholesterol and weight reduction. Important as these modifications are, they do not cover additional options that may form part of the cholesterol-lowering portfolio. In addition to the consumption of high amounts of viscous fibers, these options include the replacement of meat and dairy products with soy protein and the addition of plant sterols to margarines, chewing gum, and other foods. Even though the effects of these dietary changes singly are considered small and possibly clinically insignificant (1), their cumulative action may be worthwhile if each contributes ≈5–10% to the reduction in LDL cholesterol. If these effects are indeed additive, one could expect a 15–20% reduction in LDL cholesterol from inclusion of adequate amounts of viscous fiber, soy protein, and plant sterols in the diet (**Table 2**). Added to these is the 10–20% reduction in LDL resulting from lowering the saturated (and *trans*) fatty acids and dietary cholesterol contents as advocated in an NCEP Step II diet (7, 8). Overall, a cholesterol reduction could be achieved that is equivalent to that produced by a starting dose of the statins, the current first-line drugs for cholesterol control.

In defense of this approach, Anderson et al also point out that the fiber effect was seen even when diets already low in saturated fat and dietary cholesterol were consumed, an important point if the fiber effect is to be added to the cholesterol-lowering effect of the NCEP Step II diet. Furthermore, they assessed a great number of studies to show a lack of causally related serious adverse effects associated with psyllium consumption.

Anderson et al also positioned the benefits of psyllium in the context of the recent Food and Drug Administration's (FDA) approved health claim for psyllium. It is encouraging that the FDA, following the Nutrition, Labeling and Education Act of 1991, has permitted cardiovascular disease risk reduction health claims to be made by industry for 2 viscous fibers, β-glucan and psyllium. Soy protein has recently received a similar approval. This process draws attention to the validated components of a possible cholesterol-lowering portfolio.

Internationally, there is considerable regulatory interest in facilitating a process that breaks down the barrier between food and drugs because, in most jurisdictions, a health claim or disease risk reduction claim can only be made for a drug. In this way, it is hoped that the food industry will be encouraged to develop products with specific health attributes. However, if industry is to be truly motivated, product-specific health claims must also be sanctioned, ie, a health claim must be related to a specific product based on the testing of that product or a company's specific line of products. Competing companies wishing to make a specific product claim for a similar product would have to give evidence of efficacy of that product. In this way, a measure of protection is given to a company against opportunis-

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TABLE 1
Three meta-analyses of LDL reduction by psyllium

	Average dose	Mean baseline LDL concentration	Percentage reduction
	g/d	*mmol/L*	*%*
Brown et al (2), 1999 (*n* = 479)	9.1	4.37	6.0
Olson et al (3), 1997 (*n* = 209)	9.4	4.33	7.4
Anderson et al (1), 2000 (*n* = 384)	10.2	4.19	7.2

tic competition and the public would be assured of product effectiveness. This process is important in relation to viscous fibers, for which loss of viscosity may result in loss of effect (9), and removal of potentially active components such as, for example, the isoflavones and saponins from soy, may reduce the effectiveness of manufactured soy protein products.

It is also important that the drive to identify potentially active food components and to manufacture functional foods should not eclipse the continued need to promote healthy diets with increased dependence on plant foods, whole-grain cereals, and fresh fruit and vegetables—all of which may have multiple beneficial effects (10). The exact functional components of these foods have often not been defined. For example, insoluble cereal fiber consumption relates to freedom from diabetes and cardiovascular disease in cohort studies (11–14), although its only notable physiologic effect is to increase fecal bulk. Foods such as fresh fruit and vegetables may have multiple effects, including homocysteine reduction and antioxidant potential. Nevertheless, the highlighting of viscous fibers and other functional dietary components provides an opportunity to select a lipid-lowering portfolio. Such approaches to treatment may go some way toward bridging the gap between a conventionally good diet and drug therapy.

TABLE 2
A portfolio of dietary factors useful for cholesterol reduction

Factor	Change required	Approximate LDL reduction
		%
Saturated fat intake[1]	<7% of energy	10
Dietary cholesterol intake	<200 mg/d	5
Body weight	–10 lb (5 kg)	5
Viscous fiber intake	5–10 g/d	5
Soy protein intake	25 g/d	5
Plant sterol intake[2]	1–3 g/d	5
Total	Full portfolio[3]	35

[1] Reduce *trans* fatty acid intake as close to none as possible.
[2] Depending on the sterol or stanol.
[3] Assuming that the effects are additive.

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