

[S-5]**Effects of Dietary Fiber on Lipid Metabolism.**

Susan Sungsoo Cho
Kellogg Company, USA

Coronary heart disease (CHD) is one of the largest causes of deaths in Korea and many industrialized countries. This review examines the question whether there is a relation between cereal fiber consumption and CHD. Several of the nutrients in cereal fibers, have known potential for reducing risk factors for CHD: the linoleic acid, fibre, vitamin E, selenium and folate. Cereals also contain phytoestrogens of the lignan family and several phenolic acids with antioxidant properties. Processing generally reduces the content of these nutrients and bioprotective substances. The protective effect does not seem to be limited to cholesterol-lowering. Large, prospective, epidemiologic studies show a protective effect of dietary fiber against coronary heart disease (CHD) and form the basis for new recommendations from the National Academy of Science for fiber intake (38 and 25 g/d for young men and women, respectively, based on an intake of 14 g of fiber per 1000 kcal). Mechanisms by which fibers may protect against CHD include lowering blood cholesterol (soluble fibers), attenuating blood triglyceride levels (mostly soluble fibers), decreasing hypertension (all fibers), and normalizing postprandial blood glucose levels (all fibers). An important consideration in making diet recommendations to protect against CHD is that the total amount of fiber from fiber-containing foods is important, and individuals should not just be counseled to focus on soluble fiber.

Mozaffarian (2003) investigated whether fiber consumption from fruit, vegetable, and cereal sources (including whole grains and bran) was associated with incident CHD in elderly persons in a prospective cohort study conducted from 1989 to June 2000. After adjustment for age, sex, education, diabetes, ever smoking, pack-years of smoking, daily physical activity, exercise intensity, alcohol intake, and fruit and vegetable fiber consumption, cereal fiber consumption was inversely associated with incident CVD (P for trend =.02), with 21% lower risk (hazard ratio [HR], 0.79; 95% confidence interval [CI], 0.62-0.99) in the highest quintile of intake, compared with the lowest quintile. In similar analyses, neither fruit fiber intake (P for trend =.98) nor vegetable fiber intake (P for trend =.95) were associated with incident CHD. When CHD events were separately evaluated, higher cereal fiber intake was associated with lower risk of total stroke and ischemic stroke and a trend toward lower risk of ischemic heart disease death. The authors concluded that cereal fiber consumption late in life is associated with lower risk of incident CHD, supporting recommendations for elderly individuals to increase consumption of dietary cereal fiber. This presentation also reviews several prospective studies which evaluated the impact of consuming cereal

fiber and whole grain foods on relative risks (RR) of CHD. Those studies consistently demonstrated protective effects of high fiber or whole grain foods against CHD.

The presentation also reviews pooled epidemiological data on the odd ration of various cancers affected by high fiber food consumption. High fiber or whole grain food consumption significantly decreased the odds ratios of colon cancer, esophageal, pancreatic, breast, endometrial cancers. Many epidemiological studies suggest an inverse relationship between the intake of dietary fiber, particularly fiber from cereal grains, and colon cancer risk. Dietary fiber is slowly fermented to short chain fatty acids (SCFAs) in the large bowel. This process, namely fermentation, is an important function of the large bowel; SCFAs, mainly acetate, propionate and butyrate account for approximately 80% of the colonic anion concentration and are produced in nearly constant molar ratio 60:25:15. SCFAs are of major importance in understanding the physiological function of dietary fibers and their possible role in intestinal neoplasia. SCFAs production and absorption are closely related to the nourishment of colonic mucosa, its production from dietary carbohydrates is a mechanism whereby considerable amounts of calories can be produced in short-bowel patients with remaining colonic function and kept on an appropriate dietary regimen. SCFAs enemas or oral probiotics are a new and promising treatment for ulcerative colitis. SCFAs, particularly butyrate, are protective against neoplastic processes of the large bowel.

Foods rich in insoluble fiber decrease intestinal transit time and increase fecal bulk and stool number. In general, cereal grains are more effective than fruits and vegetables in increasing the bulk of stools and preventing constipation. Wheat bran, in a variety of forms and doses, has been found to significantly increase stool weight and volume. Wheat bran is able to increase fecal bulk because it traps water, increases the amount of undigested material and increases the bacterial cell mass in the feces. Increase in stool weight and volume due to increased fiber consumption results in the dilution of fecal contents. Dietary fiber has also been shown to increase stool frequency and decreases transit time.

The routine use of high-fiber foods has been found to reduce the risk for obesity and assist in weight maintenance. Obesity is a critical factor in the development and progression of cardiovascular disease, hypertension, and diabetes. High-fiber foods may help reduce the risk of obesity by the operation of the following mechanisms: high-fiber foods are lower in energy; they take longer to eat, which increases the feeling of satiety; they slow gastric emptying, thereby increasing the feeling of fullness; they decrease serum insulin concentration, thereby decreasing food intake because insulin stimulates appetite; and they decrease the absorption of energy.

Despite universal acceptance of the importance of high fiber or whole grain foods in the diet, consumer knowledge of the benefits of high fiber or whole grains and intake of these foods are limited. High fiber or whole-grain foods are valuable sources of nutrients that are lacking in the most diet, including dietary fiber, B vitamins, vitamin E, selenium, zinc, copper, and magnesium. High fiber, in particular cereal bran containing foods also contain phytochemicals, such as phenolic compounds, that

together with vitamins and minerals play important roles in disease prevention. It is important for health professionals to recommend the increased intake of high fiber foods, in particular cereal fibers.

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