

# Fiber and Heart Disease

Am J Epidemiol 1999 Nov 15;150(10):1073-80

**Dietary antioxidant vitamins and fiber in the etiology of cardiovascular disease and all-causes mortality: results from the Scottish Heart Health Study.**

**Todd S, Woodward M, Tunstall-Pedoe H, Bolton-Smith C**

**Department of Applied Statistics, University of Reading, United Kingdom.**

In this paper, data obtained between 1984 and 1993 from 11,629 men and women as part of the Scottish Heart Health Study (Scotland, United Kingdom) were used to investigate the relation between antioxidant vitamin and fiber intakes and both incident coronary heart disease (CHD) (649 events) and all-causes mortality (591 deaths). All age-adjusted mean intakes tended to be higher in the group that experienced no event. For men, increased fiber intake was associated with decreased risk of CHD even after adjustment for a host of other major coronary risk factors; hazard ratios relative to the lowest quarter were 0.68, 0.70, and 0.64 by increasing quarter. This relation was also observed for mortality (hazard ratios of 0.62, 0.66, and 0.62). Evidence was found that higher intakes of the antioxidants were also beneficial, although the associations were weaker.

For women, fiber was the only obviously influential dietary factor, with hazard ratios of 0.94, 0.60, and 0.56 for CHD and 1.25, 0.82, and 0.65 for mortality. These results suggest that the current public health drive to increase the consumption of foods rich in antioxidant vitamins and (particularly) fiber will impact on both CHD risk and the general health of the population.

***NOTE: Average was a 49% decreased risk of coronary heart disease for the nine year study with increased fiber intake.***

# Fiber and Heart Disease

Am J Clin Nutr 1999 Sep;70(3):412-9

**Whole-grain consumption and risk of coronary heart disease: results from the Nurses' Health Study.**

**Liu S, Stampfer MJ, Hu FB, Giovannucci E, Rimm E, Manson JE, Hennekens CH, Willett WC**

**Division of Preventive Medicine and Channing Laboratory, Department of Medicine, Brigham and Women's Hospital, Harvard Medical School, Boston, MA 02215, USA. simin.liu@channing.harvard.edu**

**BACKGROUND:** Although current dietary guidelines for Americans recommend increased intake of grain products to prevent coronary heart disease (CHD), epidemiologic data relating whole-grain intake to the risk of CHD are sparse. **OBJECTIVE:** Our objective was to evaluate whether high whole-grain intake reduces risk of CHD in women. **DESIGN:** In 1984, 75521 women aged 38-63 y with no previous history of cardiovascular disease or diabetes completed a detailed, semiquantitative food-frequency questionnaire (SFFQ) and were followed for 10 y, completing SFFQs in 1986 and 1990. We used pooled logistic regression with 2-y intervals to model the incidence of CHD in relation to the cumulative average diet from all 3 cycles of SFFQs. **RESULTS:** During 729472 person-years of follow-up, we documented 761 cases of CHD (208 of fatal CHD and 553 of nonfatal myocardial infarction). After adjustment for age and smoking, increased whole-grain intake was associated with decreased risk of CHD. For increasing quintiles of intake, the corresponding relative risks (RRs) were 1.0 (reference), 0.86, 0.82, 0.72, and 0.67 (95% CI comparing 2 extreme quintiles: 0.54, 0.84; P for trend < 0.001). After additional adjustment for body mass index, postmenopausal hormone use, alcohol intake, multivitamin use, vitamin E supplement use, aspirin use, physical activity, and types of fat intake, these RRs were 1.0, 0.92, 0.93, 0.83, and 0.75 (95% CI: 0.59, 0.95; P for trend = 0.01). The inverse relation between whole-grain intake and CHD risk was even stronger in the subgroup of never smokers (RR = 0.49 for extreme quintiles; 95% CI: 0.30, 0.79; P for trend = 0.003). The lower risk associated with higher whole-grain intake was not fully explained by its contribution to intakes of dietary fiber, folate, vitamin B-6, and vitamin E. **CONCLUSIONS:** Increased intake of whole grains may protect against CHD.

**NOTE:** *Average was a 46% decreased risk of coronary heart disease for the ten year study with increased fiber intake and evaluation for whole grains.*

# Fiber and Heart Disease

**J Nutr 1999 Jul;129(7 Suppl):1457S-66S**

**Impact of nondigestible carbohydrates on serum lipoproteins and risk for cardiovascular disease.**

**Anderson JW, Hanna TJ**

**Metabolic Research Group, VA Medical Center and University of Kentucky, Lexington, KY, USA.**

Atherosclerotic cardiovascular disease (ASCVD) is the leading cause of death in the U.S. and in most developed countries. Many nutritional factors contribute to risk for ASCVD including total and saturated fat consumption, fruits and vegetables in the diet and dietary fiber intake. This review will focus on the relationship of dietary fiber intake to risk for coronary heart disease (CHD) and ASCVD (which includes, principally, CHD, cerebral vascular disease and peripheral vascular disease). Fiber-rich foods such as vegetables, fruits, whole-grain cereals and legumes are rich sources of nutrients, phytochemicals and antioxidants. For example, most high fiber foods contain soluble and insoluble fiber, minerals, vitamins, other micronutrients and phytochemicals. Cereals and legumes also contain complex carbohydrates and unsaturated fatty acids. Some high fiber foods are rich in monounsaturated fatty acids, whereas others provide (n-3) fatty acids. Legumes and certain vegetables provide oligosaccharides. When assessing the health benefits of dietary fiber, one should consider the potential effects of associated nutrients, micronutrients and phytochemicals. These interactions will be reviewed as we discuss relationships of dietary fiber to ASCVD.

***NOTE: Review states that increased fiber intake lowers cholesterol, decreases risk of atherosclerosis (hardening of the arteries) and decreases risk of coronary heart disease.***

# Fiber and Heart Disease

JAMA 1999 Jun 2;281(21):1998-2004

**Long-term intake of dietary fiber and decreased risk of coronary heart disease among women.**

**Wolk A, Manson JE, Stampfer MJ, Colditz GA, Hu FB, Speizer FE, Hennekens CH, Willett WC**

**Department of Medical Epidemiology, Karolinska Institutet, Stockholm, Sweden.  
alicja.wolk@mep.ki.se**

CONTEXT: Epidemiological studies of men suggest that dietary fiber intake protects against coronary heart disease (CHD), but data on this association in women are sparse. OBJECTIVE: To examine the association between long-term intake of total dietary fiber as well as fiber from different sources and risk of CHD in women. DESIGN AND SETTING: The Nurses' Health Study, a large, prospective cohort study of US women followed up for 10 years from 1984. Dietary data were collected in 1984, 1986, and 1990, using a validated semiquantitative food frequency questionnaire. PARTICIPANTS: A total of 68782 women aged 37 to 64 years without previously diagnosed angina, myocardial infarction (MI), stroke, cancer, hypercholesterolemia, or diabetes at baseline. MAIN OUTCOME MEASURE: Incidence of acute MI or death due to CHD by amount of fiber intake. RESULTS: Response rate averaged 80% to 90% during the 10-year follow-up. We documented 591 major CHD events (429 nonfatal MIs and 162 CHD deaths). The age-adjusted relative risk (RR) for major CHD events was 0.53 (95% confidence interval [CI], 0.40-0.69) for women in the highest quintile of total dietary fiber intake (median, 22.9 g/d) compared with women in the lowest quintile (median, 11.5 g/d). After controlling for age, cardiovascular risk factors, dietary factors, and multivitamin supplement use, the RR was 0.77 (95% CI, 0.57-1.04). For a 10-g/d increase in total fiber intake (the difference between the lowest and highest quintiles), the multivariate RR of total CHD events was 0.81 (95% CI, 0.66-0.99). Among different sources of dietary fiber (eg, cereal, vegetables, fruit), only cereal fiber was strongly associated with a reduced risk of CHD (multivariate RR, 0.63; 95% CI, 0.49-0.81 for each 5-g/d increase in cereal fiber). CONCLUSIONS: Our findings in women support the hypothesis that higher fiber intake, particularly from cereal sources, reduces the risk of CHD.

***NOTE: Same study as Reference #2, but published with stricter peer-review and different data skews. Again, shows an average 46% decreased risk of coronary heart disease for the ten year study with increased fiber intake and evaluation for whole grains.***

# Fiber and Heart Disease

Am J Public Health 1999 Mar;89(3):322-9

**Is whole grain intake associated with reduced total and cause-specific death rates in older women? The Iowa Women's Health Study.**

**Jacobs DR Jr, Meyer KA, Kushi LH, Folsom AR**

**Division of Epidemiology, School of Public Health, University of Minnesota, Minneapolis 55454, USA. jacobs@epivax.epi.umn.edu**

**OBJECTIVES:** This study sought to determine whether nutrient-rich whole grains reduce mortality risk. **METHODS:** The study included 38,740 Iowa women, aged 55 to 69 years. A food frequency questionnaire was used to obtain data on grain intake. **RESULTS:** Median whole grain intake quintiles ranged from a median of 0.2 to more than 3 servings per day. Women with higher intakes had healthier lifestyles and less baseline disease. The total death rate decreased in increasing quintiles, and the pattern repeated for cancer, cardiovascular disease, and other causes combined. Adjusted for lifestyle and baseline disease, the relative hazard rate ratio for total death was about 0.85 in daily consumers of whole grain. Findings persisted in strata of baseline healthy and diseased and were not explained by dietary fiber. Rates of total mortality, but not cardiovascular disease mortality, were higher among frequent consumers of refined grain. **CONCLUSIONS:** Total mortality risk was inversely associated with whole grain intake and positively associated with refined grain intake. Refined grains contributed more than 20% of energy intake, and whole grains contributed 1%. Substitution of whole for refined grain may reduce chronic disease risk in the United States.

***NOTE: Chronic diseases were reduced with increased fiber intake and evaluation was made for whole grains.***

# Fiber and Heart Disease

Am J Cardiol 1998 Nov 26;82(10B):83T-87T

**Coronary risk reduction through intensive community-based lifestyle intervention: the Coronary Health Improvement Project (CHIP) experience.**

**Diehl HA**

**Lifestyle Medicine Institute, Loma Linda, California 92354, USA.**

Vigorous cholesterol lowering with diet, drugs, or a combination has been shown to slow, arrest, or even reverse atherosclerosis. Residential lifestyle intervention programs have successfully lowered serum cholesterol levels and other coronary risk factors, but they have the disadvantages of high cost and difficulty with long-term adherence. Community-based risk-reduction programs have the potential to effect change at low cost and improve long-term adherence. To assess the effectiveness of, and to develop a model for, such programs, the community-based Coronary Health Improvement Project (CHIP) was developed in Kalamazoo, Michigan. In the intensive (30-day, 40-hour), hospital-based educational program, participants are encouraged to exercise 30 minutes a day and to embrace a largely unrefined plant-food-centered diet that is high in complex carbohydrates and fiber; very low in fat, animal protein, sugar, and salt; and virtually free of cholesterol. A total of 304 enrollees in the first program were at elevated risk of coronary artery and related diseases: 70% were  $\geq$  10% above their ideal weight, 14% had diabetes, 47% had hypertension, and 32% had a history of coronary artery disease. Of the enrollees, 288 "graduated" from the program (123 men, 165 women; mean age was 55 $\pm$ 11 years). Various markers of disease risk, including serum blood lipids and fasting blood glucose concentrations, were measured before and after the program. At 4 weeks, overall improvements in the participants' laboratory test results, blood pressures, weights, and body mass indexes were highly significant ( $p < 0.001$ ). Triglyceride levels decreased significantly ( $p < 0.05$ ) in participants who had elevated triglyceride levels ( $>200$  mg/dL in men, 200-299 mg/dL in women).

***NOTE: Overall improvement was found in just 4 weeks by improving diet and adding a 30 minute exercise regime. People with high triglycerides had a 50% reduction, participants with elevated glucose levels brought serum glucose into normal ranges and an average of ten pound was lost by participants.***

# Fiber and Heart Disease

**Am J Cardiol 1998 Nov 26;82(10B):18T-21T**

**Diet, lifestyle, and the etiology of coronary artery disease: the Cornell China study.**

**Campbell TC, Parpia B, Chen J**

**Division of Nutritional Sciences, Cornell University, Ithaca, New York 14853, USA.**

Investigators collected and analyzed mortality data for >50 diseases, including 7 different cancers, from 65 counties and 130 villages in rural mainland China. Blood, urine, food samples, and detailed dietary data were collected from 50 adults in each village and analyzed for a variety of nutritional, viral, hormonal, and toxic chemical factors. In rural China, fat intake was less than half that in the United States, and fiber intake was 3 times higher. Animal protein intake was very low, only about 10% of the US intake. Mean serum total cholesterol was 127 mg/dL in rural China versus 203 mg/dL for adults aged 20-74 years in the United States. Coronary artery disease mortality was 16.7-fold greater for US men and 5.6-fold greater for US women than for their Chinese counterparts. The combined coronary artery disease mortality rates for both genders in rural China were inversely associated with the frequency of intake of green vegetables and plasma erythrocyte monounsaturated fatty acids, but positively associated with a combined index of salt intake plus urinary sodium and plasma apolipoprotein B. These apolipoproteins, in turn, are positively associated with animal protein intake and the frequency of meat intake and inversely associated with plant protein, legume, and light-colored vegetable intake. Rates of other diseases were also correlated with dietary factors. There was no evidence of a threshold beyond which further benefits did not accrue with increasing proportions of plant-based foods in the diet.

***NOTE: The Chinese diet which is lower in fat and higher in fiber than the American diet grants them protection from cancer and coronary heart disease. American Men are 16.7 times (Women 5.6 times) more likely than their Chinese counterparts to suffer from coronary heart disease.***

# Fiber and Heart Disease

**Am J Clin Nutr 1998 Aug;68(2):248-57**

**Whole-grain intake may reduce the risk of ischemic heart disease death in postmenopausal women: the Iowa Women's Health Study.**

**Jacobs DR Jr, Meyer KA, Kushi LH, Folsom AR**

**Division of Epidemiology, School of Public Health, University of Minnesota, Minneapolis 55454, USA.**

**Jacobs@epivax.epi.umn.edu**

**BACKGROUND:** A recent review of epidemiologic literature found consistently reduced cancer and heart disease rates in persons with high compared with low whole-grain intakes. **OBJECTIVE:** We hypothesized that whole-grain intake was associated with a reduced risk of ischemic heart disease (IHD) death. **DESIGN:** We studied 34,492 postmenopausal women aged 55-69 y and free of IHD at baseline in 1986. There were 438 IHD deaths between baseline and 1995. Usual dietary intake was determined with use of a 127-item food-frequency questionnaire. **RESULTS:** Whole-grain intake in median servings/d was 0.2, 0.9, 1.2, 1.9, and 3.2 for quintiles of intake. The unadjusted rate of IHD death was 2.0/1 x 10<sup>(3)</sup> person-years in quintile 1 and was 1.7, 1.2, 1.0, and 1.4 IHD deaths/1 x 10<sup>(3)</sup> person-years in succeeding quintiles (P for trend < 0.001). Adjusted for demographic, physiologic, behavioral, and dietary variables, relative hazards were 1.0, 0.96, 0.71, 0.64, and 0.70 in ascending quintiles (P for trend = 0.02). The lower risk with higher whole-grain intake was not explained by intake of fiber or several other constituents of whole grains. **CONCLUSION:** A clear inverse association between whole-grain intake and risk of IHD death existed. A causal association is plausible because whole-grain foods contain many phytochemicals, including fiber and antioxidants, that may reduce chronic disease risk. Whole-grain intake should be studied further for its potential to prevent IHD and cancer.

**NOTE:** *Average was a 36% decreased risk of ischemic heart disease for the nine year study with increased fiber intake and evaluation for whole grains.*

# Fiber and Heart Disease

**J Nutr 1998 Apr;128(4):714-9**

**A prospective study of dietary fiber types and symptomatic diverticular disease in men.**

**Aldoori WH, Giovannucci EL, Rockett HR, Sampson L, Rimm EB, Willett WC**

**Department of Nutrition, Harvard Medical School and Brigham and Women's Hospital, Boston, MA 02115, USA.**

To examine prospectively dietary fiber calculated from food composition values based on analytic techniques and specific dietary fiber types in relation to risk of diverticular disease, we analyzed data from a prospective cohort of 43,881 U.S. male health professionals 40-75 y of age at base line; subjects were free of diagnosed diverticular disease, colon or rectal polyps, ulcerative colitis and cancer. The insoluble component of fiber was inversely associated with risk of diverticular disease relative risk (RR) = 0.63, 95% confidence interval (CI), 0.44-0.91, P for trend = 0.02, and this association was particularly strong for cellulose (RR = 0.52, 95% CI, 0.36-0.75, P for trend = 0.002). The association between diverticular disease and total dietary fiber intake calculated from the AOAC standards method was not appreciably different from results using the Southgate or Englyst method [for AOAC method, RR = 0.60, 95% CI, 0.41-0.87; for Southgate method, RR = 0.61, 95% CI, 0.42-0.88; for Englyst method, RR = 0.60, 95% CI, 0.42-0.87, for the highest quintiles]. Our findings provide evidence for the hypothesis that a diet high in dietary fiber decreases the risk of diverticular disease, and this result was not sensitive to the use of different analytic techniques to define dietary fiber. Our findings suggest that the insoluble component of fiber was significantly associated with a decreased risk of diverticular disease, and this inverse association was particularly strong for cellulose.

***NOTE: Average was a 60% decreased risk of diverticulosis for study with increased dietary fiber intake especially insoluble fiber.***