

## Data to Digest

### Health Benefits of Diets High In Fiber

#### **Breast Cancer**

*Pediatrics Volume 137, Number 3, March 2016*

“The findings in this large prospective study support the hypothesis that consumption of foods high in fiber reduce breast cancer risk. These results also suggest that dietary fiber intake during adolescence and early adulthood may be particularly important. ...A 13% lower breast cancer risk was seen for each 10 grams / day increment of fiber intake.... This association was materially unchanged with adjustment for red meat intake, animal fat, or alternate healthy eating index.” Beta-carotene intake, length of menstrual cycle, and BMI did not influence these results!

#### **Colorectal Cancer and Colonic Polyps**

*Gastroenterology 2014; 146:689 – 699*

“The results of this meta-analysis support the hypothesis that dietary fiber intake is associated inversely with the risk of colorectal adenomas (precancerous colon polyps). Analysis of high versus low intake and dose-response models indicated that colorectal adenoma risk was reduced by 28% and 9% per 10 g per day increase respectively.” Colonic adenomas are pre-cancerous polyps of the colon. Not every adenoma turns to cancer but 98% of colon cancers originate from adenomas. Dietary fiber protects against colorectal neoplasm by fermentation of dietary fiber by the bacteria of the colon producing short chain fatty acids, increased stool bulk which increases stool transit through the colon, dilutes carcinogens in the intestines, and the reduction of secondary bile acid production. Short chain fatty acids increase healthy gut microbiota and induce differentiation, arrest growth, and cause apoptosis in the gastrointestinal tract. These mechanisms are safeguards to prevent tumor development and growth.

#### **Colorectal Cancer**

*British Medical Journal 2011; 343:1 – 20*

“Conclusions: Our results indicate a 10% reduction in risk of colorectal cancer for each 10 g per day intake of total dietary fiber.”

**Colorectal Cancer**

*Journal of the National Cancer Institute 2010; 102:614 – 626*

“For individuals who consumed an average of 24 g per day of fiber which was the highest quintile, the odds of developing colorectal cancer were 30% lower than that for individuals who consumed an average of 10 g per day of fiber (the lowest quintile), ...for individuals who consumed an average of 18 g per day of fiber, the odds of developing colorectal cancer were approximately 20% lower.”

**Hepatic Encephalopathy**

*Aliment Pharmacol Ther .33(6):662–71*

*European Journal of Gastroenterology  
Hepatology 2010 February, 22 (two): 199 – 206*

*Hepatology 2004 May; 39 (five): 1441 – 9*

These three articles report that dietary fiber has a positive effect on intestinal Bifidobacterium. This bacteria plays a protective role by reducing the production of toxins that contribute to hepatic encephalopathy (confusion and mental status changes). Hepatic encephalopathy is one of the most common complications of cirrhosis which affects millions of individuals worldwide.

**Lower Morbidity and Mortality / Lower Risk of Death**

*Archives of Internal Medicine  
2011; 171 (12): 1061 – 1068*

“Dietary fiber intake was associated with a significantly lowered risk of total death in both men and women... Dietary fiber intake also lowers the risk of death from cardiovascular, infectious, and respiratory diseases by 24% to 56% in men and by 34% to 59% in women. This study found a 22% lower risk of total death comparing the highest with the lowest quintile of intake of fiber in both men and women. Inverse association between dietary fiber intake and cancer death was observed in men. Conclusion making fiber rich food choices more often may provide significant health benefits.”

## **Colorectal Cancer and Esophageal Cancer**

*World Cancer Research Fund – American Institute for Cancer Research, Nutrition, Physical Activity, and the Prevention of Cancer A Global Perspective. Washington DC. American Institute for Cancer Research, 2007*

Dietary fiber intake probably lowers the incidence of colorectal and esophageal cancer.

## **Cardiovascular Disease**

*Archives of Internal Medicine 2004; 164:370 – 376*

“The results of the present study suggest that dietary fiber is inversely associated with risk of coronary heart disease in both men and women. The associations were stronger for coronary mortality (27% reduction in risk for each 10 g of fiber per day increment in total dietary fiber than for all cardiac events (14% reduction in risk).”

Protection from coronary heart disease comes from both soluble and insoluble fiber. The relative risk reduction were stronger for soluble fiber in this study. A characteristic of soluble fiber that may explain this finding is the propensity to increase the intraluminal viscosity of the small intestine, thereby slowing the absorption of nutrients and potentially binding bile acids. Such effects have been shown to decrease insulin secretion and improve glucose control, lower serum cholesterol levels, and lower blood pressure.

“Coronary risk was 10% to 30% lower for each 10 g per day increment of total, cereal, or fruit fiber. Therefore, the recommendations to consume a diet that includes an abundance of fiber rich foods to prevent coronary heart disease are based on a wealth of consistent scientific evidence.”

## **Cardiovascular Disease**

*Circulation 1996; 94:2720 – 2727*

“Based on our data, an increase in daily soluble fiber intake by 3 g reduced the risk of coronary death by 27%.”

“Proposed mechanisms: the effect of soluble fiber on serum cholesterol did not explain our results. Other mechanisms have been suggested to explain an inverse association between dietary fiber and coronary heart disease. These involve postprandial insulin response, glucose tolerance factors, and hemostatic factors. Of note, this study focused on middle-age men who are smokers.”

**Cardiovascular Disease**

*Journal of the American Medical Association 1999;  
21:1998 – 2004*

“Our results for women are the same for total fiber increases (a 19% reduction in coronary heart disease per 10 g per day increase in dietary fiber).”

“In conclusion, our results provide evidence that an increase in foods high in dietary fiber,... May be protective against coronary heart disease in women.”

**Colorectal Cancer and Other Cancers**

*J Nutrition 1997; 127:717 – 723*

“The soluble component of fiber is fermented in the colon and at least one of the products (butyrate) has been demonstrated to inhibit cancer cell growth in a range of studies.”

**Cardiovascular Disease**

*American Journal of Epidemiology 1999; 150:1073 – 1080*

“...Increased fiber intake was associated with a significantly protective effect for both incident coronary heart disease and mortality.”

**Cardiovascular Disease / Morbidity & Mortality**

*American Journal of Clinical  
Nutrition 2008; 88:1119 – 1125*

“In conclusion, recent dietary fiber intake was inversely associated with coronary heart disease and all cause mortality risk.”

**Duodenal Ulcers**

*Epidemiology 1997; 145:42 – 50*

“This prospective data suggest that a high intake of dietary fiber reduce the risk of duodenal ulcer,...”

**Diverticulosis**

*Journal of Nutrition 1998; 128:714 – 719*

“Our findings provide evidence for the hypothesis that a diet high in dietary fiber decreases the risk of diverticular disease...”

“Soluble fiber is metabolized by colonic bacteria more than insoluble fiber, and hence has little effect on stool weight. However, it has been suggested that fermentable fiber can increase fecal output by stimulating microbial growth, with the production of short chain fatty acids and other products. Short chain fatty acids are recognized now as an important fuel source for the colon, particularly in the distal, which is the most common site for diverticular disease.”

**Chronic Inflammation**

*Nutrition 2008; 24: 941 – 949*

“In postmenopausal females, diets high in fiber were associated with lower serum markers of chronic inflammation such as IL-6 and TNF- $\alpha$ -R2. These blood tests are markers for inflammation and host response to disease, particularly in predicting diabetes, cardiovascular diseases, and cancer. Findings went further support to the notion that the effects of a high fiber diet on risks of chronic diseases might be mediated through their effects on systemic inflammation.”

**Hypertension**

*Journal of Hypertension 2005; March; 23 (three): 475 – 481*

“Conclusions: Our results indicate that increased intake of dietary fiber may reduce blood pressure in patients with hypertension. An intervention of at least eight weeks may be necessary to achieve the maximum reduction in blood pressure.”

**Hypertension**

*Archives of Internal Medicine 2005 January 24; 165 (two): 150 – 156*

“Fiber supplementation (average dose, 11.5 g per day) reduced systolic and diastolic blood pressure. Reductions in blood pressure tended to be larger in greater than 40 years of age and in older hypertensive populations than in younger and normotensive ones.”

“Conclusions: increasing the intake of fiber in Western populations, where intake is far below recommended levels, may contribute to the prevention of hypertension.”

**Hypertension***Journal of Hypertension 2004 January; 22 (one): 73 – 80*

“Conclusions: Our findings suggest that a diet rich in fiber may have a moderate blood pressure lowering effect...”

**Cardiovascular Disease and Inflammation***American Journal of Cardiology 2003;  
92:1335 – 1339*

“The findings of our study support the concept that fiber may play an important role in mediating the relation between diet, inflammation, and cardiovascular disease.”

**Diabetes, Inflammation and Fatty Liver Disease***Diabetes Care, 32, number 10,  
October 2009: 1823 – 1825*

“Conclusions: In this study of older men, low dietary fiber intake (less than 20 g per day) was associated with significantly increased risk of diabetes. We have observed that a diet high in fiber is associated with reduced inflammation and reduced GGT P (a marker of liver fat deposition) as well as t-PA; all these factors have been shown to be strong predictors of diabetes.... The data suggest that a high-fiber diet (at least 20 g of fiber per day) and in older men may reduce the risk of diabetes...”

**Inflammation***American Journal of Clinical Nutrition 2006; 83:760 – 766*

“Conclusions: Our results suggest that dietary fiber is protective against high CRP, which supports current recommendations for a diet high in fiber...C- reactive protein (CRP) is a marker of inflammation recently recognized as an independent predictor of future coronary heart disease. Furthermore, CRP is associated with the metabolic syndrome and diabetes mellitus.” The mechanisms between dietary fiber and inflammation are unclear. In a recent review article it was suggested that dietary fiber decreases lipid oxidation, which in turn is associated with decreased inflammation. Normal bowel flora also contributes to a healthy intestinal environment, which helps to prevent inflammation”

”Our results support the current dietary guidelines, which recommend that Americans consume 20 – 35 g of fiber per day, including both soluble and insoluble fibers. However, the average American currently consumes one half this amount.”

## **Cardiovascular Disease**

*Archives of Internal Medicine 2003; 163:1897 – 1904*

“... Dietary intake of soluble fiber was significantly associated with coronary heart disease incidence, coronary heart disease related mortality, cardiovascular disease incidence, cardiovascular disease related mortality, and mortality from all causes. Persons consuming more than 4 g of soluble fiber per 1735 kcal had a 15% lower risk of coronary heart disease, a 24% lower mortality from coronary heart disease, a 10% lower risk of cardiovascular disease, a 12% lower mortality from cardiovascular disease, and an 11% lower mortality from all causes compared with those consuming fewer than 1.3 g of soluble fiber per 1735 kcal.”

“Our findings of a 12% lower risk of coronary heart disease and at an 11% lower risk of cardiovascular disease for persons consuming more than 15.9 g of fiber per 1735 kcal per day support the existing American Heart Association recommendations to increase dietary fiber intake from foods to approximately 25 to 30 g per day, aimed at reducing coronary heart disease and cardiovascular disease in the US adult population.”

“Dietary fiber has been shown to delay the absorption of carbohydrates after a meal and thereby decrease the insulinemic response to dietary carbohydrates. Experimental studies have also shown that higher levels of insulin may promote dyslipidemia, hypertension, abnormalities in blood clotting factors, and atherosclerosis. In addition, water-soluble dietary fiber has been shown to decrease total and low-density lipoprotein cholesterol levels while not affecting levels of high-density lipoprotein cholesterol... Moreover, recent studies have suggested inverse associations between dietary fiber and other cardiovascular disease risk factors, such as blood pressure, waist – hip ratio, fasting insulin levels, to our postprandial will cause insulin level, levels of triglycerides, and levels of fibrinogen.”

## **Cardiovascular Disease and High Serum Cholesterol**

*American Journal of Clinical Nutrition 1999; 69:30 – 42*

“Soluble fiber, 2 – 10 g per day, was associated with small but significant decreases in total cholesterol.”

“Introduction: coronary artery disease is the major cause of death in the United States and in most Western countries, and blood cholesterol is a major risk factor. Dietary and pharmacologic reductions in total and LDL cholesterol decrease the risk of coronary events, and dietary intervention is the first line approach. Increasing dietary fiber has been recommended as a safe and practical approach for cholesterol reduction.”

## **Coronary Artery Disease, Cholesterol and Diabetes**

*Journal of the American Medical Association 1996; 275:447 – 451*

“This study found that for every 10 g increase in fiber was associated with a 29% reduction in coronary heart disease.”

“The reduction in serum cholesterol attributable to soluble fiber can range from .5% to 2% per gram of fiber intake. If a 1% decrease in serum cholesterol decreases risk of coronary heart disease by 2%, then there must be other mechanisms in reduction of risk factors for myocardial infarction of fiber than by cholesterol lowering effect alone. Evidence from experimental studies suggest that fiber (mainly soluble) may reduce risk of coronary heart disease through cholesterol reduction from bile acid excretion and decreased hepatic synthesis of cholesterol, slowed absorption of macronutrients leading to increased insulin sensitivity, lowered plasminogen activator inhibitor1 and factor 7 coagulation activity, and increased satiety leading to overall lower energy intake.”

## **Hypertension**

*Archives of Internal Medicine 2005; 165:150 – 156*

“Conclusion: increasing the intake of fiber in Western populations where intake is far below recommended levels, may contribute to the prevention of hypertension.”

“Possible Mechanisms: Dietary fiber reduces the glycemic index of foods, thereby attenuating insulin response. Insulin may play a role in blood pressure regulation, and dietary fiber has been shown to enhance insulin sensitivity and improve vascular endothelial function. Furthermore there is evidence that fiber, especially soluble, improves mineral absorption in the gastrointestinal system, which may have an indirect favorable effect on blood pressure.”

“Data from our meta-analysis provides some support for a larger effect of soluble and insoluble fiber on blood pressure... In the Health Professionals Follow-Up Study of 30,681 US male subjects, dietary fiber was independently associated with a reduced risk of hypertension.”

## **Diabetes**

*Journal of the American Board of Family Medicine 2012  
January – February, 25 (one) 16 – 23*

“Conclusion: Overall, an intervention involving fiber supplementation for type II diabetes mellitus can reduce fasting blood glucose and hemoglobin A1c. This suggests that increasing dietary fiber in the diet of patients with type II diabetes is beneficial and should be encouraged as a disease management strategy.”

## **Morbidity and Mortality Reduction**

*Archives of Internal Medicine 2011  
January 27, 171 (12): 1061 – 1068*

“Conclusions: Dietary fiber may reduce the risk of death from cardiovascular, infectious, and respiratory diseases. Making fiber rich food choices more often may provide significant health benefits.”

## **Inulin as a Source of Dietary Fiber**

*Nutritional Review 2011 January, 69 (1): 9– 21*

“Conclusions: Inulin a polydextrose shows many of the same functionalities of grain fiber in the large intestine, and that they are fermentable, bifideogenic, and laxative.”

## **Colorectal Cancer**

*Journal of the National Cancer Institute 2011  
October 5; 103 (19): 1484*

“Results: Indicates absolute fiber and of fiber intake density, ascertained by food diaries, were statistically significantly inversely associated with the risks of colorectal and: cancers in both age-adjusted models and multivariable models that adjusted for age; anthropomorphic and socioeconomic factors...”

## **Role of Fiber as a Prebiotic and Enhancing the Effects of Probiotics and Wellness, Overall Health and Stronger Immune System**

*J. Physiol Pharmacol. 2009; Dec; 60 Suppl 6:5–11*

“Abstract: Favoring the development of a simple flora, dominated by bifidobacteria to which various health benefits have been prescribed. Currently, high colonic bifidobacteria levels has been considered favorably at all ages and strategies to augment their presence had been demonstrated in placebo-controlled intervention studies, e.g. in toddlers to reduce sickness events, and adults to reduce the risk for developing gastrointestinal disease and in the elderly to re-enhance their declining immune activity... This paper provides an up-to-date review of the health benefits associated to the induction of high bifidobacteria levels in the colon by the use of prebiotics (inulin).

## **Preeclampsia and Pregnancy Related Complications**

*American Journal of  
Hypertension 2008 August; 21 (8): 903 – 909*

“Conclusions: These findings of reduced preeclampsia risk with higher total fiber intake corroborate an earlier report; and expand the literature by providing evidence, which suggests that dietary fiber may attenuate pregnancy associated dyslipidemia, an important clinical characteristic of preeclampsia.”

## **Guar Gum and Reduction in Cholesterol**

*Nutrition of Reviews  
Volume 67 (4) 188 – 205*

“Summary: Guar gum ingestion – intakes ranging from 9 to 30 g per day, divided into at least three servings per day were associated with a weighted mean reduction of 10.6% for LDL cholesterol values.”

“... These data do indicate that regular use of a soluble fiber can sustain significant hypercholesterolemic affects for long-term periods.”

*Prepared and collated for your information  
Courtesy of Dr. Raymond Mis, Board Certified Gastroenterologist*