Bean Briefs
Research | Update | Analysis

Winter 2010

This issue of BeanBriefs *is a publication of the US Dry Bean Council's Health and Promotion Committee*

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In addition to summarizing articles from scientific peer-reviewed journals, **Bean Briefs** *highlights news and emerging research about beans and health.*

Focus on Cancer

Legume and isoflavone intake and prostate cancer risk: The Multiethnic Cohort Study

Park SY, Murphy SP, Wilkens LR, et al
International Journal of Cancer 2008; 123(4):927-32.

Although soy has garnered much attention for possible protection against breast and prostate cancers, little research has been done on legumes in general, which include beans, peas, lentils and peanuts. This study compared the influence of legumes versus soy in particular on the risk of developing prostate cancer. In the multiethnic cohort study of more than 82,000 men, a protective effect was seen for those who ate the most legumes compared to those who ate the fewest. Specifically, there was an 11% reduced risk for all prostate cancers and a 26% reduction for non-localized, highly problematic prostate cancers.

Although previous research has suggested that the isoflavones in soy are particularly protective against hormone-related cancers, this study found no association with isoflavones, instead attributing the protective effect seen against prostate cancer to something else in legumes in general. Although there was no statistical difference in the results among ethnicities, the positive effect of total legumes was most pronounced in Latinos, whose legume intake was the highest and whose soy intake was the lowest.

TAKE-HOME BEAN MESSAGE:
This study found evidence that an anti-cancer effect is more likely due to a high intake of total legumes, including all beans, not just soybeans, although soy may exert additional beneficial effect on hormone-sensitive cancers. This means there is much more potential for promoting all beans as possible protectors against prostate cancer (and perhaps breast cancer as well).

Legume intake and the risk of cancer: a multisite case-control study in Uruguay

Aune D, De Stefani E, Ronco A, et al
Cancer Causes & Control 2009; [Epub Aug 4, ahead of print]

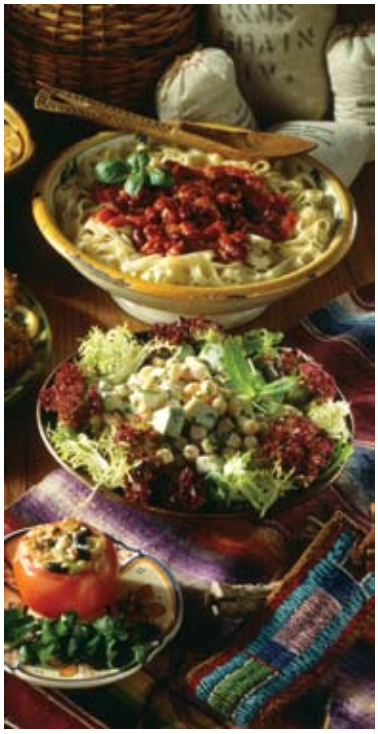
Legumes would seem to be an ideal cancer-fighting food. They are rich in fiber, (particularly soluble fiber) and nutrients like folic acid, and they contain potentially cancer-protective substances like isoflavones and lignans. But research to show that legumes offer protection against cancer has not found consistent results. Some of this has been because research on soy is often mixed in with research on beans and peas. However, studies do suggest an anti-cancer effect from eating legumes in general. Recently, Norwegian, Uruguayan and French researchers set out to see if they could confirm the previously inconsistent anti-cancer findings.

The study results were mixed, depending on the cancer site. The eight-year, multisite, case-control study, conducted in Uruguay, found that eating more legumes (55% as lentils, 45% as beans) afforded participants about a 50% reduced risk of developing cancer of the oral cavity, digestive tract or kidney. But the researchers found no evidence to link total legumes to protection against cancers of the bladder, breast, lung or prostate. Beans themselves, however, were most protective against stomach and bladder cancers.

The researchers propose several possible mechanisms for how legumes might be cancer-protective, including that additional fiber speeds up stool transit time, that an increase in the production of butyrate results in a more acidic intestinal environment, that extra folate alters DNA favorably, and perhaps that eating beans often means eating less meat.

TAKE-HOME BEAN MESSAGE:
The implications of this research are heavily weighted towards beans and lentils, as these are the primary legumes in the Uruguayan diet. The conclusions suggest, therefore, that beans could be an important addition to the diet to help prevent particularly prevalent cancers (such as cancer of the colon) as well as especially troublesome cancers (such as esophageal and those of other oral cavity sites).

The Nuts and Bolts (and Beans) of Food Recommendations for Diabetes



More than for most chronic diseases, food and diet play key roles in both treating diabetes and preventing it from developing in people who are at risk. In this disease, the body cannot handle blood glucose (blood sugar) normally, causing levels to be too high first thing in the morning and after eating a meal. Moreover, elevated blood glucose has been linked to other chronic conditions like heart disease, high blood pressure and circulation problems. That's why the recommended diet for diabetes includes strategies for controlling not only blood glucose, but also blood cholesterol and blood pressure.

Keys to Eating Healthfully for People with Diabetes

- **Coordinate insulin or oral medication doses with carbohydrate consumption.**
- **Maintain consistency in carbohydrate intake throughout each day.**
- **Increase fiber intake to slow down the digestion of carbohydrates.**
- **Eat more fruits, vegetables, whole grains, legumes, low-fat dairy products, lean meats and healthful oils like olive or canola.**

The body normally absorbs carbohydrates from foods and quickly converts them into blood glucose. Insulin from the pancreas helps move this glucose from the blood into cells throughout the body. However, people with diabetes aren't able to do this well without taking insulin or other medications. For this reason, the diet for controlling diabetes regulates the amount of carbohydrates at each meal so that blood glucose levels remain relatively constant, without dangerous highs or lows.

The American Diabetes Association recommends that most people with diabetes limit carbohydrates to about 45 to 60 grams per meal, using one of several methods for keeping track of carb grams. Beans are classified slightly differently in each method.

- **The Diabetes Food Pyramid** resembles the government's Food Guide Pyramid (www.mypyramid.org), except that it groups foods based on carb content. For example, grains, beans and starchy vegetables are part of the same food group, with 1/2 cup of each providing about 15 grams of carbohydrates. Beans differ nutritionally from grains and starchy vegetables in that they supply more fiber, protein and important minerals
- **Carbohydrate Counting** involves adding up the total carbs in each meal so that they are balanced throughout the day.
- **The Plate Method** involves mentally dividing a dinner plate into three sections—half a plate plus two quarter-plate sections. The largest section should be filled with non-starchy vegetables; one of the quarter-sections is reserved for starchy foods, such as beans, breads, cereals and starchy vegetables like corn and potatoes; the other quarter consists of protein foods like meats, poultry, fish, low-fat cheese or plant-based protein sources like beans and soy-based products. Beans appear in two different categories; their carbohydrate content is similar to that of high starch foods, but they also are good sources of protein (and other key nutrients).

- **Exchange Lists for Diabetes** groups foods based on carbohydrate, fat, protein and nutrient content. For example, beans, soy-based foods, nut spreads and tofu are all in the "Plant-Based Proteins" group.

Each of these meal-planning systems includes fruits, vegetables, whole grains, legumes (including beans) and low-fat dairy products, all hallmarks of a healthy diet. Each system encourages meatless main dishes made with plant-based proteins. Beans are a particularly healthful carb for those with diabetes. They are especially good for blood sugar control because they are high in fiber, slowing digestion so blood glucose levels do not spike. And because people with diabetes often suffer from heart disease, it helps that beans offer the bonus of being a low-fat, heart-healthy source of protein.

Legume and soy food intake and the incidence of type 2 diabetes in the Shanghai Women's Health Study

Villages R, Gao YT, Yang G, et al
American Journal of Clinical Nutrition 2008; 87(1):162-7.

Research indirectly supports a protective link for legumes—beans, peas, lentils and peanuts—against type 2 diabetes. Much of the research suggesting a link includes legumes as a component of plant-based prudent diets. But direct evidence for legumes has been limited and what does exist is contradictory. The Shanghai Women's Health Study (SWHS) supports the notion that legumes are protective. This was a prospective population study of 64,227 middle-aged Chinese women (ages 40 to 70) with no diabetes, cancer or cardiovascular disease, who were followed for an average of 4.6 years. Their diet was assessed by a food-frequency questionnaire at the start of the study and two to three years later. Researchers also estimated body composition and previous physical activity. The women's diets were analyzed for intake of peanuts, soybeans and "other legumes" (beans, peas and lentils), as well as total legume intake.

Overall, both pre- and postmenopausal women with the highest intake of total legumes were 38% less likely to develop type 2 diabetes during the study than those who ate the least. When the data was evaluated by type of legume, soy clearly was the most protective, with 47% less risk for those eating the most soy compared to those eating the least. The "other legumes" category was associated with 24% less risk, while peanuts provided 20% less. A drawback of the study was the self-reporting of a diabetes diagnosis for many participants, but for those who also had objective confirmation of blood glucose levels, legumes still proved protective. And while this study only included Chinese women, similar results were found in the Seven Countries study, lending validity to extending these findings to other populations.

TAKE-HOME BEAN MESSAGE: This study found protection against type 2 diabetes for participants who ate the most legumes, like beans. Soy demonstrated an advantage, but other beans, as well as peas, lentils and peanuts, were also protective. The authors suggest several possible mechanisms of action for the effects of legumes, such as by increasing fiber in the diet, by lowering the glycemic index of the diet and by boosting polyphenol—and thus antioxidant—content of the diet. It seems prudent, therefore, to advocate eating more legumes of all kinds, with an emphasis on a wide variety of beans.

Whole grain and legume acceptability among youths with type 1 diabetes

Gellar L, Rovner AJ, Nansel TR
The Diabetes Educator 2009; 35(3):422-7. [Epub March 16]

Few studies have looked at legume intake and acceptance in young people, assuming perhaps that they are not bean eaters. At the same time, there is a new understanding that people with diabetes vary tremendously in how they respond to different types of carbohydrates in the diet. This study, from the University of Massachusetts, in coordination with the National Institutes of Health, evaluated how well 128 youth campers, 7 to 17 years old, all with type 1 diabetes, accepted different types of legumes they were served. The upshot? The campers seemed perfectly willing to eat beans when served them, with a 79% acceptability rating. Not surprisingly, however, familiar chili and baked beans were camper favorites. The participants were willing to try other less-familiar foods, but once away from a confined camp environment, competition for the youths' taste buds from refined carbs might prove to be a tougher test.

TAKE-HOME BEAN MESSAGE:
These researchers learned that it's wise not to make assumptions about what kids will eat. Just serve a particular food a number of times and they'll eventually try it. However, certain bean dishes—chili, baked beans and seven-layer dip, for example—are perennial favorites, as this study bore out. So stick with what's familiar, but test the boundaries by mixing in some new bean dishes once in a while too.

Siren Call of the Mediterranean

The allure of the Mediterranean goes well beyond its sandy beaches and hospitable climate. Health experts have long observed that the region's residents enjoy good health and long life. In the 1950s, Ansel Keys, Ph.D., and his colleagues conducted the famous Seven Countries Study to look at the relationship between diet and health around the world. The study followed heart attack and stroke rates in seven countries with different diets: the United States, Japan, Italy, Greece, the Netherlands, Finland and Yugoslavia. The research team found that the native diet of southern Italy and Greece, both in the Mediterranean region, was connected with better health. Over the past several decades, researchers have continued to study the health benefits of the so-called "Mediterranean Diet," which include longer life and less risk of heart disease, diabetes, cancer and other chronic diseases.

Eating the Traditional Mediterranean Way

A traditional Mediterranean diet is moderate in fat, low in saturated fat and cholesterol, and high in fiber. It includes the following:

- **Abundant fruits, vegetables and beans**
- **Abundant whole-grain foods**
- **Olive oil**
- **Lean meats, poultry and fish**
- **Nuts and seeds**
- **Cheese and yogurt**
- **Fresh herbs and spices**
- **Moderate amounts of red wine**

Current studies typically assess how closely a person is following the traditional Mediterranean way of eating by using a simple index developed by Antonia Trichopoulou, M.D., Ph.D., and her colleagues at the University of Athens (Greece) Medical School. To determine a score using the Mediterranean Diet Index, study researchers tally one point for each of certain foods—legumes, fruits and nuts, vegetables, grains and fish—that a participant eats in an amount over the study group's median; they add another point if the participant has a higher ratio of monounsaturated fat (such as that found in olive oil and nuts) to saturated fat (like that found in meats and dairy); they add another point if the participant is below the group's median for intake of meats and full-fat dairy products (because of their saturated fat content); and they add one last point if the participant consumes alcohol, up to about one ounce a day for women, two ounces for men.

Mediterranean Diet Index scores range from 0 (little adherence to principles of a traditional Mediterranean way of eating) to 9 (strong adherence to the Mediterranean diet).

Anatomy of health effects of Mediterranean diet: Greek EPIC prospective cohort study

Trichopoulou A, Bamia C, Trichopoulos D
British Medical Journal 2009; Jun 23;338:b2337.

Numerous studies show a link between eating a traditional Mediterranean diet and good health, but few have looked at the connection between individual components of the diet and death rates. In this prospective cohort study—dubbed EPIC—more than 23,000 healthy Greek participants in 10 European countries were followed for more than eight years with periodic diet and lifestyle questionnaires. Each participant's diet was scored using the Mediterranean Diet Index (see above). Researchers found that those who had the highest scores were less likely to die from any cause during more than eight years of follow-up. Legumes, including beans, were considered one of the "dominant" components of the diet that predicted a lower mortality, contributing about 10% of the reduced risk.

TAKE-HOME BEAN MESSAGE:
In this large multi-country study, beans were among the foods most closely tied to fewer deaths, and the scientific evidence for health benefits continues to be strong for an overall Mediterranean way of eating. Experts suggest that beans and other legumes—and the nutrients and compounds in them—may work synergistically with other dietary components to promote health and longevity, accounting for an even greater benefit from the entire diet as a whole when beans are added as a regular component

Mediterranean diet and mild cognitive impairment

Scarmeas N, Stern Y, Mayeux R, et al
Archives of Neurology 2009; 66(2):216-25.

Mild cognitive impairment (MCI) is a relatively new diagnosis that describes people whose mental function has begun to decline, but has not yet reached dementia or Alzheimer's disease. In this study, among the first to look at associations between the Mediterranean diet and MCI, 1,400 participants underwent periodic neurological exams to assess their mental function for more than four years. Their diet was evaluated approximately every 18 months. Those who adhered most closely to a Mediterranean way of eating were 28% less likely to develop MCI. And those who adhered closely to those diet principles yet developed MCI anyway, were still 48% less likely to have it progress to Alzheimer's disease.

TAKE-HOME BEAN MESSAGE:
Risk factors that affect the health of blood vessels—namely, high blood pressure, high total and low-density lipoprotein (LDL) cholesterol levels, and high blood glucose and insulin levels—appear to be linked to MCI and Alzheimer's disease by hindering circulation to the brain. Improvement in these risk factors, as is seen in people who eat a traditional Mediterranean diet, which includes legumes like beans, may partially explain the beneficial effect on both mild and severe cognitive impairment.

Adherence to the Mediterranean diet and risk of metabolic syndrome and its components

Babio N, Bulló M, Basora J, et al
Nutrition, Metabolism and Cardiovascular Diseases 2009: 19(8):563-70. [Epub January 26]

Metabolic syndrome is characterized by a combination of risk factors that include abdominal obesity, high blood glucose, high triglycerides, high blood pressure and low levels of high-density lipoprotein (HDL) cholesterol. In order to evaluate the relationship between the Mediterranean diet and metabolic syndrome, a group of Spanish researchers studied about 800 older adults, all of whom were at high risk for developing cardiovascular disease. The results? The participants, particularly men, who followed the Mediterranean diet most closely were the least likely to be diagnosed with metabolic syndrome. The researchers singled out legumes as one of three Mediterranean diet components that most contributed to the lower prevalence of the syndrome.

TAKE-HOME BEAN MESSAGE:
Bean consumption has been consistently associated with healthier blood cholesterol and blood glucose levels, as well as a reduced risk of heart disease and diabetes. Eating legumes like beans not only boosts intake of beneficial nutrients like fiber, folate and magnesium, but also typically takes the place of eating other high-protein foods—such as meats—that are higher in fat and therefore less healthful. So, in effect, it's a two-pronged benefit for beans.

Chickpeas may influence fatty acid and fiber intake in an *ad libitum* diet, leading to small improvements in serum lipid profile and glycemic control

Pittaway JK, Robertson IK, Ball MJ
Journal of the American Dietetic Association 2008; 108(6):1009-1013.

Like other dried beans, chickpeas (garbanzo beans) provide potential health benefits from a wide array of nutrients, including polyunsaturated fatty acids (PUFAs), resistant starch, fiber and vitamins and minerals. This study examined the effects of adding chickpeas to the diet on nutrient intake, body weight and serum lipid and insulin levels.

The 45 study participants, all with mildly elevated cholesterol levels, ate a diet of their choosing for four weeks, followed by 12 weeks of the same "ad lib" diet, but supplemented with a minimum of four 10.5-oz cans of chickpeas per week, followed by four weeks of an ad lib diet without chickpeas at the end of the study. They weighed and recorded their food intake during the last week of each of the three phases and also at the mid-point of the chickpea phase. Researchers measured fasting blood levels of total cholesterol, lipoproteins, glucose and insulin in the last week of each phase.

During the chickpea phase, the participants ate, on average, 4.2 ounces of chickpeas daily, which resulted in their diets containing more fiber, with a higher percentage of calories from protein and a lower percentage of calories from saturated fat. During this phase, total cholesterol levels dropped an average of 7.7 mg/dL, while low-density lipoprotein (LDL) cholesterol dropped 7.3 mg/dL. Study participants also lost an average of one pound.

TAKE-HOME BEAN MESSAGE:
Chickpeas are an excellent source of soluble fiber, the type of fiber that helps lower blood cholesterol levels. Soluble fiber forms a gel-like substance in the small intestine, which traps bile, preventing it from being reabsorbed and used by the body to make cholesterol. Because participants ate their usual diet over the course of the study, researchers were unable to determine whether or not the improved laboratory values resulted from the chickpeas or other foods that the participants added or eliminated during the chickpea phase. But given their known benefits, it's likely that chickpeas can be at least partially credited.

Sodium reduction in canned bean varieties by draining and rinsing

Jones JB, Mount JR
Poster presentation, Institute of Food Technology Annual Meeting, 2009.

Lower sodium diets often limit regular canned beans because of their sodium content. To determine the validity of two methods of reducing the sodium in canned beans (draining and rinsing or simply draining), the researchers tested five common varieties: red kidney, garbanzo, pinto, great northern and black. Simply draining the beans reduced the sodium level by more than one-third, from an average of about 500 milligrams per serving to about 320 per serving. Draining *and* rinsing the canned beans cut the sodium to about 300 milligrams, almost the same as from draining alone. The researchers conclude that both methods are appropriate for lowering sodium.

TAKE-HOME BEAN MESSAGE:
Draining canned beans offers an easy method for reducing sodium while encouraging intake of a convenient form of this tasty, nutritious and economical food. The current Dietary Guidelines for Americans recommends limiting sodium to 2,400 milligrams a day (1,500 milligrams for people with heart disease or high blood pressure). These limits are likely to be lowered even more in the 2010 Dietary Guidelines, making simple methods for reducing sodium, including draining beans, even more valuable as a take-home tip for consumers.

Cereal grains, legumes, and weight management: a comprehensive review of the scientific evidence

Williams PG, Grafenauer SJ, O'Shea JE
Nutrition Reviews 2008; 66(4):171-82.

Legumes are often touted for their ability to keep you full longer, to keep blood sugar levels on an even keel, and their high-protein content, making them a perfect substitute for high-fat sources of protein. All three benefits form the basis of claims that beans can help weight-loss efforts. But does the evidence bear this out? This broad overview from Australia looks at whether research supports the notion that legumes and whole grains can influence weight control, while also evaluating whether refined grains encourage weight gain.

How the body digests different types of carbohydrates also affects the development and course of certain chronic diseases, especially if those carbs influence body weight. That's because the likelihood for both diabetes and metabolic syndrome is increased when someone at risk for those diseases gains weight. The authors suggest that eating beans is still beneficial even without solid evidence that they aid weight control, because there is strong support from population studies for the general nutrition benefits of legumes like beans.

The study results support the following conclusions on beans:

There is good evidence that

- **A diet that includes a lot of beans can limit weight gain.**
- **Weight loss is possible on a calorie-controlled diet rich in beans.**
- **A diet rich in beans is associated with lower body mass index, waist circumference and risk of being oveweight.**

The authors reviewed 556 research papers for inclusion in this study, eventually finding just 53 that were relevant and with a high enough quality rating based on methodology. After an exhaustive discussion of the studies' merits and shortfalls, the authors conclude that there is evidence that legumes, including beans, and whole grains are protective against heart disease and diabetes. As for weight control, there is less solid evidence (see box). The review paper notes that obesity is a multifactorial disease, but that efforts to replace refined grains with more healthful carbs, like those in beans and other legumes as well as in whole grains, is a positive overall health benefit that would likely help maintain weight at the very least.

TAKE-HOME BEAN MESSAGE:
There is ample evidence from population and intervention studies that not only do beans contribute to a healthful diet, but they can be a successful part of weight-loss efforts. Moreover, the authors debunk the notion that carbs are fattening, noting a lack of scientific backing. Research is still needed in long-term studies of bean-rich diets to show they can not only limit weight gain, but also aid weight-loss.

Take Advantage of USDBC Grant Program Supporting Nutrition and Health Research on Beans

Recognizing the limited funding opportunities for many university scientists, the U.S. Dry Bean Council initiated a modest grant program to support nutrition and health research on beans. The program began with the selection of this year's recipients and recently closed its application period for grants in 2010.

This USDBC funding initiative encourages new and continuing research on dry beans, including common beans, black-eyed peas, lima beans and chickpeas. Research can be in one of the following areas:

- Relationship between bean consumption and improved health or nutrition outcomes.
- Roles of beans and their components in reducing the risk of chronic diseases.
- Effects of bean consumption on cognition, athletic endurance or work performance.
- Factors that influence consumer attitudes and dietary behaviors in relation to beans.
- Strategies for increasing bean consumption as a part of health and nutrition programs.

The grant program benefits researchers on several levels. Scientists are invited to use USDBC grant monies to test innovative hypotheses on the relationship between beans, nutrition and health. Results of preliminary experiments that have been supported by a USDBC grant might subsequently attract additional funding from public or private sources. The grants help create opportunities for U.S. university scientists with common interests in health, dietetics and consumer behavior in relation to beans and to network with each other, as well as to interact with and advise the USDBC Health and Promotions Committee.

Four researchers received grants of $10,000 each in 2009.

The United States Dry Bean Council (USDBC) is a private trade association in the United states that represents growers and shippers of U.S. edible dry beans. The USDBC promotes the use, consumption, and marketing of edible dry beans worldwide.

2009 Grant Recipients

- Megan McCrory, Ph.D., Assistant Professor, Foods and Nutrition, Purdue University; "Effect of Legume Consumption Pattern on Postprandial Appetite."
- Donna Winham, DrPH, CHES, Assistant Professor, Department of Nutrition, Arizona State University; "Effects of Pinto, Black and Dark Red Kidney Bean Consumption on Postprandial Glucose and Insulin in Adults with Type 2 Diabetes."
- Wendy Dahl, Ph.D., R.D., F.D.C., Assistant Professor, Food Science and Human Nutrition, University of Florida; "Knowledge, Skills, Attitudes of Women Infant Children (WIC) Recipients toward Dry Beans."
- Andrea Hutchins, Ph.D., Assistant Professor, Health Sciences, University of Colorado, Colorado Springs; "Do Pinto Beans Improve Glycemic Control in Adults with Type 2 Diabetes?"

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