



Reduced energy intake and weight loss on a legume-enriched diet lead to improvements in biomarkers related to chronic disease

Hartman TJ, Zhang Z, Albert PS, et al
Topics in Clinical Nutrition
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In addition to summarizing articles from scientific peer-reviewed journals, Bean Briefs highlights news and research about beans and health.

The Legume Inflammation Feeding Experiment (LIFE) was designed to evaluate the effects of a high-legume, high-fiber, low-glycemic index diet on biomarkers of insulin resistance and inflammation. The LIFE research team also postulated that this diet might promote weight loss by positively affecting levels of hormones associated with satiety and by adding bulk and viscosity, which delay gastric emptying and promote feelings of fullness.

A subset of 44 out of 64 LIFE study participants took part in this optional four-week, weight-loss phase that began at the conclusion of the LIFE study. All participants were healthy, non-smoking, middle-aged men with an average body mass index (BMI) of 29 at the start of the trial. The men were instructed to continue eating 250 grams of legumes (1½ cups) each day, as they had during the LIFE study, but to also cut out 500 to 1,000 calories daily. Strategies included reducing their intake of high-calorie-dense foods such as spreads, dressings, and desserts and eating non-legume foods only until satisfied. By the end of the four-week weight-loss trial, participants ate 800 fewer calories per day on average and lost an average of 4 kilograms. Their biomarkers of insulin resistance, including fasting glucose and C-peptide, and other chronic diseases, including fasting triglycerides and leptin, all improved.



TAKE-HOME BEAN MESSAGE:

Beans are rich in dietary fiber, a nutrient that may aid weight-loss efforts through its effects on metabolic hormones, satiety, and fermentation of food in the colon. The soluble fiber content of beans has been shown to slow gastric emptying and affect the release of gut hormones such as cholecystokinin (CCK), which may enhance feelings of fullness. Regardless of whether these weight-loss benefits can be attributed to fiber, something else in beans, or both, it may be wise to include a generous serving of beans in every weight-reduction meal plan.



Dietary patterns and colorectal cancer: a case-control study from Portugal

Magalhaes B, Bastos J, Lunet N
European Journal of Cancer Prevention 2011; 20(5):389-395.

Much of nutrition research now focuses on how diseases are affected by patterns of eating, as opposed to studying individual foods or nutrients as in the past. Such results are more translatable into useable information for the public. With that in mind, researchers are testing traditional versus Western ways of eating to see if what is known about certain foods' propensity to raise or lower the risk of various diseases holds true when they are eaten as part of typical meal patterns.

In this study, Portuguese researchers compared three dietary patterns against the risk of colon and rectal cancers. Participants included 151 patients with rectal cancer and 102 with colon cancer. Based on answers to a food frequency questionnaire, they were divided into one of three eating patterns: (1) "healthy"—high consumption of dairy, seafood, whole grains, fruits, vegetables, and legumes, with a low intake of wine; (2) "normal"—the opposite of the "healthy" pattern: low consumption of dairy, seafood, fruits, vegetables, and legumes; and (3) "Western"—high consumption of red and processed meats, refined cereals, sweets, potatoes, alcohol, with a low intake of whole grains, and vegetable soup.

The eating pattern with the lowest risk of colon cancer was the first ("healthy") pattern. The second ("normal") eating pattern was associated with 2.7 greater risk of colorectal cancer overall, with double the risk for colon cancer and more than triple the risk for rectal cancer. Eating the third ("Western") pattern more than doubled the risk of colon cancer, but did not statistically increase the risk of rectal cancer.



TAKE-HOME BEAN MESSAGE:

Instead of promoting specific nutrients, it may be more effective to promote real-life eating patterns that favor health, such as those that embrace legumes along with dairy foods, seafood, whole grains, fruits, and vegetables. This was the pattern favored in this study and the kind of "healthy" diet most nutritionists recommend.

A vegetarian dietary pattern as a nutrient-dense approach to weight management: an analysis of the National Health and Nutrition Examination Survey 1999-2004

Farmer B, Larson BT, Fulgoni VL, et al
Journal of the American Dietetic Association 2011; 111(6):819-27.

Vegetarians, on average, have a lower BMI than nonvegetarians. Yet vegetarian diets often suffer from the critique that they are low in certain nutrients, making the choice of following them for weight loss a questionable one. This analysis of NHANES government data compared the dietary recall of men and women whose foods for that day happened to meet the criteria for a lacto-ovo vegetarian diet (851 adults) versus those who ate meat, poultry, or fish that day (12,441 others). In addition, based on total caloric intakes on the survey day, the researchers separately compared dieting participants to each other as well as non-dieters to each other.

The researchers found that, contrary to common perception and despite eating fewer calories, the average intakes of the "vegetarians" were higher for all nutrients studied than they were for the nonvegetarians. For both groups, however, the average intakes of vitamins A and E and magnesium were suboptimal. Still, calorie for calorie, the vegetarians had higher intakes than nonvegetarians for vitamins A, C, and E, as well as fiber, thiamin, riboflavin, folate, calcium, magnesium, iron, and potassium. Moreover, total fat, saturated fat, and cholesterol intakes were lower for vegetarians. The only area for improvement for vegetarians appeared to be in zinc and protein intake, despite higher legume and nut intakes in vegetarians compared to nonvegetarians.



TAKE-HOME BEAN MESSAGE:

This study finds vegetarian diets are more nutrient dense than nonvegetarian diets and are consistent with current dietary guidelines. Moreover, they are adequate even for weight management. A preferred recommendation for weight loss could well be a vegetarian diet instead of simply cutting calories, borne out by the lower BMIs of vegetarians compared to nonvegetarians. The researchers do suggest that vegetarians increase their protein and zinc intakes by eating an additional one to two cups of beans daily.

Beans and rice meals reduce postprandial glycemic response in adults with type 2 diabetes: a cross-over study

Thompson SV, Winham DM, Hutchins AM, et al
Nutrition Journal 2012; 11(1):23.

The glycemic index of foods has received significant attention in recent years, because the incidence of diabetes is on the rise. Foods that have a high glycemic index raise blood glucose levels and may make control of diabetes harder. But now, instead of focusing on individual foods, researchers are turning their attention to patterns of eating, such as beans and rice eaten together—a common pairing in several ethnic cultures—because foods are rarely eaten in isolation.

In this clinical study, 17 middle-aged adults with well-controlled type 2 diabetes (none on insulin) were randomly fed four “meals,” each a week apart. Three of the meals were various beans and rice combinations; the fourth was just long-grain white rice. Each time, the researchers measured participants’ blood glucose levels six times during the three hours after the meal. They compared the rice-and-bean results to the control meal of just white rice, which when eaten by itself is known to have an undesirably high glycemic index, compared to the low index of beans eaten solo.

All three of the combinations (white rice with black, kidney, or pinto beans) resulted in lower blood glucose levels than the “meal” of white rice alone, though black and pinto beans lowered blood glucose the most, possibly because red kidney beans may contain less soluble fiber and resistant starch.

Besides having a favorable glycemic index, beans are high in fiber, protein, folate, iron, magnesium, zinc, omega-3 fatty acids, and antioxidants. In addition, by inhibiting alpha-amylase, beans may function similarly to the oral diabetes medication acarbose. Moreover, diets rich in beans help combat overweight and heart disease, perennial problems that accompany diabetes.



TAKE-HOME BEAN MESSAGE:

For many cultures, beans are a familiar food that can make it easier to follow the dietary changes that are the first defense against type 2 diabetes. Yet surveys show that while beans are often recommended as a heart-healthy food, they may be avoided in diabetic diets, perhaps because of their carbohydrate content. However, by substituting them for rice or other high-carb foods, they can be worked into meal plans. And, as this study shows, eating beans with rice lowers the glycemic index of rice.



A higher ratio of beans to white rice is associated with lower cardiometabolic risk factors in Costa Rican adults

Mattei J, Hu FB, Campos H, et al
American Journal of Clinical Nutrition 2011; 94(3):869-76.

Traditional Latin American cuisine features white rice and beans. However, bean consumption has declined in recent years, leaving rice as a major source of calories. At the same time, diabetes has increased worldwide as well as in this population. White rice has been identified as a potential risk factor for diabetes and metabolic syndrome because of its high glycemic index. However, the combination of rice and beans eaten together has not been sufficiently studied until now. This research looked at the intakes of 1,879 adults with no history of diabetes or heart disease, culled from a 10-year population study of Costa Ricans. Despite no previous diagnosis, 30% of them met the criteria for metabolic syndrome.

Nearly two-thirds of the participants reported eating more than a serving of white rice a day, while only slightly more than one-third of them reported more than a serving of beans a day, typically as black beans. After controlling for confounding factors, those eating the most rice had the worst laboratory values—higher fasting glucose and triglyceride levels with lower HDL cholesterol levels—plus higher systolic blood pressure. In contrast, those eating the most beans tended to have lower

waist circumference and triglyceride levels plus lower diastolic blood pressure and higher HDL levels.

Most revealing, simply substituting one serving of beans for one serving of rice lowered the risk of metabolic syndrome by 35%. Limiting white rice to one serving a day or fewer improved cardiometabolic health, while the ideal intake of beans was calculated to be twice that of rice. The protective effects of beans have been attributed to a combination of their high-fiber and alpha-linolenic content with little saturated fat. Other studies have shown that substituting brown rice or barley for white rice is beneficial, but this is the first to suggest improved health by simply increasing the bean-to-rice ratio.



TAKE-HOME BEAN MESSAGE:

Eating more beans and less white rice is an inexpensive and culturally appropriate option to help reduce the rising risk of metabolic syndrome in Latin American countries. This simple substitution of one culturally familiar food for another has a better chance of success than an approach that seeks to introduce new foods.

Legume consumption is inversely associated with serum concentrations of adhesion molecules and inflammatory biomarkers among Iranian women

Esmailzadeh A, Azadbakht L
Journal of Nutrition 2012;
142(2):334-39.

Inflammation and endothelial dysfunction are associated with an increased incidence of heart disease, insulin resistance, type 2 diabetes, and other chronic diseases. Researchers monitor such changes by measuring blood concentrations of inflammatory biomarkers and soluble adhesion molecules, both of which may be influenced by diet. While past research has examined relationships between these measures and certain dietary factors, until now studies have not evaluated the specific effects of legumes, a food that's prominent in the traditional Iranian diet.

This study evaluated 486 female Iranian teachers with an average age of 49 and a mean BMI of 27.5. Participants completed a food-frequency questionnaire and were stratified by their consumption of various legumes, including lentils, peas, chickpeas, and different kinds of beans in the Iranian diet, including broad beans and chickling vetch. The researchers also monitored physical activity and collected anthropometric measurements. They evaluated the relationships between legume intake and serum concentrations of three adhesion molecules—E-selectin, sICAM-1, and sVCAM-1—and of inflammatory biomarkers such as C-reactive protein, tumor necrosis factor- α , IL-6, and serum amyloid A.

Study participants who ate the most legumes were younger, had lower BMIs and waist-to-hip ratios, and were more likely to be physically active. They also had the highest intakes of several healthful dietary elements, including fiber, vegetables, and fruits, with the lowest intakes of calories and fat. Controlling for age and energy intake, this group who ate the most legumes had lower concentrations of several adhesion molecules and inflammatory biomarkers.



TAKE-HOME BEAN MESSAGE:

The strong inverse relationship found in this study suggests that eating more beans can reduce the likelihood of inflammation and platelet adhesion. Because researchers now believe that these processes underlie many chronic diseases, a bean-rich diet might help reduce the risk of cardiovascular and other inflammatory diseases. These potential health benefits of beans likely come from various nutrients, phytonutrients, and other compounds in beans, as well as from fiber and magnesium, which have independently been associated with reduced inflammation.

Association between dietary fiber and incident cases of colon polyps: the Adventist health study

Tantamango YM, Knutsen SF, Beeson L, et al
Gastrointestinal Cancer Research 2011; 4(5-6):161-7.

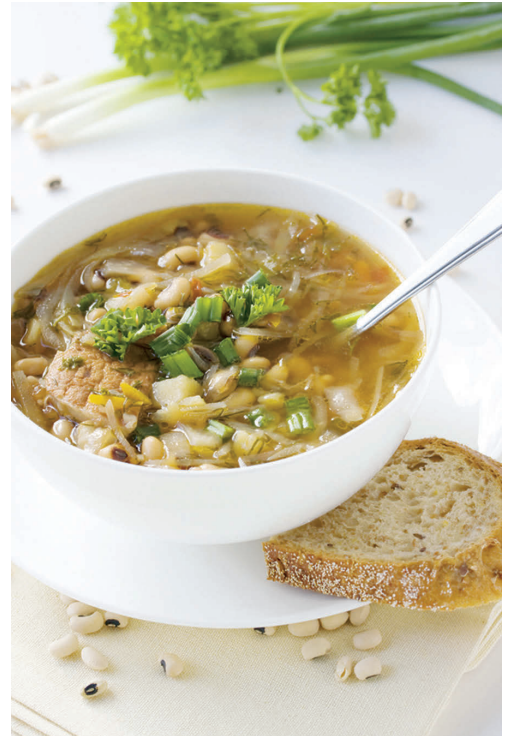
Colon cancer is a major cause of cancer-related deaths in the U.S. Most colon cancers develop from colon polyps, which are found in about one-third of older adults. Scientists believe the progression from benign lesion to cancer is modulated by environmental factors, including diet. In this study, researchers examined the relationship between dietary fiber and risk of colon polyps among a group of more than 2,800 California Seventh-day Adventists, who follow a vegetarian diet that allows for meaningful research results.

Study participants completed two diet and lifestyle questionnaires, the first in 1976-1977 and the second in 2002-2004. Questions on food frequency examined intake of various food categories, including vegetables grouped into legumes, green salads, tomatoes, and cooked green vegetables. The research team monitored who developed colon polyps over the 26-year follow-up period and compared that to the foods they ate. Intake of legumes, tomatoes, and cooked green vegetables were each associated independently with a lower risk of colon polyps. Study participants who did not develop polyps had a slightly higher intake of total dietary fiber. Those getting the most fiber were 29% less likely to develop polyps than those getting the least. However, respondents with the highest intake of vegetable fiber in particular (which includes beans), were afforded 35% more protection.



TAKE-HOME BEAN MESSAGE:

Beans appear to play a protective role against the development of colon polyps. By itself, vegetable fiber is protective. But in addition to vegetable fiber, beans also deliver a unique combination of phytonutrients that may add to their health benefits. One role of these phytonutrients might be to help neutralize carcinogenic processes initiated by a diet rich in red meat.



Adherence to a low-risk, healthy lifestyle and risk of sudden cardiac death among women

Chiuve SE, Fung TT, Rexrode KM, et al
Journal of the American Medical Association 2011; 306:62-69.

More than half of all heart disease deaths are attributable to sudden cardiac death. A low-risk lifestyle, including not smoking, eating a healthful diet, exercising regularly, and maintaining a healthy weight, has been linked to a lower risk of heart disease and cardiovascular deaths. Following such behaviors, then, may help prevent sudden cardiac deaths.

In this study, researchers evaluated data from the all-female Nurses' Health Study, looking for a preventive relationship between lifestyle and sudden cardiac death. They considered four lifestyle factors: smoking, exercise, body weight, and diet. Their benchmark healthful diet was a Mediterranean pattern, characterized by nine components: high intakes of vegetables, fruits, nuts, whole grains, legumes, and fish; a high ratio of monounsaturated to saturated fat; moderate intake of alcohol; and low intake of red and processed meat.

Each lifestyle factor was scored individually, then combined into aggregate scores for all participants, all non-smokers, all participants without diagnosed heart disease, and all participants with diagnosed heart disease.

Calculating risk based on a causal relationship between lifestyle factors and sudden cardiac deaths, the researchers concluded that 81% of the sudden cardiac deaths could have been avoided if all the women had been in the low-risk group for all four lifestyle factors. The “population attributable risk” for diet alone was 16%.



TAKE-HOME BEAN MESSAGE:

Eating more beans may help reduce the risk of sudden cardiac death. Beans are one of the nine components of the healthful Mediterranean diet, which consistently has been associated with reduced risk of chronic disease, and now with a lower risk of sudden cardiac death. Furthermore, eating beans as an alternative to red meat is likely to result in a more beneficial ratio of monounsaturated fats to saturated fats as well as a lower, more desirable intake of red and processed meats.

Major dietary patterns and blood pressure patterns during pregnancy: the Generation R Study

Timmermans S, Steegers-Theunissen RPM, Vujkovic M, et al
American Journal of Obstetrics & Gynecology
2011; 205(4):337.e1-12.

The Mediterranean diet and fetal size parameters: the Generation R Study

Timmermans S, Steegers-Theunissen RPM, Vujkovic M, et al
British Journal of Nutrition
2012; Epub Feb 21:1-11.

The prospective Generation R Study of more than 3,000 pregnant Dutch women evaluated their dietary habits early in pregnancy using food-frequency questionnaires. The women were divided into one of two groups based on how they ate: Mediterranean-style or a traditional pattern. The “Mediterranean” pattern included a high intake of legumes, vegetables, fish, pasta, rice, and vegetable oils with a moderate intake of alcohol and a low intake of sweets. The “traditional” pattern was characterized by a high intake of meat and potatoes, with a low intake of fruit, nonalcoholic drinks, fish, and bread. The women who followed the traditional eating pattern tended to be younger, with a higher BMI, less education, more smoking, and less folic acid use. Two published studies from the trove of data arrived at the following conclusions.

In the study of blood pressure, none of the women had any medical history of hypertension or related disorders. Blood pressure, weight, vitamin levels, and other parameters were measured in early, middle, and late pregnancy. Researchers found that traditional pattern eaters showed a higher systolic blood pressure during the entire pregnancy. Independently, so did those with a low adherence to the Mediterranean style of eating. The blood pressure rises were most pronounced mid-pregnancy, perhaps interfering with the normal dilation of blood vessels in pregnancy. However, no apparent association with gestational hypertension or preeclampsia was noted. The blood pressure findings mirror those of other studies of these eating patterns in men and non-pregnant women.

In the study of fetal size, low adherence to the Mediterranean diet was associated with a 2½-pound lower birth weight, on average, and half a pound less of placental weight, both indicative of decreased intra-uterine size. The researchers discuss how nutrition is one of the most important external factors influencing fetal growth and development. And while the effects of specific nutrients on fetal size have been studied previously, patterns of eating have not. Moreover, folate and vitamin B12 blood levels as well as homocysteine and C-reactive protein levels were also higher in women eating in the Mediterranean style. Folate and folic acid intake early in a pregnancy affects the insulin-like growth factor 2 gene in the fetus, which might also influence fetal growth patterns.



TAKE-HOME BEAN MESSAGE:

These two studies suggest that encouraging a Mediterranean way of eating may be significant in helping reduce the incidence of babies born with a low birth weight as well as lowering blood pressure in the mothers. Beans, an integral part of the Mediterranean diet, are rich in folate plus many other nutrients needed during pregnancy. Folate, if ingested before conception and in very early pregnancy, is known to have a beneficial effect on the health of a pregnant woman’s baby, greatly reducing the likelihood of spinal defects. This study suggests it may also influence fetal growth in later pregnancy. Beans are an easy way to boost folate intake.

Gluten-Free Diet: A Boon for Beans

Bean flours ... are now becoming more widely available and offer nutrition advantages over other flours because they are higher in protein, fiber, and numerous vitamins and minerals.

Interest in gluten-free diets continues to grow as more consumers seek to avoid foods that contain the protein gluten, namely foods made with whole or refined grains from the wheat, rye, and barley families. Some of these consumers have celiac disease, an autoimmune reaction to gluten that causes damage to the lining of the small intestine; management of the disease includes strict avoidance of gluten. Others may be sensitive only to wheat, so although their response likely is not an autoimmune response, they may choose to follow a gluten-free diet as a way to avoid wheat products. The incidence of gluten intolerance and gluten sensitivity is higher than once thought, so demand for gluten-free products has grown.

Because gluten and gluten-containing ingredients play an important role in the physical properties of foods, they are ubiquitous in packaged foods and central to many recipes. Gluten contributes structure to foods such as breads, baked goods, and pasta. Many prepared or processed foods, including cereals, soups, sauces, snack foods, and candies, are made with wheat, rye, or barley products.

The Bonus of Bean Flours

One approach to eliminating gluten replaces wheat flour with a “safe” flour. Many gluten-free flours are made from other grains, including white or brown rice, amaranth, sorghum, or corn. Nut flours also are popular, as are starches like tapioca and potato.

Bean flours—garbanzo, white, kidney, and others—are now becoming more widely available and offer nutrition advantages over other flours because they are higher in protein, fiber, and numerous vitamins and minerals. They also are lower in fat than nut flours. Additionally, their fiber helps retain moisture so baked goods made with bean flours remain fresher longer. However, bean flours and all other types of gluten-free flours lack the structural properties of gluten; baked goods made with them tend to be denser, less chewy, and more crumbly than traditional products.

Some applications call for the addition of guar or xanthan gum to improve the texture.

Baking With Bean Flours

When baking with bean flours, it is advisable to use recipes specifically developed for bean flours rather than simply substitute for the wheat or other flour in a recipe. “Pulses and the Gluten-Free Diet,” a cookbook by Pulse Canada in collaboration with Shelley Case, RD, and Carol Fenster, PhD, offers several tips for gluten-free baking:

- As with wheat flour, first aerate bean flour by stirring it with a fork, then lightly spoon it into a measuring cup, and level off with a knife. Or use a gram weight rather than volume measure. Avoid packing the flour, tapping the measuring cup to level it, or using the measuring cup as a scoop—these all increase the amount of flour in the cup and can yield unsatisfactory results.
- Follow ingredient lists, instructions, and baking times closely.
- Remove baked goods from pans before cooling to prevent sogginess.
- Use more than one type of flour, as directed in the recipe; each flour has different properties.
- Store baked goods in the freezer to maintain freshness. They rapidly become stale at room temperature or in the refrigerator.



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Delicious Gluten-Free Banana Bread

3 tablespoons vegetable oil
¾ cup packed brown sugar
2 large eggs
1 teaspoon vanilla
¾ cup garbanzo bean flour
¼ cup fava bean flour
½ cup potato starch
¼ cup tapioca flour
½ teaspoon xanthan gum
½ teaspoon sea salt
2 teaspoons baking powder
1 teaspoon cinnamon
⅛ teaspoon cardamom
⅛ teaspoon ground mace
1 cup mashed ripe bananas
½ cup chopped pecan halves
½ cup raisins

1. Preheat oven to 350°F.
2. Coat a 9" x 5" nonstick loaf pan with cooking spray and set aside.
3. Cream the oil, sugar, eggs, and vanilla together. Mix together the flours, starch, gum, sea salt, baking powder, and spices.
4. Add flour mixture to egg mixture, alternating with bananas.
5. Stir in nuts and raisins.
6. Bake for 1 hour. Remove from pan and cool on wire rack before cutting.

(Adapted with permission from Bob's Red Mill Natural Foods.)

Success With Cooked and Canned Beans

Pureed cooked and canned beans are commonly used to replace fat in a recipe. However, beans also can take the place of an ingredient with gluten to add texture, variety, and nutrition. Here are some suggestions:

- Add beans to pasta sauce and serve over cooked spaghetti squash.
- Add beans to soup or salad in place of the usual pasta.
- Create a side dish with beans and a gluten-free grain, such as red beans and brown rice or black beans and quinoa.
- Mash beans into a puree and use it to thicken soups and stews.

Guide to Shopping for Gluten-free Beans

Beans are naturally gluten-free. However, some packagers of canned beans may use a gluten-containing ingredient to thicken the contents, so check ingredient labels. Packages of beans can also be contaminated with gluten if packed in a plant that also processes gluten-containing ingredients. This possibility must be indicated as part of the allergen statement on the label. To avoid contamination, buy beans and bean flours in packages marked gluten-free rather than in bulk from a bin. Keep in mind that prepared foods containing beans, such as chili, soups, and stews, often contain gluten-containing ingredients.

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



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