



Mindy Hermann, MBA, RD, Hermann Communications  
Susan C. Male, MA, RD, SMS Scientific Writing Services  
Editor: Andrea M. Hutchins, Ph.D., RD, University of Colorado at Colorado Springs

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

## Physical activity, diet, and risk of Alzheimer disease

Scarmeas N, Luchsinger JA, Schupf N, et al  
*Journal of the American Medical Association* 2009; 302(6):627-37.

and

## Dietary patterns in Alzheimer's disease and cognitive aging

Gu Y, Scarmeas N  
*Current Alzheimer Research* 2011; 8(5):510-19.

With the aging of the U.S. population, the incidence of Alzheimer's disease (AD) is cause for concern. A Columbia University study looked at the health benefits of a Mediterranean diet, including its affects on AD, by following 1,880 older New Yorkers without dementia at the start of the 14-year study. Participants were examined and interviewed every 18 months regarding physical activity and diet, the latter of which was evaluated based on seven traditional Mediterranean food groups: legumes, cereals, dairy, meat, fish, fruits, and vegetables.



Study participants who adhered closest to a Mediterranean-type diet *and* were the most active were two-thirds less likely to develop AD during the study. Furthermore, diet and activity were each independently associated with a lower AD risk—up to 50% from physical activity alone.

A second study at the same Columbia University Taub Institute for Research in Alzheimer's Disease and the Aging Brain then investigated which model of evaluating diets was best: (1) analysis of a known dietary pattern, such as the Mediterranean Diet, as in the previous study; (2) data-driven approaches, such as cluster analysis or factor analysis, which study individual foods and then identify food patterns based on the results; or (3) a model that combines the two approaches. They found that regardless of the method, a higher intake of certain foods (legumes like beans, fruits & vegetables, fish, and nuts) and a lower intake of other foods (meats, high-fat dairy, and sweets) consistently conferred protection against Alzheimer's. This upholds their 2009 findings and other research examining dietary patterns.



### TAKE-HOME BEAN MESSAGE:

Eating the Mediterranean way, which includes emphasizing whole foods like beans, confers protection against Alzheimer's disease and cognitive aging (and many other chronic conditions). This inherently healthful way of eating is based on an entire lifestyle choice that embraces food, family, and leisure activities that weave exercise into daily life. It is also telling that the same foods consistently emerge as protective even when other methods that do not focus on the Mediterranean Diet as such are used to study food intake. This highlights the 2010 Dietary Guideline that urges Americans to eat more plant-based meals, and underscores why more meals should include beans.



## Foods and food groups associated with the incidence of colorectal polyps: the Adventist Health Study

Tantamango YM, Knutsen SF, Beeson WL, Fraser G, Sabate J  
*Nutrition and Cancer* 2011; 63(4):565-72.

Colorectal cancers are the second most common cause of cancer deaths in the U.S., and researchers have estimated that one-quarter to one-third of those cancers could be prevented by changing diet and lifestyle. Since most colorectal cancers are thought to arise from polyps, researchers at Loma Linda University in California examined data gathered during the 26-year Adventist Health Study that detailed the diets (by food frequency questionnaire) and colonoscopy results of 2,818 people. They found that people with no evidence of polyps were more likely than those with polyps to be frequent eaters of beans and other legumes, as well as brown rice, cooked vegetables, and dried fruit. Increased consumption of these foods was associated with better colorectal cancer protection. Consuming beans and other legumes 3 or more times a week decreased the risk of polyps by 33%. The authors propose that no one food is protective, but rather that protective foods trigger the bioactivity of each other, thus promoting health benefits.

The researchers suggest several reasons for the beneficial effects of beans and other legumes:

1. They provide a lot of fiber, which may dilute potential carcinogens as well as speed transit time through the gut, thus limiting the amount of time that the intestinal wall is exposed to carcinogens. The binding of fiber with bile acids, thus lowering the pH of the colon, is also thought to be beneficial.
2. The tendency of the fermentable fiber in beans to produce butyrate, a short-chain fatty acid with anticancer and anti-inflammatory properties.
3. Additional anticarcinogenic bioactives abound in legumes like beans, such as saponins, phytosterols, and gamma-tocopherol.
4. Beans' naturally low glycemic index, which has been linked to lower rates of colon cancer.
5. People who eat more beans tend to eat less meat, a food that has been linked to colon cancer.



### TAKE-HOME BEAN MESSAGE:

**Eating beans may lower your risk of colon and rectal cancers. This study found an association between bean consumption and the absence of colon polyps (a risk factor for colorectal cancer). The more beans the study participants ate, the lower their risk of colorectal cancer. Part of that protective effect might be attributed to a corresponding decrease in meat intake, as beans—rich in protein and minerals—are an excellent substitute for meat.**

## An energy-dense, nutrient-poor dietary pattern is inversely associated with bone health in women

McNaughton SA, Wattanapenpaiboon N, Wark JD, Nowson CA  
*Journal of Nutrition* 2011; 141(8):1516-23.

There has been a paucity of studies that have looked at the effects of total diet on bone health. While there is a scientific consensus about the importance of foods rich in calcium and vitamin D, as well as evidence for bone benefits from fruits, vegetables, and whole grains, little is known about other foods. In this study, Australian scientists measured the bone density (using DEXA) in the lumbar spine and total hip, as well as total bone content, in 527 young and middle-aged women. The data was then compared to the women's four-day dietary intake records. Using factor analysis, the researchers weighted the data by the amount of a food eaten and then adjusted for lifestyle factors.

The results suggest that certain dietary habits directly link to a higher bone mineral density, including a high intake of beans and other legumes, seafood, seeds, nuts, wine, rice, and vegetables—all suggestive of a Mediterranean-type diet (Med diet) pattern. For each quintile increase in the Med diet pattern score, there was a 0.2% to 0.6% increase in bone mineral density and total bone content. While it sounds small, this amount could significantly blunt the deleterious effect of the typical average yearly premenopausal bone loss of 0.25%.

The eating habits that suggest an inverse link to total bone content include a high intake of refined cereals, soft drinks, and fried foods, as well as a low intake of vegetables and whole grains. For each quintile increase in the scores for this diet pattern, there was a corresponding 0.7% decrease in total bone content. Other eating habits did not show consistent links to bone content or bone density.



**TAKE-HOME BEAN MESSAGE:**  
Beans emerge as a star for bones in this study of how overall diet affects bone health. As part of a Mediterranean-style diet, beans had the best association with a high bone mineral density. This could be one reason why vegetarians and even vegans often show good bone health, since beans are an excellent protein source and provide some calcium and magnesium as well. Protein, if not excessive, is crucial to bone mass as well as muscle mass, as the two are intertwined. Overall, a Mediterranean-style diet proved better for bones than four other eating patterns.



## Comparative nutrient analysis of commonly consumed vegetables

Hornick BA, Weiss L  
*Nutrition Today* 2011;  
46(3):130-7.

Dietary guidelines and nutrition education programs have long promoted vegetables as an important component of a healthy diet. Despite the prominence of such programs as 5 A Day, Americans continue to eat too few vegetables, hence missing the opportunity to improve diet quality. The authors of this article advocate for not only continuing to communicate vegetable messages but also for highlighting those vegetables richest in nutrients, including beans and other legumes.

Combining data from NHANES 2003-04 and the consumer market research firm NPD Group, the authors identified the 10 most commonly consumed vegetables. Beans and baked beans ranked ninth. Comparing the nutrient content of those 10 vegetables, they determined that legumes were among the top three vegetable sources of protein, fiber, calcium, potassium, magnesium, iron, and folate. Moreover, they were among the top five vegetables providing the greatest amounts of nutrients overall.



### TAKE-HOME BEAN MESSAGE:

The Dietary Guidelines for Americans 2010 breaks vegetables into five sub-groups, one of which is beans and other legumes. The recommendation to incorporate 1½ cups of legumes per week into a 2,000-calorie diet recognizes their nutrient density and unique contribution to dietary adequacy, particularly for nutrients of concern such as fiber and potassium. This study highlights how beans are not only among the most commonly consumed vegetables, but also how they are superstars when it comes to nutrition, out-ranking many other vegetables in the range of nutrients they provide. For most Americans, eating more beans would improve their diets.

## A legume-based hypocaloric diet reduces proinflammatory status and improves metabolic features in overweight/obese subjects

Hermisdorff HH, Zulet MA, Abete I, Martinez JA  
*European Journal of Nutrition* 2011; 50(1):61-9.

Researchers from Navarro, Spain, studied 30 obese men and women for eight weeks. Half of them were put on a reduced-calorie diet with no legumes, while the other half were told to eat the same reduced-calorie diet but with legumes four times a week. The legumes included beans, peas, chickpeas, and lentils, but no soy. Exercise remained constant throughout the study and a dietitian monitored diet compliance. Both groups were eating an average of one serving of legumes a week prior to the study.

There was a statistically significant loss of body weight for both groups, but the legume group lost more—an average of 7.8 pounds over the eight weeks vs. the no-legume group, which lost 5.3 pounds. Body fat and waist circumference followed the same pattern, but the changes were not statistically significant. Even more important, however, were the effects on clinical and metabolic variables. Only the legume diet resulted in significantly improved reductions in systolic blood pressure and total blood cholesterol, as well as inflammatory markers, such as C-reactive protein and complement C3, even after adjusting for weight loss.



### TAKE-HOME BEAN MESSAGE:

**Just four servings of beans and other legumes not only allowed obese study participants to lose more weight, but their blood pressure, blood cholesterol, and inflammatory blood levels improved more as well. Beans provide important nutrients like magnesium and potassium, as well as bioactives like fiber, saponins, and oligosaccharides. In addition, they are low in sodium and have a low glycemic index. All of these factors are likely important for the metabolic and clinical effects seen, especially in their interactions with each other. Most impressive, however, is that it takes just four servings a week to get these results.**



## Can low-income Americans afford to satisfy MyPyramid fruit and vegetable guidelines?

Stewart H, Hyman J, Frazão E, et al  
*Journal of Nutrition Education and Behavior* 2011; 43(3):173-9.

It has been suggested that the high relative cost of fruits and vegetables compared to high-calorie-dense, nutrient-poor foods makes meeting food group recommendations (the Dietary Guidelines for Americans, MyPyramid, and MyPlate) unaffordable for low-income families. In this study, researchers used food purchasing data from more than 60,000 households participating in the 2008 National Consumer Panel to analyze the cost of vegetables and fruits and evaluated that cost within the framework of the USDA Thrifty Food Plan.

The study authors estimated the MyPyramid cup-equivalent cost of more than 120 vegetables and fruits divided into sub-groups: dark green vegetables, orange vegetables, starchy vegetables, other vegetables, legumes, whole or cut fruit, and fruit juice. Cost per cup-equivalent generally ranged from \$0.40 to \$0.50, with lower cost items at less than \$0.40. Canned beans ranged from \$0.38 to \$0.44 per cup-equivalent, representing the lower end of food item cost. The authors conclude that low-income families can indeed meet fruit and vegetable recommendations on a low budget.



### TAKE-HOME BEAN MESSAGE:

**Canned beans fall into a lower cost range compared to other vegetables and readily fit into the \$123 to \$141 monthly budget of the 2011 USDA Thrifty Food Plan for a family of four. Dry beans that consumers cook themselves are even more affordable. Incorporating beans of all types can help families at all income levels meet MyPyramid guidelines for vegetables.**

## A high-legume low-glycemic index diet reduces fasting plasma leptin in middle-aged insulin-resistant and -sensitive men

Zhang Z, Lanza E, Ross AC, et al  
*European Journal of Clinical Nutrition* 2011; 65(3):415-8.

The hormones leptin and ghrelin are thought to play important roles in weight management. Leptin is released from adipose tissue and helps regulate appetite and metabolism. Research suggests that the high levels of circulating leptin in obese individuals represent a resistance to leptin, similar to insulin resistance among people with type 2 diabetes. Ghrelin, produced in the lining of the stomach and in the pancreas, stimulates hunger.

This paper, one of several from the Legume Inflammation Feeding Experiment (LIFE) Study, compared fasting leptin and ghrelin levels in 36 insulin-sensitive and 28 insulin-resistant (IR) men assigned in random order to four weeks each of a legume-enriched, low-glycemic index (LG) diet with approximately 1.5 cups of cooked beans a day per 2,000 calories and an isocaloric healthy American (HA) diet.

Among all participants, fasting leptin decreased from pre-study levels by 19% during the LG diet and 16% during the HA diet. Insulin-resistant participants experienced reductions in fasting leptin of 17% (LG) and 33% (HA), while those who were insulin-sensitive responded only to the LG diet with a drop of 23%. Fasting ghrelin levels did not change. Body weight changes were not a contributing factor as weight was held steady over the duration of the study.



### TAKE-HOME BEAN MESSAGE:

**Incorporating beans into the diet provides fiber, which has been shown to lower fasting leptin levels. The results of this study suggest that both insulin resistant and insulin sensitive individuals could benefit from incorporating more beans into their diets. The Dietary Guidelines goal of 1.5 cups per week is attainable and could be beneficial for improving leptin levels and thus perhaps aiding weight management.**

## The risk of child and adolescent overweight is related to types of food consumed

Matthews VL, Wien M, Sabate J  
*Nutrition Journal* 2011; 10(1):71-77.

Are consumption patterns for particular food groups associated with overweight among children and teens? Using food frequency data from the Child-Adolescent Blood Pressure Study, this research team computed and ranked the frequency of consumption for grains, vegetables (including legumes), fruits, nuts, animal protein foods, dairy, and low nutrient-dense foods in a group of 1,764 students in 1<sup>st</sup> through 12<sup>th</sup> grades. They accessed height and weight data to compute each participant's risk of overweight and compared that risk to their consumption frequency of each of the seven types of foods.

The students who averaged 2.6 servings of vegetables daily, as well as those who ate just 0.7 servings a day, showed protection against overweight, with about one-third lower risk than for those eating even fewer vegetables. Likewise, their intakes of grains and nuts were also inversely related to risk of overweight, while fruits showed no relationship.



### TAKE-HOME BEAN MESSAGE:

**Consumption of plant foods has long been linked to lower BMI and reduced risk of obesity, which led experts to strongly emphasize plant intake in the recent 2010 Dietary Guidelines for Americans. As a high-nutrient-dense, relatively low-calorie-dense plant food, beans are a crucial component of a plant-focused diet, one that may help reduce the prevalence of overweight and obesity among children and adults alike. And, as this study shows, it does not take a lot of vegetables to begin to have a positive effect. Although this study did not distinguish among vegetables, it is likely that the type of vegetables eaten might make a difference in overweight risk. Based on other studies, it would not be surprising if beans scored well in that regard.**

# Beans, Protein, and the 2010 Dietary Guidelines for Americans

Protein has long garnered less attention than carbohydrates or fats in the dietary advice to Americans. That does not mean it is any less important. But the average U.S. diet is thought to provide adequate protein, and protein deficiency is rare in the U.S. As a result, the 2010 Dietary Guidelines for Americans do not even recommend specific protein goals. Instead, they adhere to ranges (Acceptable Macronutrient Distribution Range or AMDR) as set by the Institute of Medicine:

## 2010 Protein Goals as a Percentage of Total Calories:

- Young children: 5% to 20%
- Older children and teens: 10% to 30%
- Adults: 10% to 35%  
(equivalent to 50-175 grams of protein in a 2,000-calorie diet)

## Helpful Info You Might Have Missed

The appendix to the Dietary Guidelines presents different food patterns designed to help Americans plan balanced, healthful meals along with recommended weekly amounts. As a top-notch replacement for animal protein, beans are a prominent protein source especially in the USDA vegetarian and vegan plans.

## Protein Foods/Week\*

Protein source	USDA Meat-Eaters	USDA Vegetarian	USDA Vegan
Meat, poultry, eggs (oz)	26	4**	0
Fish/seafood (oz)	8	0	0
Beans and peas (cups)	1.5	4	4.75
Nuts, seeds, soy (oz)	2	50	50
Dairy (cups)	21 (3/day)	21	21***

\* To meet 2,000 calories/day.

\*\* Eggs only (1 egg = 1 oz meat, fish, or poultry).

\*\*\* From calcium-fortified non-dairy products.

The AMDR and food patterns are designed to help adults attain a benchmark of 0.80 grams of good-quality protein per kilogram of body weight per day (more for pregnant or breastfeeding women). While the standard 2,000-calorie USDA pattern meets this recommendation, the vegetarian and vegan patterns may fall short, especially for those whose protein intake is at the lower end of the AMDR.

## Protein Is Key as You Age

Protein is particularly important for older adults. The growing population of aging baby boomers has cast attention on sarcopenia, the age-related decline in muscle mass, strength, and function. Scientists believe inadequate protein intake is a contributing factor. Loss of muscle along with age-related gain in body fat increases the risk of falling and the likelihood of immobility while decreasing physical activity, which contributes to chronic diseases like type 2 diabetes and heart disease. In addition to the worrisome health aspect, experts estimate that sarcopenia costs the U.S. up to \$18.5 billion per year in health care expenditures.

## Important Advice for Vegetarians and Vegans

Incorporate protein sources at each meal. Combine plant protein sources to improve overall protein quality. Maintain adequate protein intake, particularly when reducing calories to lose weight.

Scientists suggest that adults over 50 years of age may require up to 1.5 grams of high-quality protein per kilogram of body weight to maintain muscle mass and reduce the risk of sarcopenia. That is nearly twice the amount younger adults need. Additionally, the essential amino acid leucine has been singled out as particularly important for building protein and reducing its breakdown in the body. Legumes like beans are among the protein foods highest in leucine.

The following suggestions for increasing protein intake are particularly geared to older adults, especially those who follow a vegetarian or vegan diet:

**Include protein at every meal.** The body appears to use protein more efficiently when it is spread out over an entire day rather than when eaten just at lunch or dinner.

**Eat beans in adequate portions.** Eat beans more often and make them a prominent part of the main dish. Keep in mind that  $\frac{3}{4}$  of a cup of beans is the protein-equivalent of 3 ounces of meat, poultry, or fish.



### Ideas for Adding Beans to Your Daily Meals

- Add beans to soups and tossed salads.
- Toss beans with chopped vegetables and herbs for a tasty side salad.
- Mash beans with seasonings for a quick veggie dip or sandwich filling.
- Combine beans with vegetables in a pasta sauce.
- Go heavy on beans in chili and hearty stews.
- Puree beans to substitute for up to half the fat in quick breads and muffins.

#### UPDATE:

The Winter 2010 issue of Bean Briefs summarized a presentation at the Institute of Food Technology annual meeting on the effect of rinsing on the sodium content of canned beans. The full article was published recently:

**Sodium reduction in canned beans after draining, rinsing**

Duyff RL, Mount JR, Jones JB

*Journal of Culinary Science & Technology* 2011;9(2):106-12.

## Edible dry beans grown in the U.S.



### ADZUKI

These are small, reddish brown beans with a nutty, sweet flavor. Adzuki beans are often used in Asian cuisines. They are particularly popular in Japanese cooking where they're used in confections.

### BABY LIMA

Flat-shaped, creamy white-colored beans with a rich, buttery flavor. Baby lima beans are excellent in soups, stews and casseroles or just cooked with herbs and spices.



### BLACK BEAN

Black beans are small ovals with deep black skins. They have cream colored flesh with a mild, sweet, earthy taste and a soft texture. Sometimes called turtle beans, these beans are used in classic Latin American, Caribbean and Southwestern United States soups, stews and sauces.

### BLACK EYE BEAN

Blackeye beans are characterized by their kidney shaped, white skin with a small black eye and very fine wrinkles. They have a scented aroma, creamy texture and distinctive flavor. Originally from Africa, blackeye beans are also known as cowpeas and black-eyed peas and have rapid cooking potential, with no pre-soaking needed.



### CRANBERRY BEAN

Cranberry beans are small rounded beans known for their creamy texture with a subtle, nut-like flavor. They are ivory in color with red markings that disappear on cooking. These beans are a favorite in northern Italian, Spanish and Portuguese cuisines.



### DARK RED KIDNEY BEAN

Large, kidney-shaped bean with a deep reddish-brown color. They have a robust, full-bodied flavor and soft texture. Dark red kidney beans are most often used in chili and are also popular in salads and with rice.



### GARBANZO BEAN

Garbanzo beans or chickpeas are usually beige to pale yellow in color with a nutlike taste and buttery texture. The garbanzo bean is especially popular in many Middle Eastern and Indian dishes such as hummus, falafels and curries.



### GREAT NORTHERN BEAN

Great Northerns are flat, kidney-shaped, medium-sized, white beans with a delicate flavor. Great Northern beans take on the flavors of the foods with which they are cooked which is why they are popular in France for making cassoulet (a white bean casserole). In the United States they are traditionally prepared as Boston baked beans.

### LARGE LIMA BEAN

Sometimes called "butter beans"; large lima beans are flat-shaped, ivory-colored beans with a smooth, creamy, sweet flavor. Used in a popular American side dish called succotash, large limas make a good substitute for potatoes or rice and are excellent in soups and casseroles.



### LIGHT RED KIDNEY BEAN

Large, kidney-shaped bean with a robust, full-bodied flavor and soft texture. Popular in

the Caribbean region as well as Portugal and Spain, the light red kidney beans are most often used in chili, salads and paired with rice.



### NAVY BEAN

Small white ovals with a mild flavor and powdery texture. Also known as pea beans. Most often used in pork and beans, or baked beans, also used in soups and stews, and are great pureed.



### PINK BEAN

Small, pale, pink-colored beans with a rich, meaty flavor and a slightly powdery texture. Related to the kidney bean, pink beans turn reddish brown when cooked. Pink beans are often used in chili and are a favorite in Old West recipes.



### PINTO BEAN

Medium-sized, oval-shaped bean with a mottled beige and brown skin, an earthy flavor and a powdery texture. Closely related to red kidney beans. When cooked, pintos lose their mottling and turn brown. They are most often used in refried beans, and are great for Tex-Mex and Mexican bean dishes.



### SMALL RED BEAN

Dark red color with flavor and properties similar to red kidney, only smaller in size. Also called Mexican red bean, they hold both shape and firmness when cooked. Most often used in soups, salads, chili and Creole dishes.

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



**US DRY BEAN**  
*Council*

US Dry Bean Council  
PO Box 1026  
Pierre SD 57501 USA  
P: 605-494-0280  
F: 605-494-0304  
[www.beansforhealth.com](http://www.beansforhealth.com)

**More information, recipes  
and news at:**  
[www.beansforhealth.com](http://www.beansforhealth.com)