

Functional Foods to Reduce Cardiovascular Disease Risk

By Megan Tempest, RD

Most people eat functional foods every day, such as when they sprinkle iodized salt on a hot baked potato, enjoy a hearty sandwich made with nutrient-enriched bread, or drink a cold glass of calcium-fortified orange juice. While all foods are “functional” to an extent, the term implies a health benefit beyond the mere provision of calories or nutrients.

The Academy of Nutrition and Dietetics (the Academy) describes functional foods as whole, fortified, enriched, or enhanced foods that have a potentially beneficial effect on health when regularly consumed at effective levels as part of a varied diet. Concerning cardiovascular disease (CVD) prevention, certain foods may reduce harmful LDL cholesterol in the blood, raise levels of good HDL cholesterol, lower blood pressure, stabilize heart rhythms, and even protect arterial lining. Jeannie Gazzaniga-Moloo, PhD, RD, a national spokesperson for the Academy, believes that while functional foods are no magic bullet, “There certainly appears to be benefits to adding them to your daily diet to prevent cardiovascular disease.”

According to the American Heart Association (AHA), CVD kills more than 2,200 Americans each day, which equates to roughly one death every 39 seconds. In 2008, about 150,000 of the Americans who died because of CVD were younger than 65. The AHA also reports that, on average, someone in the United States dies of a stroke every 40 seconds. In 2008, one in nine death certificates in the United States mentioned heart failure. However, between 1998 and 2008, the rate of deaths attributable to CVD declined by 30.6%. During the same time span, the death rate due to stroke fell by 34.8%.¹

While your patients and clients may know that functional foods can meaningfully impact their cardiovascular health, the reality is that they may not know how to incorporate these foods into their diet. Additionally, they may struggle with perceived barriers to consuming heart-healthy foods, such as expense, taste, and availability.² According to a 2011 survey conducted by the International Food Information Council regarding top health concerns, Americans are most interested in learning about foods and beverages that can help prevent CVD, with 46% of Americans citing cardiovascular disease as their top health concern.²

This continuing education article will examine the major categories of functional foods that may prevent CVD and share tips RDs can use to help their patients and clients incorporate them into their diet.

Fruits and Vegetables

It's commonly accepted that the routine consumption of fruits and vegetables, which are abundant in phytochemicals, antioxidants, and fiber, protects against CVD. Flavonoids, or

plant-based phytochemicals such as flavonols and proanthocyanidins, occur naturally in many foods such as onions, tomatoes, berries, apples, and cabbage. In February 2012, McCullough and colleagues reported in the *American Journal of Clinical Nutrition* that the consumption of flavonoids is associated with a lower risk of death from CVD and that even relatively small amounts of flavonoid-rich foods may be beneficial. Also, anthocyanins, a class of flavonoids found abundantly in blueberries, cranberries, raspberries, cherries, eggplant, and purple cabbage, have been shown to enhance endothelial function and suppress inflammation that may lead to CVD.³

Janet Bond Brill, PhD, RD, LDN, praises the heart-healthy virtues of the olive fruit in the form of good-quality extra-virgin olive oil (EVOO) in her book *Prevent a Second Heart Attack: 8 Foods, 8 Weeks to Reverse Heart Disease*. Brill says EVOO is rich in oleic acid, a monounsaturated fat proven to stop the oxidation of LDL cholesterol and ward off CVD (see Resources for Cicero et al). “We know heart disease is an inflammatory condition caused by oxidation of LDL,” Brill explains. “By preventing this oxidation, you’re one step ahead of the game.”

Additionally, Brill emphasizes that making EVOO the main fat source increases the body’s levels of the antioxidant vitamin E, which in turn fights free radical damage and minimizes LDL oxidation (see Resources for Meydani).

Noting a secondary benefit of consuming EVOO with other heart-healthy foods, Brill says, “Extra-virgin olive oil is so flavorful that using it to flavor your veggies will encourage you to eat more of those healthy foods because they taste good.”

Nicknaming them “Mother Nature’s medicine chest,” Brill tells her clients to enjoy a rainbow of colorful vegetables, from dark leafy greens to cruciferous veggies such as broccoli and cauliflower to dark-red and purple varieties, including eggplant and beets. “By consuming throughout the day a plethora of these beautiful veggies,” Brill explains, “you can boost your defenses against heart disease by increasing your body’s antioxidant level and keeping it up throughout the day, thereby taking a major step in heart disease prevention.”

And the same rule applies to fruits, Brill says: “Fruits increase your body’s antioxidant levels, which is proven to ward off oxidation of LDL, and also protect against endothelial dysfunction that promotes atherosclerosis” (see Resources for Wallace).

Legumes

Legumes, which include various beans, peas, and lentils, are mainstays of a heart-healthy diet. They provide low-fat, plant-based protein and fiber along with a wide array of heart-healthy nutrients. Legumes are abundant in soluble fiber, which has been shown to help reduce blood levels of atherosclerotic LDL cholesterol.⁴

Brill points to soy, another legume, as one of the ultimate health foods for CVD prevention. “For the sake of your heart, eat soy,” Brill says. Best consumed in its natural form, such as edamame or tempeh, Brill explains, “Soy lowers LDL a bit and is high in heart-healthy plant

protein, antioxidants, fiber, and estrogenlike compounds” (see Resources for National Soybean Research Lab and Messina).

Legumes can replace less healthful foods. Choosing legumes over animal protein is a win-win situation in terms of CVD prevention, Brill says. “By choosing plant protein, you get much more bang for your buck. You’re getting amino acids, fiber, minerals, iron, and antioxidants, and you’re getting a food with bonus nutrients that boost your body’s antioxidant levels, lower cholesterol, and provide folate, which is known to lower homocysteine—high levels of which are a risk factor for CVD—all this for just pennies on the dollar. With animal protein, you’re getting the excess baggage of saturated fat and cholesterol and more calories.”

Joan Salge Blake, MS, RD, LDN, author of *Nutrition & You* and a media spokesperson for the Academy, recommends her clients choose beans instead of meat, fish, and poultry because beans are inexpensive, offer a healthful source of plant-based protein, and are high in cholesterol-lowering soluble fiber. And beans are easy to prepare. “It’s just a matter of opening the can and making your pasta with beans instead of meat or adding them to a salad,” Salge Blake says. “They’re a very heart-healthy and economical way for Americans to change their diet in a positive way.”

Fish

High in protein, low in saturated fat, and loaded with omega-3 fatty acids, the AHA recommends Americans consume at least two servings of fatty fish per week. Omega-3 fatty acids are believed to confer heart-health benefits for those with and without a high risk or diagnosis of CVD. Consuming fish rich in omega-3s may decrease the risk of cardiac arrhythmias, which can lead to sudden death; decrease triglyceride levels; slow the growth rate of atherosclerotic plaque; and modestly reduce blood pressure.⁵ Results of a large, prospective cohort of healthy young women aged 15 to 47 by Strøm and colleagues, published in the January 2012 issue of *Hypertension*, revealed that people who consume little or no fish and omega-3 fatty acids have an increased risk of developing CVD.⁶

Brill agrees that fatty fish consumption is remarkably beneficial and strongly recommends eating wild salmon, which she says works wonders for cardiovascular health by targeting what’s known in the medical arena as the “trilogy of vulnerability”—vulnerable plaque, vulnerable blood, and electrical disturbances such as arrhythmias. “The omega-3 fat in salmon targets all three in the trilogy—it stabilizes vulnerable plaque and prevents arrhythmia,” Brill says. “It also lowers our triglycerides and acts as an anti-inflammatory and as a blood thinner, so our blood is less likely to clot” (see Resources for Burillo et al).

“We know that regularly eating fatty fish can reduce your risk of dying prematurely from heart disease,” Salge Blake confirms, “but there’s another reason why the AHA recommends two meals per week of fatty fish to benefit heart health. When we choose to eat fish, we know we’re getting a food that’s low in unhealthy saturated fat, is a great source of protein, and is potentially displacing another less healthful protein source such as fatty meat or poultry with skin. So you’re getting two for the price of one in terms of heart-health benefits.”

Given the wide availability of fish, Salge Blake says Americans have few excuses to not eat it. “People often have perceived barriers to consuming fish such as the people who they dine with—including family members—who aren’t fish lovers. Now manufacturers have done an unbelievable job of making fatty fish something you can easily consume. It’s much easier to get in two fish meals per week, and those meals don’t have to be dinner. Look for cans or pouches of fish to go on salads and bring it to work for lunch.”

Whole Grains

A good source of dietary fiber, along with nutrients such as B vitamins, iron, vitamin E, polyphenols, magnesium, and selenium, the AHA recommends Americans consume six to eight servings of whole grains per day. Oats in particular provide significant cardiovascular benefits due to their high content of the soluble fiber beta-glucan, which is believed to reduce LDL cholesterol. Brill considers oats to be a “power food” in terms of heart health not only for their beta-glucan content but also for a unique antioxidant known as avenanthramides, which may lower CVD risk by reducing LDL cholesterol, total cholesterol, and triglycerides.⁷

Gazzaniga-Moloo encourages her clients to switch out refined white grains for whole grains whenever possible. “Any time you have white rice, try brown rice instead. Or instead of white pasta, have whole grain pasta whenever possible—so you’re not making a major change, you’re simply switching out a less healthful item for a heart-healthy whole grain option.”

Nuts and Seeds

Nuts are rich in heart-healthy fats, antioxidants, phytosterols, protein, and fiber and thus key players in CVD prevention. Large studies have shown that the regular consumption of nuts is associated with a reduced risk of CVD and type 2 diabetes, a known risk factor for CVD.⁸

Salge Blake encourages her clients to choose nuts at snack time. “They’re high in protein and fiber; therefore they make a great afternoon snack that can increase satiety. But a little goes a long way—the key is sticking to a portion size—approximately 1 oz—vs. having a whole jar of nuts.”

To discourage overeating calorie-rich nuts, Salge Blake recommends people go back to cracking their own nuts. “Doing so is a neat event in itself, plus it will slow down the eating process, helping you eat less.” Alternatively, if clients prefer to buy nuts that have already been shelled, counsel them to portion the nuts and put them in Ziploc bags. “Nuts are a phenomenal way to increase your intake of healthful fat, fill you up, and boost heart health at the same time,” she says.

Brill praises walnuts and flaxseeds for their exceptional cardiovascular health benefits. Walnuts, for instance, are high in fiber and antioxidants such as vitamin E and contain the most omega-3 fatty acid alpha-linolenic acid (ALA) of all nuts. “We know that people who eat diets high in ALA can reverse and prevent cardiovascular disease,” Brill says.

Flaxseeds also are loaded with heart-healthy ALA. A study by Bassett and colleagues, published in the December 2011 issue of the ***American Journal of Physiology-Heart and Circulatory Physiology***, found that adding ground flaxseed to the diet can inhibit the artery-

clogging action of cholesterol and hydrogenated trans fatty acids known to promote coronary heart disease.⁹ Counseling clients to sprinkle ground flaxseed on oatmeal for breakfast or mix 1 tablespoon into a cup of yogurt or a fruit smoothie are simple ways to encourage an increased ALA intake.

Plant Sterols and Stanols

When talking about functional foods that prevent CVD, plant sterols and stanols definitely deserve mention. These plant-based substances reduce CVD risk by blocking the absorption of cholesterol in the small intestine, which lowers harmful LDL cholesterol levels by 6% to 15% without affecting levels of good HDL cholesterol. Their consumption is believed to be safe and doesn't appear to interfere with the action of cholesterol-lowering medications such as statins.^{10,11}

Gazzaniga-Moloo supports incorporating plant stanols into a heart-healthy diet. "The research is pretty convincing that bringing plant stanols into your diet is cardioprotective," she says. "If you're looking for a spread on your toast, use whole grain bread and reach for margarine with plant stanols added to it. While they occur naturally to a degree in certain foods, some people will find it challenging to eat enough of those foods to get an adequate amount, so these products can help."

The effectiveness of plant sterols and stanols in reducing CVD has been observed at a dosage of 2 to 3 g per day.¹²⁻¹⁴ And as Gazzaniga-Moloo notes, these substances are present in minimal quantities in foods such as fruits, vegetables, vegetable oils, nuts, seeds, cereal, and legumes; therefore margarines enriched with plant stanols and sterols often are recommended. Counseling clients to consume 2 to 4 tablespoons of plant stanol-enriched margarine per day will provide them with 2 g or more of plant stanols.¹⁵

Heart-Healthy Beverages

While the research is somewhat controversial, certain drinks such as red wine, tea, and coffee may reduce CVD risk.

Given its high content of catechins (a group of flavonoids), green tea may protect against death from all causes, especially CVD.¹⁶ A study by Wang and colleagues, published in March 2011 in the *American Journal of Clinical Nutrition*, sought to find an association between black and green tea consumption and coronary artery disease (CAD). No significant cardioprotective benefit was reported from black tea; however a 1-cup-per-day increase in green tea consumption was associated with a 10% decrease in risk of developing CAD.¹⁷

The flavonols found in coffee have generated buzz due to tentative research suggesting that regular coffee consumption may cut CVD risk. It's been reported that drinking 2 to 4 cups of coffee per day (no more, no less) may reduce heart disease risk by about 20%.¹⁸ Additionally, Sugiyama and colleagues reported in the May 2010 issue of the *Journal of Nutrition* that coffee may demonstrate favorable effects on CVD mortality, especially with regard to coronary heart disease in women.¹⁹

Brill believes that the polyphenols in red wine—resveratrol, procyanidins, and quercetin—can indeed boost the heart disease defense system, supporting the recommendation that red wine is beneficial when women consume one glass per day and men consume two. “Red wine not only raises your levels of HDL but also expands the size of those HDL particles. This is important because we know it’s not just about how many HDL particles you have; you want them to be large and fluffy.” Research has shown that small HDL particle size is associated with increased risk of coronary heart disease.²⁰ But Brill cautions that wine consumption clearly is a double-edged sword, reminding her clients that a little is good, a lot is not better.

So should dietitians recommend these heart-healthy beverages to their clients for the sake of staving off CVD? Not yet, according to Gazzaniga-Moloo. “The research behind functional beverages has yet to pan out, so we’re not ready to actually recommend that our clients drink beverages such as coffee or green tea because of proven health benefits for the heart,” she explains. A review by Di Castelnuovo and colleagues, published in January 2012, reported a similar conclusion: “Although regular consumption of moderate quantities of coffee and [green] tea seems to be associated with a small protection against CAD, results from randomized clinical trials about their beneficial effects are less evident.”²¹

Takeaway From Our Experts

While RDs can agree that certain foods may significantly enhance cardiovascular health, what remains unequivocally true is that no single food will prevent CVD. “It’s not just about these individual functional foods rather the whole diet,” Salge Blake says. “We have to consider a plant-based diet that’s rich in fruits and vegetables, low in saturated fat, and includes fish, physical activity, having social support, drinking plenty of water, and being lean. The public tends to love magic foods, but there’s nothing magical about eating fish every week. You must couple it with a healthful diet and lifestyle to reap the benefits.”

Echoing the significance of looking at the big picture when it comes to heart disease prevention, Brill praises the highly regarded Mediterranean style of eating and living. “If you have a meal with spinach and extra-virgin olive oil with some garlic, spritz of lemon juice, washed down with a glass of red wine, you’re getting a cornucopia of antioxidants in one meal. The beauty of the Mediterranean diet is that all types of foods are working together to fight off atherosclerosis. It’s hands down the heart-healthiest diet and also a lifestyle that’s scientifically proven effective in primary and secondary prevention of CVD.”

Brill finds this dietary approach especially effective for survivors of heart attack, as it allows them to continue enjoying life and food. “I think so many who’ve survived heart disease think they have to deprive themselves,” Brill says. “A Mediterranean-style diet tastes good, and there’s no deprivation.”

There are numerous opportunities for dietitians to help people live longer, healthier lives by helping them eat a cardioprotective diet. Despite the existence of pharmaceutical drugs such as statins, which have proven benefits of lowering LDL cholesterol, Brill reminds us that these drugs alone don’t adequately prevent CVD. “Statin therapy doesn’t eliminate CVD risk because it only targets LDL cholesterol,” Brill explains. “The medical world hasn’t come up with a pharmaceutical agent that can raise HDL significantly—Mother Nature has.” Brill encourages

other dietitians and healthcare practitioners to teach their patients and clients that diet and lifestyle modifications can be extremely effective in warding off CVD. “We should be pushing these lifestyle changes because we know they work. Heart attack and stroke is the leading cause of death worldwide, but largely a preventable condition.”

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Examination

1. According to the Academy of Nutrition and Dietetics, functional foods are whole, fortified, enriched, or enhanced foods that have a potentially beneficial effect on health when regularly consumed at effective levels as part of a varied diet.

- A. True
- B. False

2. Which of the following statements about fruits and vegetables is false?

- A. They are abundant in plant-based phytochemicals known as flavonols.
- B. They are high in fiber.
- C. They are low in fat.
- D. They are the best source of omega-3 fatty acids.

3. According to a study by McCullough and colleagues, which statement best describes flavonoids?

- A. They associated with lower risk of death from cardiovascular disease (CVD).
- B. They are beneficial for cardiovascular health but only in large amounts.
- C. They are destroyed when cooked at high temperatures.
- D. All of the above

4. Which of the following oils is rich in oleic acid and thus may prevent the oxidation of LDL cholesterol?

- A. Safflower oil
- B. Peanut oil
- C. Extra-virgin olive oil
- D. Sesame oil

5. Which of the following statements regarding legumes is false?

- A. Legumes are generally less expensive than animal-based foods.
- B. Legumes contain less cholesterol and saturated fat than animal-based foods.
- C. Legumes contain more fiber than animal-based foods.
- D. None of the above

6. The American Heart Association recommends consuming fish this number of times per week:

- A. One
- B. Two
- C. Three
- D. Four

7. According to a study by Strøm and colleagues, little or no fish intake is associated with an increased risk of CVD.

- A. True
- B. False

8. Which of the following whole grain foods is noted for its significant benefits to cardiovascular health due to its high content of the fiber beta-glucan?

- A. Barley
- B. Wheat berries
- C. Oats
- D. Brown rice

9. According to a study by Bassett and colleagues, which of the following statements regarding ground flaxseed is accurate?

- A. It is high in alpha-linolenic acid.
- B. It can inhibit the atherogenic action of cholesterol and trans fat in the diet.
- C. It is a good source of the omega-3 fatty acid DHA.
- D. Both A and B

10. Which statement(s) are true regarding plant stanols?

- A. These plant-based substances reduce CVD risk by blocking the absorption of cholesterol in the small intestine.
- B. The effectiveness of plant sterols and stanols in reducing CVD has been observed at a dosage of 2 to 3 g/day.
- C. Counseling clients to consume 2 to 4 tablespoons of plant stanol-enriched margarine per day will provide them with 2 g or more of plant stanols.
- D. All of the above