

Adding Spice for a Healthier Life — Evidence Shows Antioxidant-Rich Herbs and Spices May Cut Chronic Disease Risk

By Megan Tempest, RD

Talk to patients about consuming foods high in antioxidants, and chances are you'll conjure up images of juicy blueberries, deep green kale leaves, or brightly colored fruits such as plums, oranges, and kiwis. What patients may not know, however, is that numerous herbs and spices, such as turmeric, clove, and oregano, also are rich sources of antioxidants.

"Most people think of antioxidants as coming strictly from foods like fruits and vegetables, dark chocolate, or red wine," says Los Angeles-based dietitian Vandana Sheth, RD, CDE, a spokesperson for the Academy of Nutrition and Dietetics (the Academy), "but many herbs and spices not only provide flavor but also a big bang of antioxidants. A little bit goes a long way."

Just 1/2 teaspoon of ground clove is said to contain more antioxidants than 1/2 cup of blueberries. And what about that little teaspoon of dried oregano that's often stirred into a simmering pot of spaghetti sauce? That's an amount equal to the antioxidants contained in a whole cup of sweet potatoes.¹

Given the number of scientific studies suggesting the health benefits of antioxidants, it's important that dietitians counsel clients about the potential benefits of consuming foods containing them and provide suggestions for increasing their intake. The use of herbs and spices in cooking is an easy way for clients to accomplish this.

The following article examines five herbs and spices that are excellent sources of antioxidants, reviews the major health benefits of antioxidant intake, and offers strategies on how to encourage clients to incorporate more antioxidants into their diets.

Spices Packing a Powerful Antioxidant Punch

By definition, antioxidants are substances that may protect cells from the damage caused by unstable molecules known as free radicals.² In nature, antioxidants protect living organisms from oxidative stress. By consuming antioxidant-rich foods, it's believed the human body obtains these protective benefits, ranging from fending off age-related wrinkles to preventing chronic illnesses such as heart disease and cancer. Examples of well-recognized antioxidants are vitamin C, vitamin E, beta-carotene, and plant-derived polyphenolic compounds such as quercetin in citrus fruits; resveratrol in red grapes; and rosmarinic acid in rosemary, basil, and oregano.

Antioxidants are found in variable amounts in the hundreds of herbs and spices that exist in the plant kingdom. Here's a quick look at five dried herbs and spices that rank highest in antioxidant content per 100 g (based on a list from the McCormick Science Institute), and various tips for helping clients incorporate them into their favorite foods.³

1. Clove

What is it? Native to the islands of Indonesia, clove is derived from the dried flower buds of the evergreen clove tree. Clove lends its distinctively strong flavor and aroma to ketchup and Worcestershire sauce preparations and historically has been used as a natural numbing agent.⁴

What does it contain? Dried clove is rich in polyphenolic compounds, a large class of plant-based compounds thought to impart antioxidant properties. In 2010, scientists at Miguel Hernández University in Spain reported that clove ranks highest as a natural antioxidant due to its phenol content and demonstrated ability to inhibit several damaging oxidative processes.⁵

How can clients use it? Due to its pungent aroma, many clients may be unsure how to subtly incorporate clove in cooking. But according to Sheth, clients can use ground clove wherever they add cinnamon or ginger. For example, stir ground clove into applesauce, stewed pears, or oatmeal. Clove is also a pleasant addition to muffins, cookies, whole grain pancakes, and sweet breads.

2. Oregano

What is it? Cultivated for centuries and widely used in Mediterranean and Mexican cuisine, dietitians would be hard-pressed to find someone who hasn't tasted oregano in foods. Scientifically known as *Origanum vulgare* and occasionally referred to as wild marjoram (to which it's a close relative), common oregano comes from the dried leaves of a small perennial flowering shrub that's native to the Mediterranean and cultivated worldwide.

What does it contain? Within its green, oval-shaped leaves, oregano is rich in phytochemicals such as thymol and rosmarinic acid, along with humalogs from the antioxidant vitamin E. Studies have shown oregano to have the highest total antioxidant capacity and phenolic content when compared with thyme, sage, rosemary, mint, and sweet basil. In addition, oregano may increase brain antioxidant activity and total antioxidant status.⁶

How can clients use it? With a little creative thinking, clients can use oregano for far more than pizza and spaghetti sauce. Sheth recommends a sprinkle of oregano to enliven sandwiches (eg, grilled cheese) as well as casseroles and salad dressings. "In the morning I may have a slice of whole grain toast with mozzarella and a sprinkle of oregano," Sheth says. Want a unique twist on scrambled eggs? Instead of adding cheese, mix in some vegetables such as mushrooms and Swiss chard with a healthful dash of oregano.

3. Ginger

What is it? Dried, ground ginger comes from the root of the perennial herb *Zingiber officinale*. After the plant reaches its 2- to 4-ft growth potential, the leaves die and the thick roots are dug up for consumption.⁴

What does it contain? Ginger contains several compounds that are thought to provide health benefits. Among them is gingerol, a relative of capsaicin found in chili peppers, which lends the root its characteristic spiciness. Historically, ginger has been used to treat everything from the common cold to motion sickness and gastrointestinal ailments. Cell cultures and animal studies show that ginger may protect tissues and organs against oxidative damage and prevent cancer development and growth.⁷

How can clients use it? Suggest clients consider ground ginger when they want to add a gentle spice to their foods. Sheth recommends clients add it to fruit smoothies, cereals, or yogurt and sprinkle it on toast to make a quick and easy gingerbread toast. Ground ginger instantly adds an Asian flair to sautéed vegetables, salad dressings, and marinades. Encourage clients to sprinkle ground ginger on sweet potatoes for an antioxidant-packed side dish.

4. Cinnamon

What is it? Cinnamon, considered one of the first known spices, is the dried inner bark of various evergreen trees within the genus *Cinnamomum*. When harvested, the tree bark is stripped and allowed to dry in the sun where it forms its characteristic curls known as quills.⁴

What does it contain? Antioxidant components of cinnamon, such as cinnamaldehyde, identified in cell cultures and animal studies, suggest cinnamon may act as an antioxidant in humans. A recent study comparing the antioxidant potential of several plants, including cinnamon, spinach, chard, Jerusalem artichoke, and red cabbage, found that extracts of cinnamon had the most potent antioxidant effects.⁸

How can clients use it? Cinnamon is incredibly versatile, says Atlanta-based dietitian Marisa Moore, MBA, RD, LD. “Cinnamon can be sprinkled on foods like oatmeal [and] yogurt, or mixed in your glass of milk.” She suggests using cinnamon to jazz up plain cereal, sprinkling cinnamon on toast with almond butter, or adding it to baked apples or pears. When counseling clients who prefer something sweet, Moore recommends using cinnamon for extra flavor and a sense of sweetness without adding actual sugar. Moore says cinnamon is an excellent addition to savory dishes as well, such as quinoa, whole wheat couscous, or barley salad. “Take a whole grain salad, throw in some dried fruit, and then add a little cinnamon to bring the whole dish together.”

5. Turmeric

What is it? Like ginger, dried turmeric originates from the root of the plant *Curcuma longa*. Noted for its bright yellow color, turmeric gives curry powder its distinctive hue and is used to add color and flavor to prepared mustard, pickles, relish, chutneys, and rice dishes.⁴

What does it contain? Curcumin, the bright yellow polyphenol compound found in turmeric, has been the focus of intense research due to its potential to avert chronic diseases such as cancer, heart disease, arthritis, and Alzheimer's disease. Curcumin has been shown to inhibit the expression of a specific gene that's believed to lead to the development and progression of breast cancer.⁹

How can clients use it? "People often don't know what to do with turmeric," Sheth says, "but it can be added to any vegetable side dish for a little curry flavor," noting that dried turmeric has a strong taste and is best cooked a bit before consumption.

Moore highlights turmeric's unique ability to add rich color to any dish, such as roasted cauliflower or a plain couscous salad. "Everyone knows we eat with our eyes first; that's where turmeric can really help out a dish," she says.

Historical Uses of Herbs and Spices

The use of herbs and spices for medicinal, culinary, and other functional purposes has persisted through multiple centuries and in regions around the world. It's been reported that the first documented use of herbs and spices dates back to Egypt as early as 2600 BC, during the age of the pyramids. Fragrant herbs and spices such as cinnamon, anise, and cumin often were integral ingredients in the embalming process. The Romans considered the scent of cinnamon sacred and, therefore, burned it at funeral ceremonies. Chinese courtiers of the third century BC are said to have carried cloves in their mouths to ensure sweet-smelling breath when they addressed the emperor. India boasts a long history of using spices like cardamom and turmeric to alleviate numerous conditions such as urinary tract ailments and jaundice. Ayurvedic wisdom suggests chewing clove and cardamom after meals to increase the flow of saliva and enhance digestion. These are just a handful of examples of the versatile uses of herbs and spices throughout history.¹⁰

Reducing Deadly Carcinogens and Disease Risk

Today herbs and spices are perhaps best known for their unique aromas and flavors they impart to food. Researchers are just beginning to understand their potential as disease-fighting sources of antioxidants, yet the available studies on the subject are intriguing. One particular hot topic on the research forefront is the role herbs and spices may play in reducing the formation of harmful carcinogens formed when cooking meat. Joy Dubost, PhD, RD, a spokesperson for the Academy, finds the evidence compelling: "The overall take-home message is that adding spices and herbs seems to reduce the harmful by-products formed in cooked meat that may lead to cancer."

For example, in the May 2010 issue of the *American Journal of Clinical Nutrition*, Zhaoping and colleagues reported that adding a polyphenol-rich spice mixture (notably containing

rosmarinic acid from oregano) to hamburger meat before cooking reduced the formation and absorption of malondialdehyde, a naturally occurring by-product of lipid peroxidation thought to cause changes to DNA and promote cancer. A similar study by Smith and colleagues of Kansas State University, published in the 2008 issue of the ***Journal of Food Science***, drew parallel conclusions regarding the power of antioxidant herbs and spices to reduce harmful meat by-products. The findings suggested that commonly available, spice-containing marinades can be effective inhibitors of heterocyclic amine (HCA) formation and lessen exposure to some of the carcinogens formed during grilling. The National Cancer Institute (NCI) defines HCAs as chemicals formed when muscle meat, such as beef, pork, poultry, and even fish, is cooked using high-temperature methods such as pan frying or grilling directly over an open flame. More specifically, HCAs are formed when amino acids, sugars, and creatinine react at high temperatures. The potential for antioxidant herbs and spices to reduce or prevent the formation of HCAs during the cooking of meat at high temperatures is important because epidemiologic studies have found that high consumption of well-done, fried, or barbecued meats, which are the only foods that contain significant amounts of HCAs, is associated with a higher risk of cancer of the colon, pancreas, and prostate.¹¹

The power of antioxidant herbs and spices to inhibit the formation of HCAs during the cooking of meat was further demonstrated by the Puangsombat and Smith study reported in the March 2010 issue of the ***Journal of Food Science***, showing that constituents of rosemary extract—rosmarinic acid, camasol, and carnosic acid—may behave synergistically to inhibit the formation of HCAs. The same researchers later supplemented their previous studies involving rosemary and analyzed HCA formation in the presence of five Asian spices: turmeric, cumin, coriander, and lesser-known galangal and fingerroot. The HCA levels in fried beef patties containing the Asian spices were compared with fried beef patties containing rosemary. Puangsombat and colleagues reported in the October 2011 issue of the ***Journal of Food Science*** that all five of the Asian spices significantly decreased HCA formation; however, only turmeric and fingerroot were found to be as effective as rosemary in reducing its development. They concluded that “the addition of Asian spices can be an important factor in decreasing the levels of HCAs in fried beef patties.”

In addition to inhibiting the formation of potentially carcinogenic by-products, antioxidant herbs and spices may prove beneficial in the prevention and treatment of other diseases. Extracts of cinnamon and clove have been shown to potentially treat diseases such as hyperlipidemia and diabetes, according to an animal study by Jin and Cho published in the July 2011 issue of ***Food and Chemical Toxicology***. When compared with ground pepper, rosemary, and ginger, the spices cinnamon and clove demonstrated the strongest antiglycation and antioxidant activity as well as the strongest inhibition of activity against LDL oxidation. Further demonstrating its overall hypolipidemic activity, the subjects treated with clove extract experienced a 68% reduction in serum cholesterol and an 80% decrease in triglyceride levels. Participants had the lowest increase in body weight and the strongest antioxidant activity following five weeks on a high-cholesterol diet. These findings suggest constituents of cinnamon and clove may lower the risk of developing atherosclerosis and diabetes.

Bioavailability of Antioxidants

Determining the level of antioxidants various herbs and spices contain, as well as how well our bodies absorb these antioxidants during digestion, is yet another area of ongoing scientific investigation. Daly and colleagues addressed this subject in the June 2010 issue of ***Plant Foods for Human Nutrition***. Their study analyzed the content of carotenoids—naturally occurring plant pigments with antioxidant properties, such as beta-carotene, beta-cryptoxanthin, and lutein and zeaxanthin—in the herbs basil, coriander, dill, mint, parsley, rosemary, sage, and tarragon. Daly and colleagues also studied the bioavailability of the carotenoids in these herbs, which they defined as the amount of carotenoids transferred to micelles after digestion when compared with the original amount present in the food. The results indicated variable levels of carotenoid content among these herbs and bioaccessibilities ranging from 0% to 42.8%. Basil and coriander contained the highest levels of the carotenoids beta-carotene and beta-cryptoxanthin as well as lutein and zeaxanthin. Based on the findings, the researchers reported that herbs aren't rich only in carotenoid content but also can significantly contribute to the intake of bioaccessible carotenoids.

Counseling Patients

Armed with the latest research on antioxidants in foods and herbs and spices, dietitians will want to encourage clients to boost their intake of these disease-fighting nutrients. The following strategies can help.

- **Consume herbs and spices for their antioxidant content, not for specific health benefits.** RDs should continue to encourage patients to consume antioxidant-rich foods, including fresh fruits, vegetables, herbs, spices, berries, and whole grains, as part of a healthful diet. However, further scientific research is needed for RDs to make clinical recommendations to patients regarding the protective health effects of specific herbs and spices related to disease prevention.

From Dubost's perspective, the real challenge lies not in proving that herbs and spices have health benefits but in determining what those specific health benefits are. "We do know, based on different tests, that there's antioxidant content within fruits and vegetables, and spices and herbs," she asserts. "However, the research is quite limited on how their antioxidant content translates to health benefits. That's important to note. We're really just beginning to understand how they work in the body."

- **Munch on a wide variety.** Just as Dubost advises patients to "eat the rainbow" of fruits and vegetables, she believes the same recommendation applies to herbs and spices so clients can get all the different antioxidants they contain. "I like adding cinnamon to coffee or adding oregano to my Italian dishes. Whatever you like, the key is to consume a variety, just as we recommend with fruits and vegetables."

- **Use herbs and spices instead of less healthful food additives.** While dietitians may not have ample evidence to recommend herbs and spices to provide specific health benefits, they can recommend them as healthful substitutions for ingredients such as salt, fat, and sugar. Experts agree that seasoning food with herbs and spices not only enhances the flavor and aroma of food but also prevents negative health risks. "For patients who are watching their

weight or trying to reduce caloric intake, herbs and spices can help them cut back on fat and sugar by adding flavor,” Sheth says.

Moore encourages dietitians to become familiar with the culinary uses and antioxidant content of various herbs and spices, as this is an area of opportunity for them to educate patients. “People are used to using salt and pepper or that familiar bottle of Italian seasoning, but many haven’t gone out of their way to try other seasonings.” That’s where the RD can make an impact. “For instance, for people trying to lower their sodium, I recommend using paprika, which adds color and a ton of flavor,” Moore says. “If you consider the implications of cinnamon replacing sugar in cereal or paprika replacing salt in chili, over time that will bring additional health benefits.”

• **Opt for dried herbs and spices.** “Some say fresh is better, but that’s not always the case,” says Dubost, who regards herbs and spices in fresh or dried form as equally beneficial. “For those who enjoy growing their own herb garden, fresh herbs are great. But for the convenience factor, dried herbs and spices are perfectly fine.” In fact, a 2011 study¹² by researchers at the UCLA School of Medicine reported that nine herbs—basil, chili, cilantro, dill, garlic, ginger, lemongrass, oregano, and parsley, as well as an Italian herb mixture—retained their antioxidant capacity and phenolic content during the drying process. Oregano displayed the highest antioxidant content of all the herbs tested in both dry and fresh forms. The researchers concluded that processed herbs contribute significant amounts of antioxidant compounds to the diet.¹²

Looking Ahead

As the scientific evidence continues to unfold, it’s possible that someday dietitians may get the green light to recommend patients consume antioxidant-rich herbs and spices to prevent and even slow the progression of specific diseases. For example, they could encourage the use of turmeric to inhibit cancer growth or eat oregano to delay Alzheimer’s disease. In the interim, however, the potential health benefits of antioxidants can’t be ignored, and dietitians should encourage patients to increase their intake of a variety of antioxidant-rich foods. The use of the antioxidant-rich herbs and spices discussed in this article is an accessible and convenient strategy for patients to achieve such an increase in their daily diets.

— *Megan Tempest, RD is a freelance writer based in Colorado.*

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Examination

1. According to the McCormick Science Institute's antioxidant comparison of spices and foods, which of the following herbs and/or spices does not rank highest in antioxidant content?

- a. Onion powder
- b. Oregano
- c. Turmeric
- d. Clove

2. In nature, antioxidants protect living organisms from oxidative damage.

- a. True
- b. False

3. According to the National Cancer Institute, which statement is false concerning heterocyclic amines (HCAs)?

- a. They are formed when amino acids, sugars, and creatinine react at high temperatures.
- b. They are found in significant amounts in vegetables cooked with meat.
- c. Pan frying or grilling meat directly over an open flame may promote their formation.
- d. Fish, when cooked at high temperatures, may form HCAs.

4. Malondialdehyde is a by-product of lipid peroxidation that alters DNA and may cause cancer.

- a. True
- b. False

5. The constituent of turmeric that's being heavily investigated for its ability to inhibit cancer growth, among other health benefits, is which of the following?

- a. Rosmarinic acid
- b. Thymol
- c. Curcumin
- d. Curry

6. Which herb is reported to contain humulones of vitamin E?

- a. Clove
- b. Oregano
- c. Turmeric
- d. Cinnamon

7. When counseling patients, appropriate recommendations regarding the use of herbs and spices may include which of the following?

- a. Liberally consume a wide variety of herbs and spices, as many are high in antioxidant content.
- b. Do not discontinue the use of a prescribed medication in favor of using a specific herb or spice to treat a medical condition.

- c. Use herbs and spices as substitutions for less healthful additives such as fat, sugar, and salt.
- d. All of the above

8. Research has suggested which of the following constituents may inhibit expression of a gene that causes breast cancer?

- a. Curcumin
- b. Cinnamaldehyde
- c. Gingerol
- d. Rosmarinic Acid

9. According to an animal study by Jin and Cho, which of the following herbs/spices were found to potentially treat hyperlipidemia and diabetes?

- a. Fingerroot and clove
- b. Cinnamon and clove
- c. Garlic and paprika
- d. Cumin and oregano

10. According to a study by Henning and colleagues, processed herbs may contribute significant amounts of antioxidants to the diet.

- a. True
- b. False