

Understanding the Health Benefits of Tomato Products

Sharon Palmer, RD

Tomato products, the humble staple in cuisines across the globe, are emerging as foods that hold particular promise in promoting health. Tomato products—including canned tomatoes, tomato sauce, tomato paste, tomato soup, tomato juice, and ketchup—are made with ripe tomatoes that are heat-processed within hours of harvest. Botanically identified as a fruit but considered a vegetable by the U.S. Department of Agriculture, tomatoes are among the most popular vegetables in the country, second only to potatoes. The popularity, value, and convenience of tomato products should not be underestimated. Some of our favorite dishes, from pizza to spaghetti, showcase them as key ingredients.

In our quest to increase the fruit and vegetable intake of Americans to nine servings per day, focusing on tomato products is a simple way to inch closer to this goal. It is well known that eating generous amounts of fruits and vegetables is likely to reduce the risk of a number of chronic diseases. However, the health-protective power of tomato products goes beyond their ability to increase fruit and vegetable intake. While emerging research hints that tomato products may be protective in such diverse conditions as ultraviolet (UV)-induced damage¹ and osteoporosis², they have a more established connection with protection from heart disease³ and cancer.⁴

Tomato Products' Nutrient Arsenal

Tomato products are generously stocked with vitamins (particularly vitamin C), minerals, fiber, and phytonutrients. Among their arsenal of nutrients, scientists are particularly intrigued with the carotenoids, which are antioxidants that inactivate free radicals, slow progression of atherosclerosis, and protect against cancer. The most abundant carotenoid in tomato products is lycopene, followed by phytoene, phytofluene, zeta-carotene, gamma-carotene, beta-carotene, eurosporene, and lutein. Several studies suggest that lycopene may be the powerhouse behind the health-protective properties of tomato products.

Tomato products account for more than 80% of the lycopene in the American diet. An Ohio State University study found that single daily servings of processed tomato products produce significant increases in blood and buccal mucosal cell lycopene concentrations in healthy adults.⁵ The lycopene from processed tomatoes versus fresh tomatoes is more bioavailable. Processing breaks down the tomato cell matrix, resulting in greater absorption of lycopene.

Tomato nutrients appear to work synergistically within the tomato and with other foods to provide benefits. Israeli

researchers examined the effects of tomato lycopene alone or combined with other natural antioxidants on low-density lipoprotein (LDL) oxidation. They found that a tomato extract showed superior capacity, by up to five-fold, to inhibit LDL oxidation compared with pure lycopene. Lycopene combined with vitamin E resulted in significantly greater inhibition than the expected additive individual inhibition. When lycopene was combined with the flavonoid glabridin, and the phenolics rosmarinic acid and carnosic acid, or garlic, synergistic antioxidative effects were obtained. Similar interactive effects also were observed with beta-carotene, but to a lesser extent.⁶

Cooking tomatoes with oil, a common practice in the Southern Mediterranean diet, may also increase carotenoid bioavailability. An Australian study investigated whether consumption of diced tomatoes cooked with olive oil resulted in higher plasma lycopene concentrations than consumption of diced tomatoes cooked without olive oil in healthy subjects. Subjects consumed one meal per day of tomatoes cooked with or without extra virgin olive oil. There was an 82% increase in plasma trans-lycopene and a 40% increase in cis-lycopene concentrations in the subjects who consumed tomatoes cooked in olive oil.⁷

Heart-Healthy Tomato Products

One of the most compelling benefits of eating more tomato products relates to heart health. Research shows that regular consumption of tomato products and higher levels of lycopene in the bloodstream are linked with lower rates of cardiovascular disease (CVD). Scientists from Brigham and Women's Hospital evaluated lycopene or tomato-based foods and CVD risk in a prospective cohort study of 39,876 middle-aged and older women. The inverse associations noted for higher levels of tomato-based products with CVD suggested that dietary lycopene or other phytochemicals consumed as oil-based tomato products confer cardiovascular benefits.⁸

Lycopene appeared to contribute to the protective effect of vegetable consumption on myocardial infarction (MI) risk in the EURAMIC Study, a multicenter case-controlled study from 10 European countries. Scientists evaluated the relationship between antioxidant status and acute MI. When examined individually, each of the carotenoids (alpha-carotene, beta-carotene, and lycopene) appeared to be protective. However, upon simultaneous analyses of the carotenoids, lycopene remained independently protective, leading the researchers to conclude that lycopene, or some substance highly correlated and in a common food source, may contribute to the protective effect of vegetable consumption on MI risk.⁹

Nutrient Profile of Canned Tomatoes

Tomatoes— red, ripe, canned, packed in tomato juice, no salt added (1 cup)

Calories: 41
Total fat: 0 g
Sodium: 24 mg
Carbohydrates: 10 g
Dietary Fiber: 2.4 g
Protein: 2 g
Vitamin A: 281 IU (6% DV)
Vitamin C: 22.3 mg (37% DV)
Vitamin E (alpha tocopherol): 1.6 mg (8% DV)
Vitamin K: 7 mcg (9% DV)
Thiamin: 0.1 mg (7% DV)
Riboflavin: 0.1 mg (8% DV)
Niacin: 1.7 mg (9% DV)
Vitamin B6: 0.3 mg (13% DV)
Folate: 19.2 mcg (5% DV)
Pantothenic acid: 0.3 mg (3% DV)
Choline: 16.8 mg
Calcium: 74.4 mg (7% DV)
Iron: 2.3 mg (13% DV)
Magnesium: 26.4 mg (7% DV)
Phosphorus: 45.6 mg (5% DV)
Potassium: 451 mg (13% DV)
Zinc: 0.3 mg (2% DV)
Copper: 0.2 mg (8% DV)
Manganese: 0.2 mg (9% DV)
Lycopene: 6,641 mcg

DV=daily value

Source: Nutritiondata.com

Fighting Oxidative Stress

Consumption of tomato-based foods also is associated with beneficial effects regarding oxidative stress parameters and LDL oxidative susceptibility, which play an important role in the development of CVD. Antioxidant vitamins and carotenoids have demonstrated an effect of reducing both oxidative stress markers and the LDL-oxidation process.¹⁰

A number of studies confirm that tomato products can reduce oxidative stress. A Northern Ireland study found that dietary intake of more than 40 mg/day of lycopene in a group of nonsmoking individuals significantly reduced susceptibility of LDL to oxidation in a short-term intervention study.¹¹ A New

Zealand study found that tomato juice increased plasma lycopene concentrations and the intrinsic resistance of LDL to oxidation almost as effectively as supplementation with high-dose vitamin E in patients with type 2 diabetes.¹²

Anti-Inflammatory Power

A growing body of research suggests that inflammation may be a significant component in the development of chronic diseases including CVD, cancer, obesity, metabolic syndrome, type 2 diabetes, osteoporosis, periodontal disease, rheumatoid arthritis, neurological degenerative disorders, and inflammatory bowel disorders. Dietary factors such as eating more tomato products can play a role in reducing inflammation. Using data from adults in the National Health and Nutrition Examination Survey (1999-2004), consumption of processed tomatoes was associated with significantly lower serum C-reactive protein, a recognized biomarker of inflammation.¹³

Researchers from Milan studied the effects of a tomato-based drink, previously shown to provide DNA protection from oxidative stress, on the modulation of immune and inflammatory markers in 26 young, healthy volunteers in a placebo-controlled, double-blind, crossover study. The inflammatory mediator, tumor necrosis factor (TNF)-alpha, was 34.4% lower after 26 days of tomato-based drink (Lyc-o-mato containing 5.7 mg lycopene, 3.7 mg phytoene, 2.7 mg phytofluene, 1 mg beta-carotene, and 1.8 mg alpha-tocopherol) consumption.¹⁴

More recently, scientists investigated the effects of processed tomato products on vasodilatation and C-reactive protein in 56 overweight and obese adults. After consumption of a low-tomato diet for 3 weeks, followed by either a 6-week high-tomato diet or low-tomato diet, the subjects' responses were assessed after eating a high-fat meal. The high-tomato group had lower C-reactive protein concentrations and increased mean vessel diameter.¹⁵

Inhibiting Platelet Aggregation

Tomato products contain anti-platelet compounds that appear to inhibit thrombin-induced platelet aggregation, which may aid in the primary prevention of CVD. In testing fruits in vitro, Scottish researchers found that tomatoes have the highest anti-platelet activity. The anti-platelet components in tomatoes, which are water soluble, heat stable, and concentrated in the yellow fluid around the seeds, inhibited aggregation by up to 70%.¹⁶ Results from a randomized, double-blinded, placebo-controlled crossover study with 90 healthy human subjects revealed that tomato extract significantly reduced platelet aggregation 3 hours after supplementation.¹⁷

Lipid Benefits

Another heart-health benefit of eating tomato products relates to lipid profile. Some, but not all, studies show a link between tomatoes and lipid profile. In 98 healthy volunteers, a tomato-rich diet significantly increased high-density lipoprotein (HDL)-cholesterol serum levels by 15.2% over 1 month of follow-up.¹⁸ In another diet intervention study, in which a 3-week low-tomato diet and a 3-week high-tomato diet were consumed by 21 healthy subjects, the high-tomato diet and low-tomato diet reduced total cholesterol and LDL-cholesterol serum concentrations by 5.9% and 12.9%, respectively.¹⁹

A Role in Hypertension

It shouldn't be a surprise that potassium-rich tomato products have also demonstrated benefits in treating hypertension. A single-blind, placebo-controlled study involving 31 subjects found that a short-term treatment with tomato extract can reduce blood pressure in individuals with grade-1 hypertension, naive to drug therapy.²⁰

Tomato Products Take on Cancer

Fitting tomato products into the diet regularly may protect against a number of cancers. Data from the Physicians' Health Study suggest that eating lycopene from tomato products may reduce the occurrence and progression of prostate cancer.²¹ Furthermore, in the most comprehensive scientific analysis of cancer prevention and causation undertaken, an expert panel reviewed more than 4,000 studies and reports, documenting their findings in the *Second Expert Report—Food, Nutrition, Physical Activity, and the Prevention of Cancer: A Global Perspective*.⁴ According to the report, substantial evidence indicates that eating tomato products and foods containing lycopene probably does protect against cancer, potentially decreasing prostate cancer risk by about 11%.

Research suggests that lycopene obtained through high consumption of tomato products provides a protective effect against the risk of colorectal cancers.²² Carotenoids found in fruits and vegetables also are linked with a lower risk of upper digestive tract cancer.²³ The results of a study performed by the Epidemiology Research Unit at the Centre Hospitalier de l'Université de Montréal indicate that a diet rich in tomato-based products with high lycopene content may help reduce the risk of pancreatic cancer.²⁴

Encouraging consumption of tomato products may be a valuable tool in promoting health. Tomato products are not only popular and well-suited for a number of delicious dishes—they are also economical, shelf stable, and easy to use. With the common misperception that “fresh is always best,” people may be overlooking the positive health benefits associated with including more tomato products in the diet. Dietitians can effectively communicate the power of including a rainbow of seasonal fruits and vegetables in many forms, with the red hue of tomato products placed high on the list.

Sharon Palmer, RD, is a food and nutrition writer and editor in Southern California. She has written more than 600 articles on food and nutrition in a variety of publications.

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Paint Your Plate Red for the Health-Protective Power of Tomato Products

Scientific evidence is pointing out that tomato products, a key ingredient in delicious cuisines around the world, may help protect your health in a number of ways. Tomato products including canned tomatoes, tomato sauce, tomato paste, tomato soup, tomato juice, and ketchup are inexpensive, always available, shelf-stable, and easy to use—making them the perfect ingredient to reach for when you're on the quest for a healthy meal to make in minutes.

Health Benefits Linked with Tomato Products

Tomato products are packed with important nutrients such as vitamin C, potassium, fiber, and the powerful antioxidant, lycopene—all in a low-calorie, low-fat bundle. In fact, the lycopene found in processed tomato products is even more available to your body compared with fresh tomatoes. Eating more tomato products—the second most popular vegetable only to potatoes—is also an easy way to help you get closer to the recommended nine servings of fruits and vegetables you should be eating every day to protect from conditions like heart disease, type 2 diabetes, cancer, and obesity.

Researchers have found a number of health benefits linked with eating more tomato products, from helping to protect against the sun's damaging rays to promoting healthy bones. But the strongest proof for eating more tomato products is linked to their ability to fend off heart disease and certain types of cancer, particularly prostate cancer. The nutrients in tomatoes help put the brakes on free radical damage and inflammation, which is at the root of many disease killers of our age such as cancer, diabetes, and heart disease.

Get Your Red On!

With so many reasons to enjoy more tomato products, start putting red into your diet every day. Here are a few tips to get you started:

- Make a pot of soup each week featuring canned tomatoes or tomato juice as a base.
- Include canned, diced tomatoes in casseroles such as tamale pie or ratatouille.
- Serve baked tomatoes as a side dish by sprinkling canned tomatoes with herbs, bread crumbs, and olive oil before baking.
- Feature a pasta dish that includes tomato sauce (like lasagna or spaghetti) for dinner at least once a week.
- Enjoy Latin dishes that feature tomato sauce or salsa (like tacos or enchiladas) at least once per week.
- Try Indian tomato-based curries as an aromatic, flavorful meal choice.
- Fill your crock pot with canned tomatoes, dried beans, onions, and seasonings to create a healthy bean stew.
- Make home-made pizza starting with whole grain pizza crust, pizza sauce, and lots of veggies.
- Don't miss out on the power of tomato-based condiments, from ketchup to salsa, to help up your tomato product intake.

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