

# Cooking Tomatoes Increases Lycopene and Beneficial Bacteria

## Story at-a-glance

- Tomatoes are a beneficial food for many reasons, chief among them being their high lycopene content when they are cooked
- Lycopene is well-known as a powerful antioxidant that decreases your risk of bone loss, cancer, stroke and even sunburn
- New research out of Spain shows cooking tomatoes not only enhances the positive effects lycopene has on your beneficial gut bacteria, but also promotes increased lycopene absorption in your gut
- Because lycopene is a fat-soluble nutrient, you can increase its absorption by eating it alongside a food rich in healthy fats, such as olive oil or organic grass fed beef

## By Dr. Mercola

It's gardening season in the U.S. and therefore no surprise tomatoes are beginning to appear in gardens across the land. Given the right conditions, they are easy to grow and highly productive plants. There is nothing quite like eating a ripe, garden-grown tomato right off the vine, and tomatoes are great additions to salads and sandwiches. The health benefits of cooked tomatoes, which are amplified when combined with a healthy fat like olive oil, continue to make news.

This gives me the opportunity to underscore the value of lycopene to your diet. You may already know the lycopene content of tomatoes is increased when you cook them. Now, new research out of Spain indicates cooking tomatoes not only enhances the positive effects lycopene has on your beneficial gut bacteria, but also promotes increased lycopene absorption in your gut. These are just two more reasons to include tomatoes in your diet.

## Lycopene: Why Tomatoes Are Such a Beneficial Food

When you reach for a [tomato](#) you may be interested to know organic ones are thought to be more nutritious than their conventional counterparts. One study found growing tomatoes according to organic standards produced tomatoes containing 55 percent more vitamin C and 139 percent more total phenolic content than their conventionally grown peers.<sup>1</sup>

According to *The World's Healthiest Foods*,<sup>2</sup> tomatoes are an excellent source of lutein, zeaxanthin and vitamin C, which is most concentrated in the jelly-like substance surrounding the seeds. They also contain good amounts of vitamins K and B, as well as copper, manganese and potassium. In addition, tomatoes possess anticancer properties and phytonutrients such as the flavonols kaempferol, quercetin and rutin, in addition to caffeic acid, coumaric acid and ferulic acid.

The [benefits of lycopene](#), the carotenoid antioxidant responsible for the red color of tomatoes and other fruits like [watermelon](#), gets top billing as one of the most important nutrients in tomatoes. Lycopene is well-known as a powerful antioxidant that decreases your risk of cancer and heart disease.<sup>3</sup> Lycopene is also notable because:

- Its antioxidant activity has long been suggested to be more powerful than hundreds of other carotenoids, including beta-carotene

- A meta-analysis pooling results from more than 116,000 subjects revealed lycopene intake may [reduce your stroke risk](#) by nearly 20 percent<sup>4</sup>
- Lycopene plays an important role in your bone health<sup>5</sup>
- Its also been shown to be helpful in treating lung cancer<sup>6</sup> and [prostate cancer](#) (more on that below)
- When consumed daily with [olive oil](#) for 10 weeks in the form of tomato paste, it was shown to reduce ultraviolet-induced sunburn by about 40 percent<sup>7</sup>

## Did You Know Cooked Tomatoes Are Better for You Than Raw Ones?

It's rare I suggest a cooked food is more beneficial for you than consuming it raw. That said, there are a few exceptions to the "raw rule." For example, it is well-known that lightly cooking vegetables such as asparagus, carrots and spinach increases the bioavailability of certain nutrients.<sup>8</sup> Dr. Rui Hai Liu, a professor in the department of food science at Cornell University, who has researched how heat affects food, suggests the cooking of certain vegetables can free up nutrients for easier absorption.

States Liu, "Common wisdom says cooked food has a lower nutritional value compared to fresh produce, but that's not always true. Many nutrients in fruits and vegetables are bound in the cell walls. Cooking helps release them so they're more bioavailable and absorbed by the body."<sup>9</sup>

A study by Liu, published in 2002 in the Journal of Agriculture and Food Chemistry,<sup>10</sup> indicated heating tomatoes for 30 minutes at 190.4 degrees F (88 degrees C) — roughly the temperature at which you'd simmer soup on the stove — boosted absorbable lycopene levels by 35 percent.

Despite the fact cooking reduced the [vitamin C](#) content of tomatoes, Liu and his team noted a 62 percent increase in the antioxidant levels of cooked tomatoes. As you may know, antioxidants protect your body from cell and tissue damage that results when harmful free radicals are metabolized. About the outcomes, Liu said:<sup>11</sup>

*"This research demonstrates heat processing actually enhanced the nutritional value of tomatoes by increasing the lycopene content ... that can be absorbed by the body, as well as the total antioxidant activity. The research dispels the popular notion processed fruits and vegetables have lower nutritional value than fresh produce."*

## The Best Food Sources of Lycopene Are Red and Pink Fruits

There is no doubt processed tomatoes are one of the best sources of lycopene. For example, 1 cup of canned, tomato puree (with or without added salt) contains 54,385 micrograms of lycopene.<sup>12</sup>

According to The American Journal of Clinical Nutrition, 80 percent of lycopene consumed by the average American is in the form of packaged tomato products such as ketchup, pizza sauce and tomato juice.<sup>13</sup> Because those foods are highly processed and often contain [added sugar](#), you may consider getting some of your lycopene from one or more of the following raw fruit sources:<sup>14</sup>

| Fruit or vegetable        | Lycopene (micrograms per cup) |
|---------------------------|-------------------------------|
| Cherry tomatoes (raw)     | 3,834                         |
| Grapefruit (pink and red) | 3,264                         |

| Fruit or vegetable | Lycopene (micrograms per cup) |
|--------------------|-------------------------------|
| Guava              | 8,587                         |
| Papaya             | 2,651                         |
| Watermelon         | 6,979                         |

As with any fruit, I recommend you eat these lycopene-rich fruits only occasionally. For optimal health, you'll want to keep your total [fructose intake](#) below 25 grams (g) daily, including [fructose from whole fruit](#). If you have diabetes, heart disease, high blood pressure or insulin resistance you'll do better by limiting your daily intake of fructose to 15 g until your condition improves.

## Increase the Absorption of Lycopene by Combining It With a Healthy Fat

Because lycopene is a fat-soluble nutrient, you can increase its absorption by eating it alongside a food rich in healthy fats. A study published in the Asia Pacific Journal of Clinical Nutrition<sup>15</sup> tested the absorption of lycopene with respect to tomatoes cooked in olive oil, a combination characteristic of the Southern Mediterranean diet.

The study authors noted previous research has proven lycopene absorption is increased with respect to processed tomatoes as compared to fresh tomatoes because "the processing breaks down the tomato cell matrix and makes the lycopene more available."<sup>16</sup>

The goal of the current research was to determine the effects of pairing cooked tomatoes with olive oil. The researchers measured plasma lycopene concentrations for healthy participants who ate a low-lycopene diet and again following a five-day dietary intervention during which time the participants ate one meal a day containing 470 grams of tomatoes cooked with or without 25 milliliters of olive oil.

The participants consuming the cooked tomatoes and olive oil showed an 82-percent increase in plasma trans-lycopene and a 40 percent increase in cis-lycopene concentrations. About the results, the study authors said:

*"[T]he addition of olive oil to diced tomatoes during cooking greatly increases the absorption of lycopene. The results highlight the importance of ... how a food is prepared and consumed in determining the bioavailability of dietary carotenoids such as lycopene."*<sup>17</sup>

If you are not fond of olive oil, you might consider adding [coconut oil](#) or Medium Chain Triglyceride (MCT) oil to your homemade tomato sauce. MCT oil, which has no taste or smell, is composed of concentrated medium chain fatty acids derived from coconut oil. Another option is to serve cooked tomatoes or homemade tomato sauce with [organic grass fed beef](#).

## Can Tomato Sauce Promote Gut Health by Boosting Your Beneficial Bacteria?

In a study published in the Journal of Functional Foods,<sup>18</sup> researchers from Polytechnic University of Valencia (UPV) in Spain evaluated how gut bacteria interacts with antioxidants in your gut, specifically with respect to cooked tomato sauce. The team chose to use pear tomatoes because they have a particularly high lycopene content and are rich in antioxidants.

Led by professor Ana Belén Heredia from UPV's department of food technology, the scientists conducted in vitro experiments to see how *Lactobacillus reuteri* (*L. reuteri*) would interact with antioxidants derived from tomato sauce and if the cooking process might influence that interaction.<sup>19</sup> *L. reuteri* is one of the main bacterial species known to contribute to your gut health.

Heredia and her team noted a loss of antioxidants with respect to both raw and cooked (fried) tomato sauce as a result of the digestive process. Furthermore, it appeared the presence of *L. reuteri* prevented some of the antioxidants from being absorbed into the bloodstream. Notably, the group also observed that antioxidants from the tomato sauce — more so with the cooked sauce than its raw equivalent — enhanced the positive effects of *L. reuteri*.

Cooked sauce also had the effect of transforming the lycopene present in the tomato, which helped preserve its integrity through the digestive process, allowing more of this important antioxidant to be absorbed. Noted Heredia, "[W]e found serving meals rich in probiotics with fried tomato sauce boosts its probiotic effect, as well as causing a progressive isomerization of the lycopene of the tomato, from form cis to trans throughout digestion, which positively results in an increased final bioaccessibility of this carotenoid."<sup>20</sup>

## **Cooked Tomatoes Shown to Slow the Growth of Malignant Prostate Cells**

Noting that prostate cancer is the second most frequently diagnosed cancer among men worldwide, researchers from the University of Illinois at Urbana-Champaign conducted a meta-analysis of 30 studies related to dietary tomato intake and prostate cancer, which was published in the journal *Prostate Cancer and Prostatic Disease*.<sup>21</sup>

After summarizing data from more than 24,000 cases involving upward of 260,000 participants, they concluded "increased tomato consumption is inversely associated with prostate cancer risk."<sup>22</sup> The findings were summarized as follows:<sup>23</sup>

- Higher total tomato consumption was associated with a reduced risk of prostate cancer
- Specifically, tomato foods, cooked tomatoes and tomato sauces were linked to a reduced risk of prostate cancer
- No associations were found with respect to raw tomatoes

A 2011 study published in the *British Journal of Nutrition*<sup>24</sup> demonstrated lycopene in cooked tomatoes was able to slow the growth of, and even kill, prostate cancer cells in test tube-based experiments. Researchers from the U.K.'s University of Portsmouth tested the effects of lycopene on the mechanism through which cancer cells flourish by disrupting your body's blood supply. Specifically, they found lycopene prevented cancer cells from attaching to a healthy blood supply.

Mridula Chopra, Ph.D., study author and senior lecturer for the school of pharmacy and biomedical sciences at the University of Portsmouth, said, "[While] more testing needs to be carried out to confirm our findings, the laboratory evidence we have found is clear. It is possible to intercept the simple mechanism some cancer cells use to grow at concentrations that can be achieved by eating sufficient [amounts of] cooked tomatoes."<sup>25</sup>

The research was partially funded by H.J. Heinz, and the food manufacturer requested follow-up research related to previous studies conducted by the same group of scientists. The earlier studies showed a significant increase in lycopene levels in blood and semen samples after subjects ate 14 ounces (400 g) of processed tomatoes for two weeks.<sup>26</sup>

The current study underscored lycopene for its anti-angiogenic properties, which explains why it has been recognized as an important anticancer compound. Before any firm conclusions can be drawn, however, researchers noted the need to conduct tests involving human participants. Chopra stated:<sup>27</sup>

*"Individuals will vary in how much lycopene their bodies make available to fight cancer cell growth. The ability of lycopene to 'intercept' in this way in the body is likely to vary between tomato products — both processing and cooking with fat have previously been shown to make lycopene more effective biologically. The type of tomatoes that offer the most effective lycopene also differs, and more tests need to be done to find the best breed of tomato for this purpose."*

## Instances When Tomatoes Do More Harm Than Good

**Canned tomatoes:** I suggest you avoid canned tomatoes due to the risk of exposure to [bisphenol-A \(BPA\)](#), which is found in the lining of many cans. BPA is a toxic chemical linked to a heightened risk of breast and prostate cancers, diabetes, heart disease, neurological effects, reproductive abnormalities and other serious health problems. BPA leaches into tomatoes due to their high acid content. You can avoid this hazardous chemical by choosing fresh tomatoes over canned varieties or by selecting brands that use glass containers.

**Raw tomatoes:** As a nightshade plant, tomatoes contain lectins — plant proteins that bind sugar and attach to your cell membranes. Lectins are known to cause weight gain, disrupt your endocrine function, interfere with your gene expression and promote inflammation.

Moreover, lectins can contribute to leaky gut and act as "antinutrients" that wreak havoc on both your gut and whole-body health. One way to make tomatoes and other nightshade foods like peppers and white potatoes more tolerable to your body is to pressure cook them. Dr. Steven Gundry, author of the book "[The Plant Paradox: The Hidden Dangers in 'Healthy' Foods That Cause Disease and Weight Gain](#)," is an expert on plant lectins.

The video above provides step-by-step instructions on how you can best [limit the lectins](#) in fresh tomatoes, most notably by removing the seeds. As you can see, tomatoes are a healthy food with some important cautions. Even if you tolerate them well, it is best to eat them sparingly. As mentioned, the good news is cooking tomatoes not only will diminish their lectin content, but also will simultaneously increase their lycopene and antioxidant content.

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