

# Green Tea Linked to Decreased Risk for Dementia

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✓ Fact Checked

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## STORY AT-A-GLANCE

- › In a study, people who drank green tea one to six days a week had less mental decline and a lower risk of dementia than non-tea drinkers
- › The epigallocatechin-3-gallate (EGCG) in green tea is a powerful antioxidant responsible for body-wide health benefits such as blood pressure and weight maintenance, lowered risk of certain cancers, energy boost and antimicrobial properties
- › Green tea also contains theanine, an amino acid that crosses the blood-brain barrier and has psychoactive properties

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Aside from water, tea is the most commonly consumed beverage in the world.<sup>1</sup> In the U.S., black tea is by far the most popular, but green tea (which accounted for just 14% of the tea consumed in America in 2015<sup>2</sup>) may have particularly powerful health benefits.

Regardless of variety, black and green tea (as well as oolong, dark and white teas) come from the same plant, an evergreen called *Camellia sinensis*. It is the processing method and degree of oxidation (exposure to oxygen) that creates the different tea types and the antioxidants available in them.

Black tea is highly oxidized, both naturally when it's picked, and deliberately when it's later crushed to speed up the oxidation process. Often incorrectly referred to as

"fermentation," oxidation of black tea is carefully controlled to avoid fermentation, which actually is a process used with some oolongs and other aged teas, such as Pu-erh, that involves very little oxygen.<sup>3</sup>

"Full" oxidation is also avoided with black tea making, as that would make it stale. Green tea, on the other hand, is either lightly steamed or not manually oxidized at all after the leaves are harvested.

Black tea gets its color from the abundance of tannins that it contains, which are a form of antioxidants. The rest of the antioxidants emerge as black tea oxidizes, chemically converting into complex flavonoids called Epigallocatechin gallate polyphenols (EGCGs).<sup>4</sup>

Commonly referred to as theaflavins and thearubigins, they are powerful antioxidants that some studies have shown may have significant health benefits, such as improved anti-inflammatory responses and lowered risk of coronary heart disease.<sup>5</sup>

Both black and green teas contain a similar amount of flavonoids and beneficial antioxidants; it is the minimal oxidation of green tea that may help to keep significant levels of its natural phenols and antioxidants, or catechins, intact.

As explained by the World of Tea,<sup>6</sup> catechins are in all tea – it's the controlled oxidation of the tea that changes the composition of catechins in the individual teas. This process usually begins after tea leaves are rolled or macerated, which breaks down the cell walls in tea leaves. The resulting reaction converts tea catechins into the theaflavins and thearubigins of black tea:

*"Theaflavins provide tea with its briskness and bright taste as well as its yellow color, and thearubigins provide tea with depth and body and its orange-brown color.*

*... Also, during oxidation chlorophylls are converted to pheophytins and pheophorbides (pigments that lend to the black/brown color of dry oxidized tea*

*leaves); and lipids, amino acids and carotenoids degrade to produce some of tea's flavor and aroma compounds."*

This conversion of catechins to theaflavins and thearubigins means that the longer the oxidation, the lower the amount of catechins in the finished tea. Hence, oxidized black tea has fewer catechins but an abundance of EGCG polyphenols, while green tea, because it's not oxidized, is full of catechins – naturally occurring polyphenols that are catching the attention of the world of science.

## **What Gives Green Tea Its 'Super Powers?'**

Researchers believe that catechins give green tea its "super powers." Green tea is rich in naturally occurring plant compounds called polyphenols, which can account for up to 30% of its dry leaf weight.

Within that group of polyphenols is epigallocatechin-3-gallate (EGCG), one of the most powerful catechins – the same polyphenol that is in black tea, and which has been shown to positively impact a number of illnesses and conditions. Like black tea, green tea also contains L-theanine, an amino acid that crosses the blood-brain barrier and has psychoactive properties.

Theanine increases levels of gamma-aminobutyric acid (GABA), serotonin, dopamine, and alpha wave activity, and may reduce mental and physical stress and produce feelings of relaxation.<sup>7</sup> Theanine may also help to prevent age-related memory decline<sup>8</sup> and has been shown to affect areas of your brain involved in attention and complex problem-solving.<sup>9</sup>

Green tea's popularity has led many researchers to study its effects on the human body, and their findings confirm it possesses a myriad of health benefits that reaches throughout your body. So what is green tea good for? The following section details green tea's most powerful benefits from studies published around the world.

## **9 Holistic Benefits of Green Tea**

Drinking green tea is associated with reduced mortality due to all causes, as well as mortality due to heart disease.<sup>10</sup> Research also shows holistic benefits from green tea consumption, including lower blood pressure, oxidative stress, and chronic inflammation.<sup>11</sup>

**Heart Health** — Green tea, like black tea, improves both blood flow and the ability of arteries to relax, with research suggesting a few cups of green tea each day may have a beneficial effect on endothelial function, which in turn may also lower cardiovascular risk.<sup>12</sup>

These study results also show EGCG can be helpful for the prevention of arteriosclerosis, cerebral thrombus, heart attack and stroke — in part due to its ability to relax your arteries and improve blood flow. And, according to a report in the Harvard Heart Letter, which compiled a list of green tea studies:<sup>13</sup>

*"People who drank the most green tea in an observational study had a 28 percent lower risk of coronary artery disease than those who drank the least green tea. **Black tea had no effect on heart risk.** [Emphasis mine.]"*

*Another 2011 meta-analysis of 14 randomized, placebo-controlled clinical trials found that green tea significantly lowered LDL cholesterol and triglyceride levels. Many of the studies had been conducted with capsules containing catechins, the active polyphenols in green tea, rather than with the beverage itself."*

The Harvard Heart Letter did issue a caveat, though, if you're planning to add green tea to your diet in the hopes of helping your heart: because of the high oxalate levels in green tea, too much of it (more than five cups a day) could also raise your risk of kidney stones, which oxalate can cause. "When consumed wisely, though, green tea may improve your cardiovascular health," the Letter said.

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**Type 2 Diabetes** — While the jury is still out on whether green tea consumption can definitively lower blood glucose levels, several studies are beginning to show a

positive light on this theory. For example, one study with oral supplements showed that the EGCG in green tea helped enhance glucose tolerance in genetically diabetic mice.<sup>14</sup>

Another study by a team of scientists at the Karolinska Institutet in Sweden showed that green tea helped moderately diabetic mice as well as, or better, than the popular diabetic drug, Avandia (It had no effect on severely diabetic subjects.)<sup>15</sup>

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**Weight Loss** – There is some evidence that long-term consumption of green tea catechins is beneficial for burning fat and may work with other chemicals to increase levels of fat oxidation and thermogenesis, and thereby help you lose weight.<sup>16</sup> Also according to research in *Physiology & Behavior*:<sup>17</sup>

*"Positive effects on body-weight management have been shown using green tea mixtures. Green tea, by containing both tea catechins and caffeine, may act through inhibition of catechol O-methyl-transferase, and inhibition of phosphodiesterase. Here the mechanisms may also operate synergistically.*

*A green tea-caffeine mixture improves weight maintenance, through thermogenesis, fat oxidation, and sparing fat free mass ... Taken together, these functional ingredients have the potential to produce significant effects on metabolic targets such as thermogenesis and fat oxidation."*

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**Bone Health** – Green tea polyphenols combined with a form of vitamin D called alfacalcidol could boost bone structure and strength, according to a 2010 study in mice. The mixture may reverse damage to bones caused by lipopolysaccharide (LPS) induced chronic inflammation, which could in turn reduce the risk of osteoporosis.<sup>18</sup>

Green tea is a relative newcomer in the bone-health arena, but previous studies have also found that epigallocatechin-3-gallate (EGCG), a component of green tea, blocks the activity of two molecules, IL-6 and cyclooxygenase-2 (Cox-2), which play a role in breaking down bone.

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**Vision Health** – Catechins in green tea could help protect you against glaucoma and other eye diseases, as research found that the compounds travel from your digestive system into the tissues of your eyes. During the study, the catechins found in green tea were absorbed into various parts of the eyes anywhere from 30 minutes to 12 hours after rats were given tea.<sup>19</sup>

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**Cancer** – Green tea components have been shown to downregulate the expression of proteins involved in inflammation, cell signalization, cell motility and angiogenesis, while an association between green tea intake and decreased risk of cancers (including ovarian and breast<sup>20</sup>) have been reported.<sup>21</sup>

Previous research has shown that green tea polyphenols act on molecular pathways to shut down the production and spread of tumor cells.<sup>22</sup> They also discourage the growth of the blood vessels that feed the tumors. EGCG even acts as an antiangiogenic and antitumor agent, and helps modulate tumor cell response to chemotherapy.<sup>23</sup>

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**Mental Health** – Green tea can benefit your mental health to a certain degree. Specifically, its L-theanine content can relax your mind and make you alert without inducing drowsiness, according to a 2008 study published in the Asia Pacific Journal of Clinical Nutrition.

In the study, participants were asked to consume 50 milligrams of L-theanine, and their levels were measured after 45, 60, 75, 90 and 105 minutes using an electroencephalograph (EEG) test. The researchers noted that the alpha frequency band of participants who took L-theanine was higher compared to those who took a placebo.

This suggests that regular consumption of green tea can improve alertness, since alpha activity plays an important role in your mind's attention abilities.<sup>24</sup>

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**Energy Boost** – By mobilizing your fatty acids, the caffeine content in green tea can be a clean, healthy source of energy compared to popular sports drinks. A study

tested this hypothesis by having participants drink a caffeine drink an hour before cycling until reaching exhaustion. Compared to the group who took a decaffeinated drink, they lasted longer and also noted that the exercise was easier to perform.<sup>25</sup>

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**Antimicrobial Properties** – Catechins in green tea possess the ability to kill bacteria, such as *Streptococcus mutans*, a common microbe found in your mouth. In a related study, 30 subjects between the ages of 20 to 25 years old were divided into three groups – green tea, chlorhexidine and water.

Initial plaque samples were taken and the participants were asked to use their respective oral solutions for one minute. Samples were collected five minutes afterward. The results indicate that green tea was as equally effective as chlorhexidine. Based on this finding, green tea can be a safer and healthier alternative to conventional oral rinses and mouthwashes.<sup>26</sup> Furthermore, green tea can also reduce bad breath.<sup>27</sup>

Evidence also suggests that green tea may inhibit the growth of certain viruses. Researchers discovered that epigallocatechin gallate (EGCG) and epicatechin gallate (ECG) can potentially inhibit the spread of the influenza virus.<sup>28</sup>

Poultry farmers can also take advantage of this benefit by mixing green tea into their animal feed. According to the journal *Poultry Science*, adding green tea byproducts into a chicken's diet exhibited positive antiviral effects, resulting in healthier livestock.<sup>29</sup>

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## Drinking Green Tea Every Week May Slow Mental Decline

Overall, tea has about eight to 10 times more polyphenols than fruits and vegetables, but because it's the catechins that researchers believe are the keys to tea's health benefits,<sup>30</sup> green tea is what they've focused on most in their studies.

For example, green tea shows promise for protecting brain health. In a study presented at the 2015 International Conference on Alzheimer's and Parkinson's Diseases, those who drank green tea one to six days a week had less mental decline than those who didn't drink it.<sup>31</sup> In addition, the researchers revealed that tea drinkers had a lower risk of dementia than non-tea drinkers. It's not the first time green tea has been linked to brain health.

In a study of 12 healthy volunteers, those who received a beverage containing 27.5 grams of green tea extract showed increased connectivity between the parietal and frontal cortex of the brain compared to those who drank a non-green tea beverage.<sup>32</sup>

The increased activity was correlated with improved performance on working memory tasks, and the researchers believe the results suggest green tea may be useful for treating cognitive impairments, including dementia. According to the study authors:<sup>33</sup>

*"Our findings provide first evidence for the putative beneficial effect of green tea on cognitive functioning, in particular, on working memory processing at the neural system level by suggesting changes in short-term plasticity of parieto-frontal brain connections.*

*Modeling effective connectivity among frontal and parietal brain regions during working memory processing might help to assess the efficacy of green tea for the treatment of cognitive impairments in psychiatric disorders such as dementia."*

## Green Tea May Be a Whole-Body Health Tonic



Tea has been enjoyed for close to 5,000 years. It was reportedly discovered in 2737 BC when tea leaves accidentally blew into Chinese Emperor Shen-Nung's pot of boiling water.<sup>34</sup> Tea has been used traditionally as a beverage and healing tonic ever since. As reported by the University of Maryland Medical Center:<sup>35</sup>

*"In traditional Chinese and Indian medicine, practitioners used green tea as a stimulant, a diuretic (to help rid the body of excess fluid), an astringent (to control bleeding and help heal wounds), and to improve heart health.*

*Other traditional uses of green tea include treating gas, regulating body temperature and blood sugar, promoting digestion, and improving mental processes."*

## **Tea Readily Absorbs Pollutants from Soil**

It's difficult to find many drawbacks to tea, but there is one potential issue you should be aware of: pollutants. Green tea plants are known to be especially effective at absorbing lead from the soil, which is then taken up into the plants' leaves. Areas with excessive industrial pollution, such as China (where more than 90%<sup>36</sup> of the world's green tea is produced), have been found in the past to contain substantial amounts of lead.<sup>37</sup>

While those studies looked at lead content during the years 1999 to 2001, according to a ConsumerLab.com analysis reported in 2013 and updated in 2015,<sup>38</sup> tea from popular packaged brands like Lipton and Bigelow contained up to 2.5 micrograms of lead per serving compared to no measurable amounts in Teavana brand, which gets its tea leaves from Japan.

(Bigelow denies that these measurements are correct, and in fact points out on its website that ConsumerLabs admitted in their report that lead found in the tea leaves was not in the actual liquid portions when they were brewed.<sup>39</sup>) The takeaway, then, is don't chew on the leaves.

So, while the lead in the tea leaves is not thought to leach very effectively into the tea you end up drinking, if you're consuming Matcha green tea, one of my favorites, it's

especially important that it either comes from Japan or is organically grown in China, which has moved toward organic green tea production in the past few years, and in 2020, announced 132 companies in Pu'er City alone, had obtained a total of 186 organic tea certificates, ranking it No. 1 in China for organic tea.<sup>40</sup>

Matcha tea contains the entire ground tealeaf, and can contain over 100 times the EGCG provided from regular brewed green tea. Both black and green teas are also naturally high in fluoride,<sup>41</sup> even if organically grown without pesticides. This is because the plant readily absorbs fluoride through its root system, including naturally occurring fluoride in the soil.

According to the late fluoride expert Jeff Green, there are reports of people who have developed crippling skeletal fluorosis from drinking high amounts of iced tea alone.<sup>42,43</sup> If you live in an area with fluoridated drinking water, as the majority of Americans do, then you could be getting a double dose of fluoride when you drink tea.

Therefore, when selecting tea of any kind, it should preferably be organic (to avoid pesticides) and grown in a pristine environment that ensures that the least amount of fluoride, heavy metals and other toxins from soil and water possible leaches into the tea trees and leaves. A clean growing environment is essential to producing a pure, high-quality tea.

## **A Quick Trick to Boost the Health Benefits of Your Tea**

To boost the benefits of green tea, add a squirt of lemon juice to your cup. Previous research has demonstrated that vitamin C significantly increases the amount of catechins available for your body to absorb. In fact, citrus juice increased available catechin levels by more than five times, causing 80% of tea's catechins to remain bioavailable.<sup>44</sup>

On the other hand, while adding lemon juice is beneficial, adding milk is not. The proteins in milk may bind to and neutralize the antioxidants in tea, such that its health

benefits are significantly reduced. One study even found, "All [beneficial vascular protective] effects were completely inhibited by the addition of milk to tea."<sup>45</sup>

Finally, know what to look for in terms of quality. A telltale sign of high-quality green tea is that the tea is in fact green. If your green tea looks brown rather than green, it's likely been oxidized, which can damage or destroy many of its most valuable compounds. Many enjoy using loose tea leaves, which ConsumerLab found may offer even more antioxidants (while also avoiding potential toxins in tea bags).

A cup of green tea will give you anywhere from 20 to 35 milligrams of EGCG, so three in a day will supply you with 60 to 105 milligrams. There are some studies that have used much higher doses than this – upwards of 1,500 milligrams a day – but as of now there's no clear-cut evidence of exactly how much is best.

The good news is that much of the research on green tea has been based on about three cups daily, which is easily attainable, and enjoyable, for most people. Here are a few simple guidelines for making the "perfect" cup of tea:

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Bring water to a boil in a tea kettle (avoid using a nonstick pot, as this can release harmful chemicals when heated)

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Preheat your teapot or cup to prevent the water from cooling too quickly when transferred. Simply add a small amount of boiling water to the pot or tea cup that you're going to steep the tea in. Ceramic and porcelain retain heat well. Then cover the pot or cup with a lid. Add a tea cozy if you have one, or drape with a towel. Let stand until warm, then pour out the water

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Put the tea into an infuser, strainer or add loose into the tea pot. Steeping without an infuser or strainer will produce a more flavorful tea. Start with one heaped teaspoon per cup of tea, or follow the instructions on the tea package. The robustness of the flavor can be tweaked by using more or less tea

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Add boiling water. Use the correct amount for the amount of tea you added (i.e. for 4

teaspoons of tea, add 4 cups of water). The ideal water temperature varies based on the type of tea being steeped:

- **White or green teas** (full leaf) – Well below boiling (170 to 185 degrees Fahrenheit or 76 to 85 degrees Celsius). Once the water has been brought to a boil, remove from heat and let the water cool for about 30 seconds for white tea and 60 seconds for green tea before pouring it over the leaves
- **Oolongs** (full leaf) – 185 to 210 degrees Fahrenheit or 85 to 98 degrees Celsius
- **Black teas** (full leaf) and **Pu-erhs**

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Cover the pot with a cozy or towel and let steep. Follow steeping instructions on the package. If there are none, here are some general steeping guidelines. Taste frequently as you want it to be flavorful but not bitter:

- **Oolong teas** – four to seven minutes
- **Black teas** – three to five minutes
- **Green teas** – two to three minutes

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Once the desired flavor has been achieved you need to remove the strainer or infuser. If you're using loose leaves, pour the tea through a strainer into your cup and any leftover into another vessel (cover with a cozy to retain the heat)

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