



Green Tea

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Green tea is prepared from dried leaves of *Camellia sinensis*, a perennial evergreen shrub. It contains several compounds that are possibly beneficial to brain health, including caffeine, catechins (types of antioxidants), and L-theanine (an amino acid derivative). Several observational studies and clinical trials suggest that green tea consumption might promote cognitive function, but no studies have tested whether it can prevent dementia.

EVIDENCE AND POTENTIAL BENEFIT FOR BRAIN HEALTH

Rated 3/4 based on 2/4 evidence

Observational studies suggest that greater green tea consumption is associated with lower dementia risk, but no clinical trials have tested whether green tea can prevent age-related cognitive decline or dementia.

Randomized controlled trials: Two randomized controlled trials have evaluated the effects of green tea extracts on cognitive functions. In a double-blind trial in 91 patients with mild cognitive impairment (MCI), the combination of green tea extract and L-theanine (1680 mg of LGNC-07, including 240 mg of L-theanine but no caffeine) for 16 weeks resulted in significant improvements in memory and attention, particularly in patients who had relatively severe baseline impairment (Mini Mental State Examination scores of 21-23)[1]. Brain theta waves were increased in the temporal, frontal, parietal, and occipital cortex after three hours, which is suggestive of cognitive alertness. A double-blind trial examining the acute effects of a drink containing 27.5 g of green tea extract reported that the extract increased brain connectivity and that the magnitude of that effect correlated with improvement in working memory task performance [2].

Other human research: Two prospective studies have reported that greater green tea consumption is associated with lower risk of incident dementia [3; 4]. In the larger study (13,645 Japanese people over 65 years old), the hazard ratio for 5 or more cups/day was 0.73 (95% CI, 0.61-0.87) [4]. The smaller study (723 Japanese people over 60 years old) showed that compared with individuals who did not consume green tea at all, the incidence of overall cognitive decline (dementia or MCI) was 0.32 (95% CI: 0.16-0.64) among individuals who consumed green tea every day and 0.47 (95% CI: 0.25-0.86) among those who consumed green tea 1-6 days per week [3]. While positive effects of green tea drinking may be attributable to the benefits of social interactions and leisurely activities with peers [5], in the latter study they did not find an association between coffee or black tea consumption and incidence of dementia or MCI. (But other studies have shown protection with coffee intake—please see the report on [coffee](#) for details).



In a population-based longitudinal cohort study in Chinese people aged 80–115 years old, tea drinking was associated with higher verbal fluency at baseline and throughout the follow-up period (up to 7 years) [6]. Thus, regular tea drinking is associated with better cognitive function at old age. In a cross-sectional study, low green tea consumption was associated with a higher prevalence of cognitive impairment in older Japanese people [7].

It is unclear whether apparent benefits of life-long green tea consumption can be mimicked by late-in-life changes in tea drinking. Also, observational studies have not been able to tease apart the benefits of green tea with the benefits of avoiding alternatives to tea/coffee, such as sodas and other sugared beverages.

Biology: Green tea contains several compounds that may be neuroprotective, including caffeine, L-theanine, and green tea catechins (e.g., EGCG), that are separately reviewed.

APOE4 carriers: No studies on green tea have examined whether it affects APOE4 carriers differently from non-carriers. Some studies have examined the interactions between APOE status and caffeine intake [8], which have produced inconclusive results. A pilot randomized crossover trial has shown that drinking six cups of black tea daily was associated with some beneficial effects on factors associated with cardiovascular disease risk (triacylglycerol, blood coagulation factors) in E2 carriers but not in people with E3/E4 or E4/E4 genotype [9]. For more information on what the APOE gene allele means for your health, read our [APOE4 information page](#).

For Dementia Patients

No studies have reported whether green tea can improve cognition or slow decline in people with dementia. In a clinical trial, markers of oxidative stress were decreased in Alzheimer's patients who consumed a beverage that included green tea extracts for eight months [10]. However, it is unknown whether this beverage helps patients. A different antioxidant therapy (not containing green tea extract) was reported to lower oxidative stress in Alzheimer's patients but accelerated cognitive decline [11].

SAFETY

Rated 4/4

Meta-analyses: There are three Cochrane meta-analyses that have included analysis of the safety profile of green tea. A Cochrane meta-analysis based on 14 randomized controlled trials (RCTs) in overweight or obese adults (total of 703 subjects) reported that side effects from green tea consumption were mild and none of the serious adverse events observed were related to the intervention [12]. In another Cochrane meta-analysis based on 11 RCTs in healthy adults and those at high risk of cardiovascular disease (total of 821 subjects), side effects were mild and no significant differences in adverse events were observed between green tea and placebo groups [13]. In another Cochrane meta-analysis based mostly on



observational studies (27 case-control studies, 23 cohort studies, and 1 RCT) that included a total of over 1.6 million subjects, green tea was judged to be safe at moderate and regular amounts (3 to 5 cups per day, up to 1200 ml/d) [14].

Drug interactions: Three drugs are known to interact with green tea, but the interactions are judged to be minor with minimal clinical significance ([drugs.com](https://www.drugs.com)). The three drugs are warfarin (also known as Coumadin™ and Jantoven™), anisindione (or Miradon™), and dicumarol. Green tea consumption may reduce the levels of folic acid in the body and interfere with iron absorption [15]. Because green tea contains caffeine, pregnant people or those with cardiovascular problems should consult their physician or healthcare provider about consuming it. Caffeine in green tea can also interact with some drugs ([drugs.com](https://www.drugs.com)).

Lead: Tea leaves can absorb lead from the soil, and according to a ConsumerLab.com analysis, tea from two common brands contained up to 2.5 µg of lead per serving, compared to no measurable amounts from Teavana tea, which sources tea leaves from Japan [16]. Green tea from areas with excessive pollution may contain higher amounts of lead [17]. While lead is not thought to readily seep into the fluid during steeping, lead contamination is a concern if you are drinking matcha, as the whole tea leaves are consumed.

Fluoride: Fluoride is known to prevent dental cavities and tap water is fluoridated in many areas of the U.S. While tea is safe when consumed in moderate amounts, long-term and excessive amounts of tea consumption can cause bone problems from fluoride in tea leaves. A case study reported that a 47 year-old woman who consumed a pitcher of tea made from 100 to 150 tea bags (estimated fluoride levels, > 20 mg/d) every day for 17 years developed skeletal fluorosis [18]. Several other case studies have also reported skeletal fluorosis in people who consumed gallons of tea daily for several decades [19; 20].

HOW TO USE

Green tea is available loose or in bags. There are multiple types of green tea. Sencha, the most common type, contains 40–60 mg of caffeine, 8–25 mg of L-theanine, and 25–60 mg of EGCG in a cup (200 mL). Gyokuro, a type of green tea produced from shading the tea leaves, contains 240 mg of caffeine, 85 mg of L-theanine, and 86 mg of EGCG per cup. Matcha is powdered Japanese green tea often used in Japanese tea ceremony and contains 25 mg of caffeine, 36 mg of L-theanine, and 17–109 mg of EGCG per serving (80 ml) [21], along with vitamins A, B-complex, C, E, K, and trace minerals. No clinical studies have compared these different types of green tea for long-term health associations. Some observational studies suggested high green tea consumption is associated with lower dementia risk and better cognitive function, but definitions of high green tea consumption varied across studies, ranging from two or more cups of tea in studies carried out in the U.S. to over seven cups of tea in Asian studies [22]. Additionally, green tea supplements (e.g.,



green tea extract, catechins, L-theanine) are available in the forms of pills, capsules, liquid, and powder.

WHAT'S THE FUTURE?

A clinical trial is testing whether a brain health supplement (BBG-1001) that contains green tea extract, turmeric, fish oil, and vitamin D can slow cognitive decline in people with mild cognitive impairment ([NCT02741804](https://www.clinicaltrials.gov/ct2/show/study/NCT02741804)). This study is scheduled to be completed in May 2019.

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