

Green Tea

A Refreshing
Beverage and
Healthful Elixir



By NEVA COCHRAN, MS, RDN, LD, FAND



any dietitians and their clients like to start off the day drinking a cup of hot tea and following up with a glass of iced tea with a spritz of lemon at lunch- or dinnertime. Worldwide, tea consistently ranks as the most frequently consumed beverage after water. According to the Tea Association of the USA, tea is found in 80% of US households. As a popular iced beverage, black tea accounts for 85% of the tea sipped in this country, while green tea makes up just 14%.

Origin of Tea

At least 5,000 years old, all tea originates from the *Camellia sinensis* plant, with the type of tea determined by the amount of time the leaves are exposed to air, or oxidized, resulting in five distinct types of tea. The lightest and most delicate is white, an unoxidized tea made from the tiny unopened plant buds with one or two young, open leaves sometimes added. Green tea is produced from the green leaves before any oxidation has occurred, oolong tea from partially oxidized tea leaves, and black tea from totally oxidized leaves. Finally, dark tea, or pu-erh, is fully oxidized as well as fermented by anaerobic bacteria, imparting a woody, earthy flavor. Herbal infusions like chamomile, licorice, ginger, and rooibos, typically called “tea” in the United States, aren’t actually tea and, therefore, don’t deliver the same health benefits.

Green Tea Trends

A recent survey of 450 dietitians conducted by *Today’s Dietitian* and Pollock Communications predicted that green tea was among the foods that will be trending upward in 2016. Kyle Stewart, a certified tea specialist and co-owner of The Cultured Cup, a tea and coffee business in Dallas, has seen an increase in green tea popularity for about a decade. Why? “Green tea’s connection to a ‘healthy lifestyle’ receives more marketing compared with other types of tea. While black tea is still the most consumed tea in the United States, it is marketed for its taste and not the health benefits it provides,” Stewart says.

Much Ado About Matcha

Matcha, the tea used in a Japanese tea ceremony, is a very fine green powder made from the green leaves of tea bushes grown in the shade. It’s the only tea where the leaves are consumed as part of the drink rather than being infused in hot water. Therefore, the antioxidant content is higher than other teas, and it’s a particularly rich source of L-theanine, an amino acid unique to tea.

Green Tea and Health

The health benefits of tea arise from the antioxidants it contains, primarily flavonoids, also known as catechins (see Table). Green tea often is touted as imparting the greatest health benefits, but all teas contain antioxidants. USDA data confirm that dry green and black teas contain similar amounts of total flavonoids; however, as tea leaves are oxidized, theaflavins and thearubigins increase, and catechins decrease.¹ Compared with black tea, green tea contains 3.5 times as many catechins, but black tea has 99 times more theaflavins and 45 times more thearubigins as green tea. Studies on the health benefits of green and black tea abound, but fewer exist for other types.

Several limitations should be considered when evaluating the research on tea. First, many of the studies are observational vs interventional, so associations between tea consumption and health indices don’t necessarily show cause and effect. Moreover, green tea primarily is consumed in Asia where lifestyle and diet are different from the United States. Plus, tea studies using animals can’t be applied directly to humans, nor are the effects of individual tea components (eg, flavonoids, caffeine, amino acids) in large amounts the same as benefits from drinking normal amounts of tea. Finally, brewing method, brewing time, and tea quality can influence the antioxidant levels of tea. The antioxidant levels in brewed tea are much less than those in dry tea leaves, as the leaves aren’t actually consumed. Instead, the tea components are extracted in the brewing process.

FLAVONOIDS IN TEA

Flavan-3-ols, or catechins

- Epicatechin, or E
- Epigallocatechin, or EGC
- Epicatechin-3-gallate, or ECG
- Epigallocatechin-3-gallate, or EGCG

Oligimeric flavonoids

- Thearubigins and theaflavins (converted from catechins during oxidation)

Flavonols

- Quercetin

— Source: Dwyer JT, Peterson J. Tea and flavonoids: where we are, where to go next. *Am J Clin Nutr.* 2013;98(6 Suppl):1611S-1618S.



Candied Ginger and Green Tea Cake

Makes one 9- X 5-inch loaf

Powdered green tea leaves give this loaf its distinctive color; ginger and lemon add flavorful accents. If you grind your own green tea leaves, use a clean coffee grinder—rather than a food processor—as it produces a finer powder. You can use powdered matcha, but not the highest grade, as it's for ceremonial purposes and is pricey. Sencha also works well.

Ingredients

- 2 cups all-purpose flour
- 2 tsp ground ginger
- 1 tsp baking powder
- 1 tsp salt
- ¼ tsp baking soda
- ¼ cup finely ground green tea leaves, such as matcha or sencha
- ¼ cup finely chopped candied ginger
- Zest of 1 lemon, finely chopped
- 4 large eggs
- 1 cup superfine sugar
- ¾ cup mildly fruity virgin olive oil or vegetable oil
- 2 T fresh lemon juice
- 2 tsp vanilla extract

Directions

1. Position a baking rack in the lower third of the oven and preheat to 350° F. Lightly oil a 9- X 5- X 3-inch loaf pan, and line with parchment paper.
2. Sift together the flour, ginger, baking powder, salt, and baking soda into a bowl. Stir in the green tea, candied ginger, and lemon zest. Set aside.
3. Break the eggs into the bowl of a food processor and process until light in color and frothy, about 1 minute. With the motor running, slowly add the sugar through the feed tube in three stages, allowing about 30 seconds between each addition. Combine the oil, lemon juice, and vanilla in a small glass measuring cup and drizzle through the feed tube into the egg mixture while the motor is running.
4. Remove the processor top and add the dry ingredients all at once. Pulse until the mixture is just blended. Scrape the batter into the prepared pan.
5. Bake until a knife inserted in the center comes out clean, 50 to 55 minutes. Remove the pan from the oven and let the cake rest for at least 30 minutes on a rack. When cool, remove cake from pan and wrap tightly in plastic wrap. To serve, slice with a serrated knife.

— RECIPE AND PHOTO USED WITH PERMISSION FROM JOANNA PRUESS, AUTHOR OF *THE TEA COOKBOOK*.

Heart Disease

Tea's most promising health benefits are related to heart disease. Flavonoids in green tea prevent oxidation of LDL cholesterol and reduce blood clotting. A meta-analysis of 13 randomized controlled trials (RCTs) reported that green tea significantly lowered systolic and diastolic blood pressure and total and LDL cholesterol.² A link between intake of tea flavonoids and prevention of some types of cardiovascular disease was confirmed in a review of five meta-analyses of epidemiologic studies, with the strongest evidence for reducing stroke. Green tea showed better outcomes than black tea.³ In a 2015 study from China, a meta-analysis of 18 cohort studies, green tea consumption was inversely associated with cardiovascular disease mortality.⁴

Cancer

While there's some evidence in animals that green tea reduces cancer, there are limited data in humans, so the National Cancer Institute doesn't recommend for or against using tea for cancer risk reduction. On the other hand, epidemiologic studies have shown green tea in large amounts over time is linked to reduced colon cancer risk. Research on other types of cancer has yielded mixed results.⁵ In 12 studies on lung cancer and green tea or tea polyphenols, eight showed decreased risk, two increased risk, and two no association. And a meta-analysis of eight epidemiologic studies on green tea and breast cancer showed a reduced risk in three, but no reduction in five others. However, another analysis combining results from four studies indicated a decreased risk of breast cancer for the highest intake of green tea compared with the lowest or no intake.⁶ There's also a lack of strong evidence for green tea and lower risk of various common cancers.

Weight Loss

Popular media outlets are filled with claims about tea's potential to promote weight loss, and the marketplace boasts a variety of green tea-based diet products. But most tea and weight studies have tested tea components like caffeine and catechins; therefore, the results may not be applicable to brewed tea consumed in normal amounts. Research suggests green tea catechins and caffeine may stimulate thermogenesis.⁷ In addition, studies have suggested that drinking green tea may increase energy expenditure and fat oxidation.⁸ A meta-analysis of 11 studies on green tea catechins demonstrated a positive effect on weight loss and maintenance,⁹ and seven interventional studies found weight loss benefits for green tea when consumed for longer than six weeks.⁸ Of course, any calorie-free tea can help with weight loss if it replaces a high-calorie beverage.



The fact remains that tea isn't a magic bullet for weight loss, and any benefit from drinking a few cups of tea per day would be modest at best. Reducing calorie intake and increasing physical activity are still the keys to taking and keeping weight off.

Glycemic Control

As with other medical conditions, there's no definitive answer on green tea's ability to promote blood sugar control. Three meta-analyses found conflicting results. One evaluated 22 RCTs with 1,584 subjects and found green tea catechins significantly lowered fasting blood glucose levels, particularly in studies 12 weeks or longer.¹⁰ Another showed decreased fasting glucose and HbA1c concentrations with green tea in 17 RCTs with 1,133 participants.¹¹ In the third, with seven RCTs and 510 subjects, green tea or green tea extract didn't significantly decrease fasting blood glucose, fasting insulin, two-hour oral glucose tolerance or HbA1c in those at risk of type 2 diabetes.¹² Green tea, however, doesn't appear to have any negative influence on diabetes management.

Other Issues

Caffeine. Though results vary based on the length of time tea is brewed, caffeine in an 8-oz cup of green tea averages about 25 mg, and can represent about one-third to one-half the amount in one cup of brewed coffee. Caffeine is one of the most researched substances in the US food supply and has a long history of safe use. No adverse effects from drinking beverages with caffeine have been seen with intakes below 400 mg per day, or the equivalent of nine cups of green tea per day.

Hydration. Studies show no effect of caffeine on hydration with an intake of up to 400 mg caffeine per day. A recent study confirmed previous ones that found tea is just as hydrating as water.¹³ The Institute of Medicine's reference intakes for water states, "caffeinated beverages appear to contribute to the daily total water intake to the same degree as noncaffeinated fluids do."¹⁴

Cooking With Tea

In addition to drinking it as a beverage, green tea is showing up in products ranging from cocktails to cookies, according to Stewart. "Green tea gives food a savory flavor, also known as umami," he says, "which is very appealing to the palate." Stewart's Cultured Cup tea store provides

tea to Stocks & Bondy, a Dallas farmers' market where Chef and Co-owner Joanne Bondy creates slow-simmered stocks and broths from meat, fish, bones, and vegetables. Her latest creation is tea-infused broths for drinking.

Joanna Pruess, a New York City food and travel writer and coauthor of *The Tea Cookbook* uses green tea in a variety of recipes. "Green tea can add several dimensions to food and beverages," Pruess explains. "In candied ginger and green tea cake, it imparts a subtle herbaceous taste and vibrant green color. And because of its bright color and taste, it has become a staple in green tea ice cream and macarons, as well." To sample one of her green tea recipes, try the Candied Ginger and Green Tea Cake on page 30.

Tea in the Diet

While most people don't drink tea primarily for health benefits, it does have the potential to enhance health and prevent disease. However, tea isn't a magic bullet; a poor diet with tea is still a poor diet. Eating a balanced variety of foods is one key to overall good health. Drinking tea can certainly be an added benefit to an already nutrient-rich diet.

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For references, view this article on our website at www.TodaysDietitian.com.