

How to hack your tea so that you can get 5 times more antioxidants from the same cup of tea.

This article we are going to get a little geeky. That is how to choose and prepare your tea for maximum flavonoid content. We are going to compare different varieties and types of teas for their ECGC content, and explore how brewing time and temperature affects the antioxidant potential.

How much ECGC in a cup of green tea

The beneficial nutrients in green tea are catechins, especially one called ECGC. Many studies used therapeutic dosages of 300 to 1000mg per day. And that's nice to know but not very practical. What we are interested is how many cups of green tea one should drink.

USD Report

The USDA in their 2007 report analyzed the flavonoid content of nearly 400 food items and they also reported [EGCG](#) content. I dug through the report and came up with the following figures of EGCG content in different teas per cup.

- Brewed green tea: 180mg
- Brewed green tea, decaffeinated: 60mg
- Brewed green tea, flavored: 45mg
- Ready-to-drink green tea: 10mg
- Brewed oolong tea: 80mg
- Brewed black tea: 20mg

The above figures are *mean* values from the report. There was a considerable variation for each of those groups, for example brewed green tea values varied from 5mg to 460mg per cup. Soil quality, growing condition, leaf age and other factors affect the flavonoid and ECGC content of teas, hence the large variation in measured levels. Similarly the type of brewed tea (tea bag, loose leaf or powder) affects ECGC content, as we'll discuss a bit later.

We can also see this when we compare brewed green tea to flavored and ready-to-drink varieties. Those often use lower quality tea leaves and that's reflected in their ECGC content. **Decaffeination process removes some EGCG** along with the caffeine, and that's why decaffeinated varieties have 2/3 less ECGC.

Brewing conditions

How you brew the tea also makes a difference on the ECGC content and antioxidant potential of your cup of tea. In this bit we'll focus on water temperature and brewing time.

Note that some of the figures in this chapter don't quite match up with the figures reported by USDA. I don't really know why. But don't get hung up on the numbers, rather look at the trends and the overall picture.

Brewing temperature

This figure shows the effect brewing water temperature has to ECGC and polyphenol content of tea.

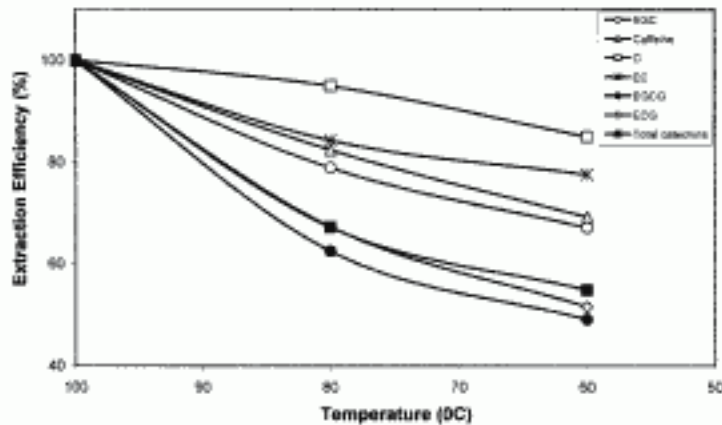


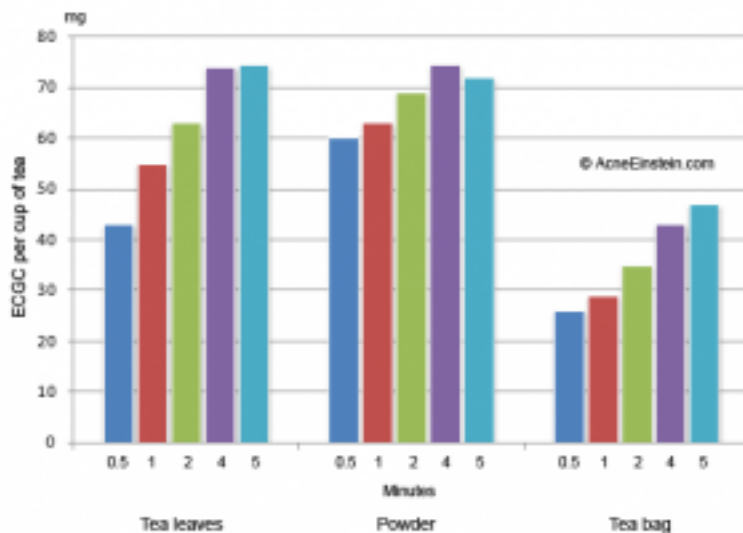
Figure 1. Extraction efficiency of catechins and caffeine from PG-Tips, as an example, at different temperatures (100, 80, and 60 °C) in 5 min.

Source: [Total Phenol, Catechin, and Caffeine Contents of Teas Commonly Consumed in the United Kingdom. \(PDF\)](#)

The take-away message is that **the hotter the water the more antioxidant** you can expect your tea to have. Note that the EGCG extraction is particularly sensitive to water temperature (the line with solid circle markers). **Brewing in 80 degrees Celsius means you get only about 60% of the EGCG from the tea leaf.**

Brewing time

The following chart is quite interesting. Let's first focus on the brewing time and how it affects ECGC content.



Source: [Factors affecting the levels of catechins and caffeine in tea beverage: estimated daily intakes and antioxidant activity. \(PDF\)](#)

To get to these figures researchers brewed tea at 100 degrees Celsius for 0.5, 1, 2, 4, and 5 minutes. Tea was used at typical tea bag concentrations, i.e. 1g of tea leaves per 100ml of water.

As is plainly obvious the longer you brew the tea the more you get out of it. The optimal time seems to be about 3 to 4 minutes in boiling water. The only exception is powdered green tea where brewing time doesn't matter so much. Powdered tea seems to give out its antioxidants much faster than other forms of tea.

Type of green tea

If you look at the previous chart again you'll see three forms of green tea: Tea leaves (means loose leaf tea), powdered and tea bag. You'll also see that when you make tea using tea bags you'll get significantly less ECGC than from loose leaf and powdered teas. The authors speculated that this could be because the tea bag itself prevents some ECGC from being absorbed. Or, more likely, that tea bags contain lower quality leaves.

White vs. green tea

Some people claim that white tea is even healthier than green tea. Unfortunately there's no good definition of what white tea means and most studies don't even mention white tea as separate category. I did find a few studies that compared black, green and white. In this study white and green tea had very similar ECGC and flavonoid levels.

Interestingly one study noted that **white tea had almost double the caffeine content** of green tea.

To milk or not to milk

Some people like to add a touch of milk to their tea. Some papers noted that there's debate in the scientific community about whether adding milk takes away some of the health benefits of tea. Some say that adding milk may reduce the antioxidant potential. Some say it has no effect.

Get 5 times more out of your tea

If you are anything like me you can get much more out of your tea by following these tips. Before I wrote this article I did everything exactly the worst way, the lazy way. I used tea bags (cos they are easy), and brewed my tea for no more than a minute in less than boiling water.

So let's see what happens when we go from that to using high quality loose leaf tea and brewing it in boiling water for 3 to 4 minutes. A quick calculation from the charts above shows that the ECGC content and antioxidant potential of my cup of tea just **multiplied by 3 to 5 times**.

Take-home messages

Type and quality of tea and how you brew it affect the antioxidant potential of your cup of tea. Here's how to get most out of your cup:

- Choose a high quality tea. Avoid mass market brands and choose a specialist brand from Japan or China.
- Choose either powdered or loose leaf green tea.
- Brew your tea in boiling hot water for 3 to 4 minutes.
- Whether you choose green or white tea doesn't matter – they both have similar antioxidant potential and ECGC levels.
- Don't put milk into your tea as it potentially diminishes some of the antioxidant value.

Just by following these tips you can get 3 to 5 times more ECGC from the same amount of tea.