

# Green Tea Science Part 3: Caffeine – Everything You Need to Know (and more) about Caffeine and Green Tea

April 21, 2017

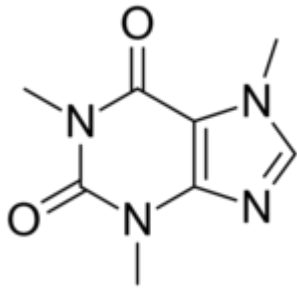
This is part 3 of Green Tea Science series. In this article, I will answer 19 commonly asked questions about green tea and its element: Caffeine.

If you have not yet read the previous parts you can read:

- [Part 1 : Polyphenols, Catechines and EGCG](#)
- [Part 2 : Tannin, Gallic Acid](#)

## Part 3 : Caffeine – Everything You Need to Know (and more) about Caffeine and Green Tea

1. [What is caffeine?](#)
2. [Why does green tea have caffeine?](#)
3. [Is the caffeine in green tea good or bad?](#)
4. [How long does green tea caffeine last?](#)
5. [Does caffeine in green tea help individuals lose weight?](#)
6. [Does green tea without caffeine help with losing weight?](#)
7. [How are caffeine levels being tested in tea?](#)
8. [How much caffeine is in green tea?](#)
9. [What determines lower or higher caffeine level on green tea?](#)
10. [Are there green tea that are caffeine free?](#)
11. [How to make green tea caffeine free?](#)
12. [Is decaffeinated green tea as good as regular green tea?](#)
13. [As part of decaffeination, does any other element get lost?](#)
14. [Which type of green tea has the most caffeine?](#)
15. [Compared to other tea, how much caffeine is in green tea?](#)
16. [Compared to coffee how much caffeine is in green tea?](#)
17. [What are the differences between drip coffee, espresso and green tea in terms of caffeine?](#)
18. [Compared to coke, how much caffeine is in green tea?](#)
19. [Compared to chocolate, how much caffeine is found in green tea?](#)
20. [Where can I find low caffeine Japanese green tea?](#)
21. [Where can I find high caffeine Japanese green tea?](#)



Caffeine

## 1. What is caffeine?

[According to the National Library of Medicine](#), caffeine is a plant product that acts as a central nervous system stimulant. Caffeine can be found in plants grown in the wild. However, it can also [be artificially created in a lab](#). As a central nervous system stimulant, caffeine affects our brains and our metabolism. It can increase our alertness but can also increase agitation. Caffeine has several other [side effects](#), including: increased energy, increased blood pressure, increased urination, and heartburn. Too much caffeine can have additional side effects, such as dehydration, anxiety, dizziness and headaches. Despite these side effects, caffeine is regularly used by many people. When it is removed from plants, caffeine is a [bitter, white, crystalline powder](#). When it hasn't been isolated or created in a lab, caffeine is a biochemical that occurs in plants such as green tea.

[Back To Top](#)

## 2. Why does green tea have caffeine?

Like many teas, green tea contains caffeine. It can be found in nearly sixty plants, including tea bushes that produce green tea. The science behind the creation of caffeine in plants is complicated. Scientists that study plants have found that caffeine, like the caffeine found in green tea, helps plants kill or disable bugs that want to eat the tea's leaves. Caffeine also helps plants outperform their neighbors and spread quickly. The amount of caffeine in a green tea plant before it is harvested depends on where the plant is grown, the soil quality, and how much sunlight the plant receives.

[Back To Top](#)

## 3. Is the caffeine in green tea good or bad?

Caffeine is naturally occurring in Green tea. As a result, green tea has positive and negative side effects that are associated with caffeine. Green tea [increases mental alertness](#). Increased mental alertness is usually viewed as a positive side effect. However, there are side effects of consuming too much caffeine and therefore green tea. Unless it is decaffeinated, [drinking too much green tea](#) can lead to shaking, jitters, difficulty sleeping, and headaches. [The Mayo Clinic](#) found that an eight ounce serving of green tea typically contains between 25 and 29 milligrams of caffeine. They also point out that the amount of caffeine can be effected by the tea's origin, how it was processed, how it was prepared, and how long the tea was brewed. The Mayo Clinic suggests that consuming less than 400 milligrams of caffeine a day is usually safe for healthy adults. (400 milligram is about 16 cups of green tea)

Green tea contains another element called L-theanine (an amino acid). Combination of caffeine and L-theanine increases the ability to concentrate and provides a calming effect rather than creating a stimulant high. Studies have shown that green tea's combination of caffeine and L-theanine are potent in improving a person's brain function.

[Back To Top](#)

#### **4. How long does green tea caffeine last?**

Caffeine reaches its [maximum effectiveness](#) one hour after it is consumed. After this, the effects gradually wear away. It is important to note that an individual may still feel the effects of caffeine for up to six hours after it is consumed. This is true for caffeine found in green tea. [Med-Health](#) shared that caffeine has a half-life of five hours. This means that after drinking a cup of tea, small levels of caffeine will remain in the body for up to ten hours. How long caffeine remains in the body can be influenced by disease, medications, age, and pregnancy.

[Back To Top](#)

#### **5. Does caffeine in green tea help individuals lose weight?**

Green tea has many effects on the human metabolism. When unsweetened, green tea is used as a substitution for beverages with a higher calorie content, such as sodas or fruit drinks, the resulting decrease in caloric intake can assist weight loss. In other words, drinking green tea can help a person consume fewer calories. [Some websites](#) contribute the weight loss associated with green tea use to its low-calorie content, caffeine content and the presence of antioxidants. This calorie decrease can help promote weight loss.

The caffeine partners with flavonoids to enhance the natural metabolic rate. Green tea with caffeine improves insulin activity in the body, improves the oxidation of fat, and provides essential antioxidants to the body. [One study conducted in 2005](#) found that caffeinated green tea was correlated with weight loss in test subjects who did not usually consume caffeine. In other words, green tea may assist with weight loss for individuals who do not currently consume caffeine on a regular basis. ([Read more about green tea and weight loss in my other article.](#))

[Back To Top](#)

#### **6. Does green tea without caffeine help with losing weight?**

Like caffeinated green tea, green tea without caffeine [can contribute](#) to weight loss due to its low calorie content. When used as a low-calorie alternative to other beverages, the decrease in total calories consumed can assist an individual in losing weight. Similar to its caffeinated counterpart, decaf green tea has antioxidants and other properties that are beneficial to its consumers. ([Read more about green tea and weight loss in my other article.](#))

[Back To Top](#)

#### **7. How are caffeine levels being tested in tea?**

Since caffeine levels vary greatly in green tea, it is important to measure caffeine levels. Unfortunately, measuring caffeine levels is complex and most easily performed in a lab. [A 2009 study](#) identified four

ways to measure caffeine in a lab. The first two methods involve isolating the caffeine in a tea plant through the use of chloroform or a lead acetate solution. In both cases, substances were used to help extract the caffeine from the tea plants. The second two methods involved analyzing the chemical structures of the tea plants. [Caffeine test strips](#) exist, however, these kits are used to accurately identify the presence of caffeine. Therefore, they cannot be used to accurately measure the amount of caffeine in a cup of tea. Other [websites](#) enable users to look up specific beverages and teas in order to learn about their beverage's caffeine content.

[Back To Top](#)

## 8. How much caffeine is in green tea?

Depending on how someone makes their green tea can determine the type of caffeine it has. Brewed green tea, according to [Mayo Clinic](#), has 20 - 29 milligrams of caffeine in an 8 ounce cup. Meanwhile, decaf green tea will have less caffeine in comparison to brewed green tea. However, this also varies depending on the brand of green tea one purchases. For instance, the Journal of Food Science evaluated how much caffeine different brands of green tea had. Various brands of green tea have different amounts of caffeine depending on how they're processed. Read onto next question about more about this topic.

[Back To Top](#)

## 9. What determines lower or higher caffeine level on green tea?

Different types of green teas have a different concentration of caffeine depending on how they're produced. There are different types of green teas: Bancha, [Gyokuro](#), Hojicha, Sencha, and [Matcha](#). There are [more types of green teas](#), however, these are the most well known and major categories of green tea.

- The most common type of green tea available is sencha green tea. Sencha green tea has a moderate amount of caffeine and is made through the most common processing methods in which the leaves are steamed and rolled. This type of tea has about 20 mg of caffeine per 8 ounce cup.
- Similarly, Hojicha has the same amount of caffeine as Sencha.
- Bancha green tea has a lower amount of caffeine compared to sencha green tea. This is because bancha green teas use older leaves than sencha green tea. Bancha has about 10 mg of caffeine per 8 ounce cup.
- [Gyokuro](#) and [matcha](#) green tea have more caffeine than other types of green teas.
- [Gyokuro](#) green tea has more caffeine as its grown the longest under the shade. Twenty days before picking it for tea, the leaf is covered with a cloth to limit the sunlight it receives. The flavors in the green tea will become richer due to the increased chlorophyll. This is because there will be a reduction in photosynthesis, which will cause the leaf to have a brighter green color while changing the natural balance of caffeine, flavors and sugar in it. [Gyokuro](#) green tea contains around 35 milligrams of caffeine per 8 ounce cup.
- [Matcha](#) tea contains higher amount of caffeine per cup. The reason being that people are consuming the whole tea leaf. [Matcha](#) green tea is a tea leaf that is crushed into powder form.

This makes [matcha](#) green tea one of the purest forms of tea in the world because of it being in its natural state. [Matcha](#) contains around 32mg of caffeine per 3.5 ounce cup. However, [matcha](#) green tea is the only type of tea that cannot be decaffeinated as it is a powder and a tea leaf in its purest form. ([Read more about matcha green tea in my other article](#))

[Back To Top](#)

## **10. Are there green tea that are caffeine free?**

Even when buying decaffeinated green tea, it isn't caffeine free because there will always be at least 2-4 milligrams of caffeine per ounce. No type of tea or coffee will ever be caffeine free. Decaffeinated drinks have less than 2.5% of their original caffeine levels.

## **11. How to make green tea caffeine free?**

In order to make green tea caffeine free there are two ways to go about it. A tea needs to be in a rolled or crushed leaf form in order for it to be decaffeinated. It cannot be decaffeinated if its a powder like [matcha](#).

- One way is to remove caffeine from green tea is by using a carbon dioxide method. In this method, the tea is cooked at a high pressure and temperature until carbon dioxide reaches a supercritical state.
- Then carbon dioxide becomes a solvent only attracting small caffeine molecules. Note how even despite cooking it at a high pressure and temperature, there will still be traces of caffeine. However, the taste of the green tea will remain because flavor molecules are larger than the caffeine molecules.
- Another way of removing caffeine is through water. In this process, the tea is soaked in hot water and then solution passed through a carbon filter. Once the solution is passed through, the water is placed where the remains of the tea was so it could reabsorb the flavors and oils.

[Back To Top](#)

## **12. Is decaffeinated green tea as good as regular green tea?**

Although decaf green tea contains less caffeine than regular green tea, some might feel a difference in taste.

- Decaffeinating a green tea through the water method, people will claim that the tea is not as strong as they like. This will be due to the fact that water acts as a dilution for the tea.
- Some people might find that through either method of decaffeinating the tea, that the tea will never taste as good as the regular one.
- Tea and coffee are both decaffeinated using the same steps. Both can use carbon dioxide decaffeinating to lose the caffeine in it through cooking the coffee beans or tea leaves at a high pressure and temperature.

[Back To Top](#)

### **13. As part of decaffeination, does any other element get lost?**

Each of the dilution processes, pose a problem for retaining the flavor of the green tea.

- For the method of water decaffeination, the flavors might seem diluted.
- A US Department of Agriculture study claims a third of the antioxidant properties in green tea will be lost in the process.
- Decaffeination also removes more than half of the [catechins](#) in the green tea.
- [Catechins](#) are the most active antioxidants in green tea. They're also the contributing factor as to how the green tea will taste and how strong it is. ([Read more about catechines in my other article](#))

Ultimately, decaffeinated green tea may have less caffeine in it but it also reduces the benefits of it. There are other brands of green tea which will contain less caffeine than others such as bancha green tea. With these options, people can shop for green teas that have less caffeine without it affecting the benefits the tea provides.

[Back To Top](#)

### **14. Which type of green tea has the most caffeine?**

The caffeine levels in green tea largely depend on where the tea was sourced, what time of year it was grown, and how it was processed. The tea leaves gathered in the springtime produce tea with higher caffeine content because the plants have been hibernating all winter and collecting nutrients. In general, the tea exported from Japan has higher amounts of caffeine. Additionally, the caffeine content increases the longer the tea is brewed.

That said, in most cases [matcha](#) tea is found to have the highest amounts of caffeine. It is grown in Japan, ground into a fine powder and soaked in water before drinking. On average, [matcha](#) contains 32 milligrams of caffeine per eight ounces. The main reason [matcha](#) contains more caffeine than other green teas is due to the fact that you are ingesting the entire crushed tea leaf, and not just steeping a bag like with most teas.

[Back To Top](#)

### **15. Compared to other tea, how much caffeine is in green tea?**

Green tea contains 20-35 milligrams of caffeine per eight ounces, depending on which type you choose and how long you allow it to brew. In terms of other tea varieties, green tea is a good middle ground in regards to caffeine content. Black tea and oolong tea generally contain more caffeine than green tea containing 25-45 milligrams. White tea has the lowest amount caffeine after green tea, with 10-30 milligrams of caffeine per eight ounces.

[Back To Top](#)

### **16. Compared to coffee how much caffeine is in green tea?**

Coffee contains a significantly higher amount of caffeine than green tea. The average cup of coffee has about 100 to 200 mg of caffeine. That is over twice the amount of caffeine found in green tea.

Also, a 1 ounce shot of espresso has between 47 and 64 milligrams of caffeine, which can equate to almost two, 8-ounce cups of green tea. Though it has a higher concentration of caffeine per volume than coffee or tea, most espresso drinks only call for one shot or sometimes two. As such, even a double-shot of espresso would have roughly the equivalent of a cup of drip-coffee.

Green tea contains the [amino acid L-theanine](#) which most people find makes them feel alert but relaxed. So while these people are actually consuming less caffeine, they feel more refreshed and energized. Given the negative health risks associated with high levels of caffeine, green tea is viewed as a healthier option for those who still need a little kick to get them going during the day.

[Back To Top](#)

## **17. What are the differences between drip coffee, espresso and green tea in terms of caffeine?**

The common belief is that espresso coffee contains more caffeine than a cup of drip coffee. Depending on how you look at it, this can be both correct and incorrect. [One two ounce espresso shot has about 80 milligrams of caffeine, whereas 12 ounces of drip coffee contains 120 milligrams caffeine.](#) So in this case, the cup of coffee will give you a bigger caffeine boost than a small shot of espresso. But if you evaluate in terms of volume, the espresso has the drip coffee beat. Espresso shots contain 40 milligrams of caffeine per ounce and a brewed cup only has around 10 milligrams in each ounce. So depending on how you view the situation, there is truth to both perspectives.

Comparatively, regular green tea contains 35 milligrams of caffeine in each eight ounce cup while [2 grams of matcha tea powder](#) contains up to 70 milligrams when mixed with water. The volume of water the [matcha](#) soaked in does not affect the amount of caffeine.

[Back To Top](#)

## **18 Compared to coke, how much caffeine is in green tea?**

An 8-ounce can or bottle of soda contains between 24 and 46 milligrams of caffeine, but soda is most commonly sold at supermarkets in 12 ounce bottles. According to the [researchers at the University of Utah](#), a 12 ounce bottle of Coca-Cola Classic contains 34 milligrams of caffeine. This means that whether you're drinking 8 ounces or 12, one drink of Coke would be roughly equivalent to an 8 ounce cup of green tea.

[Back To Top](#)

## **19 Compared to chocolate, how much caffeine is found in green tea?**

Like green tea, the amount of caffeine found in chocolate varies depending a variety of factors. These factors include but are not limited to: the percentage of cacao in each serving, location of growth, and which processing technique was used. On average, the cocoa bean contains between [0.1% and 0.7% caffeine](#). From this, cacao nuggets are made which contain slightly larger amount of caffeine.

Since dark chocolate contains large amounts of cacao, it generally has more caffeine than other types of chocolate. Milk chocolate with no cacao contains a very small amount of caffeine; in 20 grams, there is

only four milligrams. Comparatively, 20 grams of dark chocolate with 70% cacao content contains about 28 milligrams of caffeine. Compare that to green tea and it seems most chocolate only contains trace amounts of caffeine. You would need to eat several servings of chocolate in order to ingest the amount of caffeine found in the average cup of green tea.

[Back To Top](#)

## **20 Where can I find low caffeine Japanese green tea?**

There are Japanese green tea which are low in caffeine. [These tea from JapaneseGreenTeaIn.com are naturally low in caffeine.](#)

[Back To Top](#)

## **21 Where can I find high caffeine Japanese green tea?**

If you are looking for Japanese green tea which have higher in caffeine content, you want to try out [matcha](#), [gyokuro](#) or [covered tea](#). When these tea are covered before harvesting, level of caffeine increases; therefore, they have higher caffeine then other type of green tea.

# **5 Tea Myths That Need to Disappear**

[Max Falkowitz](#)

- [Profile](#)
- [Twitter](#)
- [Contact](#)

[31 Printer-Friendly Version](#)





[Photographs: Vicky Wasik]

Maybe you started drinking tea for its purported health benefits, or as a less jittery alternative to coffee, or just because it tastes good. Whatever your reason, chances are you have some questions about it: how to brew it right, for starters, and what a really good cup should taste like. Fortunately there are many, many sources out there that simplify the vast world of tea into digestible nuggets of knowledge. Unfortunately, a lot of those sources—often the very companies selling you their tea—get some basic points pretty wrong.

Sometimes that bad advice comes from a well-meaning person who, in their efforts to make a complex topic easy to understand, oversimplifies to the point where they obscure the truth. Other self-identified experts are more dogmatic: *there's only one right way to brew this tea, and if you disagree, you don't know what you're talking about.*

The reality is that when it comes to tea, a crop grown all over the world in countless variations, boldly stated rules tend to fall apart when held up to closer scrutiny. Drinking tea seriously means learning with every pot you make, and considering its enormous complexity, there's rarely only one correct answer or right way of doing things.

So let's put those misleading rules to bed. I've tackled some of these topics in these [tea basics stories](#), but here are five stubborn myths and misconceptions about tea that just refuse to die.

## **Myth #1: Black Tea Has More Caffeine Than Green**



All tea has caffeine, usually less than coffee, though exactly how much varies from tea to tea, which leads some [tea companies](#) and pundits to break down caffeine content by broad style: green tea has this much caffeine, black tea that much, etc. They usually claim that black teas have more caffeine than oolongs, which in turn have more caffeine than greens and whites, though none of them agree on amounts. Depending on who you ask, a cup of black tea could have as little as 25 milligrams per cup or as much as 90. (Of course no one ever specifies the size of the cup.)

Broad generalizations like these make as much sense as saying all IPAs have the same alcohol percentage. All sorts of things influence a brewed tea's caffeine concentration, including where and how it's grown, the size of the finished leaves, and the exact processing style (roasting, aging, and fermentation can all diminish caffeine). A green tea may have as much caffeine as a black tea, and two black teas from the same region might have totally different caffeine levels.

It's even more complicated: The very same tea may yield different amounts of caffeine depending on how it's brewed. In a [study in the \*Journal of Analytical Toxicology\*](#), researchers measured the caffeine content of 20 common tea products and found no correlation between tea style (green, black, etc.) and caffeine content. However, the longer any caffeinated tea brewed, the more caffeine made its way into the cup. Steep an English breakfast tea for one minute and you may get 14 milligrams of caffeine in your cup; steep the same amount for five minutes and that concentration can double.

Such evidence flies in the face of some tea sellers' claims that you can "decaffeinate" a tea by steeping it for 30 to 60 seconds, pouring out the brew, then steeping it again for a nearly caffeine-free cup. If you need to watch your caffeine consumption, stick to herbal tisanes, or try out roasted oolongs, aged teas, and "ripe" shou pu-erh styles, which many tea drinkers consider easier on the nerves. Or just steep your tea for shorter periods of time.

## **Myth #2: Boiling Water 'Burns' Delicate Teas**



Conventional Western tea-brewing wisdom says black teas must be brewed with near-boiling water while delicate, prissy green and white teas need, nay, *demand* cooler water, usually around 160 to 175°F, lest you irreparably ruin their subtle flavors and transform their antioxidants into deadly neurotoxins.

In broad strokes, this isn't wrong. Black teas and darker oolongs do benefit from very hot water to extract the full range of their flavors with just the right dose of tannins, while many green teas will taste sweeter and less bitter with cooler water. But not every green or white tea is made the same way—as a category, green tea is as vast as white wine—and some greens and whites do just as well in fully boiled water as black teas.

Here's a good rule of thumb: the hotter you brew, the darker and more robust your tea will be; the cooler your water, the sweeter and more mild it'll taste. You can brew *any* tea with this in mind, see what tastes best to your palate, and adjust your brew parameters accordingly. A white tea or lightly oxidized oolong, for instance, will make two different brews at 175° and 205°. If it's a good tea, both brews should good; which you prefer is up to you. For what it's worth, I tend to start brewing a new tea with boiling water and dial it down from there if I need to. The same holds true if I'm brewing an herbal tea.

The big exception to this loosey goosey freedom is Japanese greens, which really do benefit from rigidity in brewing to achieve a balance in sweet and bitter flavors. Most, like sencha and matcha, do well in the 160° to 170° range, while shade-grown gyokuro benefits from even lower temperatures, around 140°. But no matter what you're brewing, it's your tea—don't rely on a label to tell to how to brew it.

If you *do* want to get super geeky about your brew temperatures, consider buying a [variable temperature electric kettle](#) with a full digital range so you can dial in any brewing temperature that your heart desires.





**Bonavita BV382510V 1.0L Digital Variable Temperature Gooseneck Kettle**

\$94.95 from Amazon

**Myth #3: Black Teas Must Be Steeped Longer Than Greens**



The same people who say you can never brew green tea with boiling water also tend to give timing guidelines on how long to brew your tea. Greens and whites, they say, should brew no longer than a minute or two, while blacks need a whole five minutes.

Such advice often doesn't take into account the size of the leaf (smaller, broken leaves brew faster than whole ones), the amount of water you use for a given quantity of tea (more water needs longer steeps), or what brewing that particular tea takes best to. A black tea bag in a mug, for example, only needs a minute or two to steep, while a 48-ounce pot of loose leaf English Breakfast will likely take longer. A Chinese dancong oolong, on the other hand, is best brewed with a ton of leaves in a tiny pot, with a series of flash steepings of just a few seconds each.

Your best practice? Taste as you go. Brewing tea is just a form of cooking, and like that roast in your oven, blindly following a clock rarely works out well. Want to get more technical? Take a look at these [Chinese-style brewing suggestions](#) that emphasize small pots, lots of leaves, and very short steeps (five to 30 seconds each). That's how I do it at home, and it's often the best way to taste everything your tea has to offer.

## **Myth #4: Organic Tea is Higher Quality**



Demand for organic tea has skyrocketed over the past couple decades, and it shows no sign of stopping. In premium tea-growing regions like Darjeeling in India, plantation after plantation is going organic just to keep up with what the market. And as Jeff Koehler puts it in his new book, [\*Darjeeling: A History of the World's Greatest Tea\*](#), the pressure to go organic is a boon for the region's soil, which after over a hundred years of intensive development and cultivation is eroding and depleting with every harvest.

But is government-certified organic tea always better for the environment? Nope. As with any produce, organic certification is just a label, and lots of large plantations are cashing in on organic caché while still engaging in unsustainable practices. Unfortunately Big Organic is just as prevalent in the Asian tea business as the California lettuce market. Meanwhile, many small farms that can't afford the organic certification process work in far more sustainable ways.

Even if a farm is 100% organic, its neighbors might not be, and if the farmer up the hill sprays his tea bushes, chances are those pesticides will make their way to the "unsprayed" organic crops through the air or groundwater. Meanwhile, a farm in total isolation might be using safe amounts of pesticides while providing a more healthy growing environment for its tea bushes.

Organic tea doesn't necessarily taste any better than conventionally grown tea, either. Up until relatively recently, many organic teas actually tasted worse than their conventional neighbors, as farmers were still negotiating the challenges of growing tea in an entirely different way. These days, though, the organic tea market is improving. But so are many parts of the conventionally grown tea market. If taste is your primary concern, don't think you need to pay a premium for organic leaves. And if you care about the environmental impact and health of your tea, there's a lot more to consider beyond an organic label. As always, buy from [vendors you trust](#) who in turn buy from farms they trust.

## **Myth #5: Green Tea is 'Better' for You Than Other Teas**





We don't talk much about food and health on Serious Eats, and I don't plan to start now, but considering how many people start drinking tea for its purported health benefits, it's worth looking at green tea in some detail.

The most common claims in favor of drinking green tea are its low caffeine content and high antioxidant value. We've already dealt with the first claim—some green teas have just as much caffeine as other varieties. As for antioxidants, well, yes, thanks to its low oxidation, green tea possesses more antioxidants than black and oolongs. (Though lightly oxidized white teas often show even higher levels!) What those antioxidants *do* when you're drinking tea is far less clear, and there's far less scientific consensus on the practical benefits of regularly drinking green tea.

That's not to say there *aren't* any benefits, but rather that when sensationalist headlines call out green tea as a miracle cure for everything from allergies to cancer, it's worth taking a more skeptical perspective. It's also doubtful that green tea is the only kind of tea to make you feel good. Green tea's modern popularity means it dominates the scientific literature; researchers focus far less on certain dark, heavily processed teas that have been used as folk remedies for hundreds of years. Some tea drinkers consider roasted teas like dark tieguanyin to be more gentle on the stomach than bright greens, while others prefer the soothing sweetness of an inky-dark ripe pu-erh as a nightcap before going to sleep. Meanwhile, many tea drinkers report upset stomachs from drinking green tea without eating, a problem not shared by oolongs, black teas, and aged teas like pu-erhs.

As the Western world learns more about tea's hidden complexities, these myths should die out on their own. But for now, it's good to remember: no set of rules is a substitute for open minds willing to play with their food. Or their tea.

## **Does coffee that's been sitting around in the pot all day have less caffeine than freshly brewed coffee?**

**June 3, 2012 3:42 PM** [Subscribe](#)

Does coffee that's been sitting around in the pot all day have less caffeine than freshly brewed coffee?

If not, what factors affect the caffeine level of older coffee? Does refrigeration make a difference? Does a thermal carafe?

NOTE: This question is NOT in reference to whether coffee that's been sitting around all day tastes good, only whether the caffeine content is the same.

posted by [Caviar](#) to [Food & Drink](#) (12 answers total) [2 users marked this as a favorite](#)

[Coffee detective says](#) the caffeine level remains the same or might increase as a percentage of the liquid because some water might evaporate.

posted by [jessamyn](#) at [3:54 PM](#) on June 3, 2012

But that's really only discussion of whether it evaporates, not whether it breaks down. I ask because older coffee seems to have much less kick to it.

posted by [Caviar](#) at [4:20 PM](#) on June 3, 2012

From Jessamyn's link:

*To answer your first question, caffeine does not evaporate **or otherwise disappear** after brewing. **There will be as much caffeine in your coffee after five hours as there is after five seconds.***

How does that not answer the question at hand? The caffeine is not 'breaking down'. It's just sitting there.

posted by [trip and a half](#) at [4:40 PM](#) on June 3, 2012

Ah okay then you might want [this answer from the Stack Exchange cooking site](#)

According to Sigma-Aldrich, pure caffeine has a shelf-life of four years at room temperature, or many years at 2-8°C.

A caffeine solution can be stable for months even at moderately high temperatures.

So, essentially, your day old coffee has still all its caffeine in it, although probably it does not taste that well, but that's caffeine unrelated.

As a side note, after drinking coffee/tea/Coke/etc. it will take ~1-2 hours for blood caffeine levels to peak. Caffeine half-life in the body is ~3-6 hours.

posted by [jessamyn](#) at [4:43 PM](#) on June 3, 2012 [[5 favorites](#)]

I have often wondered this; thanks for asking. These links discuss room temp or colder coffee... I wonder if the caffeine remains if you take the room temp coffee and re-heat it?

posted by [LobsterMitten](#) at [4:54 PM](#) on June 3, 2012

For example, this says that a pure caffeine solution is shelf stable for 3 days, but no info about whether it may react with any of the hundreds of other chemicals in a brewed cup of coffee.

<http://cameochemicals.noaa.gov/chemical/19945>

This seems inconclusively tested.

posted by [Caviar](#) at [4:56 PM](#) on June 3, 2012

I doubt the other chemicals have a significant effect. They're all from the same source, the coffee bean, and the plant produces caffeine because it's a pesticide. Evolutionary pressures strongly suggest that

plants that produce more caffeine that's stable for longer have a better chance of surviving.  
posted by [sbutler](#) at [5:04 PM](#) on June 3, 2012

Look you have to compare the evidence you have on hand.

On the one hand you have rigorously tested empirical data stating that caffeine in solution is very stable.

On the other hand you have a feeling that old coffee has less kick.

The former evidence outweighs the latter.  
posted by [kavasa](#) at [5:10 PM](#) on June 3, 2012 [[5 favorites](#)]

Caffeine is chemically stable up to the point at which it turns into a gas (which is higher than the boiling point of water). It doesn't react with anything in your cup of coffee.  
posted by [jessamyn](#) at [5:12 PM](#) on June 3, 2012 [[1 favorite](#)]

Old coffee seems to have less of a "kick" only because all the nice feelings you get from drinking a hot and tasty beverage are lacking.

Caffeine is important, but it's far from the only thing in your coffee.  
posted by [helicomatic](#) at [5:33 PM](#) on June 3, 2012 [[4 favorites](#)]

Speaking as an organic chemist, there's nothing in coffee that would give me the slightest concern about it reacting with caffeine, which is as stable a biological molecule as you're likely to run across. The acid is the only thing likely to cause any reaction, and caffeine requires much stronger acids than coffee to do anything. Isolating caffeine is a standard undergrad lab, and if they can't massacre the molecule, no amount of sitting around will.  
posted by [Dr.Enormous](#) at [6:41 PM](#) on June 3, 2012 [[12 favorites](#)]

*On the one hand you have rigorously tested empirical data stating that caffeine in solution is very stable.*

*On the other hand you have a feeling that old coffee has less kick.*

*The former evidence outweighs the latter.*

You're incorrect. The placebo effect, your expectation of what will happen when you drink a cup, certainly has a bearing on how you react to an old cup of coffee. If all we are concerned about is the caffeine in the cup, then the empirical data is paramount. If we're concerned with the reaction to the coffee, there are many things beyond the amount of caffeine that affect that.