

# Citrus juice, vitamin C give staying power to green tea antioxidants

November 13 2007

---



Mario Ferruzzi

To get more out of your next cup of tea, just add juice. A study found that citrus juices enable more of green tea's unique antioxidants to remain after simulated digestion, making the pairing even healthier than previously thought.

The study compared the effect of various beverage additives on catechins, naturally occurring antioxidants found in tea. Results suggest that complementing green tea with either citrus juices or vitamin C likely increases the amount of catechins available for the body to absorb.

"Although these results are preliminary, I think it's encouraging that a

big part of the puzzle comes down to simple chemistry," said Mario Ferruzzi, assistant professor of food science at Purdue University and the study's lead author.

Catechins (pronounced KA'-teh-kins), display health-promoting qualities and may be responsible for some of green tea's reported health benefits, like reduced risk of cancer, heart attack and stroke. The problem, Ferruzzi said, is that catechins are relatively unstable in non-acidic environments, such as the intestines, and less than 20 percent of the total remains after digestion.

"Off the bat you are eliminating a large majority of the catechins from plain green tea," Ferruzzi said. "We have to address this fact if we want to improve bodily absorption."

Ferruzzi tested juices, creamers and other additives that are either commonly added to fresh-brewed tea or used to make ready-to-drink tea products by putting them through a model simulating gastric and small-intestinal digestion. Citrus juice increased recovered catechin levels by more than five times, the study found. Ascorbic acid, or vitamin C, used to increase shelf life in ready-to-drink products, increased recovered levels of the two most abundant catechins by sixfold and 13-fold, respectively.

The study, published this month in *Molecular Nutrition and Food Research*, also found that soy, dairy and rice milk appeared to have moderate stabilizing effects. But Ferruzzi said the result is misleading; a chemical interaction between milk proteins and tea catechins apparently helps shelter the complex from degradation, a force likely overcome by enzymes within a healthy human digestive system.

Lemons and tea go even better together than their popularity might suggest. Lemon juice caused 80 percent of tea's catechins to remain, the

study found. Following lemon, in terms of stabilizing power, were orange, lime and grapefruit juices. Ferruzzi said both vitamin C and citrus juices must interact with catechins to prevent their degradation in the intestines, although data made it clear that citrus juices have stabilizing effects beyond what would be predicted solely based on their vitamin C content.

"If you want more out of your green tea, add some citrus juice to your cup after brewing or pick a ready-to-drink product formulated with ascorbic acid," Ferruzzi said.

Ready-to-drink green tea products should optimally contain 100-200 mg of catechins, but oftentimes do not have sufficient levels of tea extract since some people do not like green tea's flavor, Ferruzzi said.

Although this study only examined green tea, Ferruzzi said he suspects that some of the results also could apply to black tea, which is produced by fermenting green tea. Many prefer black tea's flavor, although it contains lower total levels of catechins.

Studies have shown catechins from the green tea plant, *Camellia sinensis*, are able to detoxify toxic chemicals, inhibit cancer cell activity and stimulate production of immune-strengthening enzymes. Finding methods to improve uptake of these catechins may, therefore, be important in improving health, part of the study's goal, Ferruzzi said.

The study was funded by the National Institutes of Health.

Ferruzzi currently is conducting an in vivo study, or study on a live organism, to quantify the ability of juices and vitamin C to increase levels of catechins in the intestines and bloodstream of animals and, by extension, in humans. He collaborates with the NIH-funded Purdue Botanicals Research Center on this project.

"This next study is designed to get us past the limitations imposed by our digestive model, which is really just a simple screening process that relies on preset physiology parameters," he said. "Human digestion is a lot more complicated."

To see if juices and vitamin C actually increase catechin absorption, researchers will have to find out if increased levels of intestinal catechins translate to higher levels of absorbed catechins in live animals and humans. They also will need to better document effects upon catechin metabolism in order to prove, for instance, that increased levels of absorbed catechins are not leveled off by metabolic factors, Ferruzzi said.

"This study tells us a lot of interesting things, but it raises many questions that have yet to be answered," he said.

Source: Purdue University

Citation: Citrus juice, vitamin C give staying power to green tea antioxidants (2007, November 13) retrieved 3 May 2024 from <https://medicalxpress.com/news/2007-11-citrus-juice-vitamin-power-green.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--