

Study: Green tea can alter how we perceive flavor

14 December 2010, By Stacey Shackford

While trying to figure out what makes certain beverages cloudy, Cornell researchers made the startling discovery that certain chemicals in green tea -- and perhaps red wine -- react with saliva in ways that can alter how we perceive flavors.

Specifically, regular consumption of the polyphenol-rich drinks can boost astringent sensations and our sensitivity to acids, reports Karl Siebert, professor of [food science](#), in an article published online in *Food Quality and Preference* Sept. 21 and in print January 2011.

Siebert also discovered that we all have varying levels of polyphenols already stored in our systems.

Siebert, who worked for 18 years in a brewery before becoming an academic, stumbled upon the finding while studying the relationship between polyphenols -- chemical compounds found in plants -- and protein chains in such drinks as beer and [apple juice](#).

It was well known that the two combine to form complexes. The larger these complexes grow, the less soluble they become, until they become visible to the human eye in the form of haze or turbidity.

Siebert's group discovered the strong effect of pH on haze formation, peaking at a pH level near 4. More acidic beverages like grape juice don't get as cloudy. Higher pHs also lead to less haze.

These findings led Siebert to question whether the same thing happened in people's mouths.

We perceive astringency, which is a tactile (touch) sensation, similarly to how we perceive the cooling of menthol and the heating (or pain) of capsaicin, the hot pepper compound. The traditional thinking was that the astringency was caused by a loss of lubrication when polyphenols reacted with proteins in saliva.

Siebert wondered if pH levels made a difference there too, and if so, why.

"We had this idea because of what we had seen before about the protein effect in beverages, and we knew that acid together with polyphenols tastes more astringent than either alone," Siebert said.

He presented several dilute solutions of acid to a group of panelists, who rated the intensity of astringency. While most reported a mild difference, others had more dramatic sensitivity. Digging deeper, he discovered the most sensitive had been regular [green tea](#) drinkers prior to the start of the study.

He then measured the polyphenol levels in saliva of people on days before, during and after they consumed several cups of green tea. This showed that saliva normally contains polyphenols, and there are large differences among individuals. Regular red wine and green tea drinkers had the highest levels. Drinking green tea was shown to elevate the saliva polyphenol levels.

"I would expect that red wine drinking would also, but we didn't demonstrate this," Siebert said.

The polyphenol level in saliva returns to an individual's baseline level within half an hour after consuming such beverages as coffee or tea; but over time, the underlying baseline level gradually rises with the continued consumption of tea.

"It appears that there is a metabolic pool of polyphenol that is influenced by dietary habits, and that the salivary polyphenol level influences perception of astringency caused by acids," Siebert said.

"This was the first demonstration that you normally have polyphenols in your saliva," he added. "That has some other implications, because the liquid in your saliva comes from the blood. So the long-term

build-up must be in the blood."

This may help explain what has been labeled "the French paradox" -- the observation that French people have a relatively low incidence of heart disease, despite their diet rich in saturated fats. Some scientists believe it is due to their increased consumption of [red wine](#), and have attributed it to the antioxidant benefits of polyphenols.

Provided by Cornell University

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