

Green tea boosts production of detox enzymes, rendering cancerous chemicals harmless

August 10 2007

Concentrated chemicals derived from green tea dramatically boosted production of a group of key detoxification enzymes in people with low levels of these beneficial proteins, according to researchers at Arizona Cancer Center.

These findings, published in the August issue of *Cancer Epidemiology, Biomarkers & Prevention*, a journal of the American Association for Cancer Research, suggest that a green tea concentrate might help some people strengthen their metabolic defense against toxins capable of causing cancer.

In a study of 42 people, the concentrate – composed of chemicals known as green tea catechins in amounts equal to that found in 8-16 cups of green tea – boosted production of the enzymes, which belong to the glutathione S-transferase (GST) family, by as much as 80 percent in some participants.

GST enzymes are believed to be crucial to the body's defense against cancer-causing chemicals and other toxins, according to the study's lead investigator, H.-H. Sherry Chow, Ph.D., a research associate professor at the University of Arizona. They modify the cancer-causing molecules that would otherwise damage cellular DNA, thus rendering them inert.

“They actually convert known carcinogens to non-toxic chemicals, and

studies have shown a correlation between deficient expression of these enzymes and increased risk of developing some cancers,” Chow said.

“Expression of this enzyme varies dramatically in people due to genetic variation and environmental factors,” Chow added. “Green tea catechins somehow increase gene expression of these enzymes, which can be an advantage to people with low levels to start with.”

Green tea has long been of interest to researchers given studies that have shown populations in which it is often consumed, such as the Chinese and Japanese, generally have lower rates of cancer. To find out if green tea can protect against cancer, the NCI has sponsored a number of rigorous scientific studies testing capsules of the extract, Polyphenon E, that have been prepared in Japan to meet exact specifications. These pills contain epigallocatechin gallate (EGCG), a catechin known for its potent antioxidant activity, and are currently being tested against a variety of cancers in clinical trials.

This study was designed to see if green tea catechin concentrate had any effect on the levels of GST enzymes in healthy individuals – research that could explain the tea’s anti-cancer properties. Healthy volunteers were asked to abstain from consuming any tea or tea-related products for four weeks. At the end of this “washout period,” blood was drawn and baseline GST enzyme levels were determined for each participant. Then, the volunteers were asked to take four Polyphenon E capsules, for a total of 800 milligrams of EGCG, each morning on an empty stomach for four weeks and to abstain from drinking tea or eating many cruciferous vegetables, which contain other beneficial chemicals. Another blood sample was taken after four weeks, and GST activity was determined.

Researchers found that use of Polyphenon E enhanced GST activity when data from all participants were included for analysis. But it had its most significant effect in volunteers whose baseline blood measurements

showed low GST activity – an 80 percent increase compared to baseline GST activity. Activity did not change in volunteers with medium GST expression, or in those with the highest levels, GST seemed to decrease slightly although researchers believe that decline was due to random variation.

“This is the first clinical study to show proof that chemicals in green tea can increase detoxification enzymes in humans,” Chow said. “There may be other mechanism in play by which green tea may protect against cancer development, but this is a good place to start.”

Source: American Association for Cancer Research

Citation: Green tea boosts production of detox enzymes, rendering cancerous chemicals harmless (2007, August 10) retrieved 27 April 2024 from <https://medicalxpress.com/news/2007-08-green-tea-boosts-production-detox.html>

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