

# **Digestive process affects anti-cancer activity of tea in gastrointestinal cells**

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Increased consumption of teas rich in catechins is associated with reduced risk of stomach, colon and other gastrointestinal cancers. However, the effects of digestion on the anticancer activity of tea catechins have largely been ignored. A study by nutrition researchers at The Ohio State University and Purdue University found that the digestive process could both alter the structure of the tea catechins and their anticancer activity.

Fabiola Gutierrez Orozco, a graduate student in the laboratory of Dr. Joshua Bomser, The Ohio State University, presented study results on April 7 at Experimental Biology 2008 in San Diego. Other co-authors of the study are Dr. Marti Cenky of Ohio State; Dr. Mario G. Ferruzzi and Rodney Green, a graduate student in the Ferruzzi laboratory, of Purdue University. The presentation at Experimental Biology is part of the scientific program of the American Society for Nutrition.

Using a model simulating gastric and small-intestinal digestion, the researchers treated gastric cancer cells and colon cancer cell lines with digested and undigested (parent) extracts of green, tea, black tea, and a combination of the most active tea catechins (EGCG/EGC). In colon cells, digestion of both the green tea extracts and the catechin combination significantly reduced anticancer activity compared to undigested parent extracts. Black tea, on the other hand, showed the same anticancer activity for both parent and digested extracts.

Digestion and the type of tea made a difference in terms of anticancer

activity. In addition, the anticancer activity of the tea extracts differed between gastric and colon cancer cell lines. In gastric cancer cells, the undigested extracts were 50 percent less effective than in colon cancer cells.

What does the new study show us?

First, says Dr. Bomser, it points out that better understanding the impact of digestion on tea could lead to changes in how we formulate products in order to protect and enhance their anticancer activity. It also could change how we prepare tea now. In a study from Dr. Ferruzzi's laboratory published last November, for example, he found that adding citrus (such as lemon juice) or ascorbic acid to green tea protected the catechins from digestive degradation. Lemon juice caused 80 percent of tea's catechins to remain available for the body to absorb.

Second, say the researchers, some of the digestive changes may impact anti-cancer activities. Work in Dr. Ferruzzi's laboratory has shown that digestion can alter the structure of polyphenols, degrading and destroying some while forming others. His laboratory is currently identifying these new compounds and testing their own anticancer activity.

Third, the findings of digestive impact on tea catechins are likely also true for other bioactive compounds in foods. Dr. Bomser points out that the active compound in broccoli, for example, is not released until chewing and the digestive process begins. How do we formulate food to prevent degradation and perhaps enhance anti-cancer activity?

And fourth, say the researchers, the epidemiological findings of protective impact of teas rich in the unstable, easily degraded catechins may indicate that other compounds in tea are responsible, in part, for this anticancer activity. Further research is necessary to identify these

compounds and to understand the impact of digestion on their anticancer activity.

Source: Federation of American Societies for Experimental Biology

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