



CEDARS-SINAI MEDICAL CENTER®

NEWS

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HIGHLIGHTS:

Because of the antioxidant properties of compounds occurring naturally in green tea leaves, tea has been considered a possible intervention for atherosclerosis. In fact, antioxidants have been shown to protect against plaque formation in animal studies, results in human trials have been disappointing. A new mouse study, published in the May 25 issue of *Circulation*, shows that the timing of intervention may be key. Tea leaf catechins appear to inhibit the formation of new plaque buildup without affecting that which is already established.

ANTIOXIDANT COMPONENT OF GREEN TEA BLOCKS NEW BUT NOT ESTABLISHED ARTERIAL PLAQUE IN MICE

LOS ANGELES (May 24, 2004) – Using a technique that enables them to study both early and advanced stages of arterial plaque buildup in the same mice, researchers at Cedars-Sinai Medical Center found that an antioxidant compound found in green tea leaves does not clear established plaque but does inhibit the development of new deposits.

Results of the study are published in the May 25 issue of the American Heart Association journal *Circulation*.

Several components of green tea leaves are known to have natural properties that counteract the harmful effects of oxidation in the blood. In fact, the principal and most powerful of these catechins or flavonoids, EGCG (epigallocatechin-3-gallate), has been shown to provide some protection against the development of inflammation, tumors and the new blood vessels that support tumor growth.

Because of the antioxidant properties of the catechins in its leaves, tea also has been seen as a potential dietary intervention for cardiovascular diseases. Oxidation, which damages the inner surfaces of arteries and encourages the formation of plaque deposits, is believed to be one factor in the development of atherosclerosis.

In fact, antioxidants have been shown to protect against plaque formation in animal studies, but results in human trials have been disappointing. This has led researchers to wonder if failure in clinical trials might be due to the short duration of treatment, the use of the “wrong” antioxidant, or other factors such as the timing of the introduction of antioxidants. Theoretically, antioxidant therapy might be effective in human trials if it is started before atherosclerosis is established.

(more)

“Most animal experiments evaluating the effects of antioxidants are started when the animals are young, while randomized clinical trials typically enroll adult patients with varying stages of plaques,” said Kuang-Yuh Chyu, MD, PhD, cardiologist, first author of the article. “This discrepancy supports speculation that antioxidant treatment affects early but not later stages of plaque development.”

To test the theory, researchers at Cedars-Sinai’s Atherosclerosis Research Center studied the effects of a highly purified form of EGCG, provided for the study by Lipton® Tea, on two areas of blood vessels in mice that are genetically predisposed to rapid development of plaque. The mice were fed a high-cholesterol diet and at the age of 28 weeks the right common carotid artery was injured to induce new plaque formation. This enabled the researchers to determine the effect of EGCG on new plaque at the site of the injury as well as on established plaque in the aorta.

EGCG was injected once a day, five days a week after carotid artery injury, and animals were sacrificed three days, 21 days and 42 days after injury. Atherosclerotic development and benefits of treatment were measured in comparison to mice in a control group. In the mice that did not receive EGCG, plaque continued to build up at the carotid artery site. In treated mice, however, administration of EGCG significantly reduced new plaque formation. In fact, there was little difference in the size of the plaque after 42 days compared to 21 days. But treatment had no effect on established plaque.

“EGCG treatment was started late, when atherosclerotic lesions in the aortic sinus were already at an advanced stage,” said Dr. Chyu, who serves as an assistant professor of medicine at the David Geffen School of Medicine at the University of California, Los Angeles. “Our observations that EGCG reduced the progression of evolving carotid plaques but had no effect on the mature plaques in the aorta reinforce the theory that intervention is effective in early but not late stages of atherosclerotic development. It appears that antioxidant therapy would have therapeutic benefits only if initiated during a critical window very early in the formation of plaque.”

In addition to evaluating potential therapeutic value, the research team studied the effects of EGCG on genetic and molecular mechanisms and signaling pathways that are involved in the regulation of vessel cell growth, the tissue repair process, and the evolution of plaque, according to Prediman K. Shah, MD, cardiologist, senior author of the study and director of Cedars-Sinai’s Division of Cardiology and the Atherosclerosis Research Center.

“By identifying and better understanding the underlying processes, we look forward to developing and fine-tuning innovative prevention and treatment techniques in the future,” said Dr. Shah, who holds the Shapell and Webb Family Endowed Chair in Cardiology at Cedars-Sinai and is a professor of medicine at UCLA.

Cedars-Sinai is one of the largest nonprofit academic medical centers in the Western United States. For the fifth straight two-year period, it has been named Southern California's gold standard in health care in an independent survey. Cedars-Sinai is internationally renowned for its diagnostic and treatment capabilities and its broad spectrum of programs and services, as well as breakthroughs in biomedical research and superlative medical education. It ranks among the top 10 non-university hospitals in the nation for its research activities.

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