

## **Green Tea Extract Shows Potential as an Anti-Cancer Agent**

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A study on bladder cancer cell lines showed that green tea extract has potential as an anti-cancer agent, proving for the first time that it is able to target cancer cells while leaving healthy cells alone. The study, published in the Feb. 15 issue of the peer-reviewed journal Clinical Cancer Research, also uncovered more about how green tea extract works to counteract the development of cancer, said Jian Yu Rao, a Jonsson Cancer Center member, an associate professor of pathology and laboratory medicine, and the study's senior author.

"Our study adds a new dimension in understanding the mechanisms of green tea extract," Rao said. "If we knew exactly how it works to inhibit the development of cancer, we could figure out more precisely which bladder cancer patients might benefit from taking it."

Numerous epidemiologic and animal studies have suggested that green tea extract provides strong anti-cancer effects in several human cancers, including bladder cancer. It has been shown to induce death in cancer cells, as well as inhibiting the development of an independent blood supply that cancers develop so they can grow and spread.

In the UCLA study — which brought together researchers from UCLA's Jonsson Cancer Center, School of Public Health, Center for Human Nutrition and the departments of pathology and laboratory medicine, surgery, urology, and epidemiology — scientists were able to show that green tea extract interrupts a process that is crucial in allowing bladder cancer to become invasive and spread to other areas of the body.



Green tea extract affects actin remodeling, an event associated with cell movement. When a human moves, the muscles and skeletal structure operate together to facilitate that movement. For cancer to grow and spread, the malignant cells must be able to move. The cell movement depends on actin remodeling, which is carefully regulated by complex signaling pathways, including the Rho pathway. When actin remodeling is activated, the cancer cells can move and invade other healthy cells and eventually other organs.

By inducing Rho signaling, the green tea extract made the cancer cells more mature and made them bind together more closely — a process called cell adhesion. Both the maturity of the cells and the adhesion inhibited the mobility of the cancer cells, Rao said.

"In effect, the green tea extract may keep the cancer cells confined and localized, where they are easier to treat and the prognosis is better," Rao said. "Cancer cells are invasive and green tea extract interrupts the invasive process of the cancer."

Bladder cancer is the fifth most common cancer in the United States, with about 56,000 new cases diagnosed each year. About half of all bladder cancers are believed to be related to cigarette smoking. Without a reliable, noninvasive way to diagnose the disease, bladder cancer can be difficult to detect in the early, most treatable stages. When not found early, the tumors can be aggressive, and more than half of patients with advanced cancers experience recurrences.

UCLA researchers currently are seeking hundreds of former smokers who have had bladder cancer for a clinical trial studying whether green tea extract prevents recurrence — one of the first studies in the country to test the agent on cancer patients. The study is part of a comprehensive program funded by the National Cancer Institute and designed to prevent the recurrence and progression of smoking-related bladder cancer. In



addition to the trial, the program seeks to develop new biomarker tests to help predict who will get bladder cancer, discover the molecular profile of the disease to identify those most at risk and create a tumor bank to aid research. Volunteers interested in participating in the study should call (310) 825-4415.

Rao cautioned that his study was conducted in a carefully controlled cell line environment and that more research needs to be done to discover exactly how green tea extract functions as a cancer fighter. The next phase of his research will analyze urine from bladder cancer patients to determine which subset of patients would benefit most from taking green tea extract. Researchers will be looking for specific biomarkers associated with actin remodeling and activation of the Rho signaling pathway.

"We're hoping the results from these studies will tell us who will best benefit from the agent," Rao said, adding that the basic research he is doing and the clinical trial on bladder cancer patients will provide scientists with vital information from both ends of the research continuum, an example of bench-to-bedside-and-back-again science.

"I think this publication further supports the potential role of green tea in the prevention and treatment of bladder cancer," said Dr. Robert Figlin, a UCLA professor of hematology/oncology and urology and a principal investigator for the human studies. "In the end, both studies will help us achieve our goal — to decrease bladder cancer occurrence and develop molecular profiles that tell us who is most at risk."

UCLA's Jonsson Comprehensive Cancer Center is composed of more than 240 cancer researchers and clinicians engaged in cancer research, prevention, detection, control and education. One of the nation's largest comprehensive cancer centers, the JCCC is dedicated to promoting cancer research and applying the results to clinical situations. In 2004 the



Jonsson Cancer Center was named the best cancer center in the Western United States by U.S. News & World Report, a ranking it has held for five consecutive years.

Source: UCLA

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