

Asian Spice Could Reduce Breast Cancer Risk in Postmenopausal Women Exposed to Hormone Replacement Therapy

COLUMBIA, Mo. – by Kelsey Jackson, Sr. Information Specialist- Previous studies have found that postmenopausal women who have taken a combined estrogen and progestin hormone replacement therapy have increased their risk of developing progestin-accelerated breast tumors. Now, University of Missouri researchers have found that curcumin, a popular Indian spice derived from the turmeric root, could be able to reduce the cancer risk for women after exposure to hormone replacement therapy.

“Approximately 6 million women in the United States use hormone replacement therapy to treat the symptoms of menopause,” said Salman Hyder, the Zalk Endowed Professorship in Tumor Angiogenesis and professor of biomedical sciences in the College of Veterinary Medicine and the Dalton Cardiovascular Research Center. “This exposure to progestin will predispose a large number of postmenopausal women to future development of breast cancer. The results of our study show that women could potentially take curcumin to protect themselves from developing progestin-accelerated tumors.”

In the study, researchers found that curcumin delayed the first appearance, decreased incidence and reduced multiplicity of progestin-accelerated tumors in an animal model. Curcumin also prevented the appearance of gross morphological abnormalities in the mammary glands. In previous studies, MU researchers showed that progestin accelerated the development of certain tumors by increasing production of a molecule called VEGF that helps supply blood to the tumor. By blocking the production of VEGF, researchers could potentially reduce the proliferation of breast cancer cells. Curcumin inhibits progestin-induced VEGF secretion from breast cancer cells, Hyder said.

“Curcumin and other potential anti-angiogenic compounds should be tested further as dietary chemopreventive agents in women already exposed to hormone replacement therapy containing estrogen and progestin in an effort to decrease or delay the risk of breast cancer associated with combined hormone replacement therapy,” Hyder said.

The study, “Curcumin delays development of MPA-accelerated DMBA-induced mammary tumors,” has been accepted for publication in *Menopause*, a journal of the North American Menopause Society. It was coauthored by Hyder; Candace Carroll, graduate student of biomedical sciences; Cynthia Besch-Williford, associate professor of veterinary pathobiology in the MU College of Veterinary Medicine; and Mark Ellersieck, professor and researcher in the MU Experiment Station Statistics.

A quantity of ricin smaller than a grain of sand can kill a person



Liqun Gu, PhD

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By: Laura Cassiday from Chemical & Engineering News

A quantity of ricin smaller than a grain of sand can kill a person, so researchers are trying to develop sensitive detection methods for this potent bioterrorism threat. Now, Li-Qun Gu and colleagues at the University of Missouri, Columbia, report an aptamer-studded glass nanopore that detects single molecules of ricin protein (*Anal. Chem.*, DOI: [10.1021/ac9006705](https://doi.org/10.1021/ac9006705)). The team attached copies of a ricin-specific aptamer—a short RNA sequence that recognizes ricin—to the surface of a glass nanopore.

When a ricin molecule binds to an aptamer at the narrow opening of the wineglass-shaped nanopore, the ionic current through the pore changes. The researchers detect sequential molecules of aptamer-captured ricin as a series of stepwise current blocks. Unlike antibodies, aptamers are much smaller than their targets, so the method is more sensitive than antibody-coated synthetic nanopores.

It also distinguishes between transient current blockades caused by nonspecific molecules passing through the nanopore and longer blocks resulting from ricin binding. In principle, the technique could be used to detect any molecule for which an aptamer has been identified.

Engineering graduate student studies functionality of blood vessels



Shrikanth Ella

By Jashin Lin

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A video of bright, gently pulsing, irregular green stripes dimly lights up a computer screen in a small laboratory. To the right is a

complex-looking construct with racks that takes up most of the available space, and to the left is Srikanth Ella, a doctoral student in biological engineering at the University of Missouri who is developing techniques for imaging blood vessels that may lead to research on preventing heart attacks and related diseases. He is working with Michael Hill, professor of medical pharmacology and physiology, bioengineering and the assistant director of Dalton Cardiovascular Research Center, where the lab is located.

Ella, who studied electrical engineering as an undergraduate in India, explains that the green stripes in the video are vascular smooth muscle cells in blood vessels whose primary role is to regulate contraction and relaxation of the blood vessels. He uses the microscope - the piece of equipment that fills up most of the room - to see, or image, how blood vessels move and contract.

"We want to understand the signaling mechanisms underlying the functionality of blood vessels, particularly arterioles, which form a major resistance pathway to blood circulation," Ella says, gesturing at the screen, explaining that the cells appear green in the video because he uses a fluorescent indicator to label calcium ions moving around in the smooth muscle cells.

"Blood vessels expand and contract, which is how they regulate blood flow throughout the body," Ella said. "This phenomena, scientifically know as the 'Myogenic Response,' is affected in diseases such as hypertension, which ultimately results in high blood pressure. If we understand the basic functionality of blood vessels, we can help prevent heart diseases."

Ella and his research group have custom-built a high-speed spinning disk confocal microscope as part of the project. He and other researchers involved with the project have so far been refining their techniques on male rats. Collaborators include Michael Davis, also a professor in medical pharmacology, Gerald Meininger, director of Dalton and faculty from the Medical College of Wisconsin.

"Until now, the accepted technique to measure membrane potential in smooth muscle cells was patch clamp - electrophysiology," Ella said. "We're developing new noninvasive technologies to optically image the changes in membrane potential using Fluorescence Resonant Energy Transfer, or FRET."

FRET can detect membrane potential in multiple cells and, unlike electrophysiology, it can potentially be done in vivo, or in the body.

The upshot of the research is that it may lead to early prediction of heart attacks and heart-related diseases, and pharmaceutical companies can potentially begin to develop drugs to help prevent them. The techniques also can be modified to image other types of body tissues.

Besides the primary microscope in Ella's lab, he and his team are developing techniques for studying single cells in simulated high-tension environments - similar to that in blood vessels - which is advantageous for the study of cellular signaling pathways at the single cell level.

Ella, who expects to finish his Ph.D. by 2010, received the Clinical Biotective Award sponsored by the National Institute of Health in 2009.

"As part of the award, we take clinical issues from hospital to the bench," Ella said, using the colloquial term for lab research. "Then, the doctors take the data back for use in developing cures for diseases. In addition, the award encourages the development of biomedical electronic devices for scientific communities."

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