Medical Xpress

An earlier start on diagnosing breast, prostate cancers

January 10 2011

Using biological samples taken from patients and state-of-the-art biochemical techniques, a Florida State University researcher is working to identify a variety of "biomarkers" that might provide earlier warnings of the presence of breast and prostate cancers.

"Biomarkers are indicators of certain biological and pathological processes that are occurring, such as cancer," said Qing-Xiang "Amy" Sang, a professor in Florida State's Department of Chemistry and Biochemistry. "Either the cancer cells themselves, or surrounding normal tissue for that matter, can produce specific proteins or exhibit other biological changes that provide a signal that something unusual is taking place. Different types of cancer produce different biomarkers, so the challenge is to identify the most effective one for each type of the disease."

For more than 15 years, Sang and her colleagues have focused their efforts on two types of cancers that are particularly prevalent in the United States: breast and prostate. National Cancer Institute statistics illustrate the enormity of the problem:

- An estimated 207,090 American women and 1,970 men were expected to be diagnosed with breast cancer during the year 2010, with 39,840 women and 390 men dying from the disease. It is the second most frequent type of cancer and second leading cause of cancer death among American women.

- An estimated 217,730 American men were expected to be diagnosed with prostate cancer in 2010, with 32,050 men dying. It is the most frequent type of cancer and the second leading cause of cancer death among American men.

"The U.S. Food and Drug Administration has recognized three separate biomarkers for the identification of breast cancer and one for prostate cancer," Sang said. "But if we can identify new and more accurate biomarkers that offer even earlier glimpses of these diseases, we stand a better chance of offering patients the most customized treatment possible, then, being able to closely monitor their progress, provide follow-up treatment as needed. With earlier diagnosis and treatment, the end result will hopefully be fewer people dying from these cancers."

Sang and five colleagues recently co-wrote a paper published in the cancer research journal *Clinical and Experimental Metastasis* that could set the stage for breakthroughs in the identification of new biomarkers for breast cancer. Their paper, "Alteration in Protein Expression in Estrogen Receptor Alpha-Negative Human Breast Cancer Tissues Indicates a Malignant and Metastatic Phenotype," (http://www.springerlink.com/content/wqrh887k711729g0/) noted that most research efforts involving breast cancer have focused on epithelial cells — cells that line the surfaces of structures throughout the body — while paying less attention to the stromal cells, or connective cells, that lie beneath them. Those stromal cells, however, may play a larger role in the spread of breast cancers than was previously known, and measuring the number and amount of immunoreactive and metastasis-suppressing proteins that they produce could provide an early indication of how likely the cancer is to metastasize.

(Working with Sang on the Clinical and Experimental Metastasis paper were postdoctoral associate Ziad J. Sahab and graduate students Suzan

M. Semaan and Robert G. Newcomer, all from the FSU Chemistry and Biochemistry Department, as well as Yan-Gao Man of the Armed Forces Institute of Pathology and American Registry of Pathology in Washington, D.C. and Stephen W. Byers of the Lombardi Comprehensive Cancer Center, also in Washington.)

Sang recently co-wrote another paper, this one published in the *Journal of Cancer*, that focused on possible new approaches for identifying and treating prostate cancer. In "Protein Profiling of Isolated Leukocytes, Myofibroblasts, Epithelial, Basal, and Endothelial Cells from Normal, Hyperplastic, Cancerous, and Inflammatory Human Prostate Tissues," (http://www.jcancer.org/v01p0070) she, Ziad J. Sahab, her graduate student Zahraa I. Khamis at FSU and collaborator Kenneth Iczkowski of the University of Colorado Health Science Center examined the crucial role that stromal cells play in tumor development and invasion. Advanced analyses of normal stromal cells and "reactive," or tumor-associated, stromal cells in prostate tissue showed key differences in the patterns of proteins that were expressed by each. This suggests that targeting the so-called tumor "microenvironment" — the precise location where cancer cells interact with and sometimes alter epithelial and stromal cells — may lead to the identification of new biomarkers produced by stromal cells, thereby providing a promising opportunity for prostate cancer prevention and treatment.

A number of organizations are helping to fund Sang's various cancer research efforts. They include the U.S. Department of Defense's U.S. Congressionally Directed Medical Research Programs, the Susan G. Komen for the Cure Breast Cancer Foundation, the Florida Breast Cancer Coalition Research Foundation, the Elsa U. Pardee Foundation, and a Program Enhancement Grant from the Florida State University Research Foundation. In all, approximately $940,446 is helping Sang to advance her work in these areas.

"Many frequently fatal diseases, including cancers of the lungs, liver, pancreas, and colon, as well as heart disease, asthma, and cystic fibrosis, currently have no FDA-approved biomarker that can be used to diagnose them early and allow doctors to get a jump on treating them," Sang said. "So while I'm hopeful that our current research will lead to more effective biomarkers for breast and prostate cancer, I would also be very pleased if it could provide other scientists with the knowledge they need to take on these other diseases as well."

Provided by Florida State University

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