Researchers discover a DNA marker may indicate differences in breast cancer

June 2 2012

Researchers and doctors at the North Shore-LIJ Health System and the Feinstein Institute for Medical Research have discovered a potential explanation for why breast cancer is not experienced the same way with African American and Caucasian patients. This data will be presented at the 2012 American Society of Clinical Oncology (ASCO) Annual Meeting to be held from Friday through Tuesday (June 1-5) in Chicago, IL.

Breast cancer is more common in Caucasian women than in African American women; however, African American women experience a more aggressive form of breast cancer that occurs almost a decade earlier than Caucasian women. Because of this, African American women have a lower breast cancer survival rate than Caucasian women. To explore the reasons why, researchers and doctors at the North Shore-LIJ Health System and the Feinstein Institute for Medical Research conducted a study to determine 1) why the expression of a genetic marker embedded in deoxyribonucleic acid (DNA), called microRNA, differs between African American and Caucasian women, and 2) if variation in microRNAs may explain the observed survival difference between African American and Caucasian women.

In this study, microRNA profiles from the blood of 32 female patients were collected before removal of breast tumors. The mean age of the patients was 50 years, ranging from age 31 to 68, and 10 of the patients had stage III triple-negative breast cancer (five were African American and five were Caucasian), 10 patients had stage III estrogen-receptor or

progesterone-receptor positive breast cancer (five were African American and five were Caucasian), and 12 patients were controls (six were African American and six were Caucasian). Triple-negative breast cancer refers to any breast cancer that does not express three receptors known to advance most breast cancers; estrogen receptors, progesterone receptors and human epidermal growth factor receptor 2 (HER2). Although triple-negative breast cancer is estrogen-receptor negative, progesterone-receptor negative and HER2 negative, and the most successful treatments for breast cancer target these receptors, triple-negative breast cancer typically responds to chemotherapy.

The study found that, 1) female Caucasian patients who had triple-negative breast cancer overexpressed 20 microRNAs (15 times higher than the controls), and none of the microRNAs these patients had were found in any of the African American patients, 2) female African American breast cancer patients overexpressed only six microRNAs (15 times higher than the controls), and none of these microRNAs were detected in Caucasian patients who had triple-negative breast cancer, and 3) four microRNAs in African American patients and eight microRNAs in Caucasian patients were not previously reported in association with breast cancer, which suggests that they may be connected to how the patient reacts to cancer.

"The striking difference in the patterns of microRNA expression between African American and Caucasian breast cancer patients may provide insight into answering why, when receiving similar treatments, outcomes are different between African Americans and Caucasians," said Iuliana Shapira, MD, director of the Cancer Genetics Program at the North Shore-LIJ Health System's Monter Cancer Center. "Breast cancer patients who have the most devastating outcome may carry the microRNAs that promote cancer. What we saw in this study is that Caucasian women may carry microRNAs that protect against cancer while African American women do not express those microRNAs. The

lack of expressing these microRNAs in African Americans could be the cause of poor outcomes seen in these women. Methods to increase microRNAs in the blood before surgery for cancer, such as giving chemotherapy before surgery for cancer, may improve survival rates in African American women with triple-negative breast cancer."

Provided by North Shore-Long Island Jewish Health System