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NEWS

RSNA Press Release

MRI Successfully Gauges Breast Cancer Treatment Response

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OAK BROOK, Ill. - Magnetic resonance (MR) imaging can accurately monitor early response to chemotherapy in patients with breast cancer, according to a study appearing in the July issue of the journal *Radiology.*

Chemotherapy is designed to diminish tumor size and reduce the number of blood vessels feeding the tumor. The study, conducted at Harvard Medical School and Massachusetts General Hospital in Boston and Caritas St. Elizabeth's Medical Center in Brighton, Mass., found that contrast-enhanced MR imaging is a reliable, non-invasive way to measure blood flow to the tumor, thus gauging the success of chemotherapy.

"The more vessels a tumor has, the more likely it is to take up the MR contrast agent. The more vascular a tumor is, the more likely it will be to light up on the scan," said study co-author Priscilla J. Slanetz, M.D., M.P.H., director of breast imaging at Caritas St. Elizabeth's Medical Center. "MR's high temporal resolution (ability to assess how rapidly a tumor takes up the contrast agent) is important in determining therapeutic response rather than relying solely on tumor shape and margins," she said.

Patients with locally advanced breast cancer — tumors three centimeters in size or larger that has not spread beyond the breast — generally are treated with chemotherapy to reduce tumor size, enabling conservative breast surgery.

Monitoring a patient's response to chemotherapy allows physicians to determine the optimal time for surgery and to detect resistant tumors requiring a change in therapy. Clinical exams, ultrasound and mammography are generally used to monitor breast tumor response. However, these methods can be unreliable at differentiating chemotherapy-induced fibrosis (benign fibrous tissue) from residual disease.

To evaluate the appropriateness of dynamic contrast-enhanced MR imaging as a marker of tumor response to chemotherapy, the researchers studied 14 consecutive women, between the ages of 28 and 61 (mean age 46.3), who had locally advanced breast cancer.

"In our study, we measured angiogenesis, or blood vessel development, and found that it decreased following chemotherapy in patients who were responding to their treatment and

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actually increased for patients who did not respond to treatment," Dr. Slanetz said.

Specifically, the noninvasive measure of tumor angiogenesis used in this study decreased for all responders by approximately 77 percent and increased for nonresponders by approximately 45 percent.

"MR imaging is emerging as a very promising tool that complements mammography and breast ultrasound in evaluating patients with breast cancer," Dr. Slanetz said. "It is useful for discerning tumors within dense breast tissue and can differentiate scar tissue from cancer recurrence following surgery." Dr. Slanetz noted that MR imaging is also useful in detecting the primary breast cancer in patients who have a positive lymph node finding following a normal mammogram and physical exam.

According to Dr. Slanetz, some centers have begun to use MR imaging for selected patients, particularly young women who have proven breast cancer or cancer that did not appear on a mammogram, either being detected solely by ultrasound or physical examination. Other centers are using MR imaging to assess women who have very dense breast tissue that makes the tumor size difficult to measure with ultrasound or mammography.

"Because young women tend to have dense breast tissue, those who have been recently diagnosed with breast cancer need to be aware that MR is a useful imaging tool to look at the extent of their disease prior to undergoing any treatment," Dr. Slanetz said. "MR may be beneficial to some of these patients in terms of guiding their further chemotherapeutic treatment or determining the timing of surgery."

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Radiology is a monthly scientific journal devoted to clinical radiology and allied sciences. The journal is edited by Anthony V. Proto, M.D., School of Medicine, Virginia Commonwealth University, Richmond, Va. *Radiology* is owned and published by the Radiological Society of North America Inc. (http://radiology.rsna.org)

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"Invasive Ductal Breast Carcinoma Response to Neoadjuvant Chemotherapy." Collaborating with Dr. Slanetz on this study were Jean-Paul Delille, M.D., Eren D. Yeh, M.D., Elkan F. Halpern, Ph.D., Daniel B. Kopans, M.D., and Leoncio Garrido, Ph.D., from Massachusetts General Hospital and Harvard Medical School in Boston.

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