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The WCC Note™

Presented by Stephen J. Pomeranz, M.D.

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MRI BREAST CANCER

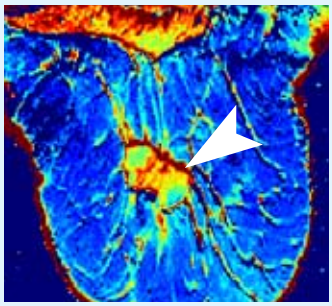
Breast Cancer's Response to Chemotherapy May Be Predicted by MRI

In a study from the University of California, San Francisco, researchers performed dynamic contrast-enhanced MRI on 42 women with invasive breast cancer, both before and after one cycle of neoadjuvant chemotherapy. Next, they analyzed the enhancement characteristics of the normal, non-tumor stromal tissue. This was done to assess the vascularity of the non-tumoral tissue, as it has been shown that neoplastic neovascular changes in histologically normal tissue may increase the risk for local recurrence after breast conservation therapy. These stromal enhancement values were then correlated with several factors, including tumor size, nodal involvement, and clinical outcome. The researchers found that the mean stromal signal enhancement after one cycle of chemotherapy was strongly associated with disease-free survival.[1] **Conclusion: Dynamic contrast-enhanced MRI may be used to assess the vascularity of non-tumoral breast tissue, which is a potential predictor of response to treatment and outcome in breast cancer patients.**

HOW DOES BREAST MRI WORK?

MRI is an imaging modality that uses a microwave and a magnet to estimate the distribution of fat and water in the breast. Because it is not density-dependent and emits no radiation, this type of exam is well-suited for use with the breast.

During the examination the patient lies face-down on the MRI table. First, pre-contrast images are obtained. Next, a gadolinium contrast agent is administered and the breast imaged every minute or so to see the "angiogenesis," or vascular behavior, of the tumor.



A CAD color map MRI of the breast.

The sequential contrast-enhanced images allow the radiologist to analyze the rate of peak enhancement and "wash-out." In other words, how fast does the mass take in the contrast agent and how fast does it release it? These factors are central in distinguishing benign from malignant tumors. Because of angiogenesis and leaky blood vessels, malignant breast tumors take in a great deal of contrast very quickly; they also release it very quickly. In benign masses the opposite effect is observed: the contrast is taken up gradually and consistently for several minutes. Angiogenesis is one indicator of a tumor's aggressiveness.

A computer-aided detection, or CAD, system can aid the radiologist in localizing the areas that take in more contrast more quickly, using an automated process that creates color-coded maps of the areas of enhancement *(see above right)*.

PET AND SPECT

Nuclear Medicine PET/SPECT Show Efficacy of Progenitor Cell Therapy for Coronary Artery Occlusion

Chronic coronary artery occlusion is often treated with recanalization of the blocked artery, a technique that can leave parts of the myocardium hypoperfused. German researchers randomly

assigned 26 patients with chronic coronary artery occlusions to one of two groups, one of which underwent only recanalization procedures and a placebo, and the other which had recanalization followed by injection of blood-derived circulating progenitor cells (CPCs). Tc99m-tetrofosmin SPECT and F18-FDG PET nuclear medicine studies were performed in all patients after recanalization, then again three months after CPC or placebo administration. Using the SPECT and PET studies together, myocardial segments were classified as either "normal," "perfusion-metabolism mismatch," or "scar." Perfusion-metabolism mismatch indicates a dysfunctional segment of myocardium with decreased perfusion and increased metabolism. The researchers found that patients in the CPC group had an average of 1.7 total perfusion-metabolism mismatch segments, significantly fewer than the average of 3.0 seen in placebo patients. In addition, of the segments in all the patients that were normal at baseline, 2.7% in the CPC group and 30% in the placebo group revealed a perfusion-metabolism mismatch at three-month follow-up.[2] **Conclusion: PET and SPECT showed the efficacy of circulating progenitor cells in preventing the normal myocardium from becoming dysfunctional after recanalization therapy in patients with coronary artery disease.**

SOURCES:

1. Hattangadi J, Park C, Rembert J, *et al*. "Breast Stromal Enhancement on MRI Is Associated with Response to Neoadjuvant Chemotherapy." *Am. J. Roentgenol.* 2008; 190:1630-1636.
2. Kendziorra K, Barthel H, Erbs S, *et al*. "Effect of Progenitor Cells on Myocardial Perfusion and Metabolism in Patients after Recanalization of a Chronically Occluded Coronary Artery." *J. Nucl. Med.* 2008; 49:557-563.

NEXT ISSUE: MORE BREAKING NEWS AND STUDIES IN CLINICAL TRIAL IMAGING

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