

MRI/MRS COMBO CAN IMPROVE EARLY DETECTION OF BREAST CANCER

July 9, 2007--Combining magnetic resonance imaging (MRI) of the breast with magnetic resonance spectroscopy (MRS) may help lower the number of false positives associated with MRI screening alone, and improve early diagnosis of breast cancer, according to preliminary results from an ongoing study being conducted by researchers at the University of Nevada, Las Vegas (UNLV). Those initial results will be presented Tuesday morning, July 10, at the 2007 annual meeting of the Health Physics Society in Portland, Oregon.

The American Cancer Society recently issued new recommendations for women with a higher risk of developing breast cancer, including those with a family history of breast or ovarian cancer, and those who may carry genetic mutations (BRCA1 or BRCA2) that make them more likely to develop the disease. Specifically, it recommends the use of screening MRI as an alternative to conventional mammography for women at higher risk, because the former is more sensitive and can detect hidden tumors that might otherwise escape notice.

However, according to UNLV's Dr. Phillip Patton, the lead investigator on the project, MRI is so sensitive that it reveals even non-cancerous suspicious growths in the breasts, providing insufficient specifics about whether such growths are malignant. This in turn leads to many unnecessary biopsies and additional scans, not to mention heightened anxiety. In this new approach, any suspect lesions can be imaged with MRS, with no need for an invasive biopsy. Spectroscopy can be used to test for any number of chemical compounds. In breast MRS, it is useful in measuring the amount of a metabolite called choline in suspect lesions. In most cases, elevated levels of choline are a strong indicator of malignancy (cancer).

Thus far, the UNLV researchers have done MR spectroscopy on healthy patients without breast cancer as proof of principle. As expected, choline levels were low. The next step is to image patients with breast cancer to confirm that MRS can be used to detect the telltale higher choline levels. The UNLV study is being conducted in conjunction with Spring Valley Nevada Imaging Centers Amigenics and Philips Medical Systems. The study is the first step in what Patton and colleagues hopes will be a series of clinical studies on the efficacy of MRS to distinguish between normal and cancerous tissue, including comparisons to other magnetic field strengths for both MRI and MRS.

Patton and graduate student Rob Etnire are using a 3.0 T MR spectrometer, the highest magnetic strength allowable for clinical use by the FDA. There have been prior similar published studies, but those used 1.5 T or 4.0 T spectrometers; Patton's team is the first to publish results using the 3.0 T instrument. "In theory, the higher magnetic strength gives more signal to noise for the same imaging time," explains Etnire "Thus, it will either improve the quality of the image, or shorten the time to obtain a certain quality image."

Neither MRI nor MRS uses the ionizing radiation (X-rays) that is used in traditional mammography and CT breast scans, and both procedures can be completed in a single sitting. Nor does adding MRS elevate the cost of the procedures substantially. There are already concerns about the higher cost of MRI compared to conventional mammography - breast MRI costs between \$1000 and \$2000, ten times that of a mammogram -- particularly in light of the million or more women who are likely to undergo breast MRI each year as a result of the new ACS guidelines. For those at higher risk, however, the extra cost is

worthwhile.

UNLV's combined MRI/MRS technique will not be widely available clinically for several years. But Patton and Etnire are hopeful that as the public becomes more aware of the advantages to be gained from breast MRI, it will become a more widely used clinical technique for breast cancer detection, paving the way for the newer concept of coupling MRI with MRS.

While there are clear benefits to combining MRI and MRS, Srirama Swaminathan, a senior clinical scientist with Philips Medical Systems, cautions that there are still some limitations. For instance, not all breast cancers demonstrate elevated choline levels, and at least one form of breast cancer shows no choline signal at all. Nor will MRS detect very small lesions. "In spite of the added value MRS brings to improving specificity in characterizing lesions, it is not the 'magic bullet' for improving specificity across all types of lesions," he said.

HPS Meeting Presentation: Tuesday, July 10, 2007, 8:45 AM PDT, Paper TAM-C.2, "Magnetic Resonance Spectroscopy for Breast Cancer."

Online Risk Calculator for Breast Cancer:

<http://www.cancer.gov/bcrisktool>

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