



LATEST ADVANCEMENTS AND TECHNIQUES IN BREAST CANCER IMAGING UNVEILED AT 2008 ERA OF HOPE MEETING

New Research Highlights Benefits of Nanotechnology, Molecular Breast Imaging, and Subharmonic Imaging to Improve Breast Imaging and Patient Care

Baltimore, Md. – June 26, 2008 – Some of the latest advancements and new techniques in breast cancer imaging are being released this week at the 5th Era of Hope meeting sponsored by the Department of Defense Breast Cancer Research Program (BCRP). During the 4-day meeting being held June 25–28 at the Baltimore Convention Center, breast cancer survivors and researchers will review and discuss new imaging research and reflect on the BCRP's progress toward its vision of eradicating breast cancer, the most commonly diagnosed cancer among women in the United States (excluding skin cancer).

While traditional detection techniques, such as mammography, magnetic resonance imaging (MRI), and clinical breast examination have been found to be effective, some of these conventional screening methods are unable to detect breast tumors until a later stage of development and may have high false-positive rates, resulting in unnecessary surgical biopsies. With the goal of increasing the rate of early detection, new techniques are currently being investigated by researchers funded by the BCRP, including the use of nanoparticles to increase the accuracy and sensitivity of diagnosis, and molecular breast imaging (MBI) and subharmonic imaging (SHI) as alternatives to MRI.

“Early detection of breast cancer greatly improves a patient's treatment options and survival,” said Dr. Martin Tornai, Associate Professor in the Departments of Radiology & Biomedical Engineering, Duke University. “With this in mind, imaging research funded by the BCRP examines ways to improve on existing imaging technology as well as develop new imaging techniques for the early detection of breast cancer.”

The BCRP will showcase its progress in the field of breast cancer imaging at several symposia sessions, two of which are entitled “New Eyes on Breast Cancer: Imaging Technology for the New Millennium” scheduled to be held on Thursday, June 26 at 2 p.m., and “Making the Connections: Multimodality Imaging,” scheduled to be held on Saturday, June 28 at 10:30 a.m. Some of the latest research on imaging advancements at the meeting will be presented within the context of the following abstracts:

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Ultrasensitive Multimodality in Vivo Imaging Using Nanoparticles – Fanqing Chen, Lawrence Berkeley National Laboratory

Detection and imaging of breast cancer at an early stage are vital for clinical intervention and patient survival. Recently, antibodies specific to breast tumor cells have gained popularity in early diagnosis. However, conventional imaging modalities using conventional contrasting and reporter agents have limited sensitivity and lack long-term optical and chemical stability, making diagnostic molecular imaging very difficult to implement. Multimodality imaging with different and complementary detection principles can greatly improve the accuracy and sensitivity of diagnosis and has a broad range of clinical implications. Incorporation of multiple modalities into a single delivery vehicle was limited until recent advances in nanoparticle bioengineering. In this study, researchers present two cutting-edge nanoparticles developed for multimodality imaging: paramagnetic optical nanoparticles and superparamagnetic gold nanoparticles. Both types of nanoparticles can be imaged with photoacoustics and MRI and have allowed the researchers to achieve unparalleled sensitivity. Additionally, they are more sensitive than superparamagnetic MRI particles even in complex in vivo environments and approach the sensitivities of radiolabels.

Comparison of Molecular Breast Imaging and Breast MRI for Diagnostic and Screening Applications – Carrie Beth Hruska, Mayo Clinic and Foundation, Rochester

Mammography can reliably detect breast cancer before physical symptoms develop. However, several studies have shown mammography to have reduced sensitivity in women who have an increased risk of developing breast cancer and in women with dense breast tissue. To improve early detection of breast cancer in these women, other modalities are continually being studied, including whole breast Ultrasound and Magnetic Resonance Imaging (MRI). Of these alternative modalities, MRI has been shown to have better sensitivity than either mammography or ultrasound, although its high cost and the high level of expertise required for accurate interpretation prohibits its widespread use for routine breast evaluation. At Mayo Clinic, Rochester, researchers have developed Molecular Breast Imaging (MBI), a new technique that has both high sensitivity and specificity for small breast tumors. With MBI, specialized gamma cameras are used to detect the preferential uptake of a radiotracer in breast disease. Unlike mammography, MBI is not affected by breast density and therefore may be a valuable adjunctive technique for women who have dense breasts on a mammogram. The MBI procedure is significantly less expensive than a bilateral contrast-enhanced breast MRI exam and the interpretation of MBI exams is much less complex. The objective of this study was to compare the sensitivity and specificity of MBI to MRI in the evaluation of breast cancers from patients who had undergone both imaging modalities within a 30-day period. Retrospective analysis of 48 patients showed that MBI has comparable sensitivity and specificity to MRI. While additional studies are necessary, MBI may be a more cost-effective alternative to MRI, particularly in women who have increased risk and dense breasts.

Subharmonic Ultrasound Contrast Imaging Breast Masses: Preliminary Results – Flemming Forsberg, Thomas Jefferson University

To improve on the characterization of breast masses, this study prospectively compared the accuracy of grayscale ultrasound subharmonic imaging (SHI) to grayscale ultrasound (US), power Doppler imaging (with and without contrast), and mammography for the diagnosis of breast cancer. A total of 14 women with 16 biopsy-proven breast lesions were included in the analysis with histopathology or follow-up used as the reference standard. From the results gathered in this pilot study, SHI, a contrast-specific US imaging technique, appears to improve the diagnosis of breast cancer relative to conventional US and mammography. While larger studies are warranted, SHI could provide a major improvement to breast imaging and patient care.

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About the BCRP and Era of Hope

The Department of Defense BCRP is a congressionally mandated program managed by the U.S. Army Medical Research and Materiel Command's Congressionally Directed Medical Research Programs (CDMRP). The BCRP seeks to eradicate breast cancer by funding innovative, high-impact research and has integrated the ideas and perspectives of breast cancer survivors into all aspects of the program. As the second largest source of breast cancer research in the United States, the BCRP has received over \$2 billion in congressional appropriations since its inception in 1992, granting over 5,000 unique awards that fulfill unmet needs in breast cancer research. The success of these grants is illustrated in part by the fact that over 10,000 publications have resulted from BCRP-funded research, more than 11,000 abstracts have been published, and over 400 patents and licensures have been issued. In 2008, the program received \$138 million in congressional appropriations to be invested in breast cancer research. For more information about the BCRP, please visit <http://cdmrp.army.mil/bcrp/>.

The BCRP is hosting its fifth international Era of Hope meeting, a unique forum for scientists, clinicians, breast cancer survivors and advocates, policy makers, and the public to come together and discuss the latest findings in breast cancer research and future directions to eradicate this disease. More than 1,600 awardees, researchers, breast cancer survivors and health advocates will attend this year's Era of Hope, which will feature more than 1,200 abstracts focusing on the program's breakthroughs in the prevention, detection, diagnosis, and treatment of breast cancer as well as quality of life issues. For more information about the Era of Hope meeting, please visit: <https://cdmrpcures.org/>.

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