Dr. Muge Karaman receives NIH Trailblazer award

Muge Karaman, Ph.D., Research Assistant Professor of the Center for Magnetic Resonance Research (CMRR) and Department of Biomedical Engineering, was recently awarded a National Institutes of Health (NIH) Trailblazer Grant for a project on breast cancer imaging using advanced diffusion MR techniques and exploring their applications in characterizing breast tissue properties. The award recognizes early stage or early career investigators pursuing research programs that integrate engineering and the physical sciences with the life and/or biomedical sciences. Dr. Karaman is the first UIC investigator who has ever received the Trailblazer award.

The interdisciplinary project is a collaborative effort between Drs. Muge Karaman and X. Joe Zhou of the CMRR, Dr. Kent Hoskins of the Department of Hematology and Oncology, Dr. Elizabeth Wiley of the Department of Pathology, and Dr. Erin Neuschler of the Department of Radiology. The project titled, "Comprehensive Characterization of Breast Tissue Using Multi-modal MRI" is a three-year, nearly $640,000 grant funded by the National Institute of Biomedical Imaging and Bioengineering (NIBIB).

Biological tissues have a variety of structural features leading to different tissue properties. Among these, changes in cellularity, vascularity, and heterogeneity have been increasingly linked to the physiologic or pathologic states in diseases, particularly in cancer. Recognizing the complexity of the breast tissue, the breast imaging community has shown an increasing interest in incorporating advanced diffusion-weighted imaging (DWI) into breast tissue characterization. However, expansion of advanced DWI to the breast has not been fully achieved due to technological barriers.

The team aims to explore the advancements in DWI to improve characterization of breast cancer and its response to therapy. This will be achieved by developing a novel, distortion-resilient, and time-efficient diffusion pulse sequence and an integrated multi-modal MRI analysis framework for the breast. Successful completion of the project will serve as a prototype for the expansion of advanced DWI into other organs.

"To further exploit the potential of diffusion-based breast imaging, rapid development of advanced acquisition and analysis techniques must be achieved specifically for the breast. The development of enabling technologies would be a critical step toward the characterization of the breast tissue from multiple facets which will lead to new ways for effective differentiation, classification, and prognostication of disease," Karaman said. "We are excited to evaluate how comprehensive characterization of breast tissue help accurate assessment of breast lesions *in vivo* and prediction of tumor response at an early time point during neoadjuvant chemotherapy".