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Low-dose Imaging Technique (LITE) MRI: Introduction of a reduced-dosage dynamic contrast enhanced MRI technique in breast imaging

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Abstract

Purpose: To evaluate the diagnostic equivalency of a reduced-dosage Dynamic Contrast Enhanced (DCE) breast MRI technique to standard-dosage utilizing a novel dual-dose injection protocol.

Methods & Materials: Between October 2017 and April 2018, six patients (age range: 18-60) with a total of eight lesions (lesion size range: 0.5-2.0 cm as measured on ultrasound) with imaging features suggestive of a fibroadenoma were imaged. All lesions were ultimately either biopsy-proven or clinically-confirmed to be benign. Each patient underwent an IRB-approved dynamic contrast-enhanced MRI scan utilizing a novel dual-dose injection protocol. Pre-contrast scans including T2-weighted scans and high temporal resolutions scans were obtained. Next, 15% of the contrast was administered with post-contrast imaging including: Standard T1 weighted scans and high temporal resolution scans. Approximately 10 minutes later, 85% of the contrast was administered with repeat post-contrast imaging similar to prior. Two radiologists reviewed the low-dose MR images and high-dose MR images to evaluate for: Lesion conspicuity, imaging characteristics and enhancement kinetics.

Multi-parametric MRI (mpMRI) is suggested for determination of prostate sickness. Critically, DCE-MRI is an indispensable piece of the mpMRI strategy, with malignant growths demonstrating early central sign upgrade because of angiogenesis. Since patients frequently experience different MRIs, it is sensible to test the attainability of DCE-MRI utilizing a diminished Gd portion for prostate malignancy analysis to lessen the dangers related with Gd affidavit

Notwithstanding lessening the danger of antagonistic responses, low portions of differentiation media may have different points of interest. Lower portions lessen possibly frustrating impacts of water trade and T2* impacts related with standard dosages, and may permit progressively precise estimations of complexity media fixation. Moreover, differentiate media portion subordinate impacts might be distinctive for malignancies contrasted with ordinary tissue, e.g., because of contrasts in water trade across cell layers, or vein thickness and brokenness creating varying T2* impacts. Consequently,examination of improvement energy following low vs. high dosages of differentiation media may give symptomatically valuable data.

This practicality study examined whether organization of low portions of GBCA for dynamic differentiation upgraded MRI can be as compelling as a standard portion in recognizing prostate disease from kindhearted tissue. Moreover, we explored whether the mix of a low portion followed by a high portion of complexity media is invaluable.

Results: In all 8 out of 8 lesions, there was concordance between the low-dose MR images and high-dose MR images in terms of lesion conspicuity and imaging characteristics. While the ratio of the contrast doses administered was roughly 0.18, this was not reflected in the ratios of kinetic parameters. The uptake rate ratio (low-to-high dose) was 1.30±0.39, upper limit of enhancement had a 0.31±0.06 ratio, and 0.35±0.06 for initial area under the uptake curve. Rates of initial uptake measured with low-dose MRI were uniformly and significantly greater than rates measured by the high-dose MRI. Lesion time-to-enhancement was similar for both doses, with a ratio of 0.91±0.06. Lesion conspicuity was measured as the ratio of the signal increase in the lesion to the signal increase in the surrounding parenchyma. The average lesion conspicuity over the first minute of enhancement had a low-to-high dose ratio of 1.87±0.99.

Conclusion: This preliminary study demonstrates that LITE MRI has the potential to be diagnostically equivalent to standard DCE MRI in breast imaging.

Clinical Relevance: Low-dose Imaging Technique (LITE) MRI can be a promising alternative to standard-dose breast MRI, particularly with recent concerns related to gadolinium deposition.

Biography:

Deepa Sheth has completed her MD at the University of Illinois at Chicago and graduate studies from University of Chicago Medicine. She is currently an Assistant Professor of

Radiology at the University of Chicago Medicine, USA. She is an Oncology Radiologist who believes women should be empowered with options for the early detection, diagnosis and treatment of breast cancer. She is active in various multi-institutional clinical trials that evaluate MRI imaging as a tool to predict and classify potential malignancies. She has written or co-authored more than a dozen articles on breast cancer that have appeared in the American Journal of Roentgenology, European Journal of Radiology and Journal of Vascular Interventional Radiology.

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