

Diffusion Weighted Magnetic Resonance Imaging of the Breast: Technical Considerations and Clinical Applications

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Purpose There has been increasing interest in the use of diffusion weighted (DW) MRI for breast imaging. This technique has been shown to have promise for improving the positive predictive value of breast MRI, improving evaluation of response to neoadjuvant chemotherapy, and as a non-contrast MRI alternative for breast screening. However, there is currently no standardized approach to DW MRI of the breast and data quality varies widely. The purpose of this educational poster is to review technical considerations to optimize DW MRI of the breast, review the promising clinical applications, and discuss areas needing future research.

Outline of Content

I. Background on the principles of DW MRI

We will briefly review the theory behind DW MR in oncologic imaging, the basic physical principles of DW MRI, and the calculation of quantitative DW parameters including apparent diffusion coefficient.

II. Protocol optimization

We will review technical considerations for optimization of breast DW MRI protocols: effects of field strength, TE, b values, and other imaging factors on SNR and data quality.

III. Current technical challenges

We will describe the most common technical issues affecting data quality in DW MRI of the breast, including inadequate fat suppression, eddy current-based distortions, and magnetic susceptibility artifacts and current techniques to address these issues.

IV. Review of potential clinical uses of DW MRI of the breast

We will review the current literature regarding the clinical utility and applications of DW MRI of the breast.

V. Future Directions

We will highlight areas of future investigation to improve image quality, facilitate clinical implementation, and identify the most appropriate clinical applications of DW MRI of the breast.

Summary As breast MRI gains more widespread use for a variety of clinical indications, the addition of DW MRI to standard dynamic contrast enhanced MRI protocols holds promise for improving the clinical utility of this tool. Prior to implementing DW MRI into clinical practice, however, it is important to understand the pertinent technical considerations and current evidence of clinical applications of DW MRI of the breast.