3 mm2/s, EPI-DWI, two b-values 0/1000 s/mm2) were measured and assigned a traffic light label: red (score +1, ADC ≤1), yellow (score 0, ADC > 1-≤1.4) and green (score -1, ADC > 1.4). CE-MRI and ADC scores were added and any final score > 0 was considered suspicious for malignancy. Histology and imaging follow-up of > 24 months were defined as the reference standard. Diagnostic parameters were compared using McNemar tests.

Results: A total of 150 lesions (73 malignant) were investigated. Based on reading of CE-MRI, a sensitivity of 100% (95% CI 95.1% to 100.00%) and a specificity of 81.8% (95% CI 71.38% to 89.69%) were observed. The addition of traffic light labeled ADC increased specificity to 92.4% (95% CI 84.20% to 97.16%, P=0.057) without causing false negative results.

Conclusion: DWI can be integrated with CE-MRI of the breast using a simple traffic light labeling of the ADC. This approach improves specificity of lesion diagnosis without decreasing sensitivity.

B-0620 14:40

Are morphologic descriptors of MR BIRADS lexicon applicable to breast DWI?

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Purpose: To define if morphologic descriptors of MR BIRADS lexicon are applicable to DWI.

Methods and Materials: 556 breast cancer patients underwent DWI and Dynamic-MRI followed by surgery. MR BIRADS morphologic descriptors for mass (ML) and non mass-like enhancing areas (NML) were evaluated for the corresponding DWI areas of hyperintensity. Agreement was assessed by Cohen's k test.

Results: Pathology identified 680 malignancies, all detected at Dynamic-MRI. For the 585 ML: shape was round in 143, oval in 175 and irregular in 267; margins circumscribed in 73, irregular in 360 and spiculated in 152; internal characteristics homogeneous in 24, heterogeneous in 511, rim in 50. For the 95 NML: distribution was focal in 10, linear in 34, segmental in 41, regional in 4 and diffuse in 6; internal pattern clumped in 24 and heterogeneous in 71; asimmetry in 95. DWI detected 551/680 malignancies. For the 472 ML: shape was oval in 56, round in 42 and irregular in 374; margins circumscribed in 27, irregular in 430 and spiculated in 15; internal characteristics homogeneous in 18, heterogeneous in 398 and rim in 56. For the 79 NML: distribution was focal in 11, linear in 26, segmental in 32, regional in 3 and diffuse in 7; internal pattern clumped in 7, heterogeneous in 70 and homogeneous in 2; asymmetry in 79. Margins and internal characteristics for ML and distribution and asymmetry for NML showed highest concordance (k 0.71 and 0.77).

Conclusion: Morphologic MR BIRADS lexicon could be applied to breast DWI.

Author Disclosures:
  L. Martincich: Speaker; Bracco Imaging. Other; Blinded reader Bayer Schering.

B-0621 14:48

Diffusion-weighted imaging at 3 T: correlation of the apparent diffusion coefficient value with breast cancer biomarkers

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Purpose: To evaluate the relationship of the apparent diffusion coefficient (ADC) value with cancer biomarkers in patients with biopsy-diagnosed breast cancer.

Methods and Materials: DWI was performed in 255 patients with biopsy-diagnosed breast cancer undergoing dynamic contrast-enhanced MRI at 3 T for local staging. The MRI protocol comprised precontrast FSE T2w IDEAL sequence, single shot echo planar DWI imaging with b-factor 0 and 800 sec/mm2 and VIBRANT 3D T1w sequence before and after administration of 0.1 mmol/kg gadobenate dimeglumine (MultiHance®). The relationship between ADC and classical histopathological/immunohistochemical tumour features (size, histological type, grade, oestrogen receptor [ER], progesteron (PgR) receptor, Ki-67 expression, HER2 status) was assessed for all index cancers. ADC values were compared between immunohistochemical surrogates of the intrinsic subtypes (Luminal A; Luminal B; HER2-enriched; triple negative) using non parametric tests.

Results: The median ADC value of the 255 index lesions (mean diameter 24 mm) was 1.08×10-3 mm2/s (range 0.45-2.20). No relationship was observed between ADC values and size, histological type, grade, ER, PgR and HER2 status. A significant correlation was found between ADC values and Ki-67 expression (p=0.006) and a significant difference in ADC was found between Ki 67< 14 (1.12±0.24 ×10-3 mm2) and Ki 67 ≥14 (1.05±0.24 ×10-3 mm2) groups (p=0.03). No significant difference of ADC values between different immunohistological type was found. However triple negative cancers demonstrated lower median ADC than other subtypes (1.05±0.27 ×10-3 mm2).

Conclusion: MRI with DWI may be an additional tool to predict tumour malignancy, particularly for more aggressive tumours.

B-0622 14:56

Role of unenhanced breast MRI for detecting and differentiating breast lesions

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Purpose: To assess the role of STIR, T2-weighted TSE and DWIBS sequences for detecting and characterizing breast lesions and to compare unenhanced (UE)-MRI results with contrast enhanced (CE)-MRI and histological findings, having the latest as the reference standard.

Methods and Materials: 280 consecutive patients (age range, 27-73 years; mean age ± standard deviation (SD), 48.8 ± 9.8 years) underwent MR examination with a diagnostic protocol including STIR, T2-weighted TSE, THRIVE and DWIBS sequences. Two radiologists blinded to both dynamic sequences and histological findings evaluated in consensus STIR, T2-weighted TSE and DWIBS sequences and after two weeks CE-MRI images searching for breast lesions. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy for UE-MRI and CE-MRI were calculated. UE-MRI results were also compared with CE-MRI.

Results: UE-MRI sequences obtained sensitivity, specificity, diagnostic accuracy, PPV and NPV values of 94%, 79%, 86%, 79% and 94 %, respectively. CE-MRI sequences obtained sensitivity, specificity, diagnostic accuracy, PPV and NPV values of 98%, 83%, 90%, 84% and 98%, respectively. No statistically significant difference between UE-MRI and CE-MRI was found.

Conclusion: Breast UE-MRI could represent an accurate diagnostic tool and a valid alternative to CE-MRI for evaluating breast lesions. STIR and DWIBS sequences allow to detect breast lesions while T2-weighted TSE sequences and ADC values could be useful for lesion characterization.

B-0623 15:04

Unenhanced breast magnetic resonance imaging : detection of breast cancer

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Purpose: The purpose of this study was to assess detectability of both mass and non-mass lesions, evaluating sensitivity and specificity of DWI combined with T2-weighted images, compared with contrast-enhanced MRI (ceMRI).

Methods and Materials: We retrospectively reviewed our institutional database and we selected 117 patients who underwent MRI in our department between June and December 2010, with histopathologically proven lesions or 2-year imaging follow-up. In 3 patients, only one breast was evaluated because of previous monolateral mastectomy. Two blinded observers experienced in breast imaging evaluated unenhanced MRI (ueMRI), assessing lesion size, ADC values and T2-weighted descriptors and then rated the examination according to the BI-RADS scale.

Results: This study examined 231 breasts (89 with lesions, 142 without disease). The sensitivity of ueMRI was 76 % for both observer 1 and 2. The specificity was 96.8 % for observer 1 and 97 % for observer 2. The differences between observers were not significant. UeMRI was less accurate in the detection of lesions smaller than 2 cm (sensibility of 65 % for observer 1 and 69 % for observer 2). ADC value was a fundamental positive predictive factor (94 % for observer 1, 95 % for observer 2).

Conclusion: In our study, the sensitivity and the specificity of ueMRI were comparable to ceMRI. However, the detectability of smaller lesions was worse than ceMRI.

B-0624 15:12

Breast lesion differentiation by 3-parameter IVIM analysis

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Purpose: Optimise intravoxel incoherent motion (IVIM) modeled diffusion-weighted imaging (DWI) for differentiation of malignant and benign breast mass lesions.

Methods and Materials: Twenty-eight consecutive patients with breast lesions ≥ 1 cm were examined with 1.5 T DWI (b=0.50,200,500,800.1000 s/mm^2) between July 2012 and June 2013. Lesions were classified by histopathology or follow-up and non-mass lesions were excluded. Offline IVIM voxel-by-voxel analysis (ROI was drawn with wide margin around the lesion) yielded molecular diffusion (D_{slow}), microperfusion (D_{fast}) and respective fractions ($f_{slow/fast}$). The parameters were combined in parallel to exclude malignancy based on three thresholds optimised during the analysis.

Results: Twenty-four breast mass lesions were found: 10 benign (fibroadenoma/adenosis) and 14 malignant (12 IDCs; 1 ILC; 1 Pyllodes). Malignancy was correctly identified when using the following decision algorithm and optimised thresholds: $D_{slow} < 1.58\times10^{-3}$ mm^2/s AND $D_{fast} < 0.068$ mm^2/s AND $f_{fast} < 66.5\%$; otherwise benign. Optimal discrimination was obtained when