



Interpretation of Positron Emission Mammography (PEM) by Experienced Breast Imaging Radiologists: Comparison to MRI

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PURPOSE

The purposes of this study are: 1) to train breast imaging specialists in the interpretation of positron emission mammography (PEM) and validate that training; and, 2) to validate breast MRI interpretive skills of experienced breast imagers, preparatory to a multi-center trial comparing high-resolution PEM to MRI for pre-surgical planning.

METHOD AND MATERIALS

Under an IRB-approved protocol, a two-hour didactic module was developed to train physicians to interpret PEM images, which included 12 proven cases and a sample feature analysis lexicon. An interpretive skills task was developed which included 49 breasts for PEM, (mean invasive tumor size 15 mm), with accompanying low-resolution mammograms (M) for 31 cases. A separate, similar interpretive skills task was developed for breast MRI (without M) including 32 breasts (mean invasive tumor size 11 mm). Observers were asked to give assessments using expanded BI-RADS® scale (1, 2, 3, 4A, 4B, 4C, 5). Demographic variables of reader experience were collected for the 12 observers (from four different sites) who completed both PEM and MRI assessment tasks.

RESULTS

Seven observers had > 10 years' experience in breast imaging, 4 had 6-10, and 1 < 2 years, with 9 spending >50% of their time in breast imaging. Nine (75%) observers had previously interpreted fewer than 20 PEM scans prior to this task, with 2 having reviewed 21-39 and one 40-69 PEM images. Four observers had >5 years experience interpreting breast MRI, 6 had 2-5 years, and 2 had 1-2 years, with all having interpreted at least 50 MR exams. Median sensitivity, specificity, and AUC for PEM were 100% (range 75%-100%), 83% (range 72%-97%) and 0.96 (range 0.91-0.98) respectively. Median sensitivity, specificity, and AUC for the MR task were 82% (range 64%-100%), 74% (range 48%-90%) and 0.81 (range 0.66-0.96) respectively.

CONCLUSION

With very little training, experienced breast imagers demonstrated high performance interpreting PEM images. Performance in MRI interpretation by the same observers validated expected clinical practice.

CLINICAL RELEVANCE/APPLICATION

Interpretation of PEM images can readily be learned by experienced breast imagers. Validation of clinical performance in women with newly diagnosed cancer is ongoing.